



Banco de Portugal

EUROSISTEMA

Estudos e Documentos de Trabalho

Working Papers

23 | 2008

**INFLATION EXPECTATIONS IN THE EURO AREA:
ARE CONSUMERS RATIONAL?**

Francisco Dias

Cláudia Duarte

António Rua

December 2008

*The analyses, opinions and findings of these papers represent the views of the authors,
they are not necessarily those of the Banco de Portugal or the Eurosystem.*

Please address correspondence to

Francisco Dias

Economics and Research Department

Banco de Portugal, Av. Almirante Reis no. 71, 1150-012 Lisboa, Portugal;

Tel.: 351 21 312 8327 , Email: fadias@bportugal.pt

BANCO DE PORTUGAL

Economics and Research Department

Av. Almirante Reis, 71-6th floor

1150-012 Lisboa

www.bportugal.pt

Printed and distributed by

Administrative Services Department

Av. Almirante Reis, 71-2nd floor

1150-012 Lisboa

Number of copies printed

170 issues

Legal Deposit no. 3664/83

ISSN 0870-0117

ISBN 978-989-8061-62-1

Inflation expectations in the euro area: Are consumers rational?

Francisco Dias Cláudia Duarte
Banco de Portugal Banco de Portugal

António Rua
Banco de Portugal

Abstract

In this paper, we propose a quantitative measure for inflation expectations based on consumer survey data. Thereafter, we proceed to testing the rationality assumption. This issue is of noteworthy interest in its own as it is commonly assumed in the theoretical modelling literature that the rational expectations hypothesis holds. This analysis is conducted for the euro area as a whole, as well as for several member countries, using a sample covering the last two decades. Moreover, we also assess if the conclusions hold when one focuses on the post-euro introduction period.

Keywords: Inflation expectations; consumer survey; probability method; rationality tests; common factors.

JEL classification: C16, C22, C43, E31.

1 Introduction

The analysis of agents' expectations is of paramount importance. For instance, it is common practice to assume *a priori* that the rational expectations hypothesis holds in the theoretical modelling literature. Hence, the empirical assessment of the properties of expectations is a key issue. In particular, we focus on inflation expectations, discussing its quantification based on consumer survey data and testing the rationality assumption for the euro area as a whole, as well as for several member countries.

The study of the expectations formation process is particularly relevant for understanding how economic agents make decisions. In addition to its influence on the dynamics of economic behaviour, a formal analysis of expectations became crucial in the wake of Lucas's (1976a) critique. In particular, it is now widely accepted that monitoring the evolution of inflation expectations is of great importance, for example, for central banks, such as the European Central Bank (ECB), who are committed to a credible and price stability-oriented monetary policy.

Among the theories on expectations formation presented so far in the literature, the one that has received more attention is the rational expectations hypothesis. This hypothesis, advanced by Muth (1961), relies on the assumption that expectations are, in their essence, similar to the informed predictions derived from the relevant economic theory. For relevant economic theory read conditional expectations from the 'true' structural economic model, whatever that may be. The rational expectations hypothesis has been subject to an ongoing debate, which partly owes its existence to the inherent difficulties associated with testing a variable that is not easily measurable.

Regarding the measurement of expectations, the surge of qualitative opinion surveys, associated with the improvement of data collection and treatment techniques, fostered the use of quantification methods for measuring expectations. In particular, the probability method, developed by Carlson and Parkin (1975) (CP hereafter), is one of the most widely used for this purpose. This method assumes that each survey respondent answers the questionnaire based on a subjective probability density function associated with the variable under question. Therefore, the aggregate share of respondents that provide a certain answer to the question can be interpreted as a specific portion of the area under

the aggregate probability density function.

In practice, the CP method has been frequently applied to price expectation questions. Initially, the original CP formulae were developed for surveys with three alternative answers (see Carlson and Parkin (1975), Smith and McAleer (1995) and Driver and Urga (2004)). Due to the subsequent existence of surveys in which there are five possible alternative answers, like the European Commission's (EC) consumer survey, the CP method had to be extended in order to take into account the larger information set (see Batchelor and Orr (1988) and Berk (1999)). In this generalised version of the method it is assumed that the consumers' price expectations are conditioned by their perceptions of current and past inflation. This extended method has been applied, for example, by Forsells and Kenny (2002) and Mestre (2007) to the euro area and also by Liziak (2003) to both Poland and the euro area.

The assessment of the rationality hypothesis is based on a set of four tests that has been suggested in the literature, namely tests for unbiasedness, lack of serial correlation, efficiency, and orthogonality (see Pesaran (1989)). The unbiasedness test tries to evaluate the existence of a systematic and/or persistent difference, i.e., a bias, between the observed and the expected inflation measures. The lack of serial correlation test assesses whether forecast errors, defined as the difference between actual inflation and inflation expectations, are serially correlated. Finally, both efficiency and orthogonality tests aim to evaluate the extent to which agents incorporate relevant information (past inflation values, in the case of the efficiency test, and data from a broader set of macroeconomic variables, for the orthogonality test) in their expectation formation process.

Some authors, for instance Grant and Thomas (1999) and Bakhshi and Yates (1998), focus on the unbiasedness test, while others also assess the efficiency and orthogonality (see Thomas Jr. (1999), Forsells and Kenny (2002) and Liziak (2003)). Concerning the assessment of the lack of serial correlation, this test has progressively lost ground. Presently, the existence of serial correlation in the forecast errors is no longer considered inconsistent with rational expectations. In fact, due to overlapping forecast intervals and the difficulties that agents face in identifying the temporary or permanent nature of shocks affecting price developments, serial correlated forecast errors may subsist even in a context of rational expectations (see Grant and Thomas (1999)). Nevertheless, assessing serial correlation in forecast errors may still be relevant, since

understanding the dynamics of forecast errors is essential for the proper testing of efficiency and orthogonality.

