Temi di discussione
del Servizio Studi

Macroeconomic uncertainty and banks' lending decisions: The case of Italy

by Mario Quagliariello

The purpose of the Temi di discussione *series is to promote the circulation of working papers prepared within the Bank of Italy or presented in Bank seminars by outside economists with the aim of stimulating comments and suggestions.*

The views expressed in the articles are those of the authors and do not involve the responsibility of the Bank.

MACROECONOMIC UNCERTAINTY AND BANKS' LENDING DECISIONS: THE CASE OF ITALY

by Mario Quagliariello[*]

Abstract

This paper discusses the role that macroeconomic uncertainty plays in banks' decisions on the optimal asset allocation. Using a portfolio model recently proposed in the literature, the paper aims at disentangling how Italian banks choose between loans and risk-free assets when uncertainty on macroeconomic conditions increases. The econometric results confirm that macroeconomic uncertainty is a significant determinant of banks' investment decisions, also after controlling for other factors. In periods of increasing turmoil, banks' ability to accurately forecast future returns is hindered and herding behaviour tends to emerge, as witnessed by the reduction of the cross-sectional variance of the share of loans held in portfolio.

Contents

* Banca d'Italia, Banking and Financial Supervision.

1. Introduction[1]

In recent years, the increasing interest in financial stability as an autonomous policy target, along with monetary and microeconomic stability, has encouraged the analyses of the linkages between the macroeconomic environment and the soundness of the banking system.

This stream of work is usually referred to as research on the "procyclicality" of banks' operations. Most of these studies use the current status of macroeconomic conditions as the main exogenous cause for the state of health of banks. The goal is to assess to what extent macroeconomy affects banks' performance (cyclicality) and whether, in turn, banks' reaction to changing macroeconomic conditions further affects the macroeconomy, reinforcing cyclical fluctuations (procyclicality). These studies generally confirm that banks' balance sheets are affected, simultaneously or with some delay, by the business cycle and claim that banks' behaviour is procyclical.

However, the change in banks' behaviour through the business cycle is not explicitly modelled, but it is simply inferred looking at the reduced-form relationships between micro and macro-variables. Bank-specific indicators are frequently included as regressors, but they are only used as control variables, while the focus rests on the proxies for macroeconomic conditions. Furthermore, apart from some recent papers on North-American banks, no study assesses the role that macroeconomic uncertainty plays in determining banks' behaviour: in other words, no attention is paid on the second moments of macroeconomic variables.

Summing up, the current state of the art is unsatisfactory for two main reasons: i) no attempt is made in order to model how banks' management varies in changing macroeconomic environments; ii) the effect of the uncertainty regarding future macroeconomic conditions is typically neglected.

This paper tries to fill these gaps. In particular, it aims at disentangling which are the determinants of banks' willingness to invest in risky loans as opposed to risk-free assets and

understanding whether macroeconomic uncertainty plays a role in this choice. Following the portfolio model proposed by Baum *et al.* (2005), which provides an explicit link between the cross-bank dispersion of the share of loans held in portfolio and uncertainty, the paper discusses how Italian banks choose between loans and risk-free assets when the uncertainty of macroeconomic conditions increases. Given the substantial differences between North-American and European banking sectors, this paper can provide useful insights on the reliability of the model when a different sample of intermediaries is used.

An important innovation of this work is that, with respect to Baum *et al.*, who neglect the role of idiosyncratic factors in the econometric specification, the impact of macroeconomic uncertainty is assessed after controlling for bank-specific sources of uncertainty. In particular, introducing an appropriate proxy, I explicitly consider the importance of idiosyncratic uncertainty in determining banks' portfolio decisions.

This paper also enriches the existing evidence employing different proxies for macroeconomic uncertainty; this also allows me to extensively assess the robustness of the results. Finally, the paper provides evidence on banks' sub-samples, testing whether the theory is valid at different levels of aggregation.

The econometric results confirm that macroeconomic uncertainty plays a significant role in Italian banks' investment decisions. In periods of increasing turmoil, banks receive noisier signals on the expected returns of loans and, therefore, tend to behave more homogenously, as shown by the reduction of the loan-to-asset ratio cross-sectional dispersion. Idiosyncratic uncertainty is also relevant and its coefficient takes on a positive sign. When returns on specific investments are less easily predictable, better informed banks can exploit their competitive advantage and behave in a different way with respect to poorly-informed intermediaries.

The remainder of the paper is organized as follows. Sections 2 and 3 provide a short survey of the literature and describe the portfolio model used in the analysis. Section 4 reports the empirical results. Conclusions are provided in Section 5.

2. Review of the literature

There is a huge literature supporting the hypothesis that macroeconomic conditions affect the performance of the banking sector[2]. Most of the work focuses on measures of central tendency rather than on those of uncertainty.

Salas and Saurina (2002), for instance, observe that macroeconomic shocks are quickly transmitted to Spanish banks' balance sheets. During economic booms, intermediaries tend to expand their lending activity, often relaxing their selection criteria; in the following downturns, bad loans remarkably increase, producing losses. Using a panel of Italian banks, Quagliariello (2006) finds that loan-loss provisions and bad debts increase in bad macroeconomic times. Pesola (2001) shows that the high level of both corporate and households' indebtedness, along with shortfalls of GDP growth below forecast levels, contributed to the banking crises in the Nordic countries. Similar evidence is provided in cross-country comparisons by Bikker and Hu (2002), Laeven and Majnoni (2003) and Valckx (2003). Gambera (2000) and Meyer and Yeager (2001) document that a small number of macroeconomic variables are good predictors for non-performing loan ratio in the US. Similarly, Hoggarth *et al.* (2005) provide evidence of a clear link between the state of the UK business cycle and banks' write-offs.

While there is an extensive literature on the investment decisions of non-financial firms under macroeconomic instability (for a survey, see Carruth *et al.* (2000)), the role of uncertainty regarding future macroeconomic conditions has been largely neglected for banks instead. This is an important issue, since banks' investments fuel those of the rest of the economy. To the best of my knowledge, there are only two recent papers that investigated this issue.

Baum *et al.* (2005) use a portfolio model and a sample of US banks. Their results suggest that when macroeconomic uncertainty – proxied by the conditional variance of a relevant macroeconomic variable – increases, the cross-bank dispersion of the share of risky loans to total assets diminishes, as uncertainty hinders bank ability to foresee investment opportunities. In other words, they claim that higher uncertainty makes the signals on

---

[2] For a survey, see Quagliariello (in press).

expected returns noisier. Uncertainty would therefore push banks to rebalance the composition of their assets according to new (worse) signals provided by credit markets, adversely affecting the allocation of financial resources. This fosters herding behaviour and leads banks to behave more homogeneously than in quiet periods. This evidence is robust to the inclusion of several control variables and holds for total bank loans as well as for their main components.

Adopting the same approach, Garcia and Calmes (2005) reach similar conclusions for the Canadian banking system. Their results, though based on univariate regression, confirm that there is a negative relationship between the proxy for macroeconomic uncertainty and the cross-bank variance of the loan-to-asset ratio. In other words, also Canadian intermediaries show herding behaviour when they deal with more pronounced aggregate uncertainty.

3. Banks' lending decisions under uncertainty: Baum, Caglayan and Ozkan's model

Adapting the framework for non-financial firms' investment decisions developed by Beaudry *et al.* (2001), Baum *et al.* (2005) propose a model in order to describe how banks set the optimal composition of their portfolios.

In their scheme, banks' managers operate in a risky environment and, in each period, can invest deposits into two different assets: loans and bonds. The investment in bonds is assumed for simplicity free of default risk, but it bears market risk since the value of the securities may change as a result of varying market conditions. However, this risk is more predictable and, more importantly, it can be managed and hedged. The return of such an investment is the risk free rate (r_f).

On the other hand, loans to customers entail the exposure to two different sources of risk: market risk and default risk. The latter is the result of an idiosyncratic component – due to the probability that the specific customer will default in the future without repaying the debt – and systemic factors, correlated to the overall status of the economy. In fact, it is well documented that in bad macroeconomic times the riskiness of bank portfolios tends to increase.

For bank i at time t, the investment in risky loans provides a stochastic return (r_i) equal to the risk-free rate plus a risk premium(rp_i), which is equal for all loans – assumed to be homogeneous – and does not depend on the riskiness of the single borrower[3]:

$$r_i = r_f + rp_i \qquad (1)$$

The risk premium has an expected value $E(rp_i)=\rho$ and a variance $Var(rp_i)=\sigma^2_\varepsilon$.

The return on loans can thus be expressed as

$$r_i = r_f + \rho + \varepsilon_i \qquad (2)$$

where ε_i is a random component distributed as $N(0, \sigma^2_\varepsilon)$. Baum *et al.* also assume that each bank has a specific portfolio with different riskiness structure and, hence, the random components of return across different intermediaries are not correlated ($E[\varepsilon_i\varepsilon_j]=0$).

Within this framework, banks' managers deal with a portfolio optimization problem. They rebalance the composition of their assets in order to obtain the preferred combination of risk and expected return. According to their utility functions, they have to choose the shares α_i and $(1-\alpha_i)$ of their assets to invest respectively in loans and bonds. However, before taking the decision, banks observe neither the actual risk premium nor the random component ε_i, but only a noisy signal of them:

$$S_i = \varepsilon_i + \nu \qquad (3)$$

where ν is a random variable independent of ε_i with a normal distribution $N(0, \sigma^2_\nu)$. By assumption, the noise component (ν) of the signal banks receive is identical for all of them, while the overall signals remain different across intermediaries because of ε_i. In fact, even though all banks are believed to have the ability to overcome asymmetric information problems, cross-sectional differences in their private information set remain. In principle, ν may be observed and uncertainty eliminated if all banks would share their private information. However, information sharing is unlikely to hold in the credit market.

---

[3] The subscript t is omitted since the model describes a one-period problem.

The noise ν can be interpreted as the degree of uncertainty on future macroeconomic conditions. Its impact on banks is homogeneous, regardless of managers' ability to predict the random component of loan return ε_i. When macroeconomic uncertainty increases, the higher variance of ν makes the estimates of the true return of loans less precise. The assumption of independence between ν and ε_i is now clearer; indeed, it is plausible that the aggregate macroeconomic shock is not correlated with the idiosyncratic component of loan returns.

In order to determine the expected return on loans (r_i), bank managers have to predict the value of ε_i. Without observing the noisy signal, banks' (unconditional) forecast on ε_i would be the mean of its distribution, i.e. zero. However, banks do observe the signal and can extract additional information from it. The expected value of the return from loans conditional upon S_i, $E[\varepsilon_i|S_i]$, is assumed to be a constant proportion (λ) of the signal, where λ represents a linear regression coefficient of ε_i on S_i:

$$E[\varepsilon_i \mid S_i] = \lambda S_i = \lambda(\varepsilon_i + \nu) \qquad (4)$$

where

$$\lambda = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_\nu^2}$$

The conditional expected return of the i-th bank's portfolio $E[R_i|S_i]$ is therefore given by the following expression:

$$E[R_i \mid S_i] = \alpha_i(r_f + \rho + E[\varepsilon_i \mid S_i]) + (1 - \alpha_i)r_f =$$
$$\alpha_i(r_f + \rho + \lambda(\varepsilon_i + \nu)) + (1 - \alpha_i)r_f \qquad (5)$$

and the conditional variance $Var[R_i|S_i]$ is:

$$Var[R_i \mid S_i] = \alpha_i^2 \lambda \sigma_\nu^2 \qquad (6)$$

Risk-averse banks are assumed to have the following utility function:

$$E[U_i \mid S_i] = E[R_i \mid S_i] - \frac{\omega}{2} Var[R_i \mid S_i] \qquad (7)$$

which is increasing in expected return and decreasing in return volatility (and ω is the coefficient of risk aversion).

