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A POLICY-SENSIBLE CORE-INFLATION MEASURE FOR THE EURO AREA

by Stefano Siviero* and Giovanni Veronese*

Abstract

Although the concept of core inflation is apparently well defined and intuitively appealing, its practical usefulness has often been questioned on at least two accounts: first, existing core inflation measures are by and large exclusively based on statistical criteria and thus lack a firm theoretical justification; second, there appears to be no generally accepted and plausible criterion to assess the empirical performance of competing measures. Both criticisms are indeed justified. In this paper we propose an approach to build a benchmark measure of core inflation that aims to overcome those drawbacks. Our measure is based on a criterion that explicitly treats core inflation as a wholly artificial concept whose usefulness rests only on its role in defuse inflationary pressures that may be in the pipeline. Our measure is obtained by conveniently combining disaggregate information coming from price sub-indices, as is the case for the most popular core inflation measures. However, we depart from all other approaches by combining the information available in price sub-indices in such a way so as to provide the best guidance to a forward-looking monetary policy-maker. Accordingly, our measure of core inflation is based on the solution of a standard monetary policy optimisation problem. We illustrate our approach using a simple estimated model of the euro-area economy and appraise the performance of a few of the most popular core inflation measures in use. We find, generally speaking, that one cannot recommend that those measures be used to support monetary policy-making.

JEL classification: C53, E52

keywords: core inflation, optimal monetary policy rules, Eurosystem

Contents

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1. Introduction[1]

Overall inflation is often thought of as being the observable outcome of two distinct sets of unobservable driving forces: on the one side, inflation reflects the developments in a number of volatile components, whose effects are expected to vanish in a short time, and hence are of no or little relevance for predicting future price dynamics; on the other, it is also driven by relatively long-lasting factors which, unlike the previous component, are expected to provide useful information as to the likely evolution of aggregate price dynamics in the future. Core (or underlying) inflation is, broadly speaking, an indicator that, being unaffected by the relatively high-frequency noise stemming from the more erratic components of currently observed inflation, is able to cast light on future inflationary developments, proving useful guidance for monetary policy-making purposes.

The justification for developing core inflation measures is thus explicitly normative: any such measure is of interest to the extent that it makes it easier to keep future price dynamics under control.

In the recent literature various measures of core (or underlying) inflation have been proposed, which differ in the way transient noise is defined and removed; most, if not all methods, however, share one main feature, in that they are constructed by applying (cross-section or time-series) statistical filters to available information.

Although the concept of core inflation is apparently well defined and intuitively appealing, its practical usefulness has often been questioned on at least two accounts: first, being exclusively based on statistical criteria, existing core inflation measures lack a firm theoretical justification; second, there appears to be no generally accepted and intuitively plausible criterion to assess the empirical performance of competing core inflation measures. Both criticisms are indeed valid. It is particularly striking that, while the main justification for building core inflation measure rests on its ability to effectively support policy decisions, this feature has never been used as the main guiding principle in the construction of indicators of underlying inflation.

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In this paper we propose an approach to build a benchmark measure of core inflation that aims to overcome those drawbacks. Our measure is based on a criterion that treats core inflation as an artificial concept whose usefulness rests only on its role in defusing inflationary pressures that may be in the pipeline. In other words, we set out to select a core inflation measure that explicitly acknowledges its essentially normative nature. A normative viewpoint is also underlying the approach followed by Aoki (2001). However, unlike Aoki (2001) – who finds that the socially optimal allocation may be achieved by targeting inflation in the sticky price sector only, and dubs the latter "core inflation"– we do not ask which price index should be targeted by a monetary policy-maker interested in maximizing the welfare of the representative household; rather, for a given target, we ask on the basis of what synthetic measure of current inflation should the monetary policy-maker make her interest rate decisions.

To put this idea into practice, we consider a monetary policy-maker whose aim is to optimise a standard welfare function whose arguments are overall inflation and, possibly, the output gap and a measure of instrument volatility. In most of the literature, the policy-maker is assumed to react to the state of the economy using a simple Taylor-type rule whose standard arguments are the current inflation rate (or its future expected values), the output gap and lagged values of the policy instrument. We depart from that standard specification and assume instead that the policy-maker may selectively respond to sectoral inflationary developments. We therefore allow for more flexibility in the way the information conveyed by the components of overall inflation may be exploited for policy-making purposes. Specifically, in our framework the monetary policy instrument is allowed to react differently to the main inflation sub-indices. Once the policy-maker's optimisation problem has been solved, we build our core inflation measure as a linear combination of the various inflation components, the weights being a function of the optimised values of the parameters in the policy-maker's reaction function. This differs sharply from available core inflation measures, which are built using weights that are selected on the basis of exclusively statistical criteria. By contrast, the measure we propose is explicitly based on economic criteria and is therefore in principle more sensible from a policy-making viewpoint.

The approach described above is then used to build a measure of core inflation for the euro area, which we then mean to use as a benchmark to compare the performance of popular core inflation indicators. We estimate a simple multi-sectoral model, which describes separately price dynamics in four sectors: industrial goods, services, energy and food. The model we use is mainly intended for illustrative purposes and is admittedly simple; however, our approach can easily be applied to models more firmly founded on theory than the one we use. We then optimise a standard loss function subject to the constraint that the monetary policy rule be a sort of extended Taylor-type rule that includes sectoral inflation rates instead of aggregate inflation only; this delivers the sets of weights on the basis of which we may then compute our benchmark core inflation measure. A few sensitivity checks are also performed.

The rule derived as sketchily described above is then used as a benchmark to appraise the performance of a few of the most popular underlying inflation indicators that can be straighforwardly modelled within our simple multi-sectoral framework. To do so, we impose the appropriate constraints on the specification of the extended Taylor-type rule, and compute the optimal coefficients of the rule thus modified. We also compare the various competing rules on the basis of statistical, rather than policy effectiveness based, criteria; in particular, we compute measures of their ability to predict future inflation developments, and assess their performance during the most recent past.

We find that it may be inappropriate to remove all erratic components from headline inflation: by reacting to core inflation measures that do so, monetary policy effectiveness may be seriously impaired, even if one's reaction is designed so as to be optimal on the basis of standard welfare criterion. In fact, headline inflation is arguably more useful for monetary policy-making purposes (i.e. it results in monetary policy attaining a lower degree of inflation volatility) than many of the most popular core inflation measures. For any given model, our measure of core inflation is best by construction, as it is the only one that does not impose any constraints on the specification of the monetary policy rule. However, if the restrictions that other measures impose on the monetary policy rule were appropriate, our measure should deliver trifling welfare gains. We find this not to be the case: our core inflation indicator dramatically improves monetary policy effectiveness compared with its popular competitors. Finally, our results also suggest that a finer disaggregation of price dynamics than the one we can use (given data availability) is presumably needed in order to build reliable underlying inflation indicators.

Given the model-dependent nature of an indicator such as the one we propose, we believe that its robustness should be thoroughly tested, using a range of models, before it is used in practice;[2] thus, by no means should we be taken to claim that the benchmark indicator we build here provides the best core inflation measure possible (aside from the need to test for robustness, we argue that it may be desirable, in practice, to rely on a finer sectoral and/or country disaggregation). Rather, we intend to show that, once one takes a monetary policy effectiveness perspective (in our opinion, the only sensible one in the present case), the usefulness of popular core inflation indicators may be badly undermined, no matter how appealing they may look from a strictly statistical viewpoint. We also find that a few largely shared *a-prioris* (such as the desirability of getting rid of all that is volatile when building underlying inflation indicators) may result in severely sub-optimal core inflation measures.

The paper is organised as follows: Section 2 presents a brief overview of the literature; Section 3 describes our approach; Section 4 highlights the main properties of the model of the euro-area economy that we use for our empirical application. Section 5 presents the empirical results, first, discussing the properties of our measure, and then appraising the performance of a few popular core inflation indicators relative to our measure. Section 6 concludes.

2. Core inflation in the literature

With the introduction of explicit inflation targets in many countries, the last decade whas witnessed a sizeable growth in the number of core inflation indicators routinely monitored by central banks; at the same time the degree of sophistication underlying their construction has increased. Nonetheless, the ultimate goal of these indicators has remained the same, namely, to extract a signal regarding the underlying inflation trend that embodies the most relevant information from the perspective of the monetary policy-maker, and which may be more informative than the change in the official consumer price index (CPI).

The approaches suggested in the literature to extract the core inflation measures differ mainly with respect to the information set deemed relevant for the extraction of the underlying signal. In the more standard approach, core inflation computation relies on some form of *refinement* of the CPI, which is derived by systematically excluding some classes of products; their exclusion is typically justified on the grounds that the signal to noise ratio in their price changes is just too small to convey useful information on the underlying inflation

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[2] Note, however, that while the benchmark indicator proposed here is model-dependent, its relatively superior forecast ability, documented in Section 5.2, is not, and thus provides substantial empirically-based support for our indicator.

dynamics. The best known core inflation indicator is indeed the CPI Excluding Food and Energy indicator, originally used by Blinder (1982) to estimate underlying inflation in the US in the 1970s and 1980s.

In the same class we can place more sophisticated core inflation measures that rely on the so-called *limited influence estimators* first introduced by Bryan and Cecchetti (1994). Their computation requires a rather high level of disaggregation of the CPI, since the full cross-section of the distribution of price changes is used to remove the most extreme observations in every month.[3] These measures, unlike the more traditional CPI Excluding Food and Energy, do not a priori exclude specific classes of products, as they do not make the assumption that certain items are guaranteed never to contain relevant information regarding trend inflation. In a similar vein, Diewert (1995) proposes instead to exploit the full distribution of price changes in every month weighting each price observation by its information content. In practice, rather than discarding the information contained in the tails of the distribution of price changes, Diewert (1995) proposes assigning to individual price changes weights that are inversely related to their historical variance.

Univariate time series models have also been used to remove high frequency noise from CPI-inflation series and the resulting smoothed series taken to provide an estimate of core inflation. The year-on-year rate of inflation, which constitutes the standard reference measure for the inflation outlook, may itself be viewed as a very crude measure of core inflation; the signal extraction achieved by adopting the year-on-year rate removes seasonal fluctuations, but suffers from to two well-known drawbacks: it is still affected by a sizeable amount of short-run volatility and, furthermore, being a 12-month moving average of the month-on-month changes, it makes severely inefficient use of most recent (and arguably most valuable) information. Other forms of univariate filtering typically involve the use of the Kalman filter, which requires an assumption on the functional form of the underlying core inflation process. More recently, Cogley (2002) has obtained a univariate one-sided filter designed to estimate the persistent component of inflation resulting from monetary policy regime changes.

Bryan and Cecchetti (1993) were the first to apply the dynamic factor index model of Stock and Watson (1991) in the context of inflation analysis. Their approach exploits the

[3] These measures, like the median, the weighted median, or the trimmed mean, aim to capture the central tendency of the distribution of price changes in a more efficient way than the mean does. For a detailed description and evaluation of these measures see Vega and Wynne (2001).

cross-section and time-series information on a small set of price indices to extract the common component of price changes, which is interpreted as core inflation.