As we try to provide further insight on the measurement and on the nature of inflation expectations, the aim of this paper is twofold. First of all, we reassess the measurement and quantification of inflation expectations. In contrast with most of the literature on this topic, which focuses on the euro area and/or a single country, we consider a more comprehensive empirical application, covering data for the euro area as a whole as well as for eight member countries, namely Germany, France, Italy, Spain, Belgium, the Netherlands, Ireland and Portugal. Moreover, as we use the information for the question related to price expectations from the EC consumer survey, we apply the extended version of the CP method for tackling the five alternative answers case. However, unlike most of the work published so far, we anchor the inflation expectations on a more refined measure of inflation perceptions, which is also based on the EC's consumer survey (see Dias *et al.* (2007)).

Secondly, after obtaining a quantified measure of expected inflation, we proceed on testing whether the agents' inflation expectations are rational or not. To shed some light on this issue, we consider the unbiasedness, efficiency and orthogonality tests, and we also check for the serial correlation of forecast errors. While adopting the conventional testing framework for the unbiasedness and efficiency tests (see, for example, Forsells and Kenny (2002) and Liziak (2003)), we extend the orthogonality test framework to those cases in which agents have access to large information sets. In such a context, we resort to the diffusion index model of Stock and Watson (1998). The basic underlying idea of the diffusion index model is to summarise large amounts of information in a handful of variables, which retain the major features of the original dataset.

Furthermore, in order to provide an additional insight into the potential effects of the introduction of the euro on the nature of inflation expectations, the above-mentioned tests are applied not only to the whole sample but also to the post-euro introduction period, i.e., January 1999 onwards.

The paper is organised as follows. In section 2, the quantification of inflation expectations is discussed while in section 3, the framework for the rationality tests is described. In section 4, the empirical results for the euro area and several member countries are presented. Finally, section 5 concludes.

2 Inflation expectations

The existence of regular and readily available economic surveys, such as the EC consumer survey, prompted the use of qualitative data for measuring expectations. Nevertheless, even though the surveys inquire consumers directly on their assessment of future developments in prices, the answers only refer to the agents' opinion on the direction of changes, not to precise figures. Therefore the data gathered are of qualitative nature. Thus, in order to use it as a proxy for inflation expectations, qualitative information has to be converted into quantitative data, so as to be comparable with the benchmark quantitative variable, the observed inflation series.

Amongst all the methods presented in the literature to convert qualitative data into quantitative variables, we use the CP method to quantify the qualitative information on inflation expectations from the EC consumer survey. Though formal comparisons of the different quantification methods encompass several difficulties, there is some evidence in favour of the method proposed by Carlson and Parkin. In a simulation context, the results in terms of measurement errors suggest that the CP method performs well in terms of fitting the generated data (see Nardo (2003)).

The key assumption of the CP method is that each consumer, at each moment in time, responds to the questionnaire according to a subjective probability density function associated with the variable of interest. It follows that the aggregate proportion of respondents that provide a particular answer can be interpreted as a specific area under an aggregate probability density function. Initially, the CP methodology was developed for surveys that encompassed only three possible answers. Within this framework, consumers would report no change in expected inflation if their expectations fell within an interval centred at zero, with fixed boundaries. By the same token, if their expectations were higher (lower) than the right (left) boundary of that interval, they would report a rise (fall) in expected inflation.

Currently, numerous surveys, including the EC consumer survey, present five alternative answers instead of three. In particular, referring to the question on the evaluation of future price developments, the corresponding possible answers are the following (see European Commission (2007)):

By comparison with the past 12 months, how do you expect that consumer

prices will develop in the next 12 months? They will...

- 1) increase more rapidly
- 2) increase at the same rate
- 3) increase at a slower rate
- 4) stay about the same
- 5) fall
- 6) don't know

In other words, consumers are asked if the year-on-year expected inflation rate will be: 1) above their current inflation perceptions; 2) the same as the perceived inflation; 3) below the perceived inflation; 4) nil or 5) negative¹.

To take into account this richer set of answers, the initial formulae of the CP method were extended (see Batchelor and Orr (1988) and Berk (1999)). The extension of this method implicitly allowed for time-varying boundaries for the indifference intervals. Furthermore, the exact wording of the question and the five alternative answers reveals the existence of two reference values for the assessment of the evolution of expected inflation: zero and the perceived inflation. Therefore, the quantification of inflation expectations, through the extended CP methodology, necessarily reflects the different allocation of the answers, the assumed distribution, as well as the perceived inflation rate. So, the calculation of the expected inflation measure requires *i*) the choice of the distribution for inflation expectations across the population, and *ii*) the quantification of inflation perceptions.

Concerning the distribution for inflation expectations, the Normal distribution is the most frequently used. Such a choice is based on the Central Limit Theorem. Consider inflation expectations, at time t , for the N consumers surveyed, as random variables. If one assumes that these variables are independently distributed, with subjective probability density functions with finite first and second moments, then relying on the Central Limit Theorem, the distribution of the sum of these variables, for the N individuals, is asymptotically Normal. Despite not being a consensual choice, the Normal distribution hypothesis has been very popular, probably because of its analytical simplicity, and has proved to be robust to comparative analysis. For example, in contrast

¹As stressed by Mestre (2007), the "don't know" answer is not very informative. Thus, the proportion of respondents that fall in this category are reallocated proportionally to the other response categories (see, for instance, Forsells and Kenny (2002)).

with those who criticise the symmetric shape of the distribution (see, for example, Carlson (1975) and Batchelor (1981)), Balcombe (1996) and Berk (1999) do not find empirical evidence in favour of using asymmetric distributions. Furthermore, the latter and Löffler (1999) conclude that assuming normality does not affect the results significantly.