Employing the portfolio's mean/variance equations, it is straightforward to derive the optimal loan-to-asset ratio (α_i) for bank i and the associated cross-sectional dispersion:

$$\alpha_i = \frac{\rho + \lambda S_i}{\omega \lambda \sigma_v^2} \tag{8}$$

$$Var(\alpha_i) = \frac{\sigma_\varepsilon^2}{\omega^2 \sigma_v^4} \tag{9}$$

The variance of the cross-sectional distribution of the loan-to-asset ratio is negatively correlated to the level of macroeconomic uncertainty σ_v^2. Indeed, taking the first derivative of the variance of α_i with respect to σ_v^2, it derives:

$$\frac{\partial Var(\alpha_i)}{\partial \sigma_v^2} = -\frac{2\sigma_\varepsilon^2}{\omega^2 \sigma_v^6} < 0 \tag{10}$$

which provides a testable implication of the hypothesis that the cross-sectional variance of the loan-to-asset ratio narrows as macroeconomic uncertainty increases.

The variance of α_i instead widens when the variance of the idiosyncratic component increases:

$$\frac{\partial Var(\alpha_i)}{\partial \sigma_\varepsilon^2} = \frac{1}{\omega^2 \sigma_v^4} > 0 \tag{11}$$

Therefore, it is essential to control for this component when testing for the impact of macroeconomic uncertainty. The choice of a proper proxy for idiosyncratic risk may however represent a major problem.

In sum, there are two hypotheses to be tested:

Hypothesis 1): *When macroeconomic uncertainty increases, banks tend to allocate assets in their portfolios more homogeneously (the variance of α across banks reduces);*

Hypothesis 2): *When idiosyncratic uncertainty increases, banks tend to behave more heterogeneously (the variance of α across banks rises).*

4. Empirical evidence

4.1 Data

The impact of macroeconomic uncertainty on banks' lending decisions modelled in the previous section can be empirically tested in the following way:

$$Var_t(LTA_{i,t}) = a + b\sigma_{v,t}^2 + c\sigma_{\varepsilon,t}^2 + u_t,$$ (a)

where $LTA_{i,t}$ is the loan-to-asset ratio and $Var_t(LTA_{i,t})$ is its cross-sectional variance at time t; σ_v^2 represents macroeconomic uncertainty evaluated at time t; σ_ε^2 is the idiosyncratic uncertainty and u_t is the error term.

The cross-bank variance of the LTA is built up using quarterly data (1990q1-2005q1) for a sample of more than 900 intermediaries, representing virtually the entire Italian banking system in each quarter. Before 1990 the Italian credit market was intensely regulated by public authorities for both monetary policy and supervisory purposes[4]. The results of the analysis would be therefore not reliable. Furthermore, formal Chow tests reject at the 1 per cent level the null hypothesis of no structural break in 1990 and advice to split the sample.

Overall, the dataset includes 58.146 bank/quarter observations. A summary of the characteristics of the sample is provided in table 1.

---

[4] For example, as far as monetary policy is concerned, in 1986q1-1986q2 and 1987q4-1988q1 ceilings on the supply of credit that each bank may provide to the aggregate of its customers (so-called *massimale sugli impieghi*) were still in use. These constraints, intended for controlling liquidity and aggregate demand, limited banks' ability to expand their shares in the loan market. As a result, even in the absence of specific obligations for banks to subscribe Treasury bonds, the banking system's demand for bonds increased (see Cotula, 1989). Also supervisory rules were particularly strict. According to the banking law, intermediaries were classified as retail banks, providing only short-term credit, and medium and long-term credit institutions. Until 1990, when the Bank of Italy decided to liberalize banks' branch networks, the opening of new branches was limited by the system of "branch plans". These legal barriers between different categories of banks and the administrative constraints on the opening of branches were an obstacle to the enlargement of banks' activity (see Ciocca, 2004).

Accounting ratios for the individual institutions are built up using the statistics that intermediaries are required to report to the Bank of Italy; the macroeconomic variables are drawn from the OECD main economic indicators (MEI) dataset.

The evolution of the loan-to-asset ratio over time is drawn in figure 1. The ratio shows a clear ascending trend, witnessing the increasing liberalization of the Italian credit market and the competitive incentives to improve market positions that banks received during the '90s. Also, the gradual reduction of interest rates made the subscription of securities, especially government bonds, less profitable for banks.

Given the relevance of this trend, I prefer to estimate model (a) using the coefficient of variation rather than the variance of the LTA in order to have a unit-free measure of dispersion:

$$CV_t(LTA_{i,t}) = a + b\sigma_{v,t}^2 + c\sigma_{\varepsilon,t}^2 + u_t \qquad \text{(b)}$$

Table 2 shows the main descriptive statistics for the loan-to-asset ratio (LTA), its variance (STDLTA) and coefficient of variation (CVLTA). Data refer to the whole banking system as well as to 5 dimensional breakdowns[5].

Looking at the table, there is no evidence of a clear relationship between LTA dispersion and bank size during the fifteen years under observation. Fig. 2 provides a clearer picture of this relationship.

Large banks are those that, in the period under examination, have the smaller cross-sectional dispersion of the indicator. By contrast, small banks are those that behave more heterogeneously. However, in the last two years, major and large banks show the highest levels of the variation coefficients. This may indicate that recently large banks have adopted more diversified growth strategies.

Certainly, the evolution of LTA is also affected by the consolidation process of the Italian banking system. Indeed, after M&As, the newly established banking groups tended to

---

[5] According to the classifications provided by the Bank of Italy, banks are grouped into five categories depending on the size of their total assets: major banks (total assets greater than 45 billion euros), large (total

reorganize their portfolios and, in some cases, to allocate specific assets to specialized entities of the group. This is particularly evident for major banks in 1995 and 1998.

4.2 Measuring macroeconomic uncertainty

There are several ways to measure macroeconomic uncertainty. According to Driver *et al.* (2004) and Sepulveda-Umanzor (2004) two approaches dominate the empirical literature: the "survey-based approach" (or cross-section dispersion forecasts) and the "model-based approach" (or time-series conditional volatility).

The first approach exploits the surveys on the expectations on relevant macroeconomic variables and obtains a measure of uncertainty as the intra-personal dispersion of the expectations. A main shortcoming of this methodology is that the intra-personal dispersion (i.e., the true uncertainty) is not observable and may only be approximated using the inter-personal dispersion of the expectations (the disagreement across forecasters). This procedure is reliable only if the latter measure is a valid proxy for the former (Zarnowitz and Lambros, 1987; Bomberger, 1996). In fact, it is possible that, even if each forecaster is extremely uncertain about future events, all of them submit similar estimates. Then, this measure would fail to capture the amount of existing uncertainty (Grier and Perry, 2000).

The second metric is obtained employing the realised values of the macroeconomic variables in order to get statistical or econometric estimations of their variability. Even though many measures of uncertainty can be implemented from time-series (unconditional variance, one-step ahead forecast errors, etc.), the conditional heteroskedasticity estimated with G(ARCH) models is one of the most commonly used (Engle, 1982; Bollerslev, 1986). In the case of GARCH(1,1), the conditional variance of a variable (h_t) can be estimated, along with its mean, using the following specification:

$$y_t = x_t \beta + \eta_t$$

$$h_t = c + a \eta_{t-1}^2 + g h_{t-1}$$

---

assets between 20 and 45 billion euros), medium-sized (7-20), small (1-7), minor (total assets up to 1 billion euros).

Provided that the coefficients on the ARCH and GARCH effects are statistically significant, the fitted values of h_t can be employed as proxies for uncertainty. This approach has a potential drawback, indeed as highlighted by Sepulveda-Umanzor (2004): "rather than measuring uncertainty, the model-based approach really measures volatility. The former is a feature that forward-looking agents face when confronting any decision, the latter is a characteristic of the data once uncertainty has been solved". A second problem is that the time-series used in the analyses do not necessarily exhibit (G)ARCH processes.

Given the complexity of defining reliable proxies for uncertainty, ideally one would use both the approaches recalled above. However, due to lack of data on survey outputs, in this paper I use the latter and calculate the conditional heteroskedasticity of relevant macroeconomic variables as proxies for macroeconomic uncertainty[6]. In spite of some of its shortcomings, this approach is widely used in the literature. As a robustness check, I also use the one-step ahead forecast error as an alternative metric.

For this purpose, I use the OECD monthly series of the composite leading indicator, industrial production and consumer price index (CPI). The time span of the series is 1975m1-2005m3. The composite leading indicator is an aggregate series that shows a leading relationship with the reference series for the business cycle in a given country; the indicator can therefore be used as an early signal of the main turning points of the aggregate economic activity. The industrial production index measures the increases and decreases in production output. Given the impact that fluctuations in the level of industrial activity have on the remainder of the economy, the variable is frequently used as a short-term indicator of the business cycle. The indicator is seasonally adjusted.

As pointed out by Carruth *et al.* (2000), often the literature that uses conditional variance as a measure of uncertainty assumes, rather than testing, both the stationarity of the time-series and the presence of (G)ARCH effects. In what follows, the original monthly series are transformed in order to obtain the monthly percentage rates of change of industrial production (INDPRODC), CPI (INFL) and the leading indicator (LEADINDC). The transformation allows to work with stationary series (table 3) and consistently estimate their

---

[6] For Italy, a quarterly survey on firms' expectations regarding future inflation is available only since December 1999.

conditional variance. For each variable, the specification of the auxiliary regression employed for the ADF tests has been selected via a general-to-simple-approach, as suggested by Enders (1995), starting with 6 lags, a trend and a constant.

The results of the Lagrange Multiplier tests for null hypothesis of no ARCH effects suggest that both industrial production growth and CPI inflation exhibit significant conditional heteroskedasticity; for the series of the composite leading indicator, the test is not significant instead (table 4). Accordingly, I exclude the latter variable from the analysis and estimate the GARCH models only for the former two variables.

Tables 5a and 5b provide the results of the unrestricted GARCH(1,1) models performed on industrial production growth (INDPRODC) and inflation (INFL). In the variance equation, the coefficients of the ARCH and GARCH effects are significant respectively at the 5 and 1 per cent levels for both the variables.

The conditional variance (h_t) derived from each GARCH model is finally averaged to quarterly frequency in order to obtain the measure of macroeconomic uncertainty (INDPRVA and INFLVA)[7].