A more recent extension of the factor index approach may be found in Cristadoro *et al.* (2005), who construct a core inflation indicator for the euro area. Unlike Bryan and Cecchetti (1993), they use a large panel of euro-area time series containing national/sectoral price variables as well as monetary and real variables. Their core inflation measure is then constructed by projecting the medium- and long-run component of monthly inflation on a set of common shocks, estimated from the panel using a dynamic factor model.

In the SVAR-based approach to the estimation of core inflation, economic theory plays a more direct role. These multivariate time series models attempt to decompose observed inflation into a core and a non-core component. The identification of these unobserved components relies on restrictions that are derived from economic theory. Among these, Quah and Vahey (1995) resort to a structural bivariate VAR, where core inflation is defined as that component of measured inflation that has no impact on output in the medium to long-run. In practice, they estimate it as the component of overall inflation driven by a nominal shock, which is identified using a restriction of long run neutrality on the activity variable. Blix (1995) and Bagliano *et al.* (2002) extend the Quah and Vahey (1995) methodology by modelling the long-run neutrality of money within a cointegrated VAR framework.[4]

To date, lacking a clear theoretical definition, existing core inflation measures are appraised empirically on the basis of three main criteria: their ability to track past movements in overall inflation, their degree of smoothness, and their ability to predict future headline inflation movements (Vega and Wynne, 2001, and Le Bihan and Sedillot, 2000). Only recently Cristadoro *et al.* (2005) have documented the empirical performance of their indicator by comparing actual policy interventions with its dynamics, and showing that the latter tracked well the first five years of interest rate decisions.[5] In this paper we explore the usefulness of the most common core inflation indicators described above in the context of a well-defined monetary policy optimisation problem.

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[4] Blix (1995) assumes stationarity of the velocity of money, implying a cointegrating relationship between output, prices and money

[5] This is also the approach suggested in Galı’ (2001)

3. A policy effectiveness-based approach

To describe our approach it is first appropriate to give our definition of core inflation: in our framework, core inflation is given by an appropriate combination of available information on disaggregate (sectoral) price developments, such that, by basing policy decisions on that measure, the monetary policy-maker maximises policy effectiveness (i.e. minimises a standard welfare loss). This definition explicitly recognises that, for any underlying inflation indicator to be of any use, it must provide valuable information that facilitates the monetary policy-maker's task of keeping overall inflation under control in the future. Given that enhancing policy effectiveness is, in the end, the only motivation behind the construction of core inflation measures, it is natural explicitly to adopt policy effectiveness itself as the main guiding criterion in the quest for such measures. Our indicator will thus by construction be immune from the main criticism often levelled against other popular indicators, to the effect that their performance as a tool to support policy decision-making is usually not demonstrated.

Since our focus is on the optimal way to combine available disaggregate information, we mostly restrict our attention to rather standard Taylor-type rules — in which only contemporaneous inflation and the output gap appear among the arguments, along with a lagged interest rate term — and ignore a number of suggestions that have been made in the literature (e.g. we are not interested in appraising the relative performance of forward-looking rules such as the ones proposed in Batini and Haldane, 1998). However, we depart from the standard framework by assuming disaggregate information on consumer price inflation to be available, so that the policy-maker is not necessarily constrained to react to overall inflation but may instead choose to react only to some components of it, or, more generally, to all components, but not in the way that would be dictated by the sub-components' weights in the overall index of inflation.

We first need to define the policy-maker's preferences. We assume the monetary policy-maker to have the following standard quadratic time-separable loss function:

$$L_t = (1-\delta)E_t \sum_{\tau=0}^{\infty} \delta^{\tau}[(4\pi_{t+\tau})^2 + \lambda y_{t+\tau}^2 + \mu(\Delta i_{t+\tau})^2], \tag{1}$$

where π_t is quarter-on-quarter inflation (so that $4\pi_t$ is annualised quarter-on-quarter inflation), y_t is the output gap, i_t is the policy interest rate controlled by the central bank, δ is a discount factor, λ and μ are parameters that reflect the weights attached by the policy-maker to the variability of the output gap and of the policy interest rate changes relative to the variability of inflation around a target, assumed to be zero for simplicity. Note that the monetary policy-maker is assumed to be interested solely in aggregate inflation; while, as shown below, our approach requires a model that describes the dynamics of at least a few sub-components of overall inflation, our choice of the loss function is consistent with the statutory provisions of the Eurosystem.

For $\delta \longrightarrow 1$ the intertemporal loss function may be interpreted as the unconditional mean of the period loss functions, which in turn is given by the weighted sum of the unconditional variances of the target variables (see Rudebusch and Svensson, 1999):

$$L_t = 16\text{var}(\pi_t) + \lambda\text{var}(y_t) + \mu\text{var}(\Delta i_t). \tag{2}$$

Let us now assume that monetary policy decision-making is supported by a model that provides relatively detailed information on the functioning of the economy, in that it includes not only aggregate inflation, but also models the evolution of a number of sub-components of the aggregate inflation index. Let us assume that information on n such sub-components is available.

The policy-maker is thus faced with the task of combining the available disaggregate information into a measure of underlying inflation that provides the best possible guidance when it comes to taking action now to keep price dynamics under control over the indefinite future.

The most natural way to combine available information optimally is to postulate a generic monetary policy reaction function in which all pieces of information enter separately, and to let that the optimal combination of those disparate pieces of information be determined by the solution of the policy-maker's loss minimisation problem. Accordingly, we posit the following extended Taylor-type monetary policy rule:[6]

(3)
$$i_t = \sum_{j=1}^{n} \gamma_{1,j}\overline{\pi}_{j,t} + \gamma_2 y_t + \gamma_3 i_{t-1}.$$

where $\overline{\pi}_{j,t}$ denotes year-on-year price changes in sector j, $\gamma_{1,1}, ..., \gamma_{1,n}, \gamma_2$ and γ_3 are $n+2$ coefficients to be determined by minimising eq. (1) subject to the constraints given by the available empirical model and to eq. (3). In the empirical application below, $n = 4$.

Let the optimal values of the n parameters $\gamma_{1,j}$ be $\widehat{\gamma}_{1,j}$. We define core inflation π_t^C to be the following linear combination of sectoral inflation rates:

(4)
$$\pi_t^C = \sum_{j=1}^{n} \frac{\widehat{\gamma}_{1,j}}{\widehat{\gamma}_1}\overline{\pi}_{j,t} = \sum_{j=1}^{n} \omega_j \overline{\pi}_{j,t}$$

where $\widehat{\gamma}_1$ is the (yet to be determined; see below) optimal policy-maker's reaction to core inflation itself. Thus, the optimal simple monetary policy rule is similar to the dynamic version of the standard Taylor rule, except that overall inflation is replaced by core inflation:

(5)
$$i_t = \widehat{\gamma}_1 \overline{\pi}_t^C + \widehat{\gamma}_2 y_t + \widehat{\gamma}_3 i_{t-1}.$$

While the definition of core inflation above is rather natural from a policy effectiveness viewpoint, it is not operational yet, as a value has to be chosen for the still undetermined parameter $\widehat{\gamma}_1$: only once the latter has been set is it possible to compute core inflation as in eq. (4). One possibility is to choose $\widehat{\gamma}_1$ so that core inflation coincides with actual headline inflation on average over the whole available sample period. A second straightforward possibility is to impose $\sum_{j=1}^{n} \omega_j = 1$ in eq. (4). In the empirical application below we opt for the first approach.[7]

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[6] Alternatively, one could compute the truly optimal rule, in which the instrument reacts to the whole set of state variables in the model. We chose to stick to simple rules following the recommendations which may be found in most of the literature on optimal monetary policy. Several authors have emphasised that the underperformance of the simple rules should be weighted against their simplicity, that can make them easier to use for the monetary authorities and a more useful tool for communication with the public. Furthermore, simple rules are in general found to be more robust than more model-dependent optimal rules. Thus, there may be a trade-off between performance in the context of a specific model and robustness (see, for instance, the papers presented at the January 1998 NBER Conference on Monetary policy rules, published in Taylor, 1999).

[7] Clearly, the choice of the normalisation criterion affects the level of our core inflation measure, but does not affect its dynamics at all.

There is *a priori* no guarantee that $\overline{\pi}_t^C$ built as described above will be a smooth series; this contrasts with most, if not all, other measures of underlying inflation, which usually are, and must be, substantially smoother than headline inflation. Indeed, Brian and Cecchetti (1994) prescribe that core inflation measures be highly persistent and correlated with future inflation. However, there is no clear reason why the policy-maker should be able to maximise policy effectiveness by looking at (and reacting to) a smooth series: it could well be the case that relevant information gets lost when filtering could actually help to prevent future price accelerations. In any event, we also build a sort of long-run core inflation indicator by approximating the infinite moving average representation that can be computed on the basis of eq. (5):[8]

$$\pi_t^{C,L} = \sum_{\tau=0}^{\infty} \gamma_3^{\tau} \left(\sum_{j=1}^{n} \omega_j \overline{\pi}_{j,t-\tau} \right). \tag{6}$$

Whether or not other popular core inflation indicators are appropriate and desirable may be assessed by measuring their relative performance with respect to the ideal measure built as described above. A number of those indicators may be easily appraised within our framework, simply by imposing the appropriate constraints on the coefficients of the optimal rule.

Consider first the case in which core inflation is given by current headline inflation, so that the policy interest rate is assumed to be determined by a standard (optimal simple) monetary policy rule. The policy effectiveness of relying on such measure may be explored by imposing the following constraint: $\gamma_{1j} = w_j \gamma_1$, where w_j represents the weight of the j-th inflation component in the overall index (so that: $\sum_j w_j = 1$ and $\pi_t = \sum_j w_j \pi_{j,t}$). In this case, the optimal values of just three coefficients of the rule are to be selected. This is done by solving the same optimisation problem as above.

Widely-used measures of core inflation are given by headline inflation net of the latter's most volatile components. Such measures are very easy to compute, which is the main reason for their popularity. To appraise the performance of the indicator given by inflation net of, say, the last m components, we solve the loss minimisation problem above subject to the constraint

8 Alternatively, the long-run core inflation indicator as descibed in the text may be justified on the ground of the weak theoretical arguments for including the lagged policy-controlled interest rate as one of the items of the rule.

that the rule be given by:

(7) $$i_t = \gamma_1 \pi_t^{-[n-m+1,n]} + \gamma_2 y_t + \gamma_3 i_{t-1}$$

where:

(8) $$\pi_t^{-[n-m+1,n]} = \sum_{j=1}^{n-m} \frac{w_j}{\sum_{i=1}^{n-m} w_i} \pi_{j,t}$$

Other popular measures may also be mimicked in a similar fashion (see Section 5).

In all cases, we require the reaction to the chosen core inflation indicator to be the best possible one.