So, considering the Normal standard distribution, denote P_{it} as the proportion of the answers falling in the i^{th} category at time t , and F as the cumulative Normal distribution function. The relevant thresholds of the intervals are the maximum likelihood estimates that can be obtained from the fractions of responses (see Batchelor and Orr (1988)) (Figure 1). Hence, the thresholds Z_{it} can be defined as

$$Z_{1t} = F_t^{-1}(1 - P_{1t}) \quad (1)$$

$$Z_{2t} = F_t^{-1}(1 - P_{1t} - P_{2t}) \quad (2)$$

$$Z_{3t} = F_t^{-1}(1 - P_{1t} - P_{2t} - P_{3t}) \quad (3)$$

$$Z_{4t} = F_t^{-1}(P_{5t}) \quad (4)$$

Following Batchelor and Orr (1988) and Berk (1999), the expected inflation rate, π_t^e , can be written as:

$$\pi_t^e = \frac{-Z_{3t} - Z_{4t}}{Z_{1t} + Z_{2t} - Z_{3t} - Z_{4t}} \pi_t^p \quad (5)$$

where π_t^p is the perceived inflation rate, which plays a scaling role for the expected inflation rate.

For the perceived inflation rate, several alternatives have been considered in the literature. One immediate and naïve proxy for this variable is the contemporaneous observed inflation rate (Łiziak (2003)), or the one-period lagged inflation, to take into account publication lags (Mestre (2007)). However, it may be a strong assumption to consider that agents perceive current or past inflation rates perfectly, in particular due to the signal extraction problem ((see Lucas (1972, 1976b)). Alternatively, survey information can be used once again, namely the question referring to inflation perceptions to obtain a measure for this variable. Berk (1999) suggests grouping the proportion of responses associated with the five possible answers to this question into only three proportions, and then applying the traditional CP method to obtain a measure of inflation perceptions (see also Mestre (2007)). This approach, though avoiding the

discussion about how to anchor the perceived inflation (with three alternative answers, the only reference is zero), does not fully take into account the detailed information provided by the survey. In this context, Batchelor and Orr (1988), argued for a measure of π_t^p based on the five alternative answers to the question on inflation perceptions, which is anchored to a moderate inflation rate. Following Batchelor and Orr (1988), Dias *et al.* (2007) presented a measure of perceived inflation that exploits all the information available in the survey and which will be adopted in this paper².

3 Rationality

The concept of rational expectations was introduced by Muth (1961) and is based on the assumption that expectations are, in their essence, similar to the informed predictions derived from relevant economic theory. The predictions should exploit, as much as possible, all available information in the dataset. Furthermore, relevant economic theory should encompass the underlying structural economic model.

In practice, for assessing the validity of the rational expectations hypothesis a set of tests has been proposed in the literature, namely tests for unbiasedness, lack of serial correlation, efficiency and orthogonality (see Pesaran (1989)). Unbiased expectations assume that rational agents do not commit systematic and persistent errors when forecasting inflation. This means that rational agents may over or under predict inflation at some moments in time, but that does not take place over a long time span. Considering the following model for observed inflation

$$\pi_t = \alpha + \beta\pi_t^e + u_t \tag{6}$$

where, π_t is the observed inflation rate, then a formal test for unbiasedness can be carried out by jointly testing $\alpha = 0$ and $\beta = 1$. The rejection of this hypothesis suggests the existence of bias in inflation expectations. For instance, if $\alpha \neq 0$ then the expected inflation would not be fully capturing the systematic

²Nevertheless, the overall results are qualitatively similar when the observed inflation rate is used as a proxy for the perceived inflation rate.

component of observed inflation, giving rise to a persistent difference in the averages of the two series.

In a non-stationary context, the rational expectations hypothesis implies that the observed and the expected inflation rates move together, so that there is no persistent divergence between the two variables (see Grant and Thomas (1999)). In this case, the unbiasedness restriction requires the existence of cointegration between the observed and the expected inflation and that the cointegrating vector $[\alpha \ \beta]$ is equal to $[0 \ 1]$. If one rejects the hypothesis of $[\alpha \ \beta] = [0 \ 1]$, then the data suggest that expectations are biased.

Regarding efficiency and orthogonality, both tests are concerned with the use of information by agents to forecast inflation: in the first case, with the use of past inflation rates, while, in the second, with the use of a wider set of information. The terminology of the tests is not consensual among the different authors. For example, Forsells and Kenny (2002) use weak- and strong-efficiency to designate the efficiency and orthogonality tests, respectively. Testing weak-efficiency (or efficiency) consists in assessing the statistical significance of past observed inflation values in a regression with the forecast error, defined as the difference between observed and expected inflation, as dependent variable. If the coefficient in this regression associated with past inflation is significant, then lagged observed inflation can be helpful to improve inflation forecast accuracy.

For strong-efficiency (or orthogonality), a similar testing framework is considered but, in this case, the purpose is to check if a broader information set is orthogonal to the forecast errors. Considering the following equation,

$$e_t = \mu + \psi\Omega_{t-12} + u_t \tag{7}$$

where $e_t = \pi_t - \pi_t^e$ and Ω_{t-12} denotes the information set available at the time expectations are formed. Forecast errors are orthogonal to the economic variables considered relevant for predicting inflation if $\psi = 0$. Rational agents are supposed to use all relevant information for which the marginal benefit of gathering and utilizing the information exceeds its marginal cost. Since nowadays, due to data dissemination progress, agents have access to a wider information set at a progressively lower cost, the relevant information set can encompass an extremely large number of variables. As noted by Forsells and Kenny (2002), including so many variables in a multivariate equation can lead to multicollinearity and/or overfitting, in addition to the potential scarcity of degrees of

freedom. To avoid these econometric difficulties, these authors suggested transforming this one-step multivariate approach into a several-step univariate one, in which each independent variable is considered one at a time. However, this testing strategy still has some caveats. First of all, the true multivariate nature of the test is lost, as the relevance of each variable for explaining the forecast errors is tested individually. Furthermore, data publication lags are not taken into account.