These variables enter in model (b) as generated regressors. They measure with noise the true, though unobservable, regressor (σ_v^2). The estimates for model (b) can therefore be biased and inconsistent if the ARCH-type model employed is misspecified.

Therefore, I use the Lagrange Multiplier in order to test for neglected serial correlation of up to order 12 in the standardized squared residuals of the ARCH models. The LM tests cannot reject the null hypothesis of no additional ARCH effects at any conventional level. These results confirm that the specification is able to capture all the conditional heteroskedasticity present in industrial production and inflation series and corroborate the choice of the parsimonious GARCH (1,1). The correct specification of the generating regressions should ensure parameter consistency also in the derived model (Pagan and Ullah, 1988).

---

[7] Strictly speaking this measure is not the quarterly volatility, but the average of the monthly volatilities in a given quarter. As an alternative measure I also use the quarter-end conditional variance. Results are unchanged.

Figures 3 and 4 plot the coefficient of variation of the loan-to-asset ratio and the measures of industrial production and inflation uncertainty respectively.

In the aftermath of the EMS crisis in the first half of the '90s, the coefficient of variation of the LTA ratio reaches the lowest figure. In the same period, macroeconomic – especially inflation – uncertainty rises markedly.

The dispersion of the LTA shows a significant increase during the second half of the decade, a period characterized by the vigorous process of consolidation, which encouraged banks to look for new markets and more profitable activities. This may help explain more heterogeneous behaviour across intermediaries. Both measures of economic uncertainty show a descending trend during the '90s; for inflation, this tendency is particularly noticeable at the end of those years. This is likely one of the benefits of the EMU convergence process.

4.3 Econometric specification and results

The final specification of model (b) is the following:

$$CV_t(LTA_{i,t}) = a + b\ h_t\ + c\ STDNPL_{t+1} + d\ INFL_t +$$
$$+ e\ INDPRODC_t + f\ SHAREC_t + u_t$$

(c)

where h_t is the estimated conditional variance of either industrial production growth (INDPRVA) or inflation (INFLVA). According to hypothesis 1), the expected sign of the coefficient of this regressor is negative. Along with the proxy for macroeconomic uncertainty (h_t), I also introduce some control variables.

First, I employ the 1-quarter lead of the cross-sectional variance of the non-performing loan ratio (STDNPL). This indicator is a proxy for the idiosyncratic uncertainty. If at time t the idiosyncratic uncertainty (ε_i) increases allowing "good" banks to correctly predict the expected return/risk of different investments, in the following periods the riskiness of those banks should be significantly lower than that of poorly-informed intermediaries. Therefore, the variance of the non-performing loans ratio across intermediaries should widen. Of course, the NPL ratio is also affected by systemic factors; however, its cross-sectional dispersion may still provide some useful insight regarding hypothesis 2). The expected sign

of this variable is positive. Since the variable may be endogenous, in the estimation it is instrumented with the lagged value of STDNPL.

Second, I use the first moment of inflation (INFL) and industrial production growth (INDPRODC) in order to control for the overall macroeconomic conditions and to test the robustness of the results in the presence of the levels of the variables (Huizinga, 1993). Inflation is frequently found as an indicator of macroeconomic mismanagement; high inflation may therefore, *per se*, imply uncertainty on the future. A negative coefficient is therefore my *a priori* belief. By contrast, it is not immediately clear the impact of industrial production growth on the dependent variable. Indeed, it is difficult to say whether in good times banks tend to behave more or less homogeneously.

Lastly, I introduce a variable (SHAREC) aiming at assessing the impact of the conditions on financial markets, since this is another factor that may influence banks' decisions. This variable is the quarterly rate of change of the "all-shares" index calculated by the OECD from daily closing quotations.

Tables 6, 7 and 8 summarize the variables used in the estimations, show the main descriptive statistics of the regressors and illustrate the pair-wise correlations between the variables. It is interesting to note that the correlations between the dispersion of the loan-to-asset ratio – both in terms of variance and coefficient of variation – and uncertainty measures are negative and statistically significant at the 5 per cent level.

Table 9 presents the instrumental-variable regression results. Newey-West standard errors are calculated assuming an autocorrelation up to the order 4.

In both the specification, the proxies for macroeconomic uncertainty show the expected negative sign and are statistically significant, although their economic relevance is different. In particular, the magnitude of the coefficient on INFLVA (-1.23) suggests that this variable is an important determinant of LTA dispersion.

Overall, this confirms that Italian banks behave more homogenously when the perspectives of the economy are unclear. This is consistent with the evidence regarding US and Canadian banks reported respectively by Baum *et al.* (2004) and Garcia and Calmes (2005) and with the results of Beaudry *et al.* (2001) for UK non-financial firms.

However, it is worth pointing out that, with aggregate data, no inference can be drawn on the allocation of funds to particular loans and hence the credit risk of the loan book. In other words, the model implicitly assumes that bank's loan portfolio is homogenous. These assumptions should be ideally tested providing results for several loan categories, along with the aggregate ones. Unfortunately, due to data limitations, this is not feasible at this stage.

The proxy for idiosyncratic uncertainty is also statistically significant and takes on a positive sign. When the returns on specific investments are less easily predictable, better-informed banks can exploit their competitive advantage and behave in a different way with respect to poorly-informed intermediaries.

In sum, results confirm that systemic uncertainty, both on the real and the financial side of the economy, induces intermediaries to herding behaviour. In contrast, individual uncertainty leads banks to behave more heterogeneously when deciding the allocation of their assets.

As far as the other control variables are concerned, industrial production growth is never significant. The inclusion of different variables aiming at controlling for the evolution of the business cycle, such as the leading indicator, demand and consumption growth or changes in the interest rates, does not change this evidence. This result indicates that the level of aggregate economic activity does not have any impact on the cross-sectional variability of the share that banks decide to invest in risky loans. However, the significance of the control variables must be interpreted with caution since the proxy for uncertainty is a generated regressor and the coefficient on it is significantly different from zero (Pagan, 1984; Oxley and McAleer, 1993).

The coefficient on inflation is not significant as well. The changes of the stock exchange index are slightly significant in the model with industrial production uncertainty.

4.4 Robustness checks

4.4.1 Size breakdowns

The dataset with banks' size breakdowns is used for robustness checks. The model is therefore estimated using panel data techniques that exploit the cross-sectional dimension and allow obtaining more robust results[8]. For the estimation, I can exploit 300 observations (60 quarters / 5 size breakdowns). The results of the random effect model are presented in table 10.

They appear consistent with those obtained in the previous paragraph. Macroeconomic uncertainty has a significant negative impact on the cross-bank dispersion of the loan-to-asset ratio, while the proxy for idiosyncratic uncertainty shows a positive sign. In these specifications, industrial production growth is significant, though at the 10 per cent level, and takes on a negative sign. According to this evidence, banks would take more uniform portfolio decisions during expansions. Inflation remains not significant, contrasting the idea that higher inflation levels are perceived as signals of economic turmoil. The Hausman tests for both the regressions imply that the random effects are appropriate for this sample.

4.4.2 Uncertainty based on the one-step ahead forecast error

In this paragraph, I use a different proxy for macroeconomic uncertainty in order to check whether my previous results are robust to different measures. The metric proposed here is based on the 1-step ahead forecast errors of the autoregressive models of industrial production growth and inflation. As suggested by Serven (1998), to ensure that the predictions use no more information than that available at the time they are formulated, they are computed from recursive estimation of the autoregressions. Therefore, for each variable, I estimate recursively the following auto-regressive model of order 2:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \upsilon_t$$

---

[8] In principle, if a bank's size is a proxy for the type of loans a bank grants, the evidence provided in this section might partly overcome the shortcomings related to loan heterogeneity mentioned above. Unfortunately, this is not necessarily the case, since Italian banks are not specialized according to their size.

The initial length of the series is set at 50. Since the dataset contains 362 observations (quarters) and I introduce 2 lags, I estimate 310 (362-2-50) regressions, in order to compute the 1-step ahead forecast errors. Using the recursive parameter estimates, I finally obtain the alternative uncertainty measure as the quarterly mean absolute values of the monthly one-step ahead forecast errors for industrial production and inflation (respectively INDPRODFE and INFLFE).

Table 11 provides the results of the regression of LTA variation coefficient on INDPRODFE and INFLFE.

The role of uncertainty is confirmed by this exercise. Both additional proxies for macroeconomic uncertainty are statistically significant and negative. In particular, inflation unpredictability seems to be the most relevant determinant of banks' herding behaviours. Idiosyncratic uncertainty remains significantly positive.

5. Conclusions

This paper tries to disentangle which are the determinants of banks' decisions regarding the allocation of their portfolios; in particular it aims at assessing whether macroeconomic uncertainty plays a role in this choice. Following the portfolio model proposed by Baum *et al.*, I discuss how Italian banks choose between loans and risk-free assets when the uncertainty on macroeconomic conditions increases. With respect to previous work, which neglects the role of idiosyncratic factors, the impact of macroeconomic uncertainty is assessed, taking also into account bank-specific sources of uncertainty.

The econometric results confirm that macroeconomic uncertainty does have a role in Italian banks' investment decisions. In periods of increasing turmoil, banks receive noisier signals on the expected returns of loans and, therefore, tend to behave more homogeneously, as shown by the reduction of the cross-sectional dispersion of the loan-to-asset ratio. A plausible corollary is that the allocation of bank credit becomes less efficient. Idiosyncratic uncertainty is also relevant and its coefficient takes on a positive sign. When the returns on specific investments are less easily predictable, better-informed banks can exploit their competitive advantage and behave in a different way with respect to poorly-informed

intermediaries. These results are generally confirmed when bank size breakdowns are employed in the estimation. Furthermore, they are robust to the inclusion of several control variables and the use of different measures of macroeconomic uncertainty.

Macroeconomic uncertainty is therefore an important determinant of banks' lending decisions and a cause of potential disturbances in financial resource allocation. Since bank loans are a relevant source of financing for the non-financial sector, central banks and supervisory authorities should monitor the degree of uncertainty on the evolution of the main economic aggregates in order to strengthen macroeconomic and financial stability.

Tables and figures

Table 1

THE SAMPLES: SUMMARY

	no. banks per quarter (average)	no. obs
FULL SAMPLE	953	58146
MAJOR BANKS	14	870
LARGE BANKS	16	972
MEDIUM BANKS	36	2203
SMALL BANKS	143	8740
MINOR BANKS	744	45361
TIME-SPAN	1st quarter 1990 - 1st quarter 2005	

Table 2

LOAN-TO-ASSET RATIO: SIZE BREAKDOWN

Variable	N. obs	Mean	STD	Min	Max
		TOTAL			
LTA	61	44.81	6.68	36.23	58.10
STDLTA	61	15.81	3.91	10.51	21.52
CVLTA	61	0.35	0.04	0.27	0.40
		Major Banks			
LTA	61	44.16	4.33	32.95	51.58
STDLTA	61	13.12	8.56	4.00	28.47
CVLTA	61	0.29	0.18	0.09	0.62
		Large Banks			
LTA	61	46.57	3.27	39.38	53.89
STDLTA	61	14.39	6.98	4.67	28.26
CVLTA	61	0.31	0.14	0.10	0.63
		Medium Banks			
LTA	61	50.00	7.27	37.79	62.92
STDLTA	61	16.53	4.18	7.56	22.01
CVLTA	61	0.33	0.06	0.17	0.45
		Small Banks			
LTA	61	48.28	7.82	36.87	62.90
STDLTA	61	19.00	5.13	10.55	24.43
CVLTA	61	0.39	0.07	0.26	0.51
		Minor Banks			
LTA	61	43.86	6.51	35.86	57.34
STDLTA	61	14.85	3.62	10.33	20.68
CVLTA	61	0.33	0.04	0.27	0.40

Notes: LTA is the average of the loan-to-asset ratio; STDLTA is the cross-sectional variance of the loan-to-asset-ratio; CVLTA is the cross-sectional coefficient of variation of the loan-to-asset-ratio.