As a benchmark, in the empirical application below we also compute the fully optimal rule (which we label FOR), which depends on all state variables of the multi-sectoral model presented in the next section (see e.g. Chow, 1975).

4. A simple aggregate model of the euro area

The euro-area economy is described by a simple 5-equation model, consisting of an aggregate demand equation (also referred to as IS curve) and four sectoral inflation equations. The first equation relates the overall economy output gap to its own lags and the real interest rate. The sectoral inflation equations instead relate inflation in each sector to its own lags and to those of inflation in other sectors, as well as to the overall output gap.[9] The sum of the coefficients on lagged inflation in each sectoral equation is constrained to be one (a restriction not rejected by the data), so that an accelerationist Phillips curve type of relationship holds in each sector.[10]

Sectoral inflation is given by the seasonally adjusted quarter-on-quarter rate of change in the corresponding HICP series.[11] Potential output is estimated by applying the Hodrick Prescott filter to euro-area (log) GDP.

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[9] While it might be appropriate to assume that price dynamics in each sector depend on the output gap for that particular sector, the available data prevented us from building reliable measures of sectoral output gap.

[10] As the model allows for simultaneous cross-sectoral linkages, it was estimated with SURE.

[11] Seasonal adjustment was performed using Tramo-Seats. CPI data for the 4 largest countries was used before 1992 to reconstruct the euro-area HICP and its main sub-componennts

The model is thus given by:

$$\begin{aligned}
\pi_{j,t+1} &= \sum_{k=1}^{p}\alpha_{j,k}\pi_{j,t+1-k} + \sum_{i\neq j}^{4}\sum_{k=0}^{p}\beta_{j,i,k}\pi_{i,t+1-k} + \sum_{k=0}^{p}\eta_{j,k}y_{t+1-k} + u_{t+1}^{j},\ j = 1,2,3,4 \\
y_{t+1} &= \sum_{k=1}^{p}\theta_{j,k}y_{t+1-k} + \sum_{k=1}^{p}\psi_k(i_{t+1-k} - 4\cdot\pi_{t+1-k}) + v_{t+1}
\end{aligned}$$

The specification search entailed a general-to-specific approach: in the starting specification, the first 4 lags of all relevant variables were included on the right-hand side of each equation. After all insignificant lags were dropped, the parsimonious specification shown in Table 1 was achieved. This framework is admittedly very simple; however, using a more fully-fledged model of sectoral inflation determination, derived from well-defined micro-foundations, would not require any changes to our approach.

Some insights into the main properties of the model can be obtained by looking at the impulse responses of the model (Figures 1-6). The model is closed by using a standard optimised stabilising monetary policy reaction function. For the aggregate demand and sectoral inflation equations the shock amounts to 1 percentage point. In the case of the monetary policy shock the nominal interest rate is raised for one period by 100 basis points.

The results are in line with the well-established stylised facts regarding the monetary transmission mechanism in the euro area. In particular, as found in Angeloni *et al.* (2002) a positive monetary policy shock results in a temporary contraction of output, reaching a maximum at the end of the first year, while the greatest reduction in inflation occurs after around 2-3 years. As shown by the impulse responses, the model is stable, although some shocks may take the economy persistently (though never permanently) away from equilibrium. Aggregate demand shocks as well as sectoral inflation shocks have persistent effects on output and inflation. Given the assumption on the interest rate rule, the sectoral inflation shocks bring about a response of the nominal interest rate, and the output gap, which is larger for those categories with a larger weight in overall inflation (namely, services and goods).

5. Empirical results

In this section we apply the approach presented in Section 3 to the estimated version of the multi-sectoral model presented in the previous section, mainly to illustrate its functioning. The purpose of this section is therefore limited: in particular, we do not mean to propose here a new core inflation indicator (given that, among other limitations, we rely on just one, simple, non-micro-founded model); rather, we want to show how our proposal works in practice. In the process, however, interesting insights on a few of the most popular core inflation measures will emerge.

5.1 *policy effectiveness-based measures of core inflation*

Our approach relies, as mentioned above, on ascertaining the best way to combine information on sectoral inflation rates, where by "best" we mean that the particular combination chosen must result in optimising a given criterion function. Thus, as a preliminary step, we need to specify the policy-maker's preferences.

Given that our goal is to build an inflation indicator that performs best, it is quite natural to assume the monetary policy maker to be a pure inflation targeter, i.e. $\lambda = \mu = 0$. However, we choose to solve the policy-maker's loss minimisation problem for a range of values for both λ and μ. Specifically, for λ we selected equally spaced values between 0 and 5, while the range for μ goes from 0 to 2 (in both cases, for successive increments of 0.5).[12]

We then find optimal values of the coefficients in eq. (3) (with $n = 4$ and j =services, goods, food and energy sectors) by minimising eq. (2) for a range of values of λ and μ.

The results are summarised in Table 2 and Figures 7 and 8. For comparison, the optimal responses to the four sectoral inflation rates are reported together with those that are implicit if we solve the same loss minimisation problem but constrain the rule to be of the standard Taylor-type (i.e. one that includes only three arguments: the aggregate inflation rate, the output gap and the lagged interest rate). The results delivered by the fully optimal policy, which depends on all state variables in the model, are also reported in the table under the heading FOR.

A few features of the results are worth discussing.

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[12] Given that reasonable results could not be obtained for $\lambda = \mu = 0$, the lowest value for both parameters was set to 0.01.

First, the results delivered by our simple rule are just slightly worse than the ones of the fully optimal policy; this is a rather remarkable feature, as the latter loads as many as 15 variables, while our rule loads about one third of them.

Second, it is obviously the case that the policy rule that is allowed to react to sectoral inflation rates must necessarily perform better than the policy rule that is constrained to react to aggregate inflation only (this must be so by construction, as the latter is a constrained version of the former). However, the undeperformance of the latter rule is generally modest.

Third, it is interesting to remark that, contrary to some popular core inflation measures, our approach does not necessarily prescribe that the weight of the most volatile components (food and energy) be zero or, at any rate, much smaller than its weight in overall inflation. Our results suggest that, while the weight of the food component should indeed be small and indeed close to nil, the energy component should retain a relatively high weight.

Having found the optimal parameters of the extended policy rule, we construct our measure of core inflation by imposing the constraint that the latter be the same as actual inflation, on average, over the whole available sample. We furthermore construct a long-run core inflation indicator, as defined in Section 3. The two measures, built on the basis of the optimised policy coefficients for the case $\lambda = \mu = 0.01$, are shown in Figure 9, together with actual aggregate inflation. Descriptive statistics for the three series are shown in Table 3.

It is worth remarking that Figure 9 questions the requirement often imposed on core inflation measures, namely that they be substantially smoother than overall inflation. While our indicator is somewhat smoother than aggregate inflation, its variance is just slightly smaller.

5.2 *Appraisal of popular core inflation indicators*

In this section we appraise the performance of other popular core inflation measures relative to our indicator. Not all measures may be easily included in our framework. We chose to restrict our analysis to indicators whose inclusion is straightforward and does not require any *ad hoc* adjustments, namely: (i) consumer price inflation net of energy goods; (ii) consumer price inflation net of energy goods and food; (iii) Edgeworth measure of core inflation (see Diewert, 1995). The latter measure gives proportionately less weight to the most volatile components of the index, as it is a weighted average of sectoral inflation rates, the weights being inversely proportional to the respective sample variances. The dynamics of all measures are shown in Figure 10. The figure seems to suggest that the popular core inflation indicator obtained by eliminating the most volatile components of overall price dynamics tend to lag behind actual price developments, at least since the upsurge in oil prices that started in early 1999. This evidence is consistent with the findings in Aoki (2001), where "an increase in the relative price of the flexible-price good leads an increase in the prices of sticky-price goods."

The performance of those core inflation measures may be easily appraised within our framework by imposing appropriate constraints to the monetary policy rule, as shown in Table 4:

Table 4: Modelling alternative core inflation indicators in a policy optimisation framework

	Constraints to be imposed on the rule coefficients
Policy-effectiv.-based indicator	none
Headline inflation	$\gamma_{1j} = w_j \gamma_1$ for all j's (where w_j =weight of jth component in index)
Inflation net of energy	$\gamma_{1E} = 0, \gamma_{1j} = \frac{w_j}{w_G + w_S + w_F} \gamma_1$ for $j = G, S, F$
Inflation net of energy & food	$\gamma_{1E} = \gamma_{1F} = 0, \gamma_{1j} = \frac{w_j}{w_G + w_S} \gamma_1$ for $j = G, S$
Edgeworth indicator	$\gamma_{1j} = w_j^e \gamma_1$ for all j's (where $w_j^e = \frac{\frac{1}{\sigma_j^2}}{\sum_i \frac{1}{\sigma_i^2}}$)

For each measure, we compute optimal parameter values by minimising the loss function in eq. (2) under the constraints indicated in Table 4. The results are presented in Table 5 and Figure 11.[13]

Our policy optimisation framework sharply rebuts the two indicators that are most often used in practice (inflation net of energy and net of the energy and food components). Both of them considerably reduce policy effectiveness, and are in fact much inferior both to the unconstrained approach proposed in this paper and to a rule that simply responds to overall inflation. While these results cannot of course question the usefulness of those indicators as measures of what current inflation would look like if no volatile shocks hit the economy, their usefulness for policy guidance is dramatically rejected. By contrast, the Edgeworth indicator performs remarkably well: it seems a much more promising route to take when supporting policy decision-making.

Finally, we test the predictive ability of our indicator compared with that of competing measures. This test is particularly challenging, as predictive ability did not play any role in the

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[13] Results for the inflation-net-of-energy indicator, not reported here, are available from the authors upon request.

selection of our indicator (whereas the exclusion of volatile components is explicitly justified as a quick way to net out high frequency noise that may impair forecasting ability). Also, while all the evidence presented so far is model-dependent, forecasting ability is of course not: should the results of the test favour our measure, this would constitute particularly supportive evidence.

Figure 12 presents the results of the checks suggested by Cogley (2002), consisting in regressing the acceleration of prices between t and $t + h$ over an indicator of "current inflationary pressure," this being the difference between a measure of core inflation and inflation itself, both at time t. For each measure the figure reports the R^2 statistic, for values of h ranging between 1 and 12.

At first sight, the results are quite encouraging: the indicator of current inflationary pressure derived from the policy-based core inflation measure is more correlated with future inflation, for all leads, than any of the inflationary pressure indicators based on the competing and popular core inflation measures we consider (Figure 12 only reports the results for inflation net of the energy and food components, but similar outcomes obtain for the other measures). In the latter, the exclusion constraints or re-weighting schemes are usually justified on the grounds that a measure of inflation net of the most volatile components is likely to provide more reliable projections of future inflation. By contrast, forecast performance was not used, either explicitly or implicitly, in building our indicator.