Recognising these limitations, Liziak (2003) tried to extend this testing procedure in order to take on board publication lags and more than one independent variable at a time. This author considered groups of variables, with between two and six variables each, and built regressions of the forecast errors on each group individually. Moreover, publication lags were also accounted for, by only including, at each moment in time, the variables that the agents actually knew at the time the survey took place. Since forecast errors exhibit autocorrelation, a lagged forecast error term was also included as an additional independent variable.

The strong-efficiency test herein proposed differs from the ones mentioned above, as we try to take into account large information sets. Following the seminal work of Stock and Watson (1998), we rely on the common factors extracted from the original dataset. In this way, it is possible to overcome the problem of the dimension of the information set at hand by reducing the number of regressors in a parsimonious way, without neglecting a significant amount of information. As in Liziak (2003), we also control for lagged forecast error terms and take into account data publication lags, by shifting the relative position of the series, so that at each moment in time the independent variables considered reflect the information available to the agents at the time of the survey (see, for example, Altissimo *et al.* (2007) and Barhoumi *et al.* (2008)). For this purpose, consider the following model

$$e_t = \mu + \sum_{i=1}^p \rho_i e_{t-1} + \sum_{j=1}^k \psi_j F_{j,t-12} + u_t \quad (8)$$

where p is the number of autoregressive terms included in order to cope for autocorrelation, F_j refers to the j^{th} common factor extracted from the broad information set and k denotes the number of common factors considered in the regression. We rely on the criteria proposed by Bai and Ng (2002) to determine

the number of factors to be included in the model. Hence, agents' inflation expectations are orthogonal to the information set considered or, in other words, agents are strongly efficient, if the hypothesis $\psi_1 = \dots = \psi_k = 0$ is not rejected.

4 Empirical results

Using the methodology described in section 2, we computed the expected inflation rate for the euro area as a whole and for several individual countries, namely Germany, France, Italy, Spain, Belgium, the Netherlands, Ireland and Portugal³. The survey data, provided by the European Commission, is available on a monthly basis, and the sample period, which differs slightly across countries, covers almost the last twenty years, up to December 2006 (see Table 1). Data for inflation, as measured by the year-on-year rate of change of the consumer price index, are from the OECD Main Economic Indicators database⁴. The resulting measure for inflation expectations is presented in Figure 2.

Concerning bias, we find no evidence in favour of unbiasedness (as in Berk (1999), Liziak (2003) and Mestre (2007)). In this case, observed and expected inflation are integrated of order one (see Table 1). Although Johansen test results point to the existence of cointegration between the observed and the expected inflation (see Table 2), we clearly reject the hypothesis of a cointegrating vector $[\alpha \ \beta]$ being equal to $[0 \ 1]$ for all countries (see Table 3)⁵. This picture does not change significantly if we restrict our sample to the post-euro introduction period, that is since January 1999, in which only Spain and Portugal show some signs of unbiasedness. Nevertheless, when we only test the condition of $\beta = 1$, we conclude that, in general, this hypothesis is not rejected, both for the full and post-euro introduction samples. So, in spite of some evidence in favour of $\beta = 1$, apparently, agents' expectations have, on average, systemati-

³The other member countries of the euro area as of 1999, namely Finland, Austria and Luxembourg, are not included because the corresponding series for these countries are only available for a shorter time span.

⁴In particular, for the euro area, the data refers to HICP, while for individual countries we consider CPI, because a longer time span is available. Nevertheless, if one considers HICP instead of CPI for the common sample period, the results remain virtually unchanged.

⁵The results do not change qualitatively if, instead of the Johansen cointegration test, we consider the single equation test of Engle-Granger. The latter results are available from the authors upon request.

cally underestimated inflation, as the estimates obtained for α (whether or not imposing the restriction of $\beta = 1$) are, in general, positive⁶.

Since agents may, at times, be unable to distinguish correctly between temporary and permanent shocks, it may not be surprising if they make repeated one-sided forecast errors, as they can mistakenly interpret permanent shocks as being of a temporary nature. This fact can help to explain why forecast errors show signs of autocorrelation for lags greater than 12 months⁷. However, this cannot explain entirely the fact that agents systematically underestimate average inflation, throughout the sample period, as the test results suggest and as is apparent in Figure 2, where expected inflation is, most of the time, below observed inflation. In fact, in the context of a steady disinflation process, during the late 80's and the 90's, and of the ECB's commitment to price stability, agents have a motive to, on average, anchor their expectations to a low inflation level, even if lower than the one actually observed.

As the unbiasedness test suggests that agents have, in general, biased inflation expectations, the hypothesis of rational expectations is immediately ruled out, regardless the results of the efficiency and orthogonality tests. Nevertheless, even though agents incur in a systematic expectation error, Paquet (1992) argues that, in these cases, the existence of cointegration between the observed and expected inflation could also be interpreted as some sort of rationality, a so-called weak-form of rationality.

Concerning the weak-efficiency test (see Table 4), we find that for the sample period as a whole, one cannot reject weak-efficiency for the euro area, France, Italy and Spain. Hence, for Germany, Belgium, Netherlands and to a lesser extent Ireland and Portugal, we find no evidence in favour of weak-efficiency. When one considers the post-euro introduction sample, the results remain qualitatively unchanged with two exceptions, namely Germany and Ireland, which also present evidence of weak-efficiency.

Regarding strong-efficiency, in order to implement the above-mentioned test strategy, we had to collect large datasets for each country, from which the common factors were extracted. The information set was drawn from a common

⁶Even though the observed and expected inflation seem to have different means, since the hypothesis of $\beta = 1$ is, in general, not rejected, the forecast errors series turn out to be stationary, as confirmed by the ADF test.