Table 3

ADF TESTS FOR UNIT ROOTS (1)

Variable	Z(t) statistics	Interpolated Dickey-Fuller		
		1% critical value	5% critical value	10% critical value
INDPRODC (2)	-6.512***	-3.452	-2.876	-2.57
INFL (3)	-4.532***	-3.986	-3.426	-3.13
LEADINDC (4)	-5.657***	-2.58	-1.95	-1.62

*, **, *** significant at the 10, 5 and 1 per cent level respectively.
Notes: (1) Augmented Dickey Fuller test for unit root. Selection of the auxiliary regression via general-to-simple procedure. (2) 5 lags and drift included in the regression. (3) 5 lags, trend and drift included in the regression. (4) 5 lags included in the regression.

Table 4

LM TEST FOR ARCH EFFECTS (1)

Variable	ARCH(1)		ARCH(4)	
	Chi-squared	df	Chi-squared	df
INDPRODC	14.206***	1	24.606***	4
INFL	3.833**	1	52.922***	4
LEADINDC	0.005	1	6.928	4

*, **, *** significant at the 10, 5 and 1 per cent level respectively.
Notes: (1) Lagrange Multiplier test for ARCH effects. 4 lags included in the auxiliary autoregression.

ESTIMATION OF MACROECONOMIC UNCERTAINTY
GARCH (1,1) FOR INDUSTRIAL PRODUCTION GROWTH

	Coefficient	Semi-robust SE	Sign. lev.
Mean equation			
INDPRODC (LAG1)	-0.2152	0.0602	***
CONSTANT	0.0793	0.0639	
Variance equation			
ARCH(1)	0.0462	0.0187	**
GARCH(1)	0.9449	0.0158	***
CONSTANT	0.0012	0.0067	
Nr. Obs.	361		
Wald Chi-squared	Chi2(1)=12.78		***
Log pseudo-likelihood	-630,765		
LM ARCH 1-12	F(12,332)= 0.37746		

*, **, *** significant at the 10, 5 and 1 per cent level respectively.
 Notes: Lagrange Multiplier test for ARCH effects is reported.

Table 5b

ESTIMATION OF MACROECONOMIC UNCERTAINTY
GARCH (1,1) FOR CPI INFLATION

	Coefficient	Semi-robust SE	Sign. lev.
Mean equation			
INFL (LAG1)	0.2901	0.0561	***
INFL (LAG2)	0.0858	0.0576	
INFL (LAG3)	0.2054	0.0563	***
INFL (LAG4)	0.1478	0.0549	***
INFL (LAG5)	0.0218	0.0522	
INFL (LAG6)	0.1103	0.0570	*
CONSTANT	0.0429	0.0170	**
Variance equation			
ARCH(1)	0.1156	0.5584	**
GARCH(1)	0.8815	0.0433	***
CONSTANT	0.0004	0.0004	
Nr. Obs.	356		
Wald Chi-squared	Chi2(6)=323.34		***
Log pseudo-likelihood	-29.64749		
LM ARCH 1-12	F(12,322)= 1.4037		

*, **, *** significant at the 10, 5 and 1 per cent level respectively.
 Notes: Lagrange Multiplier test for ARCH effects is reported.

Table 6

SELECTED VARIABLES

Name	Description	Source
LTA	Loan-to-asset ratio (%)	BoI Sup.statistics
STDLTA	Cross-sectional STD of LTA (%)	BoI Sup.statistics
CVLTA	Coefficient of variation of LTA (STDLTA/MLTA)	BoI Sup.statistics
STDNPL	Cross-sectional STD of non-performing loan ratio (%)	BoI Sup.statistics
INDPRODC	Industrial production change (%)	OECD
INFL	CPI inflation (%)	OECD
SHAREC	Share price change (%)	OECD
INDPRVA	Conditional variance of INDPRODC	OECD
INFLVA	Conditional variance of INFL	OECD

Table 7

REGRESSORS: DESCRIPTIVE STATISTICS

Variable	N. obs	Mean	STD	Min	Max
STDNPL	61	9.24	0.93	7.60	11.26
INDPRODC	61	0.04	0.53	-1.18	1.19
INFL	61	0.28	0.16	0.03	0.69
SHAREC	61	0.60	3.80	-8.15	11.67
INDPRVA	61	0.86	0.37	0.41	2.22
INFLVA	61	0.03	0.01	0.01	0.06

Table 8

CORRELATION COEFFICIENTS

	LTA	STDLTA	CVLTA	STDNPL	INDPRVA	INFLVA
LTA	1.000					
STDLTA	**0.948**	1.000				
CVLTA	**0.696**	**0.888**	1.000			
STDNPL	0.150	**0.398**	**0.700**	1.000		
INDPRVA	**-0.620**	**-0.676**	**-0.637**	**-0.415**	1.000	
INFLVA	**-0.777**	**-0.728**	**-0.526**	-0.208	**0.757**	1.000

Coefficients in bold are significant at the 5 per cent level.

Table 9

ECONOMETRIC RESULTS
INSTRUMENTAL VARIABLE REGRESSION OF CV(LTA)

Explanatory variables	Uncertainty on industrial production			Uncertainty on inflation		
	Coeffic.	N-W SE	Sign. lev.	Coeffic.	N-W SE	Sign. lev.
intercept	0.1028	0.1099		0.0868	0.0953	
INDPRVA	-0.0395	0.0187	**	-	-	
INFLVA	-	-		-1.2254	0.4394	***
LEAD(STDNPL)	0.0311	0.0101	***	0.0334	0.0090	***
INFL	-0.0230	0.0312		-0.0264	0.0323	
INDPRODC	-0.0132	0.0085		-0.0126	0.0083	
SHAREC	-0.0014	0.0008	*	-0.0010	0.0007	
Nr. Obs.	60			60		
F-test	F(5,54)=12.39		***	F(5,54)=16.40		***

*, **, *** significant at the 10, 5 and 1 per cent level respectively. The estimated regressions are:
CV(LTA)=intercept+b_1INDPRVA+b_2LEAD(STDNPL)+b_3INFL+b_4INDPRODC+b_5SHAREC+u
CV(LTA)=intercept+b_1INFLVA+b_2LEAD(STDNPL)+b_3INFL+b_4INDPRODC+b_5SHAREC+u

Notes: Newey-West robust standard errors are reported; the errors are assumed to be heteroskedastic and autocorrelated up to 4 lags. LEAD(STDNPL) instrumented with LAG(STDNPL).

Table 10

ROBUSTNESS CHECKS

INSTRUMENTAL VARIABLE PANEL REGRESSION OF CV(LTA)(1)

Explanatory variables	Uncertainty on industrial production			Uncertainty on inflation		
	Coeffic.	SE	Sign. lev.	Coeffic.	SE	Sign. lev.
intercept	0.3180	0.0272	***	0.3473	0.0267	***
INDPRVA	-0.1080	0.0180	***	-	-	
INFLVA	-	-		-3.6291	0.4449	***
LEAD(STDNPL)	0.0150	0.0016	***	0.0148	0.0015	***
INFL	-0.0377	0.0418		-0.0566	0.0357	
INDPRODC	-0.0194	0.0092	*	-0.0167	0.0088	*
SHAREC	-0.0009	0.0013		0.0005	0.0012	
Nr. Obs.	300			300		
Wald-test	Chi2(5)=255.06		***	Chi2(5)=294.35		***
R-squared (overall)	0.437			0.477		
Hausman-test	Chi2(5)=0.01			Chi2(5)=0.01		

*, **, *** significant at the 10, 5 and 1 per cent level respectively. The estimated regressions are:

CV(LTA)=intercept+b_1INDPRVA+b_2LEAD(STDNPL)+b_3INFL+b_4INDPRODC+b_5SHAREC+a+u

CV(LTA)=intercept+b_1INFLVA+b_2LEAD(STDNPL)+b_3INFL+b_4INDPRODC+b_5SHAREC+a+u

Notes: (1) Random effect model. LEAD(STDNPL) instrumented with LAG(STDNPL). Hausman test for random effects is reported (Ho: RE).

Table 11

ROBUSTNESS CHECKS
IV REG. OF CV(LTA) WITH DIFFERENT PROXIES FOR UNCERTAINTY

Explanatory variables	Uncertainty on industrial production			Uncertainty on inflation		
	Coeffic.	N-W SE	Sign. lev.	Coeffic.	N-W SE	Sign. lev.
intercept	0.0805	0.1039		0.2309	0.0606	***
INDPRODFE	-0.0187	0.0106	*	-	-	
INFLFE	-	-		-0.2577	0.0544	***
LEAD(STDNPL)	0.0329	0.0098	***	0.0218	0.0053	***
INFL	-0.0752	0.0410	*	-0.1154	0.0235	***
INDPRODC	-0.0173	0.0056		-0.0070	0.0075	
SHAREC	-0.0012	0.0008		-0.0018	0.0006	***
Nr. Obs.	60			60		
F-test	F(5,54)=12.14		***	F(5,54)=32.18		***

*, **, *** significant at the 10, 5 and 1 per cent level respectively. The estimated regressions are:

$CV(LTA)=intercept+b_1 INDPRODFE+b_2 LEAD(STDNPL)+b_3 INFL+b_4 INDPRODC+b_5 SHAREC+u$

$CV(LTA)=intercept+b_1 INFLFE+b_2 LEAD(STDNPL)+b_3 INFL+b_4 INDPRODC+b_5 SHAREC+u$