However, we are not able to accept the hypothesis that our indicator forecast encompasses all others. To test this hypothesis we ran a regression of the acceleration of prices on both our indicator and on the competing ones, one at a time. We then test the restrictions that the constant and the coefficient of the competing indicator are nil, while the coefficient of our indicator should be equal to one. This restriction is often rejected by the data; by contrast, the hypothesis that our indicator is forecast encompassed by any of the other is always and inevitably rejected. Thus, while the evidence is not fully decisive, it tends to support our benchmark indicator.

6. Conclusion

It is common practice to build core inflation indicators that rely on purely statistical criteria; the most popular measures are based on simple manipulations of the data (such as trimming of tails of distribution; exclusion of some components; simple re-weighting schemes). While the precise way in which the various indicators are built differ, they all tend to share a few key features: notably, they all tend to be significantly smoother than headline inflation itself.

While those indicators provide information as to the impact of transient and volatile inflation components of inflation, their practical usefulness in guiding the policy decision-making process has often been questioned.

In this paper we propose an approach aimed at building a core inflation measure explicitly based on policy effectiveness criteria, and showe that such an indicator, despite being very preliminary, appears to have satisfactory properties overal. We show that a few popular core inflation indicators substantially underperform the one we propose, both from a policy effectiveness viewpoint and from a forecasting ability one, although the evidence supporting the latter claim is less sharp. Our findings suggest that there is very little justification for core inflation measures that are widely used, such as inflation net of price dynamics in the energy and/or food sectors.

Our results, although preliminary, appear encouraging. They suggest, however, that a reliable indicator would presumably require more components of the overall inflation index to be taken into account than the few it was possible to consider in this paper. Also, previous research suggests that, in the context of the euro area, an effective core inflation indicator may need to acknowledge explicitly the heterogeneity of euro-area economies (see Angelini *et al.,* 2002). In short more reliable indicators should arguably rely on a finer degree of disaggregation than adopted here, regarding both the sectoral components of the index and the country ones.

References

Angelini P., Del Giovane P. , Siviero S. and Terlizzese D. (2002), "Monetary Policy Rules for the Euro Area: What Role for National Information?," Temi di discussione, No.457, Banca d'Italia, Economic Research Department.

Angeloni I., Mojon B., Kashyap A. and Terlizzese D. (2002), "Monetary Transmission in the Euro Area: Where Do We Stand?," Working Paper Series, No.114, European Central Bank.

Aoki K. (2001), "Optimal Monetary Policy Responses to Relative-Price Changes," Journal of Monetary Economics, Vol. 48, pp. 55-80.

Bagliano, F.C., Golinelli R. and Morana C. (2002), "Core Inflation in the Euro Area," Applied Economics Letters, Vol. 9, p.353-357.

Batini, N. and A. Haldane (1998),"Forward-Looking Rules for Monetary Policy," NBER Working Papers, No. 6543.

Blinder, A. (1982), 1982. "Double-Digit Inflation in the 1970s", in Robert E. Hall, ed., *Inflation: Causes and Effects*. Chicago: University of Chicago Press, pp. 261-82.

Blix, M. (1995), "Underlying Inflation: A Common Trends Approach," Sveriges Riksbank Arbetsrapport, No. 23.

Bryan, M.F. and S.G. Cecchetti (1993), "The Consumer Price Index as a Measure of Inflation," NBER Working Papers, No. 4505

Bryan, M.F. and S.G. Cecchetti (1994), "Measuring Core Inflation," in: N.G. Mankiw (ed.), *Monetary Policy*, NBER, University of Chicago Press, pp. 195-215.

Cogley, T. (2002), "A Simple Adaptive Measure of Core Inflation," Journal of Money, Credit and Banking, Vol. 34, pp. 94-113.

Chow, G. (1975), *Analysis and Control of Dynamic Economic Systems*, Wiley and Sons, New York.

Cristadoro, R., M. Forni, L. Reichlin and G.Veronese (2005), "A core inflation measure for the euro area," Journal of Money, Credit and Banking, Vol. 37, No.3, pp. 539-560.

Diewert, W.E, (1995), "On the stochastic approach to index numbers", Discussion Paper No. 95-31, University of British Columbia, Department. of Economics.

Galí, J. (2001), "Monetary Policy in the Early Years of EMU", paper presented at the conference on "The Functioning of EMU: The Challenge of the Early Years," Brussels March.

Le Bihan, H. and F. Sedillot (2000), "Do Core Inflation Measures Help Forecast Inflation? Out-of-Sample Evidence from French Data," Economic Letters, Vol. 69, No. 3, pp. 261-266.

Quah, D. and S.P. Vahey (1995), "Measuring Core Inflation," Economic Journal, Vol. 105, No. 432, pp. 1130-1144.

Rudebusch, G. and L.E.O. Svensson (1999), "Policy Rules for Inflation Targeting," in: J. Taylor (1999).

Taylor, J. (1999), *Monetary Policy Rules*, The University of Chicago Press.

Vega J.L., and M.A. Wynne (2001), "An Evaluation of Some Measures of Core Inflation for the Euro Area", Working Paper Series, No. 53, European Central Bank.

Table 1: A simple euro area model

	AD	$AS_{Services}$	AS_{Goods}	AS_{Food}	AS_{Energy}
y	0.805 [1]	0.074 [1]	0.035 [1]	0.027 [1]	0.167 [1]
r	-.048 [2]				
$\pi_{Services}$		0.93 [1,2,3]	0.296 [1]	0.491 [1]	0.33 [1]
π_{Goods}			0.704 [1]		
π_{Food}				0.509 [1-4]	
π_{Energy}		0.07 [1]			0.67 [1,3]
$\overline{R}^2$	0.817	0.959	0.972	0.779	0.389
σ	0.398	0.154	0.144	0.357	1.991
DW	1.364	2.194	2.041	2.039	2.024