⁷As for lags up to 12 months, the existence of autocorrelation can be related with overlapping forecast errors (see, for example, Forsells and Kenny (2002)).

source, the OECD Main Economic Indicators, which is an easily accessible database and covers a wide range of economic variables, including both quantitative and qualitative data, as well as real and nominal variables. In particular, we only considered the series released on a monthly frequency and available for the same sample period as the consumer survey (see Table 5)⁸. All data are seasonally adjusted (with a few exceptions, such as interest or exchange rates) and, as usual, prior to factor extraction all data were transformed to be stationary. To determine the number of factors k to be included in the regression, we relied on the *IC1* and *IC2* criteria proposed by Bai and Ng (2002). From table 5, one can see that the *IC1* and *IC2* criteria deliver the same result for the number of factors, for all countries except for the euro area (in this case we ended up considering three factors as it encompassed the other alternative). The test results suggest that there is evidence in favour of strong-efficiency only for the euro area, France and Spain (see Table 4). Focusing only on the post-euro introduction sample period, the same evidence holds with two exceptions, namely Italy and Ireland, which also show signs of strong-efficiency.

Hence, no country satisfies the whole set of conditions necessary to comply with the rational expectations hypothesis. This evidence holds not only for the full sample but also for the post-euro introduction period (except for Spain in the latter case).

5 Conclusions

The purpose of this paper is to contribute to the debate on whether inflation expectations are rational or not. This issue is of particular relevance from a policy point of view, for example, to central banks, such as the ECB. Moreover, it has been a common practice in economic modelling to assume that the rational expectations hypothesis applies.

In the first place, inflation expectations measurement is reviewed and a quantification of such expectations is provided. Resorting to the rich consumer survey data released on a monthly basis by the European Commission, we rely on the well-known generalised version of Carlson and Parkin method. Thereafter, we proceed on testing the rationality hypothesis, which involves tests of

⁸A detailed list of the series is available from the authors upon request.

unbiasedness, weak- and strong-efficiency. In the latter test, we extend the testing framework, so as to take on board large information sets resorting to the diffusion index model of Stock and Watson.

The empirical application is undertaken for the euro area and for several member countries, using a sample that covers the last two decades as well as the post-euro introduction period. We find no evidence in favour of unbiasedness, as agents' expectations, on average, systematically underestimate inflation. The results do not change qualitatively if the sample is restricted to the post-euro introduction period, case in which only Spain and Portugal show some signs of unbiasedness. Concerning efficiency, based on the full sample period, we find evidence of strong-efficiency for the euro area, France and Spain, of weak-efficiency for Italy and no efficiency for Belgium, Netherlands, Ireland and Portugal. When one considers only the post-euro introduction period, the differences are that Italy and Ireland also show signs of strong-efficiency while Germany of weak-efficiency. Overall, the assumption of rationality does not seem to hold empirically for consumer inflation expectations in the euro area.

References

- [1] Altissimo, F., R. Cristadoro, M. Forni, M. Lippi and G. Veronese (2007) "New Eurocoin: Tracking economic growth in real time", CEPR Discussion Paper no. 5633.
- [2] Bai, J. and Ng, S. (2002) "Determining the number of factors in approximate factor models", *Econometrica*, 70, no 1, 191-221.
- [3] Bakhshi, H. and Yates, A. (1998) "Are UK inflation expectations rational?", Bank of England Working Paper no. 81.
- [4] Balcombe, K. (1996) "The Carlson and Parkin method applied to NZ price expectations using QSBO survey data", *Economic Letters*, 51, 51-57.
- [5] Barhoumi, K., Benk, S., Cristadoro, R., Reijer, A., Jakaitiene, A., Jelonek, P., Rua, A., Rünstler, G., Ruth, K., van Nieuwenhuyze, C. (2008) "Short-term forecasting of GDP using large datasets: A pseudo real-time forecast evaluation exercise", ECB Occasional Paper Series no. 84, European Central Bank.
- [6] Batchelor, R. (1981) "Aggregate expectations under the stable laws", *Journal of Econometrics*, 16, 199-210.
- [7] Batchelor, R. and Orr, A. (1988) "Inflation expectations revisited", *Economica*, vol. 55, no. 219, 317-331.
- [8] Berk, J. (1999) "Measuring inflation expectations: a survey data approach", *Applied Economics*, 31, 1467-1480.
- [9] Carlson, J. (1975) "Are price expectations normally distributed?", *Journal of the American Statistical Association*, vol. 70, no. 352, 749-754.
- [10] Carlson, J. and Parkin, M. (1975) "Inflation expectations", *Economica*, vol. 42, no. 166, 123-138.
- [11] Dias, F. Duarte, C. and Rua, A. (2007) "Inflation (mis)perceptions in the euro area", Banco de Portugal Working Paper no. 15/2007.
- [12] Driver, C. and Urga, G. (2004) "Transforming Qualitative Survey Data: Performance Comparisons for the UK", *Oxford Bulletin of Economics and Statistics*, 66 (1), 71-89.