Notes: Newey-West robust standard errors are reported; the errors are assumed to be heteroskedastic and autocorrelated up to 4 lags.   LEAD(STDNPL) instrumented with LAG(STDNPL).
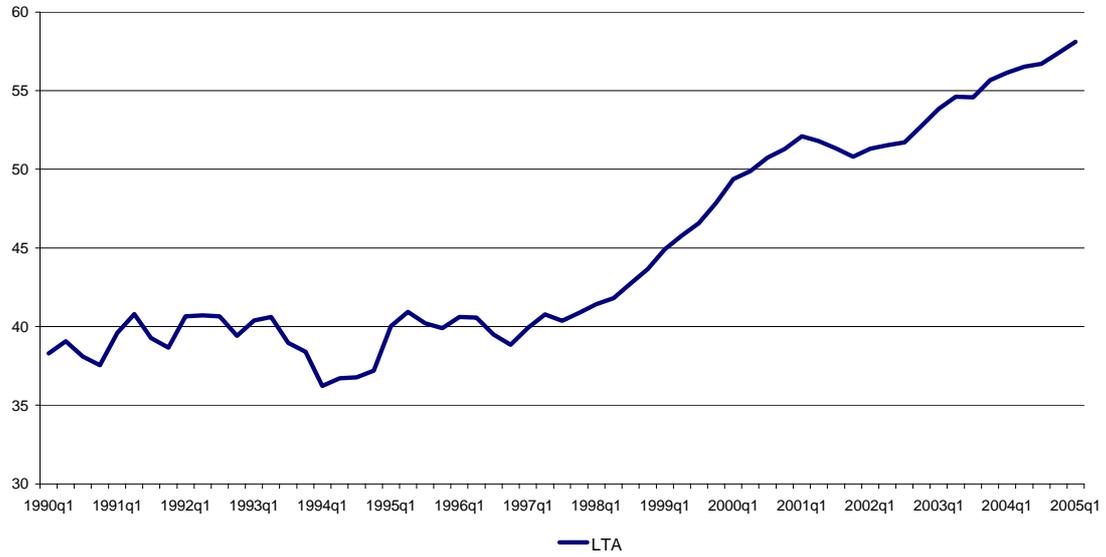
Fig. 1 LOAN-TO-ASSET RATIO
(percentage values)

Fig. 2 CROSS-SECTIONAL DISPERSION OF LTA: SIZE BREAKDOWN
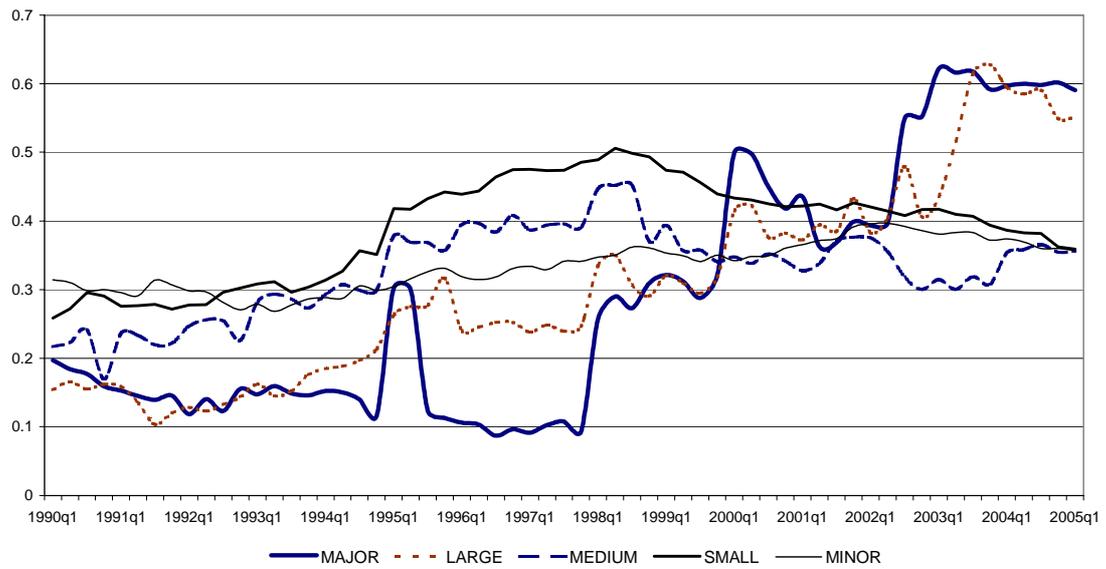*(coefficient of variation, percentage values)*

Fig. 3 CROSS-SECTIONAL DISPERSION OF LTA vs.
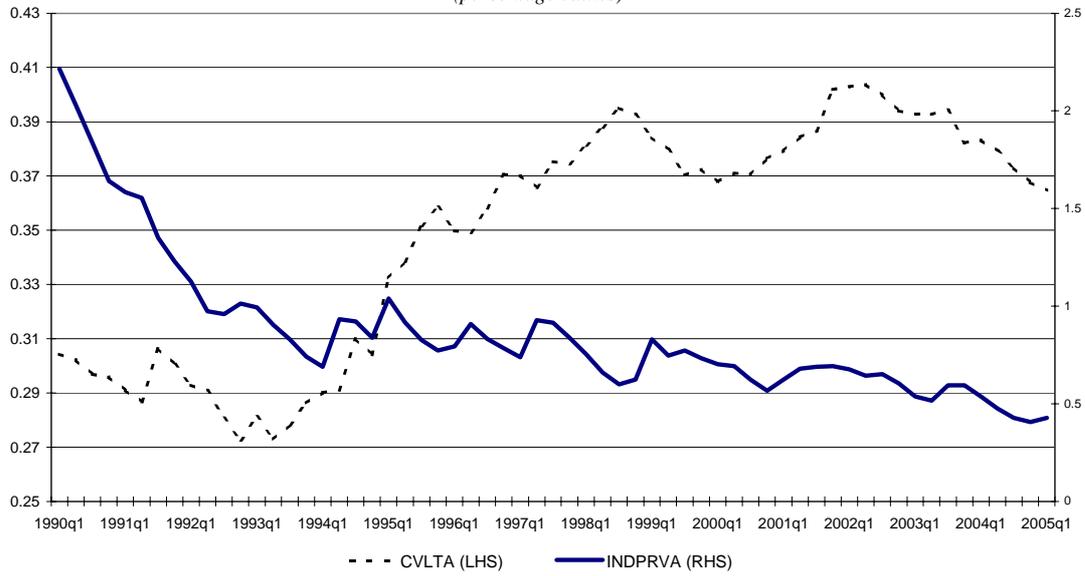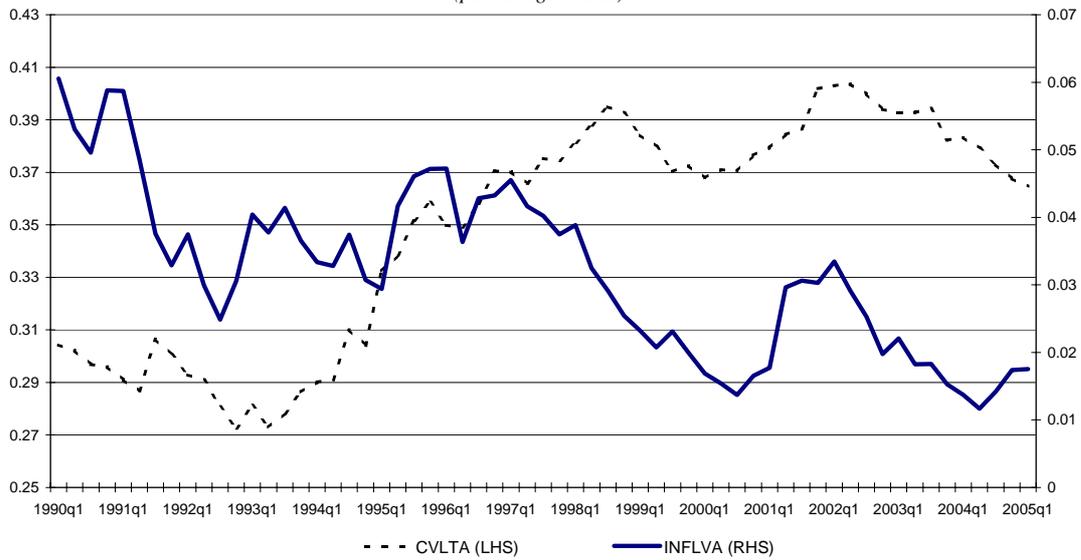INDUSTRIAL PRODUCTION UNCERTAINTY
(percentage values)

Fig. 4 CROSS-SECTIONAL DISPERSION OF LTA vs.
INFLATION UNCERTAINTY
(percentage values)

References

Baum C., Caglayan M. and Ozkan N. (2005), "The second moments matter: The response of bank lending behavior to macroeconomic uncertainty", *Boston College - Working Paper*, 521.

Beaudry P, Caglayan M. and Schiantarelli F. (2001), "Monetary Instability, the Predictability of Prices, and the Allocation of Investment: An Empirical Investigation Using UK Panel Data", American Economic Review, Vol. 91, n. 3.

Bikker J. A. and Hu H. (2002), "Cyclical Patterns in Profits, Provisioning and Lending of Banks", *DNB Staff Reports*, n. 86.

Bollerslev T. (1986), "Generalized autoregressive conditional heteroskedasticity", *Journal of Econometrics*, Vol. 31, n. 3.

Bomberger W. A. (1996), "Disagreement as a Measure of Uncertainty", *Journal of Money, Credit and Banking*, Vol. 28, n. 3.

Carruth A., Dickerson A. and Henley A. (2000), "What Do We Know about Investment under Uncertainty?", *Journal of Economic Surveys*, Vol. 14, n. 2.

Ciocca P. (2004), "*The Italian Financial System Remodelled*", Palgrave Macmillan.

Cotula F. (1989), *"La politica monetaria in Italia"*, Vol. II, Il Mulino.

Driver C., Trapani L. and Urga G. (2004), "Cross-Section vs. Time Series Measures of Uncertainty using UK Survey Data", *Royal Economic Society Annual Conference*.

Enders W. (1995), *Applied Econometrics – Time Series*, John Wiley & Sons, New York.

Engle R. (1982), "Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation", *Econometrica*, Vol. 50, n. 4.

Gambera M. (2000), *"Simple Forecasts of Bank Loan Quality in the Business Cycle"*, *Federal Reserve Bank of Chicago, Supervision and Regulation Department, Emerging Issues Series*, S&R-2000-3.

Garcia A. and Calmes C. (2005), "Banks Lending and Macroeconomic Uncertainty: The Case of Canada", *Bank of Canada – Working Paper*, n. 28.

Grier K. B. and Perry M. J. (2000), "The Effects of Real and Nominal Uncertainty on Inflation and Output Growth: Some GARCH-M Evidence", *Journal of Applied Econometrics*, Vol. 15, n. 1.

Hoggarth G., Sorensen S. and Zicchino L. (2005), "Stress tests of UK banks using a VAR approach", *Bank of England, Working Paper*, n. 282.

Huizinga J. (1993), "Inflation Uncertainty, Relative Price Uncertainty, and Investment in U.S. Manufacturing", *Journal of Money, Credit and Banking*, Vol. 25, n. 3.

Laeven L. and Majnoni G. (2003), "Loan-Loss Provisioning and Economic Slowdowns: Too Much, Too Late?", *Journal of Financial Intermediation*, Vol. 12, n. 2.

Meyer A. P. and Yeager T. J. (2001), "Are Small Rural Banks Vulnerable to Local Economic Downturns*?*", *Federal Reserve Bank of St. Louis Review*.

Oxley L. and McAleer M. (1993), "Econometric issues in macroeconomic models with generated regressors", *Journal of Economic Surveys*, Vol. 7, n. 1.

Pagan A. (1984), "Econometric Issues in the Analysis of Regressions with Generated Regressors", *International Economic Review*, Vol. 25, n. 1.