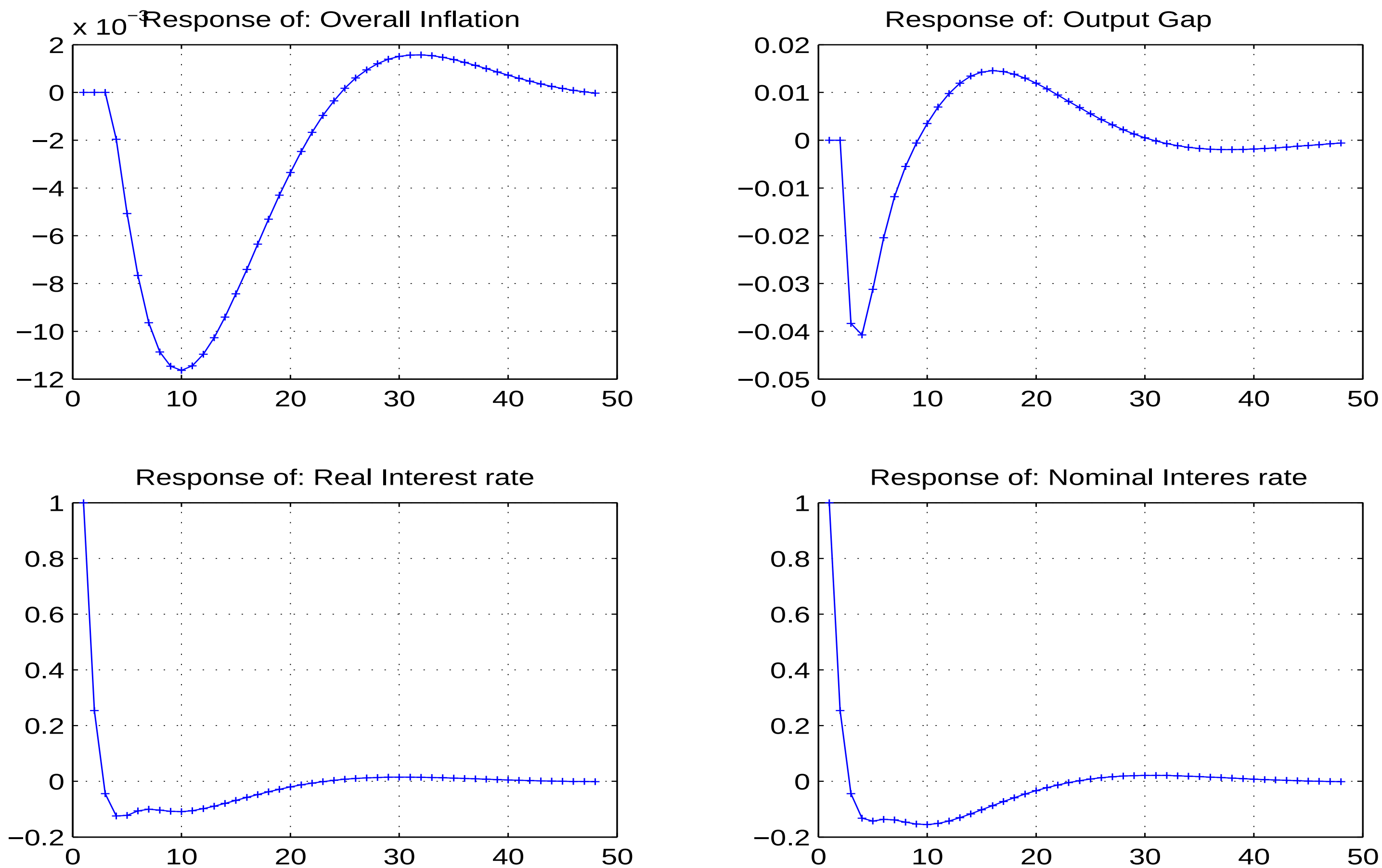

Figure 1: **Impulse response to a nominal interest rate shock (100 b.p.)**

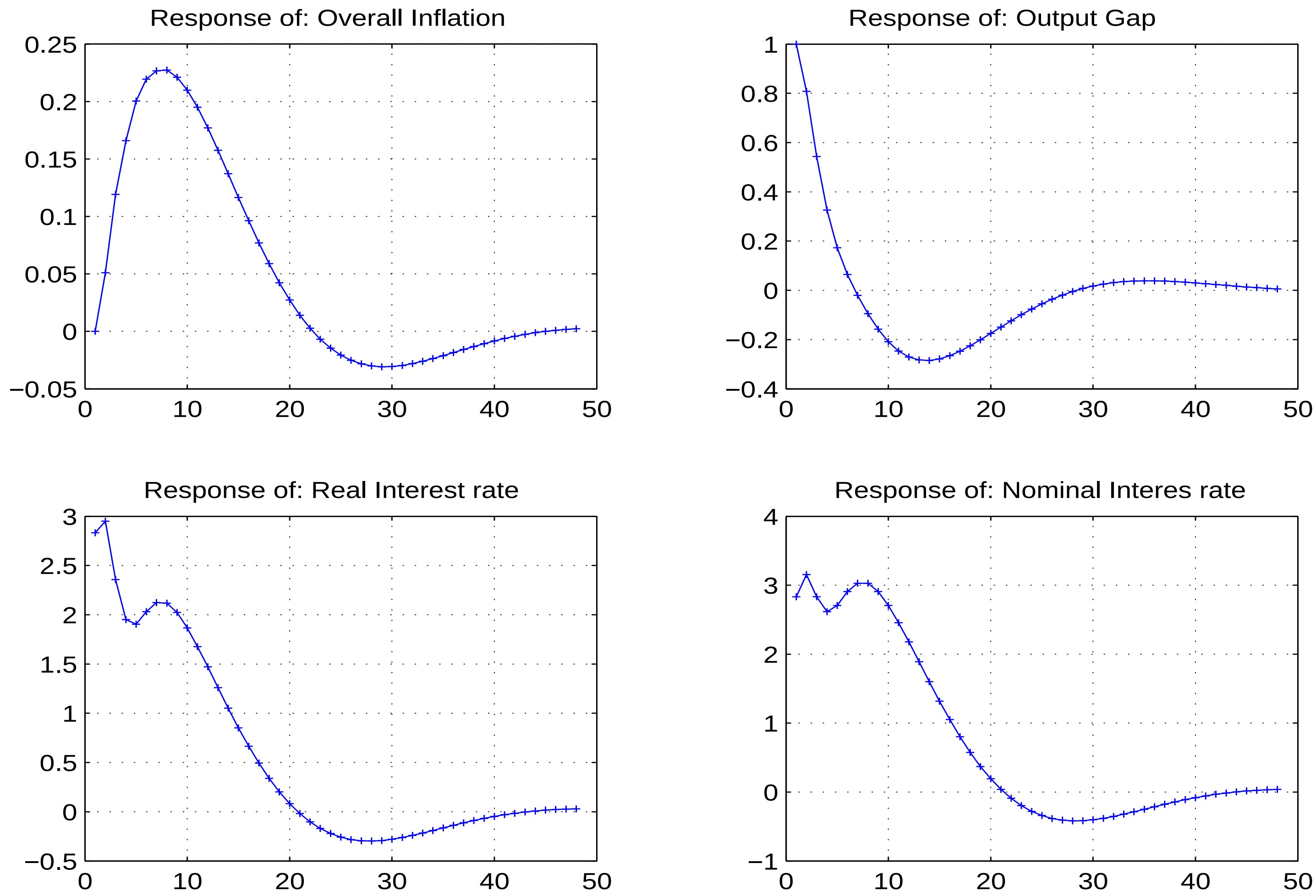

Figure 2: **Impulse response to on Output gap shock**

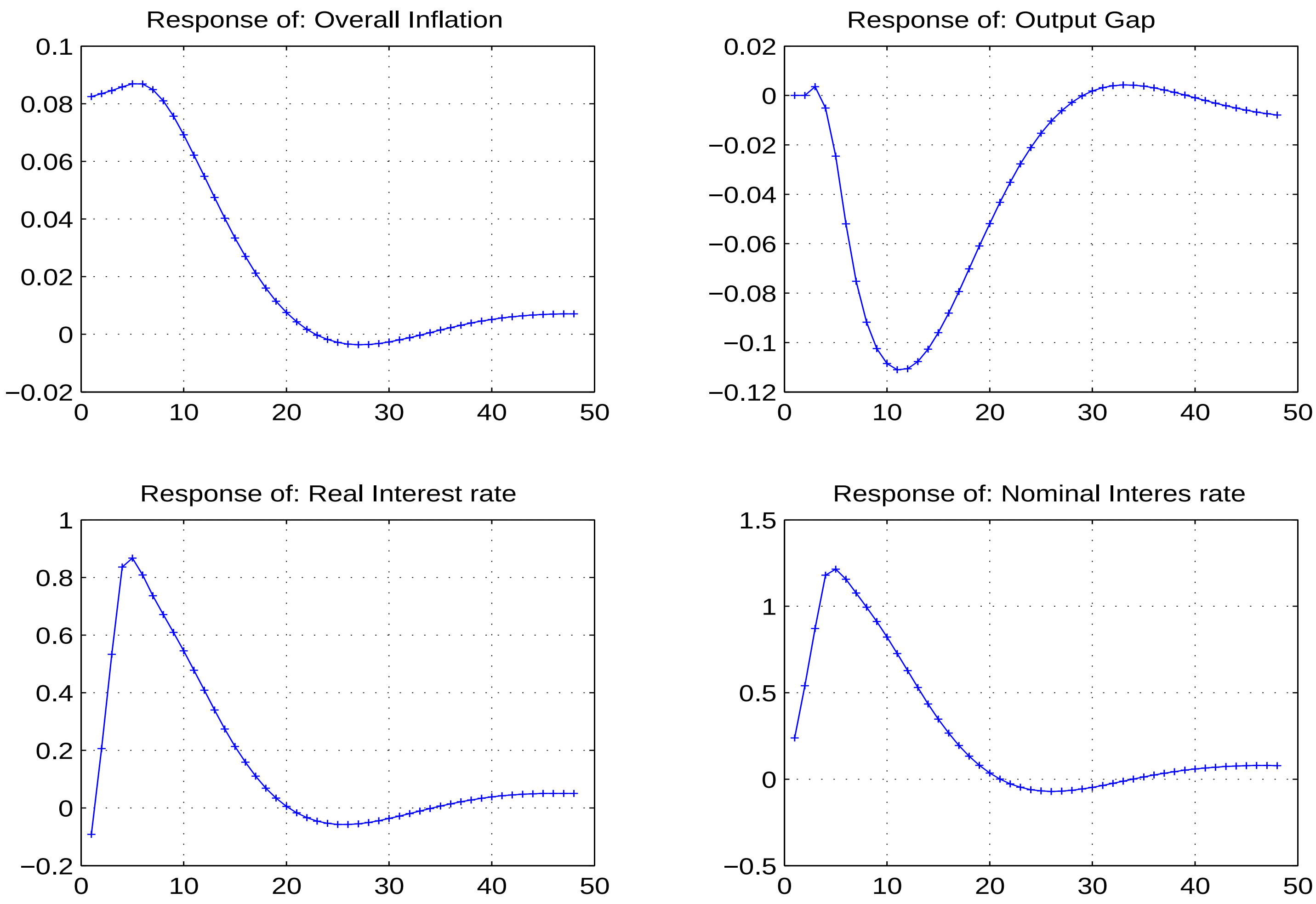

Figure 3: **Impulse response to an Energy price shock**

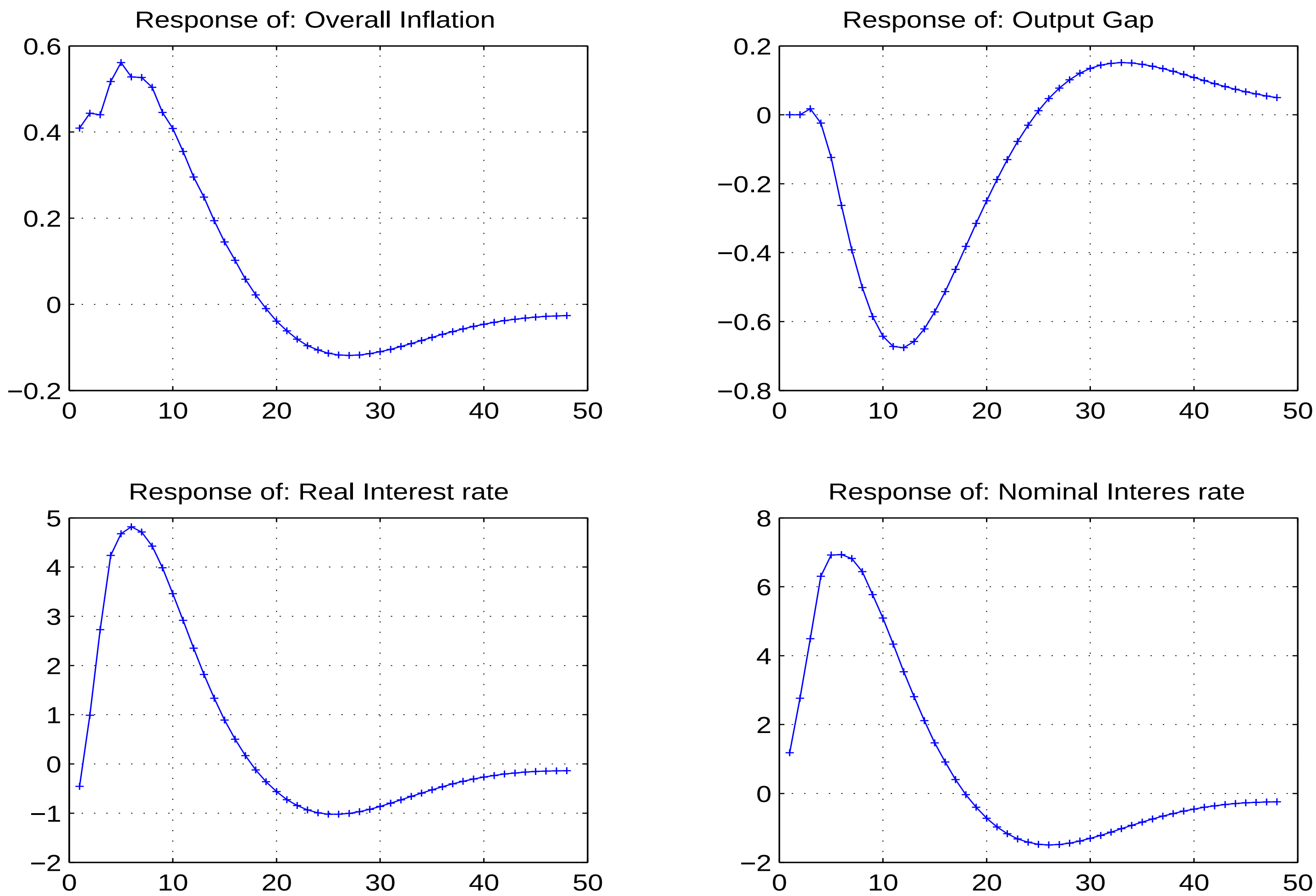

Figure 4: **Impulse Responses to a Services prices shock**

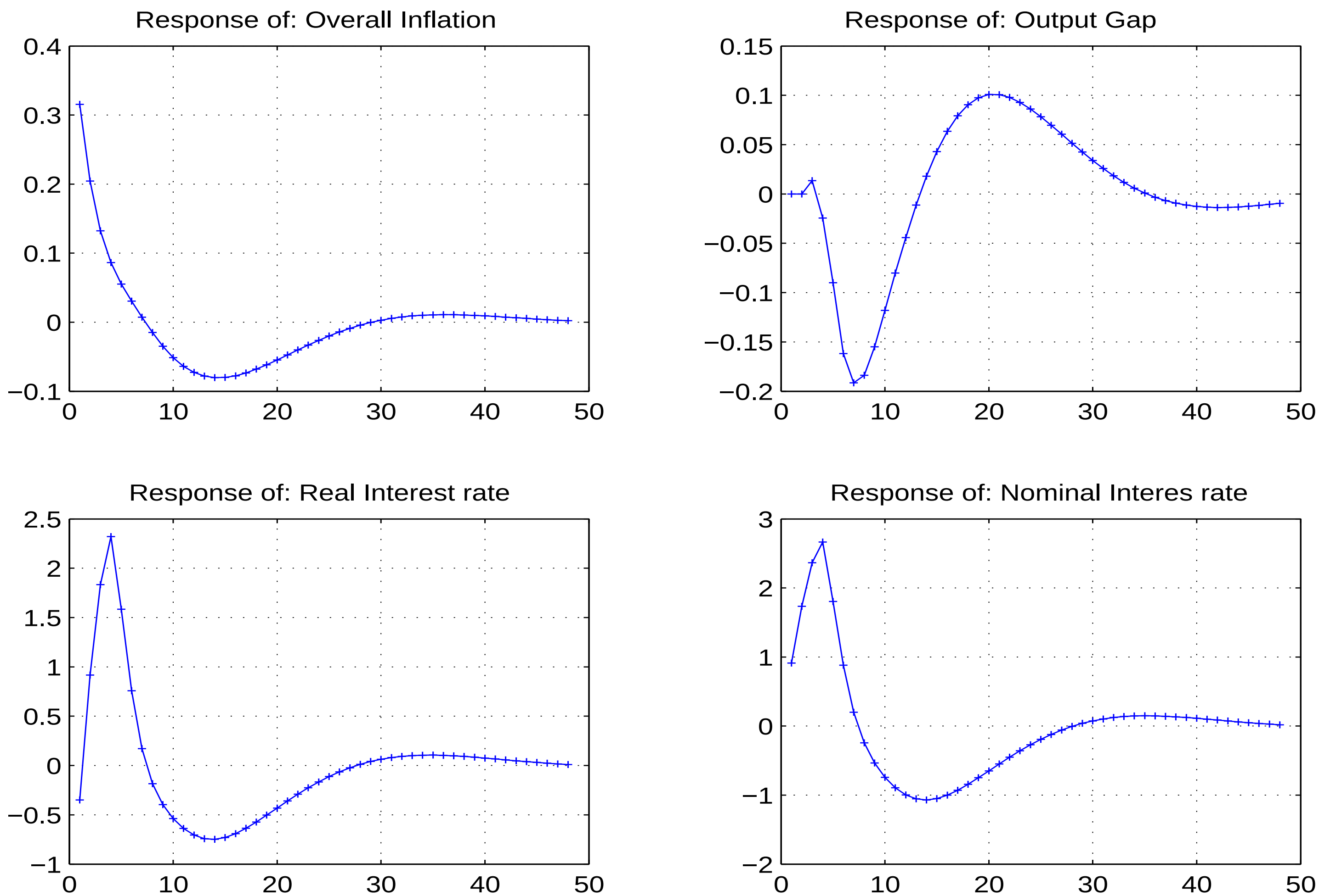

Figure 5: **Impulse Responses to a Goods prices shock**

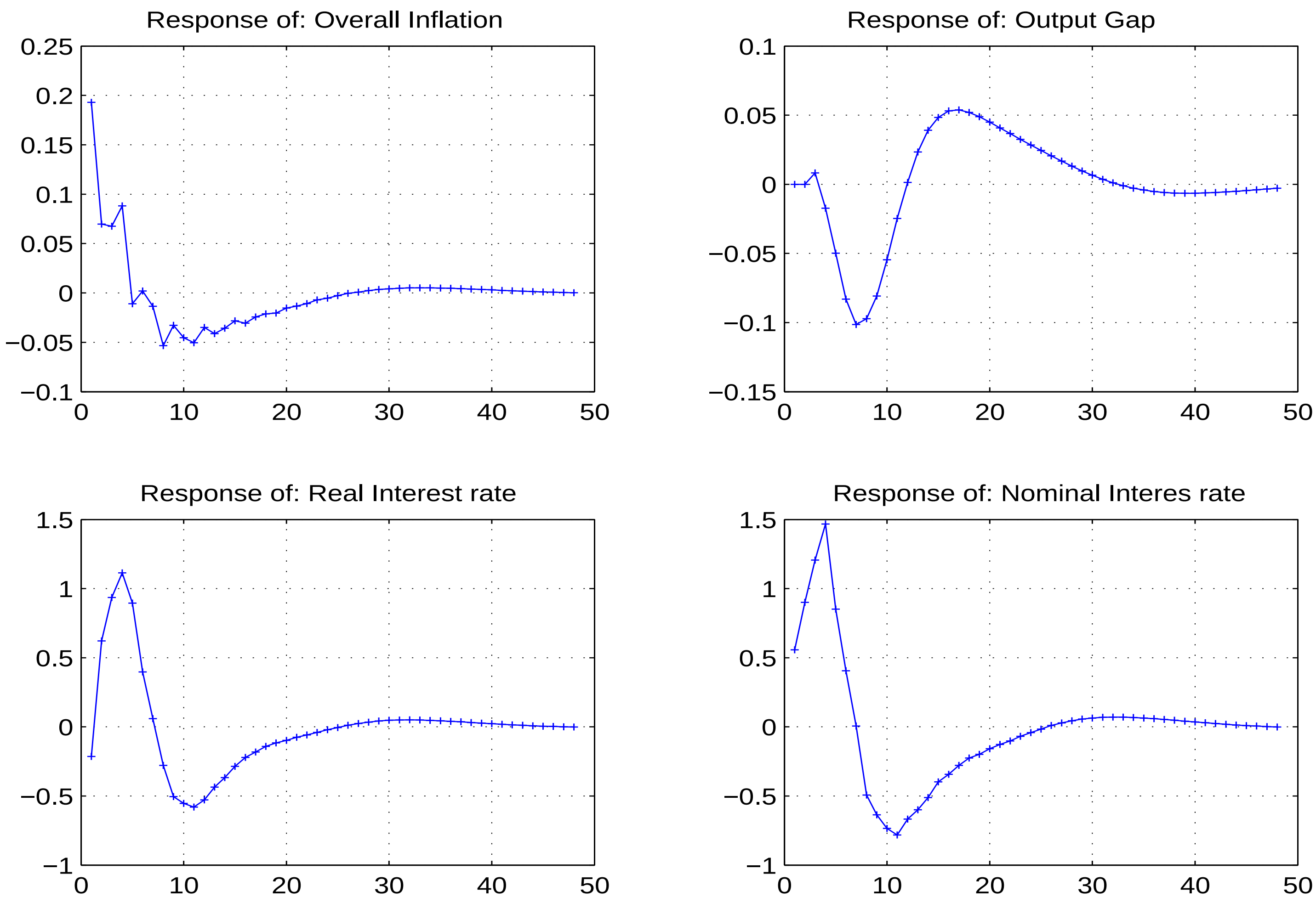

Figure 6: **Impulse Responses to a Food prices shock**

Table 2: Reaction function coefficients and loss for the optimal, the standard and the FOR rules

Parameter values in the loss function		Type of Rule	Coefficients on:				Standard deviation of:			Loss
λ	μ		$\pi_{Services}$	π_{Goods}	π_{Food}	π_{Energy}	Inflation	Output gap	Interest rate change	