- [13] European Commission (2007) "The Joint Harmonised EU Programme of Business and Consumer Surveys - User Guide", European Commission.
- [14] Forsells, M. and Kenny, G. (2002) "The rationality of consumers' inflation expectations: survey-based evidence for the euro area", ECB Working Paper series no. 163.
- [15] Grant, A. and Thomas, L. (1999) "Inflationary expectations and rationality revisited", *Economics Letters*, 62, 331-338.
- [16] Liziak, T. (2003) "Consumer inflation expectations in Poland", ECB Working Paper series no. 287.
- [17] Löffler, J. (1999) "Refining the Carlson-Parkin method", *Economics Letters*, 64, 167-171.
- [18] Lucas, R. (1972) "Expectations and the neutrality of money", *Journal of Economic Theory*, 4, 103-124.
- [19] Lucas, R. (1976a) "Econometric policy evaluation: a critique", in Brunner, K. and Meltzer, A. H. (eds), *The Phillips curve and labour markets*, Carnegie-Rochester Conference Series on Public Policy, vol. 1, North-Holland, Amsterdam.
- [20] Lucas, R. (1976b) "Understanding business cycles", reprinted in R. Lucas (1985) *Studies in business cycle theory*, MIT press, Cambridge (MA), 215-239.
- [21] Mestre, R. (2007) "Are survey-based inflation expectations in the euro area informative?", ECB Working Paper series no. 721.
- [22] Muth, J. F. (1961) "Rational Expectations and the Theory of Price Movements", *Econometrica*, vol. 29, no. 3, 315-335.
- [23] Nardo, M. (2003) "The quantification of qualitative survey data: a critical assessment", *Journal of Economic Surveys*, 17 (5), 645-668.
- [24] Paquet, A. (1992) "Inflationary expectations and rationality", *Economics Letters*, 40, 303-308.
- [25] Pesaran, H. (1989) *The Limits to Rational Expectations*, Basil Blackwell.

- [26] Smith, J. and McAleer, M. (1995) "Alternative Procedures for Converting Qualitative Response Data to Quantitative Expectations: An Application to Australian Manufacturing", *Journal of Applied Econometrics*, 10 (2), 165-185.
- [27] Stock, J. and Watson, M. (1998) "Diffusion Indexes", NBER Working Paper no 6702.