Pagan A. and Ullah A. (1988), "The Econometric Analysis of Models With Risk Terms", *Journal of Applied Econometrics*, Vol. 3, n. 2.

Pesola J. (2001), "The role of macroeconomic shocks in banking crises", *Bank of Finland Discussion Papers*, n. 6.

Quagliariello M. (2006), "Banks' riskiness over the business cycle: a panel analysis on Italian intermediaries", Banca d'Italia, Temi di Discussione, n. 599.

Quagliariello M. (in press), "Does Macroeconomy Affect Bank Stability? A Review of the Empirical Evidence", forthcoming in the *Journal of Banking Regulation*.

Salas V. and Saurina J. (2002), "Credit risk in two institutional settings: Spanish commercial and saving banks", *Journal of Financial Services Research*, Vol. 22, issue 3.

Sepulveda-Umanzor J. (2004), "The Relation between Macroeconomic Uncertainty and the Expected Performance of the Economy", North Carolina State University, *mimeo*.

Serven L. (1998), "Macroeconomic Uncertainty and Private Investment in LDCs: An Empirical Investigation", *World Bank Country Economics Department Series*, n. 2035.

Valckx N. (2003), "What determines loan-loss provisioning in the EU?", ECB, mimeo.

Zarnowitz V. and Lambros L. A. (1987), "Consensus and Uncertainty in Economic Prediction", *Journal of Political Economy*, Vol. 95, n. 3.

RECENTLY PUBLISHED "TEMI" (*)

N. 592 – *L'internazionalizzazione produttiva italiana e i distretti industriali: un'analisi degli investimenti diretti all'estero,* by Stefano Federico (May 2006).

N. 593 – *Do market-based indicators anticipate rating agencies? Evidence for international banks,* by Antonio Di Cesare (May 2006).

N. 594 – *Entry regulations and labor market outcomes: Evidence from the Italian retail trade sector,* by Eliana Viviano (May 2006).

N. 595 – *Revisiting the empirical evidence on firms' money demand,* by Francesca Lotti and Juri Marcucci (May 2006).

N. 596 – *Social interactions in high school: Lesson from an earthquake*, by Piero Cipollone and Alfonso Rosolia (September 2006).

N. 597 – *Determinants of long-run regional productivity: The role of R&D, human capital and public infrastructure*, by Raffaello Bronzini and Paolo Piselli (September 2006).

N. 598 – *Overoptimism and lender liability in the consumer credit market*, by Elisabetta Iossa and Giuliana Palumbo (September 2006).

N. 599 – *Bank's riskiness over the business cycle: A panel analysis on Italian intermediaries*, by Mario Quagliariello (september 2006)

N. 600 – *People I know: Workplace networks and job search outcomes*, by Federico Cingano and Alfonso Rosolia (September 2006).

N. 601 – *Bank profitability and the business cycle*, by Ugo Albertazzi and Leonardo Gambacorta (September 2006).

N. 602 – *Scenario based principal component value-at-risk: An application to Italian banks' interest rate risk exposure*, by Roberta Fiori and Simonetta Iannotti (September 2006).

N. 603 – *A dual-regime utility model for poverty analysis*, by Claudia Biancotti (September 2006).

N. 604 – *The political economy of investor protection*, by Pietro Tommasino (December 2006).

N. 605 – *Search in thick markets: Evidence from Italy*, by Sabrina Di Addario (December 2006).

N. 606 – *The transmission of monetary policy shocks from the US to the euro area*, by S. Neri and A. Nobili (December 2006).

N. 607 – *What does a technology shock do? A VAR analysis with model-based sign restrictions*, by L. Dedola and S. Neri (December 2006).

N. 608 – *Merge and compete: Strategic incentives for vertical integration*, by Filippo Vergara Caffarelli (December 2006).

N. 609 – *Real-time determinants of fiscal policies in the euro area: Fiscal rules, cyclical conditions and elections*, by Roberto Golinelli and Sandro Momigliano (December 2006).

N. 610 – *L'under-reporting della ricchezza finanziaria nell'indagine sui bilanci delle famiglie*, by Leandro D'Aurizio, Ivan Faiella, Stefano Iezzi, Andrea Neri (December 2006).

N. 611 – *La polarizzazione territoriale del prodotto pro capite: un'analisi del caso italiano sulla base di dati provinciali* by Stefano Iezzi (December 2006).

N. 612 – *A neural network architecture for data editing in the Bank of Italy's business surveys* by Claudia Biancotti, Leandro D'Aurizio and Raffaele Tartaglia Polcini (February 2007).

N. 613 – *Outward FDI and local employment growth in Italy*, by Stefano Federico and Gaetano Alfredo Minerva (February 2007).

N. 614 – *Testing for trend,* by Fabio Busetti and Andrew Harvey (February 2007).

"TEMI" LATER PUBLISHED ELSEWHERE

2000

P. ANGELINI, *Are banks risk-averse? Intraday timing of the operations in the interbank market*, Journal of Money, Credit and Banking, Vol. 32 (1), pp. 54-73, **TD No. 266 (April 1996).**

F. DRUDI and R. GIORDANO, *Default Risk and optimal debt management,* Journal of Banking and Finance, Vol. 24 (6), pp. 861-891, **TD No. 278 (September 1996)**.

F. DRUDI and R. GIORDANO, *Wage indexation, employment and inflation,* Scandinavian Journal of Economics, Vol. 102 (4), pp. 645-668, **TD No. 292 (December 1996)**.

F. DRUDI and A. PRATI, *Signaling fiscal regime sustainability,* European Economic Review, Vol. 44 (10), pp. 1897-1930, **TD No. 335 (September 1998)**.

F. FORNARI and R. VIOLI, *The probability density function of interest rates implied in the price of options,* in: R. Violi, (ed.) , Mercati dei derivati, controllo monetario e stabilità finanziaria, Il Mulino, Bologna, **TD No. 339 (October 1998)**.

D. J. MARCHETTI and G. PARIGI, *Energy consumption, survey data and the prediction of industrial production in Italy,* Journal of Forecasting, Vol. 19 (5), pp. 419-440, **TD No. 342 (December 1998)**.

A. BAFFIGI, M. PAGNINI and F. QUINTILIANI, *Localismo bancario e distretti industriali: assetto dei mercati del credito e finanziamento degli investimenti,* in: L.F. Signorini (ed.), Lo sviluppo locale: un'indagine della Banca d'Italia sui distretti industriali, pp. 237-256, Meridiana Libri, **TD No. 347 (March 1999)**.

F. LIPPI, *Median voter preferences, central bank independence and conservatism*, Public Choice, v. 105, 3-4, pp. 323-338 **TD No. 351 (April 1999)**.

A. SCALIA and V. VACCA, *Does market transparency matter? A case study*, in: Market Liquidity: Research Findings and Selected Policy Implications, Basel, Bank for International Settlements, **TD No. 359 (October 1999)**.

F. SCHIVARDI, *Rigidità nel mercato del lavoro, disoccupazione e crescita*, Giornale degli economisti e Annali di economia, Vol. 59 (1), pp. 115-141, **TD No. 364 (December 1999)**.

G. BODO, R. GOLINELLI and G. PARIGI, *Forecasting industrial production in the euro area,* Empirical Economics, Vol. 25 (4), pp. 541-561, **TD No. 370 (March 2000)**.

F. ALTISSIMO, D. J. MARCHETTI and G. P. ONETO, *The Italian business cycle: Coincident and leading indicators and some stylized facts,* Giornale degli economisti e Annali di economia, Vol. 60 (2), pp. 147-220, **TD No. 377 (October 2000)**.

C. MICHELACCI and P. ZAFFARONI, *(Fractional) Beta convergence*, Journal of Monetary Economics, Vol. 45 (1), pp. 129-153, **TD No. 383 (October 2000)**.

R. DE BONIS and A. FERRANDO, *The Italian banking structure in the nineties: Testing the multimarket contact hypothesis*, Economic Notes, Vol. 29 (2), pp. 215-241, **TD No. 387 (October 2000)**.

S. SIVIERO and D. TERLIZZESE, *La previsione macroeconomica: alcuni luoghi comuni da sfatare*, Rivista italiana degli economisti, v. 5, 2, pp. 291-322, **TD No. 395 (February 2001)**.

G. DE BLASIO and F. MINI, *Seasonality and capacity: An application to Italy*, IMF Working Paper, 80, **TD No. 403 (June 2001)**.

2001

M. CARUSO, *Stock prices and money velocity: A multi-country analysis,* Empirical Economics, Vol. 26 (4), pp. 651-672, **TD No. 264 (February 1996)**.

P. CIPOLLONE and D. J. MARCHETTI, *Bottlenecks and limits to growth: A multisectoral analysis of Italian industry*, Journal of Policy Modeling, Vol. 23 (6), pp. 601-620, **TD No. 314 (August 1997)**.

P. CASELLI, *Fiscal consolidations under fixed exchange rates,* European Economic Review, Vol. 45 (3), pp. 425-450, **TD No. 336 (October 1998)**.

F. ALTISSIMO and G. L. VIOLANTE, *The non-linear dynamics of output and unemployment in the US,* Journal of Applied Econometrics, Vol. 16 (4), pp. 461-486, **TD No. 338 (October 1998)**.

F. NUCCI and A. F. POZZOLO, *Investment and the exchange rate: An analysis with firm-level panel data*, European Economic Review, Vol. 45 (2), pp. 259-283, **TD No. 344 (December 1998)**.

A. Zaghini, *Fiscal adjustments and economic performing: A comparative study*, Applied Economics, Vol. 33 (5), pp. 613-624, **TD No. 355 (June 1999)**.

L. Gambacorta, *On the institutional design of the European monetary union: Conservatism, stability pact and economic shocks,* Economic Notes, Vol. 30 (1), pp. 109-143, **TD No. 356 (June 1999)**.

P. Finaldi Russo and P. Rossi, *Credit costraints in italian industrial districts,* Applied Economics, Vol. 33 (11), pp. 1469-1477, **TD No. 360 (December 1999)**.

A. Cukierman and F. Lippi, *Labor markets and monetary union: A strategic analysis,* Economic Journal, Vol. 111 (473), pp. 541-565, **TD No. 365 (February 2000)**.

G. Parigi and S. Siviero, *An investment-function-based measure of capacity utilisation, potential output and utilised capacity in the Bank of Italy's quarterly model*, Economic Modelling, Vol. 18 (4), pp. 525-550, **TD No. 367 (February 2000)**.

P. Caselli, P. Pagano and F. Schivardi, *Investment and growth in Europe and in the United States in the nineties,* Rivista di politica economica, v. 91, 10, pp. 3-35, **TD No. 372 (March 2000)**.

F. Balassone and D. Monacelli, *Emu fiscal rules: Is there a gap?,* in: M. Bordignon and D. Da Empoli (eds.), Politica fiscale, flessibilità dei mercati e crescita*, Milano*, Franco Angeli, **TD No. 375 (July 2000)**.

A. B. Atkinson and A. Brandolini, *Promise and pitfalls in the use of "secondary" data-sets: Income inequality in OECD countries as a case study*, Journal of Economic Literature, Vol. 39 (3), pp. 771-799, **TD No. 379 (October 2000)**.