0.01	0.01	Model based	19.82	3.67	0.33	2.55	0.49	1.24	7.97	4.52
		Standard	10.79	8.49	5.19	2.44	0.51	1.26	8.10	4.76
		FOR	15.01	1.37	0.20	2.73	0.49	1.24	7.96	4.50
	1	Model Based	3.18	0.59	0.12	0.44	0.71	1.01	1.71	11.08
		Standard	1.83	1.44	0.88	0.41	0.73	1.03	1.74	11.54
		FOR	2.35	0.18	0.05	0.46	0.71	1.01	1.71	11.04
1	0.01	Model Based	18.49	3.50	0.51	2.44	0.51	1.09	7.41	5.85
		Standard	10.33	8.12	4.97	2.33	0.52	1.10	7.54	6.11
		FOR	13.94	1.30	0.30	2.60	0.51	1.09	7.40	5.82
	1	Model Based	3.18	0.61	0.13	0.44	0.72	0.99	1.69	12.07
		Standard	1.85	1.46	0.89	0.42	0.73	1.00	1.72	12.56
		FOR	2.36	0.19	0.06	0.46	0.72	0.99	1.69	12.03
5	0.01	Model Based	16.15	3.29	0.76	2.27	0.56	0.92	7.13	9.71
		Standard	9.58	7.54	4.61	2.16	0.57	0.93	7.25	10.07
		FOR	11.97	1.23	0.43	2.34	0.56	0.92	7.12	9.68
	1	Model Based	3.18	0.65	0.15	0.46	0.74	0.93	1.67	15.71
		Standard	1.91	1.51	0.92	0.43	0.75	0.94	1.70	16.28
		FOR	2.36	0.22	0.08	0.47	0.73	0.92	1.67	15.67