Figure 1 - Inflation expectations distribution

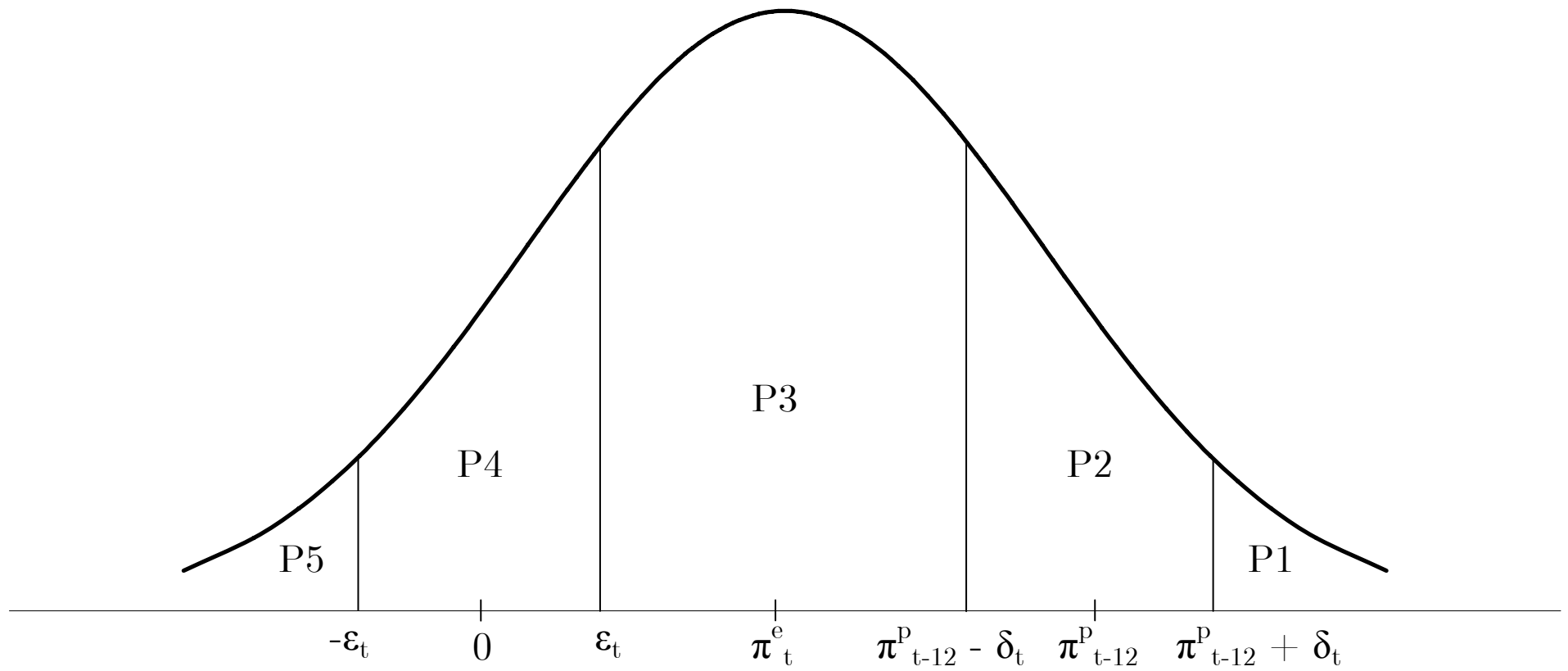


Figure 2 - Observed and expected inflation

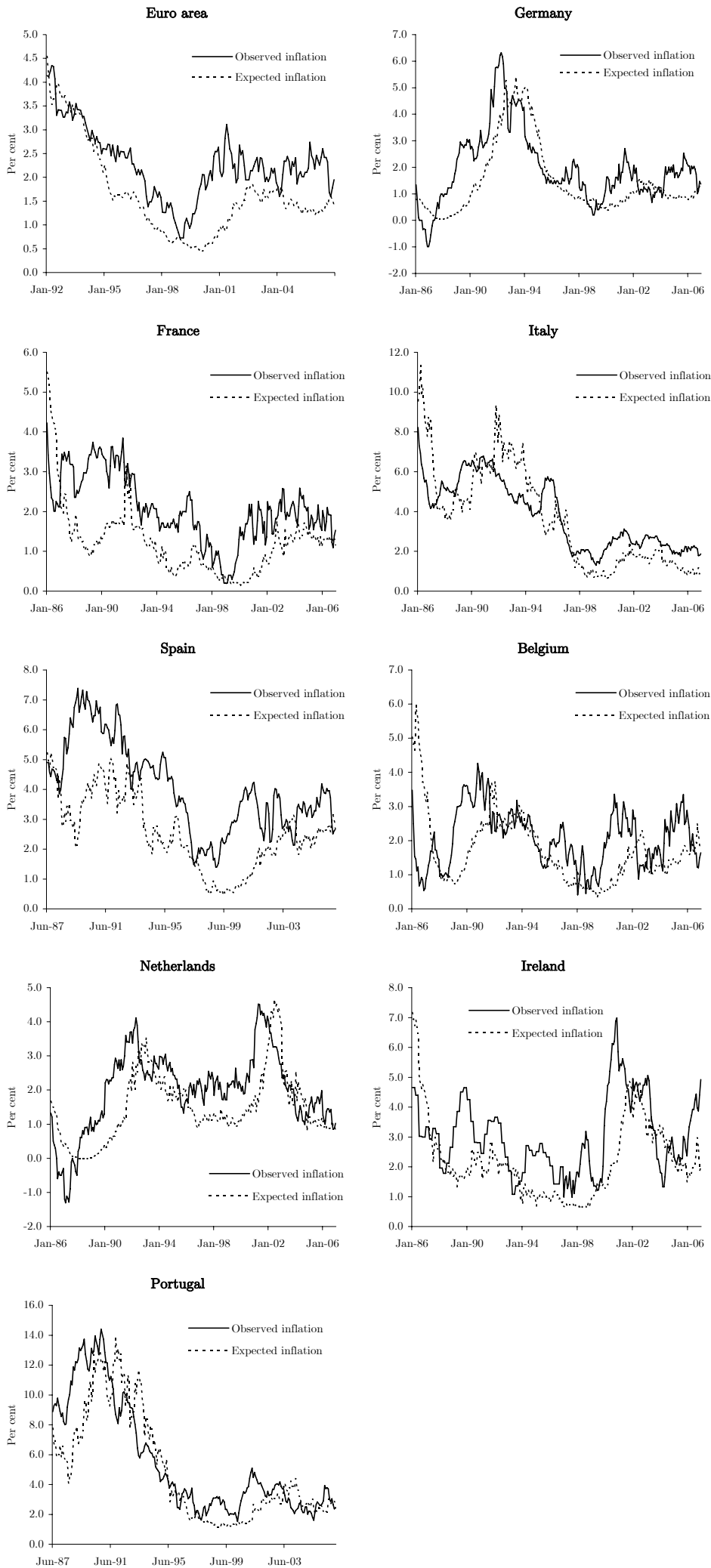


Table 1 - Unit root ADF tests

	Sample period	Observed inflation		Expected inflation	
		t-statistic	p-value	t-statistic	p-value
Euro area	Jan 1992 - Dec 2006	-2.52	0.11	-3.08	0,03*
Germany	Jan 1986 - Dec 2006	-1.74	0.47	-3.04	0,03*
France	Jan 1986 - Dec 2006	-1.89	0.38	-2.77	0.06
Italy	Jan 1986 - Dec 2006	-1.32	0.72	-1.93	0.36
Spain	Jun 1987 - Dec 2006	-1.24	0.76	-2.17	0.23
Belgium	Jan 1986 - Dec 2006	-2.40	0.15	-3.28	0,02*
Netherlands	Jan 1986 - Dec 2006	-2.37	0.16	-1.96	0.34
Ireland	Jan 1986 - Dec 2006	-2.64	0.09	-2.56	0.10
Portugal	Jun 1987 - Dec 2006	-1.29	0.74	-0.94	0.87

Note: ** denotes significance at a 1 per cent level and * at a 5 per cent level.

Table 2 - Cointegration tests

	Johansen trace test			
	r_0	N	λ_{trace} value	p-value
Euro area	0	2	26.79	0.00 **
	1	2	4.82	0.32
Germany	0	2	20.68	0.04 *
	1	2	6.83	0.14
France	0	2	38.71	0.00 **
	1	2	4.84	0.31
Italy	0	2	31.33	0.00 **
	1	2	2.86	0.62
Spain	0	2	22.14	0.03 *
	1	2	1.62	0.84
Belgium	0	2	54.75	0.00 **
	1	2	6.87	0.14
Netherlands	0	2	34.80	0.00 **
	1	2	8.20	0.08
Ireland	0	2	42.39	0.00 **
	1	2	4.16	0.40
Portugal	0	2	27.91	0.00 **
	1	2	2.82	0.62

Note: In the Johansen trace test the hypotheses are formulated as follows: $H_0: r \leq r_0$ vs. $H_1: r \leq N$, where r denotes the number of cointegrating vectors and N is its maximum value, which in this case is 2. ** denotes significance at a 1 per cent level and * at a 5 per cent level.

Table 3 - Bias of inflation expectations

	Full sample				Post-euro sample	
	Null hypothesis		α estimates		Null hypothesis	
	$\alpha = 0$ and $\beta = 1$ p-values	$\beta = 1$ p-values	β free	$\beta = 1$	$\alpha = 0$ and $\beta = 1$ p-values	$\beta = 1$ p-values
Euro area	0.00 **	0.22	0.94 [0,12]	0.78 [0,06]	0.00 **	0.23
Germany	0.01 *	0.81	0.53 [0,20]	0.46 [0,12]	0.03 *	0.06
France	0.00 **	0.00 **	0.25 [0,32]	-1.05 [0,13]	0.01 *	0.56
Italy	0.00 **	0.02 *	1.41 [0,29]	0.72 [0,25]	0.00 **	0.15
Spain	0.00 **	0.04 *	0.62 [0,57]	1.69 [0,23]	0.22	0.14
Belgium	0.00 **	0.18	0.93 [0,20]	0.61 [0,10]	0.02 *	0.35
Netherlands	0.00 **	0.03 *	-0.19 [0,30]	0.51 [0,13]	0.02 *	0.35
Ireland	0.00 **	0.76	1.10 [0,28]	1.02 [0,13]	0.04 *	0.73
Portugal	0.03 *	0.73	0.77 [0,54]	0.92 [0,31]	0.08	0.05

Note: Results obtained through the Johansen approach. ** denotes significance at a 1 per cent level and * at a 5 per cent level. Standard deviations in brackets.