D. Focarelli and A. F. Pozzolo, *The patterns of cross-border bank mergers and shareholdings in OECD countries*, Journal of Banking and Finance, Vol. 25 (12), pp. 2305-2337, **TD No. 381 (October 2000)**.

M. Sbracia and A. Zaghini, *Expectations and information in second generation currency crises models*, Economic Modelling, Vol. 18 (2), pp. 203-222, **TD No. 391 (December 2000)**.

F. Fornari and A. Mele, *Recovering the probability density function of asset prices using GARCH as diffusion approximations,* Journal of Empirical Finance, Vol. 8 (1), pp. 83-110**, TD No. 396 (February 2001)**.

P. Cipollone, *La convergenza dei salari dell'industria manifatturiera in Europa,* Politica economica, Vol. 17 (1), pp. 97-125, **TD No. 398 (February 2001)**.

E. Bonaccorsi di Patti and G. Gobbi, *The changing structure of local credit markets: Are small businesses special?*, Journal of Banking and Finance, Vol. 25 (12), pp. 2209-2237, **TD No. 404 (June 2001)**.

L. Dedola and S. Leduc, *Why is the business-cycle behaviour of fundamentals alike across exchange-rate regimes?,* International Journal of Finance and Economics, v. 6, 4, pp. 401-419, **TD No. 411 (August 2001)**.

M. Paiella, *Limited Financial Market Participation: a Transaction Cost-Based Explanation,* IFS Working Paper, 01/06, **TD No. 415 (August 2001)**.

G. Messina, *Per un federalismo equo e solidale: obiettivi e vincoli per la perequazione regionale in Italia,,* Studi economici, Vol. 56 (73), pp. 131-148, **TD No. 416 (August 2001)**.

L Gambacorta *Bank-specific characteristics and monetary policy transmission: the case of Italy,* ECB Working Paper, 103, **TD No. 430 (December 2001)**.

F. Altissimo, A. Bassanetti, R. Cristadoro, M. Forni, M. Lippi, L. Reichlin and G. Veronese *A real time coincident indicator of the euro area business cycle,* CEPR Discussion Paper, 3108, **TD No. 436 (December 2001)**.

A. Gerali and F. Lippi, *On the "conquest" of inflation,* CEPR Discussion Paper, 3101, **TD No. 444 (July 2002)**.

L. Guiso and M. Paiella, *Risk aversion, wealth and background risk,* CEPR Discussion Paper, 2728, **TD No. 483 (September 2003)**.

2002

R. Cesari and F. Panetta, *The performance of italian equity fund*, Journal of Banking and Finance, Vol. 26 (1), pp. 99-126, **TD No. 325 (January 1998)**.

F. Altissimo, S. Siviero and D. Terlizzese, *How deep are the deep parameters?,* Annales d'Economie et de Statistique, (67/68), pp. 207-226, **TD No. 354 (June 1999)**.

F. FORNARI, C. MONTICELLI, M. PERICOLI and M. TIVEGNA, *The impact of news on the exchange rate of the lira and long-term interest rates,* Economic Modelling, Vol. 19 (4), pp. 611-639, **TD No. 358 (October 1999)**.

D. FOCARELLI, F. PANETTA and C. SALLEO, *Why do banks merge?,* Journal of Money, Credit and Banking, Vol. 34 (4), pp. 1047-1066, **TD No. 361 (December 1999)**.

D. J. MARCHETTI, *Markup and the business cycle: Evidence from Italian manufacturing branches,* Open Economies Review, Vol. 13 (1), pp. 87-103, **TD No. 362 (December 1999)**.

F. BUSETTI, *Testing for (common) stochastic trends in the presence of structural break*, Journal of Forecasting, Vol. 21 (2), pp. 81-105, **TD No. 385 (October 2000)**.

F. LIPPI, *Revisiting the Case for a Populist Central Banker,* European Economic Review, Vol. 46 (3), pp. 601-612, **TD No. 386 (October 2000)**.

F. PANETTA, *The stability of the relation between the stock market and macroeconomic forces*, Economic Notes, Vol. 31 (3), pp. 417-450, **TD No. 393 (February 2001)**.

G. GRANDE and L. VENTURA, *Labor income and risky assets under market incompleteness: Evidence from Italian data,* Journal of Banking and Finance, Vol. 26 (2-3), pp. 597-620, **TD No. 399 (March 2001)**.

A. BRANDOLINI, P. CIPOLLONE and P. SESTITO, *Earnings dispersion, low pay and household poverty in Italy, 1977-1998,* in D. Cohen, T. Piketty and G. Saint-Paul (eds.), The Economics of Rising Inequalities, Oxford, Oxford University Press, **TD No. 427 (November 2001)**.

E. GAIOTTI and A. GENERALE, *Does monetary policy have asymmetric effects? A look at the investment decisions of Italian firms,* Giornale degli economisti e annali di economia, v. 61, 1, pp. 29-60, **TD No. 429 (December 2001)**.

G. M. TOMAT, *Durable goods, price indexes and quality change: An application to automobile prices in Italy, 1988-1998,* ECB Working Paper, 118, **TD No. 439 (March 2002)**.

A. PRATI and M. SBRACIA, *Currency crises and uncertainty about fundamentals,* IMF Working Paper, 3, **TD No. 446 (July 2002)**.

L. CANNARI and G. D'ALESSIO, *La distribuzione del reddito e della ricchezza nelle regioni italiane*, Rivista Economica del Mezzogiorno, Vol. 16 (4), pp. 809-847, Il Mulino, **TD No. 482 (June 2003)**.

2003

L. GAMBACORTA, *Asymmetric bank lending channels and ECB monetary policy,* Economic Modelling, Vol. 20, 1, pp. 25-46, **TD No. 340 (October 1998)**.

F. SCHIVARDI, *Reallocation and learning over the business cycle,* European Economic Review, Vol. 47 (1), pp. 95-111, **TD No. 345 (December 1998)**.

P. CASELLI, P. PAGANO and F. SCHIVARDI, *Uncertainty and slowdown of capital accumulation in Europe*, Applied Economics, Vol. 35 (1), pp. 79-89, **TD No. 372 (March 2000).**

F. LIPPI, *Strategic monetary policy with non-atomistic wage setters,* Review of Economic Studies, v. 70, 4, pp. 909-919, **TD No. 374 (June 2000)**.

P. ANGELINI and N. CETORELLI, *The effect of regulatory reform on competition in the banking industry,* Journal of Money, Credit and Banking, Vol. 35, 5, pp. 663-684, **TD No. 380 (October 2000)**.

P. PAGANO and G. FERRAGUTO, Endogenous growth with intertemporally dependent preferences, Contribution to Macroeconomics, Vol. 3 (1), pp. 1-38, **TD No. 382 (October 2000).**

P. PAGANO and F. SCHIVARDI, *Firm size distribution and growth,* Scandinavian Journal of Economics, Vol. 105 (2), pp. 255-274, **TD No. 394 (February 2001)**.

M. PERICOLI and M. SBRACIA, *A Primer on Financial Contagion,* Journal of Economic Surveys, Vol. 17 (4), pp. 571-608, **TD No. 407 (June 2001)**.

M. SBRACIA and A. ZAGHINI, *The role of the banking system in the international transmission of shocks,* World Economy, Vol. 26 (5), pp. 727-754, **TD No. 409 (June 2001)**.

L. GAMBACORTA, *The Italian banking system and monetary policy transmission: evidence from bank level data*, in: I. Angeloni, A. Kashyap and B. Mojon (eds.), Monetary Policy Transmission in the Euro Area, Cambridge University Press, **TD No. 430 (December 2001).**

M. EHRMANN, L. GAMBACORTA, J. MARTÍNEZ PAGÉS, P. SEVESTRE and A. WORMS, *Financial systems and the role of banks in monetary policy transmission in the euro area,* in: I. Angeloni, A. Kashyap and

B. Mojon (eds.), Monetary Policy Transmission in the Euro Area, Cambridge, Cambridge University Press, **TD No. 432 (December 2001)**.

F. SPADAFORA, *Official bailouts, moral hazard and the "Specialtiy" of the international interbank market*, Emerging Markets Review, Vol. 4 (2), pp. 165-196, **TD No. 438 (March 2002)**.

D. FOCARELLI and F. PANETTA, *Are mergers beneficial to consumers? Evidence from the market for bank deposits*, American Economic Review, Vol. 93 (4), pp. 1152-1172, **TD No. 448 (July 2002)**.

E.VIVIANO, *Un'analisi critica delle definizioni di disoccupazione e partecipazione in Italia,* Politica Economica, Vol. 19 (1), pp. 161-190, **TD No. 450 (July 2002)**.

M. PAGNINI, *Misura e determinanti dell'agglomerazione spaziale nei comparti industriali in Italia*, Rivista di Politica Economica, Vol. 93 (3-4), pp. 149-196, **TD No. 452 (October 2002)**.

F. PANETTA, *Evoluzione del sistema bancario e finanziamento dell'economia nel Mezzogiorno,* Moneta e credito, v. 56, 222, pp. 127-160, **TD No. 467 (March 2003)**.

F. BUSETTI and A. M. ROBERT TAYLOR, *Testing against stochastic trend and seasonality in the presence of unattended breaks and unit roots*, Journal of Econometrics, Vol. 117 (1), pp. 21-53, **TD No. 470 (March 2003)**.

P. ZAFFARONI, *Testing against stochastic trend and seasonality in the presence of unattended breaks and unit roots,* Journal of Econometrics, v. 115, 2, pp. 199-258, **TD No. 472 (June 2003)**.

E. BONACCORSI DI PATTI, G. GOBBI and P. E. MISTRULLI, *Sportelli e reti telematiche nella distribuzione dei servizi bancari,* Banca impresa società, v. 2, 2, pp. 189-209, **TD No. 508 (July 2004)**.

2004

P. ANGELINI and N. CETORELLI, *Gli effetti delle modifiche normative sulla concorrenza nel mercato creditizio,* in F. Panetta (eds.), Il sistema bancario negli anni novanta: gli effetti di una trasformazione, Bologna, il Mulino, **TD No. 380 (October 2000)**.

P. CHIADES and L. GAMBACORTA, *The Bernanke and Blinder model in an open economy: The Italian case,* German Economic Review, Vol. 5 (1), pp. 1-34, **TD No. 388 (December 2000)**.

M. BUGAMELLI and P. PAGANO, *Barriers to Investment in ICT*, Applied Economics, Vol. 36 (20), pp. 2275-2286, **TD No. 420 (October 2001)**.

F. BUSETTI, *Preliminary data and econometric forecasting: An application with the Bank of Italy quarterly model*, CEPR Discussion Paper, 4382, **TD No. 437 (December 2001)**.

A. BAFFIGI, R. GOLINELLI and G. PARIGI, *Bridge models to forecast the euro area GDP*, International Journal of Forecasting, Vol. 20 (3), pp. 447-460,**TD No. 456 (December 2002)**.