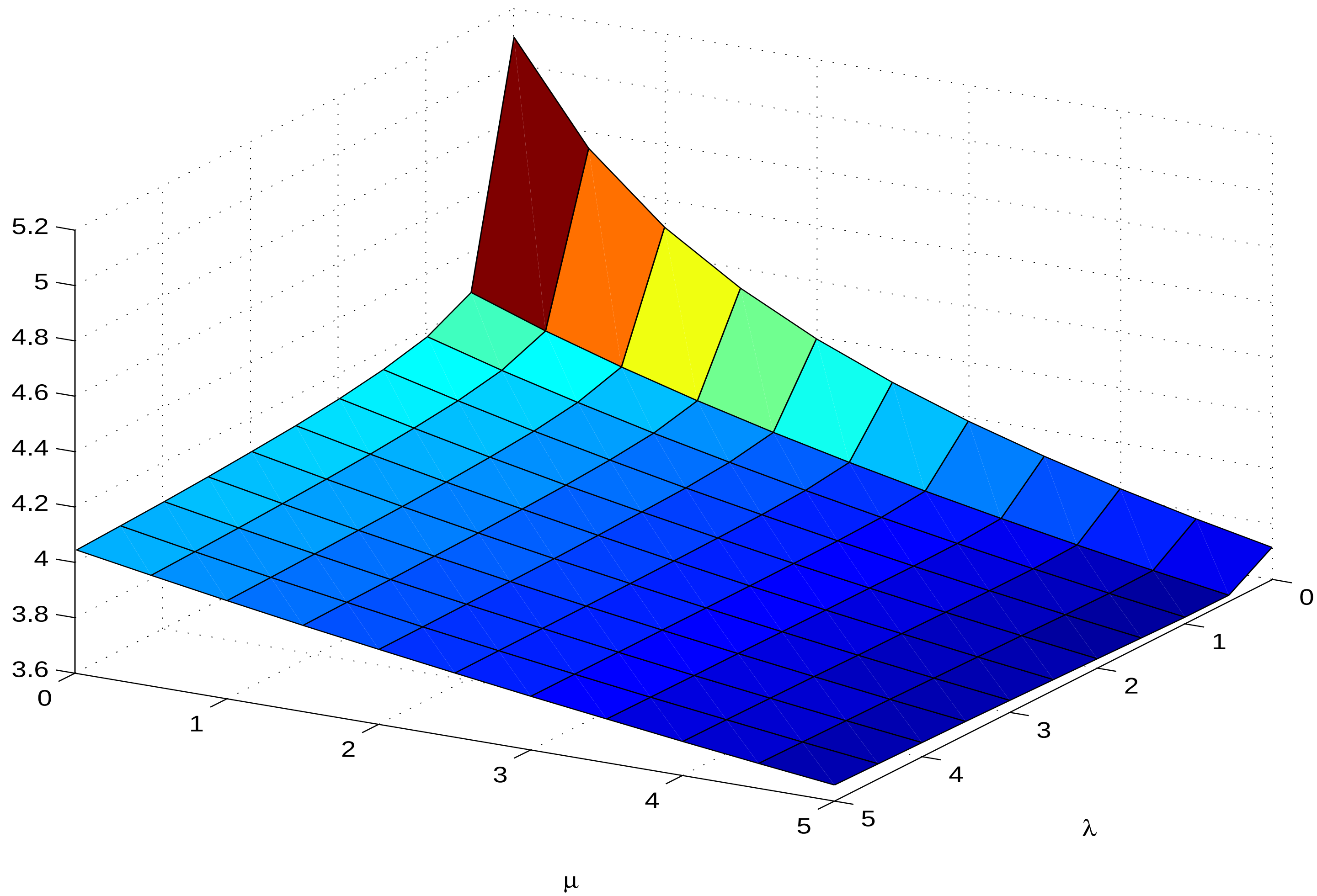

Figure 7: **Percentage increase in the optimised loss function, Standard aggregate inflation rule vs. the Model based disaggregate rule**

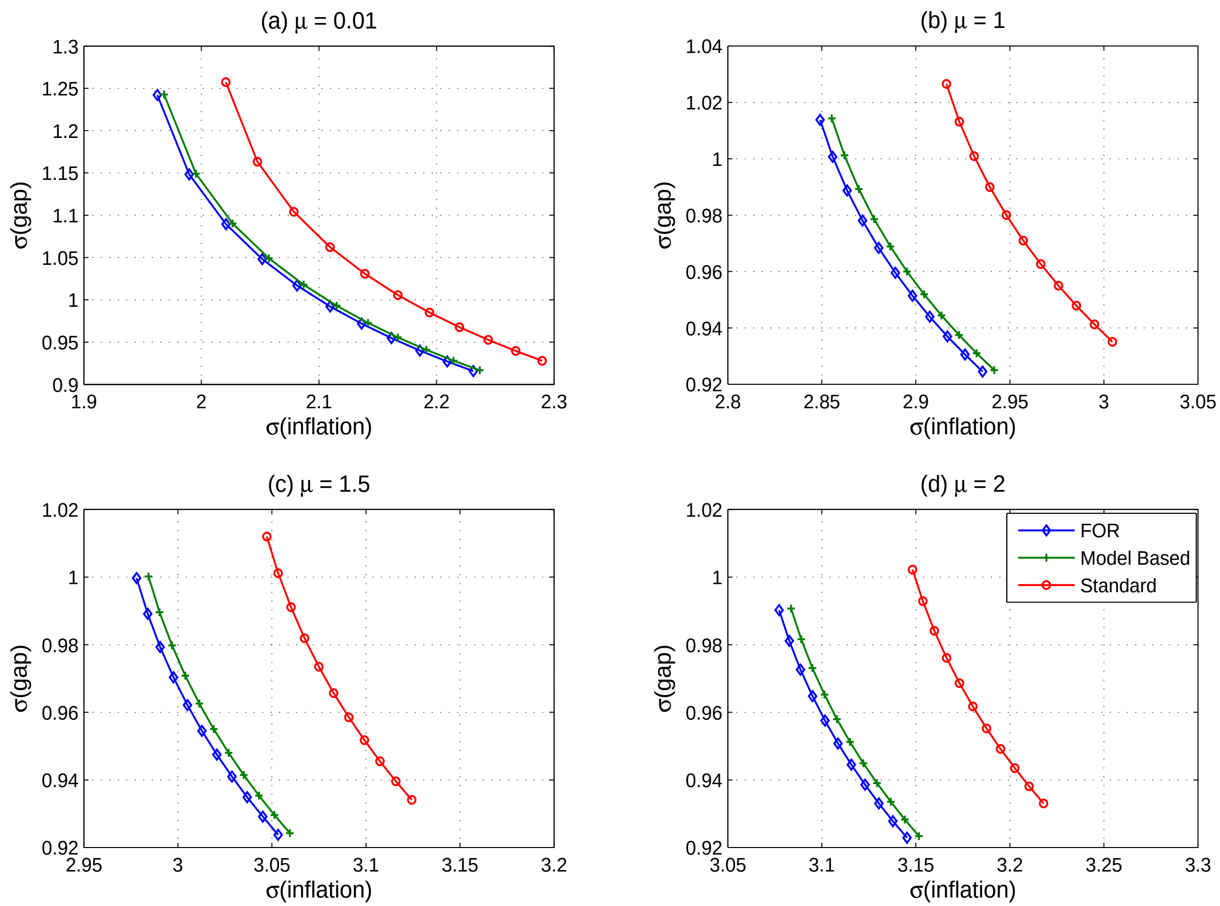

Figure 8: **Inflation - Output gap optimal frontiers**

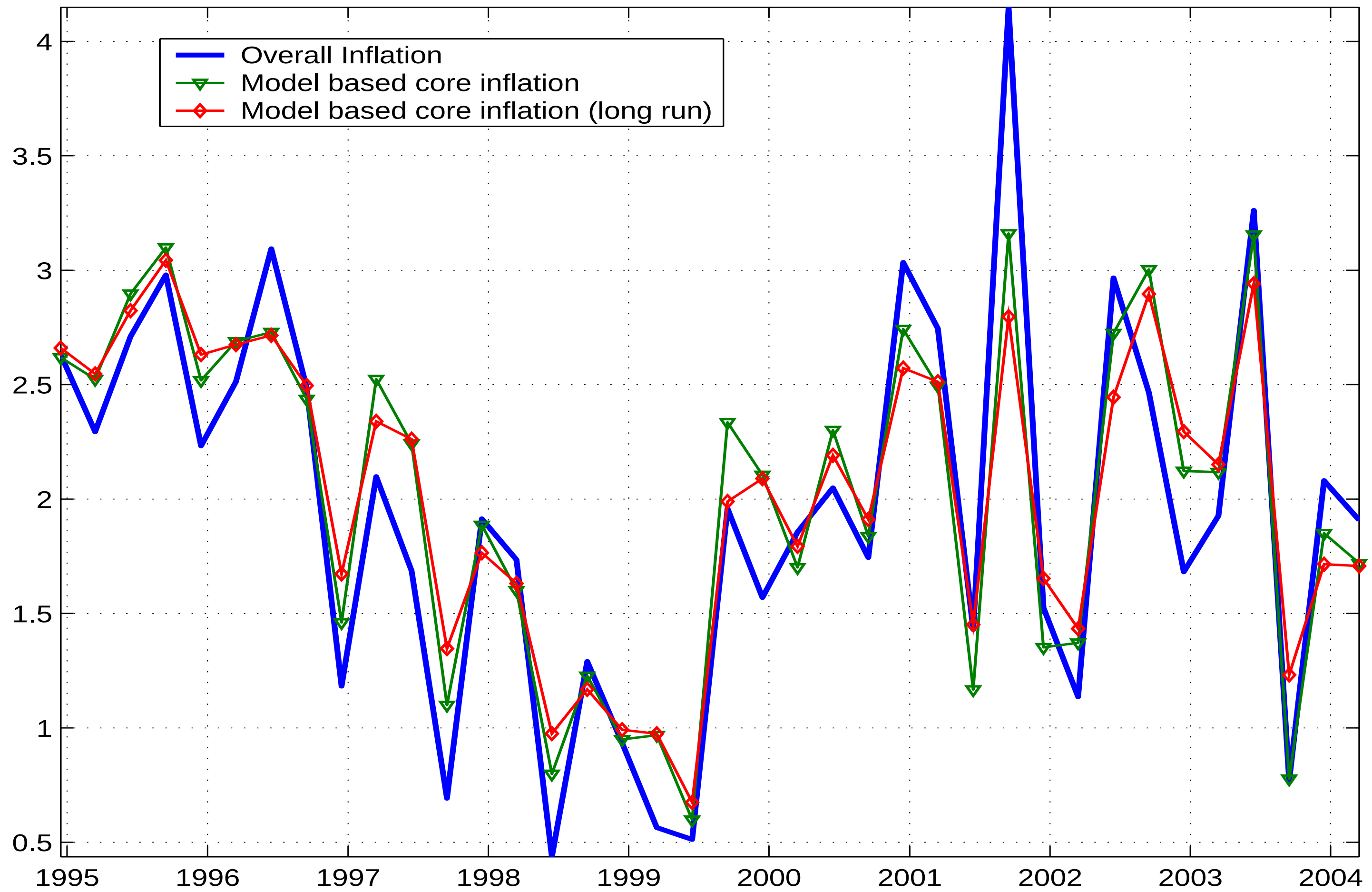

Figure 9: **Euro Area Inflation, Core Inflation and Long Run Core Inflation**

Table 3: Overall inflation and model based core inflation: descriptive statistics

	Standard Deviation	Maximum	Minimum
Model based	0.742	3.160	0.599
Model based (long run)	0.644	3.043	0.675
Overall Inflation	0.850	4.149	0.438

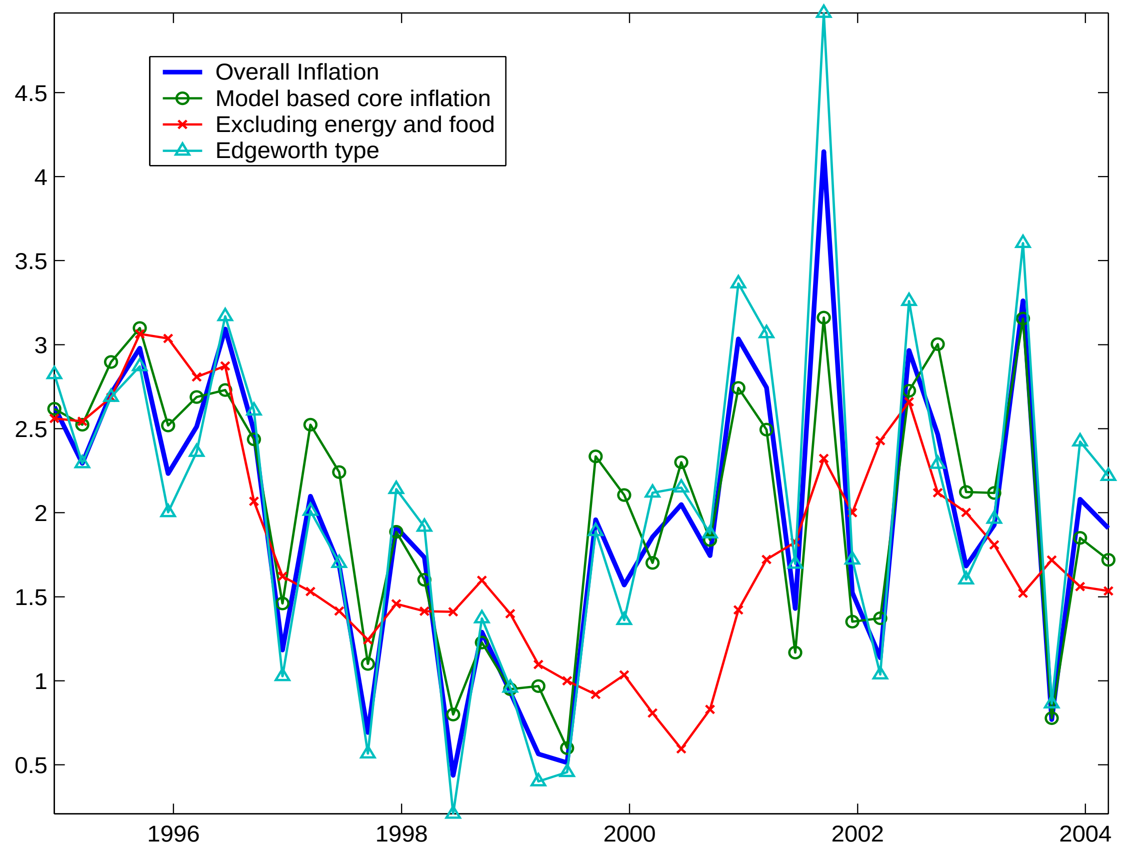

Figure 10: **Alternative Core Inflation Indicators and Overall Inflation**

Table 5: Relative performance of alternative core inflation indicators

Parameter values in the loss function		Type of Rule	Standard deviation of:			Loss
λ	μ		Inflation	Output gap	Interest rate change	
0.01	0.01	Model based	0.49	1.24	7.97	4.52
		Excl. en. and food	1.33	1.59	12.29	29.98
		Edgeworth	0.51	1.25	8.09	4.84
	1	Model based	0.71	1.01	1.71	11.08
		Excl. en. and food	1.55	1.25	2.43	44.31
		Edgeworth	0.73	1.03	1.74	11.62
1	0.01	Model based	0.51	1.09	7.41	5.85
		Excl. en. and food	1.34	1.36	11.54	32.09
		Edgeworth	0.52	1.10	7.54	6.19
	1	Model based	0.72	0.99	1.69	12.07
		Excl. en. and food	1.55	1.21	2.42	45.81
		Edgeworth	0.74	1.00	1.72	12.64
5	0.01	Model based	0.56	0.92	7.13	9.71
		Excl. en. and food	1.38	1.11	11.05	37.93
		Edgeworth	0.58	0.93	7.27	10.15
	1	Model based	0.74	0.93	1.67	15.71
		Excl. en. and food	1.56	1.12	2.40	51.23
		Edgeworth	0.75	0.94	1.70	16.36

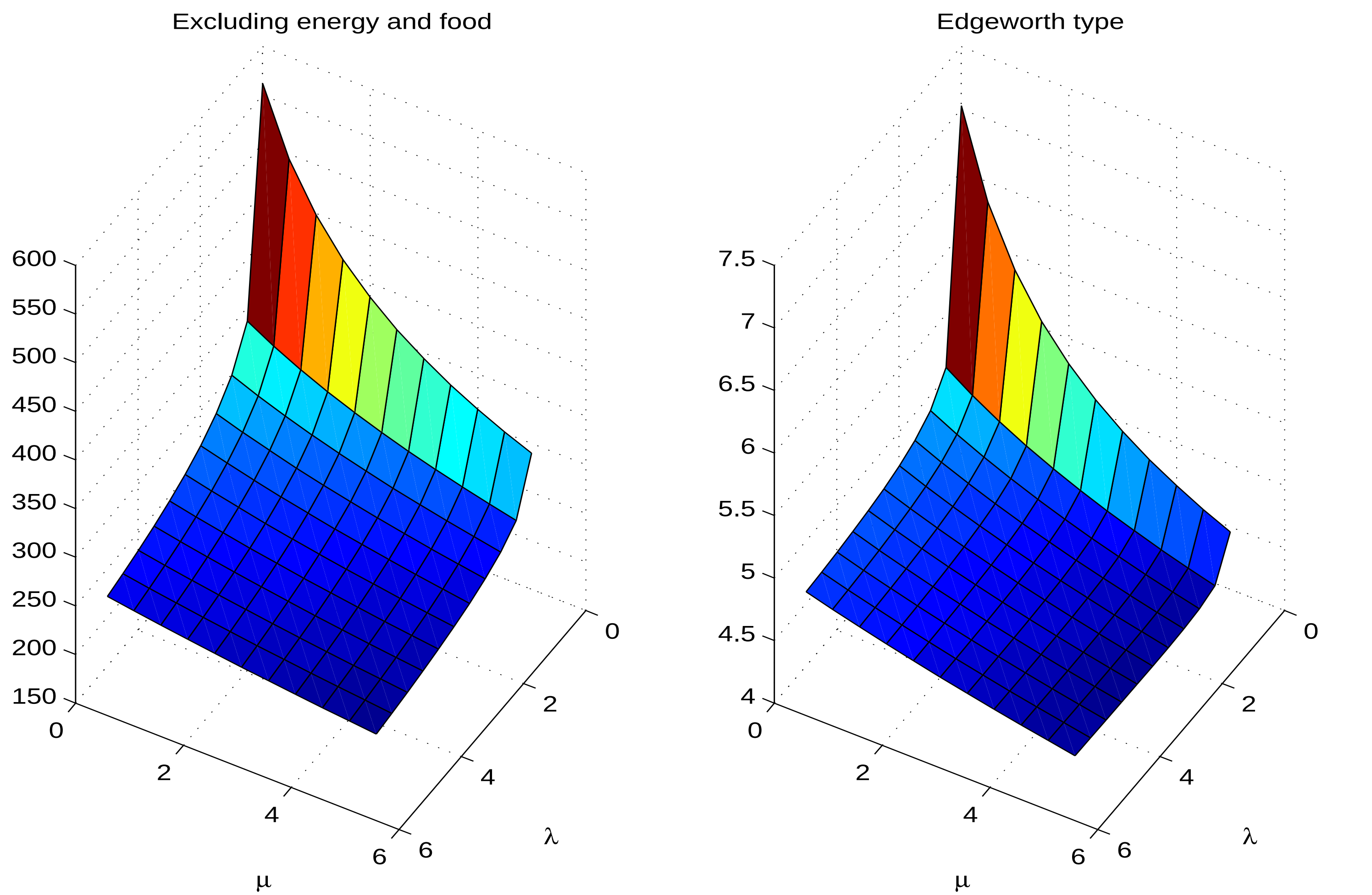

Figure 11: **Percentage increase in the optimised loss function with respect to the Model based disaggregate rule**

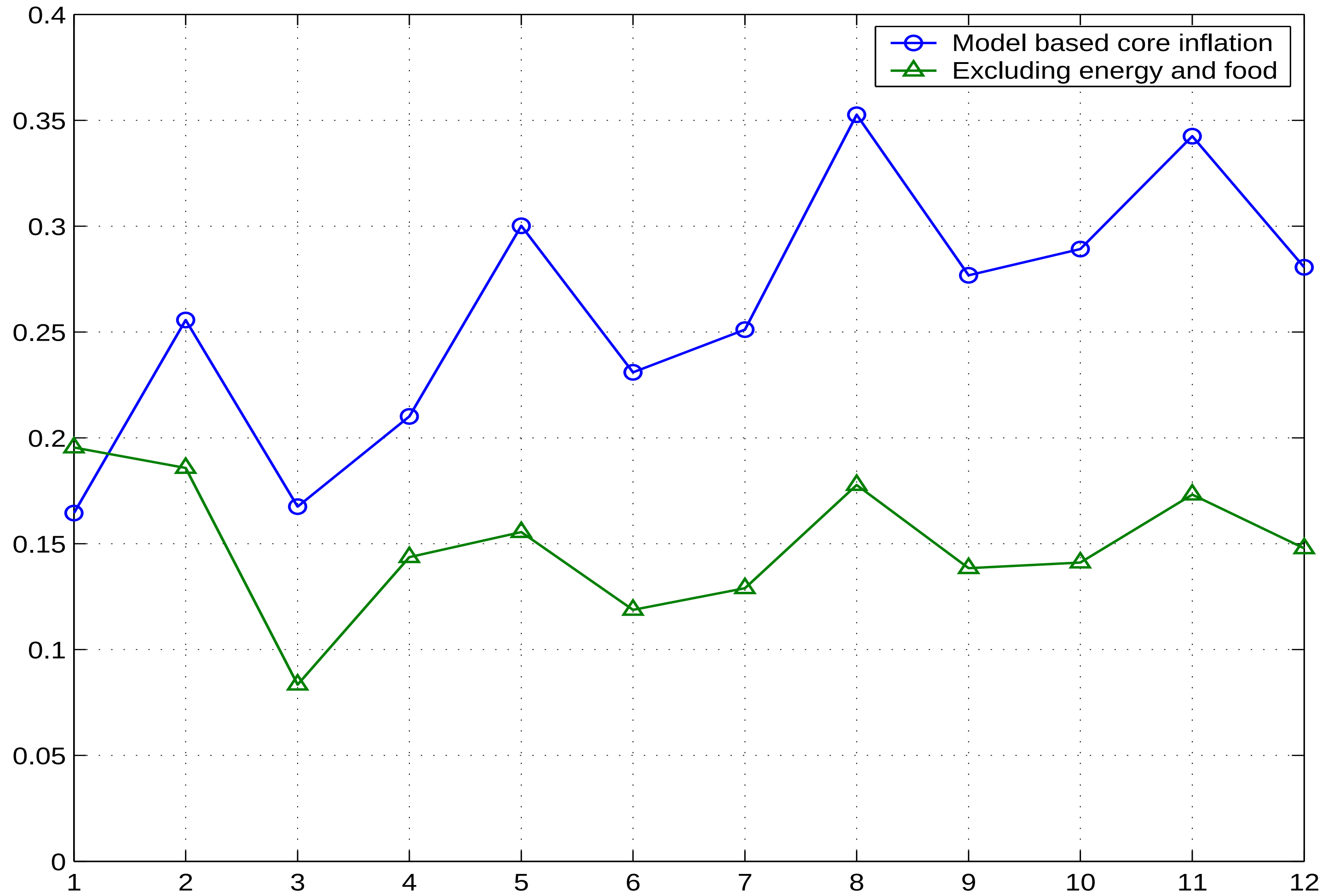

Figure 12: **Forecasting performance (R^2) of model based core inflation and inflation excluding food and energy**

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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)**.

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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).**