D. AMEL, C. BARNES, F. PANETTA and C. SALLEO, *Consolidation and Efficiency in the Financial Sector: A Review of the International Evidence*, Journal of Banking and Finance, Vol. 28 (10), pp. 2493-2519, **TD No. 464 (December 2002).**

M. PAIELLA, *Heterogeneity in financial market participation: Appraising its implications for the C-CAPM*, Review of Finance, Vol. 8, 3, pp. 445-480, **TD No. 473 (June 2003)**.

F. CINGANO and F. SCHIVARDI, *Identifying the sources of local productivity growth,* Journal of the European Economic Association, Vol. 2 (4), pp. 720-742, **TD No. 474 (June 2003)**.

E. BARUCCI, C. IMPENNA and R. RENÒ, *Monetary integration, markets and regulation*, Research in Banking and Finance, (4), pp. 319-360, **TD No. 475 (June 2003)**.

G. ARDIZZI, *Cost efficiency in the retail payment networks: first evidence from the Italian credit card system*, Rivista di Politica Economica, Vol. 94, (3), pp. 51-82, **TD No. 480 (June 2003)**.

E. BONACCORSI DI PATTI and G. DELL'ARICCIA, *Bank competition and firm creation*, Journal of Money Credit and Banking, Vol. 36 (2), pp. 225-251, **TD No. 481 (June 2003)**.

R. GOLINELLI and G. PARIGI, *Consumer sentiment and economic activity: a cross country comparison*, Journal of Business Cycle Measurement and Analysis, Vol. 1 (2), pp. 147-170, **TD No. 484 (September 2003)**.

L. GAMBACORTA and P. E. MISTRULLI, *Does bank capital affect lending behavior?*, Journal of Financial Intermediation, Vol. 13 (4), pp. 436-457, **TD No. 486 (September 2003)**.

F. SPADAFORA, *Il pilastro privato del sistema previdenziale: il caso del Regno Unito,* Economia Pubblica, 34, (5), pp. 75-114, **TD No. 503 (June 2004)**.

C. BENTIVOGLI and F. QUINTILIANI, *Tecnologia e dinamica dei vantaggi comparati: un confronto fra quattro regioni italiane*, in C. Conigliani (eds.), *Tra sviluppo e stagnazione: l'economia dell'Emilia-Romagna*, Bologna, Il Mulino, **TD No. 522 (October 2004)**.

G. GOBBI and F. LOTTI, *Entry decisions and adverse selection: an empirical analysis of local credit markets,* Journal of Financial services Research, Vol. 26 (3), pp. 225-244, **TD No. 535 (December 2004)**.

E. GAIOTTI and F. LIPPI, *Pricing behavior and the introduction of the euro:evidence from a panel of restaurants*, Giornale degli Economisti e Annali di Economia, 2004, Vol. 63, (3/4), pp. 491-526, **TD No. 541 (February 2005)**.

2005

L. DEDOLA and F. LIPPI*, The monetary transmission mechanism: Evidence from the industries of 5 OECD countries,* European Economic Review, 2005, Vol. 49, (6), pp. 1543-1569, **TD No. 389 (December 2000)**.

D. J. MARCHETTI and F. NUCCI, *Price stickiness and the contractionary effects of technology shocks.* European Economic Review, v. 49, pp. 1137-1164, **TD No. 392 (February 2001)**.

G. CORSETTI, M. PERICOLI and M. SBRACIA, *Some contagion, some interdependence: More pitfalls in tests of financial contagion,* Journal of International Money and Finance, v. 24, 8, pp. 1177-1199, **TD No. 408 (June 2001)**.

GUISO L., L. PISTAFERRI and F. SCHIVARDI, *Insurance within the firm.* Journal of Political Economy, 113, pp. 1054-1087, **TD No. 414** (**August 2001**)

R. CRISTADORO, M. FORNI, L. REICHLIN and G. VERONESE, *A core inflation indicator for the euro area,* Journal of Money, Credit, and Banking, v. 37, 3, pp. 539-560, **TD No. 435 (December 2001)**.

F. ALTISSIMO, E. GAIOTTI and A. LOCARNO, *Is money informative? Evidence from a large model used for policy analysis,* Economic & Financial Modelling, v. 22, 2, pp. 285-304, **TD No. 445 (July 2002)**.

G. DE BLASIO and S. DI ADDARIO, *Do workers benefit from industrial agglomeration?* Journal of regional Science, Vol. 45, (4), pp. 797-827, **TD No. 453 (October 2002).**

R. TORRINI, *Cross-country differences in self-employment rates: The role of institutions*, Labour Economics, V. 12, 5, pp. 661-683, **TD No. 459 (December 2002)**.

A. CUKIERMAN and F. LIPPI, *Endogenous monetary policy with unobserved potential output,* Journal of Economic Dynamics and Control, v. 29, 11, pp. 1951-1983, **TD No. 493 (June 2004)**.

M. OMICCIOLI, *Il credito commerciale: problemi e teorie,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 494 (June 2004)**.

L. CANNARI, S. CHIRI and M. OMICCIOLI, *Condizioni di pagamento e differenziazione della clientela,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 495 (June 2004)**.

P. FINALDI RUSSO and L. LEVA, *Il debito commerciale in Italia: quanto contano le motivazioni finanziarie?,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 496 (June 2004)**.

A. CARMIGNANI, *Funzionamento della giustizia civile e struttura finanziaria delle imprese: il ruolo del credito commerciale,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 497 (June 2004)**.

G. DE BLASIO, *Credito commerciale e politica monetaria: una verifica basata sull'investimento in scorte,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 498 (June 2004)**.

G. DE BLASIO, *Does trade credit substitute bank credit? Evidence from firm-level data.* Economic notes, Vol. 34 (1), pp. 85-112, **TD No. 498 (June 2004).**

A. DI CESARE, *Estimating Expectations of Shocks Using Option Prices,* The ICFAI Journal of Derivatives Markets, Vol. 2, (1), pp. 42-53, **TD No. 506 (July 2004).**

M. BENVENUTI and M. GALLO, *Il ricorso al "factoring" da parte delle imprese italiane,* in L. Cannari, S. Chiri e M. Omiccioli (eds.), *Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia*, Bologna, Il Mulino, **TD No. 518 (October 2004)**.

L. CASOLARO and L. GAMBACORTA, *Redditività bancaria e ciclo economico,* Bancaria, v. 61, 3, pp. 19-27, **TD No. 519 (October 2004)**.

F. PANETTA, F. SCHIVARDI and M. SHUM, *Do mergers improve information? Evidence from the loan market,* CEPR Discussion Paper, 4961, **TD No. 521 (October 2004)**.

P. DEL GIOVANE and R. SABBATINI, *La divergenza tra inflazione rilevata e percepita in Italia,* Bologna, Il Mulino, **TD No. 532 (December 2004).**

R. TORRINI, *Quota dei profitti e redditività del capitale in Italia: un tentativo di interpretazione*, Politica economica, v. 21, pp. 7-42, **TD No. 551 (June 2005)**.

M. OMICCIOLI, *Il credito commerciale come "collateral"*, in L. Cannari, S. Chiri, M. Omiccioli (eds.), Imprese o intermediari? Aspetti finanziari e commerciali del credito tra imprese in Italia, Bologna, il Mulino, **TD No. 553 (June 2005)**.

L. CASOLARO, L. GAMBACORTA and L. GUISO, *Regulation, formal and informal enforcement and the development of the household loan market. Lessons from Italy,* in Bertola G., Grant C. and Disney R. (eds.) The Economics of Consumer Credit: European Experience and Lessons from the US, Boston, MIT Press, **TD No. 560 (September 2005)**.

S. DI ADDARIO and E. PATACCHINI, *Wages and the city: The italian case,* University of Oxford, Department of Economics. Discussion Paper, 243, **TD No. 570 (January 2006)**.

P. ANGELINI and F. LIPPI, *Did inflation really soar after the euro changeover? Indirect evidence from ATM withdrawals,* CEPR Discussion Paper, 4950, **TD No. 581 (March 2006)**.

2006

C. BIANCOTTI, *A polarization of inequality? The distribution of national Gini coefficients 1970-1996*, Journal of Economic Inequality, v. 4, 1, pp. 1-32, **TD No. 487 (March 2004)**.

M. BOFONDI and G. GOBBI, *Information barriers to entry into credit markets,* Review of Finance, Vol. 10 (1), pp. 39-67, **TD No. 509 (July 2004).**

LIPPI F. and W. FUCHS, *Monetary union with voluntary participation,* Review of Economic Studies, 73, pp. 437-457 **TD No. 512 (July 2004).**

GAIOTTI E. and A. SECCHI, *Is there a cost channel of monetary transmission? An investigation into the pricing behaviour of 2000 firms*, Journal of Money, Credit, and Banking, v. 38, 8, pp. 2013-2038 **TD No. 525 (December 2004)**.

A. BRANDOLINI, P. CIPOLLONE and E. VIVIANO, *Does the ILO definition capture all unemployment?,* Journal of the European Economic Association, v. 4, 1, pp. 153-179, **TD No. 529 (December 2004)**.

A. BRANDOLINI, L. CANNARI, G. D'ALESSIO and I. FAIELLA, *Household Wealth Distribution in Italy in the 1990s,* In E. N. Wolff (ed.) International Perspectives on Household Wealth, Cheltenham, Edward Elgar, **TD No. 530 (December 2004)**.

A. NOBILI, *Assessing the predictive power of financial spreads in the euro area: does parameters instability matter?,* Empirical Economics, v. 31, 4, pp. , **TD No. 544 (February 2005)**.

L. GUISO and M. PAIELLA, *The Role of Risk Aversion in Predicting Individual Behavior, In P. A. Chiappori e C. Gollier (eds.) Competitive Failures in Insurance Markets: Theory and Policy Implications, Monaco, CESifo*, **TD No. 546 (February 2005).**

G. M. TOMAT, *Prices product differentiation and quality measurement: A comparison between hedonic and matched model methods*, Research in Economics, No. 60, pp. 54-68, **TD No. 547 (February 2005)**.

M. CARUSO, *Stock market fluctuations and money demand in Italy, 1913 - 2003*, Economic Notes, v. 35, 1, pp. 1-47, **TD No. 576 (February 2006)**.

R. BRONZINI and G. DE BLASIO, *Evaluating the impact of investment incentives: The case of Italy's Law 488/92.* Journal of Urban Economics, vol. 60, n. 2, pag. 327-349, **TD No. 582 (March 2006).**

A. DI CESARE, *Do market-based indicators anticipate rating agencies? Evidence for international banks*, Economic Notes, v. 35, pp. 121-150, **TD No. 593 (May 2006).**

FORTHCOMING

S. MAGRI, *Italian Households' Debt: The Participation to the Debt market and the Size of the Loan*, Empirical Economics, **TD No. 454 (October 2002)**.

LIPPI F. and S. NERI, *Information variables for monetary policy in a small structural model of the euro area*, Journal of Monetary Economics **TD No. 511 (July 2004)**.

DEDOLA L. and S. NERI, *What does a technology shock do? A VAR analysis with model-based sign restrictions*, Journal of Monetary Economics **TD No. 607 (December 2006)**.