Table 4 - Efficiency of inflation expectations

	Full sample		Post-euro sample	
	Weak	Strong	Weak	Strong
Euro area	0.226	0.460	0.964	0.112
Germany	0.009 **	0.000 **	0.076	0.003 **
France	0.179	0.063	0.081	0.053
Italy	0.080	0.033 *	0.052	0.502
Spain	0.533	0.103	0.422	0.672
Belgium	0.004 **	0.036 *	0.001 **	0.021 *
Netherlands	0.001 **	0.025 *	0.016 *	0.041 *
Ireland	0.024 *	0.038 *	0.066	0.102
Portugal	0.045 *	0.000 **	0.011 *	0.001 **

Note: Each entry of the table corresponds to the p-value of the test statistic (the HACSE versions of the t or F statistic). Rejection of the null should be read as evidence of no efficiency. ** denotes significance at a 1 per cent level and * at a 5 per cent level.

Table 5 - Number of factors according to Bai and Ng criteria

	No. of series	No. of factors according to	
		IC1	IC2
Euro area	58	3	2
Germany	58	4	4
France	60	3	3
Italy	47	2	2
Spain	45	1	1
Belgium	63	1	1
Netherlands	44	1	1
Ireland	34	3	3
Portugal	25	4	4

WORKING PAPERS

2000

- 1/00 UNEMPLOYMENT DURATION: COMPETING AND DEFECTIVE RISKS
— *John T. Addison, Pedro Portugal*
- 2/00 THE ESTIMATION OF RISK PREMIUM IMPLICIT IN OIL PRICES
— *Jorge Barros Luís*
- 3/00 EVALUATING CORE INFLATION INDICATORS
— *Carlos Robalo Marques, Pedro Duarte Neves, Luís Morais Sarmiento*
- 4/00 LABOR MARKETS AND KALEIDOSCOPIIC COMPARATIVE ADVANTAGE
— *Daniel A. Traça*
- 5/00 WHY SHOULD CENTRAL BANKS AVOID THE USE OF THE UNDERLYING INFLATION INDICATOR?
— *Carlos Robalo Marques, Pedro Duarte Neves, Afonso Gonçalves da Silva*
- 6/00 USING THE ASYMMETRIC TRIMMED MEAN AS A CORE INFLATION INDICATOR
— *Carlos Robalo Marques, João Machado Mota*

2001

- 1/01 THE SURVIVAL OF NEW DOMESTIC AND FOREIGN OWNED FIRMS
— *José Mata, Pedro Portugal*
- 2/01 GAPS AND TRIANGLES
— *Bernardino Adão, Isabel Correia, Pedro Teles*
- 3/01 A NEW REPRESENTATION FOR THE FOREIGN CURRENCY RISK PREMIUM
— *Bernardino Adão, Fátima Silva*
- 4/01 ENTRY MISTAKES WITH STRATEGIC PRICING
— *Bernardino Adão*
- 5/01 FINANCING IN THE EUROSISTEM: FIXED VERSUS VARIABLE RATE TENDERS
— *Margarida Catalão-Lopes*
- 6/01 AGGREGATION, PERSISTENCE AND VOLATILITY IN A MACROMODEL
— *Karim Abadir, Gabriel Talmain*
- 7/01 SOME FACTS ABOUT THE CYCLICAL CONVERGENCE IN THE EURO ZONE
— *Frederico Belo*
- 8/01 TENURE, BUSINESS CYCLE AND THE WAGE-SETTING PROCESS
— *Leandro Arozamena, Mário Centeno*
- 9/01 USING THE FIRST PRINCIPAL COMPONENT AS A CORE INFLATION INDICATOR
— *José Ferreira Machado, Carlos Robalo Marques, Pedro Duarte Neves, Afonso Gonçalves da Silva*
- 10/01 IDENTIFICATION WITH AVERAGED DATA AND IMPLICATIONS FOR HEDONIC REGRESSION STUDIES
— *José A.F. Machado, João M.C. Santos Silva*

2002

- 1/02 QUANTILE REGRESSION ANALYSIS OF TRANSITION DATA
— *José A.F. Machado, Pedro Portugal*
- 2/02 SHOULD WE DISTINGUISH BETWEEN STATIC AND DYNAMIC LONG RUN EQUILIBRIUM IN ERROR CORRECTION MODELS?
— *Susana Botas, Carlos Robalo Marques*
- 3/02 MODELLING TAYLOR RULE UNCERTAINTY
— *Fernando Martins, José A. F. Machado, Paulo Soares Esteves*
- 4/02 PATTERNS OF ENTRY, POST-ENTRY GROWTH AND SURVIVAL: A COMPARISON BETWEEN DOMESTIC AND FOREIGN OWNED FIRMS
— *José Mata, Pedro Portugal*
- 5/02 BUSINESS CYCLES: CYCLICAL COMOVEMENT WITHIN THE EUROPEAN UNION IN THE PERIOD 1960-1999. A FREQUENCY DOMAIN APPROACH
— *João Valle e Azevedo*
- 6/02 AN “ART”, NOT A “SCIENCE”? CENTRAL BANK MANAGEMENT IN PORTUGAL UNDER THE GOLD STANDARD, 1854 -1891
— *Jaime Reis*
- 7/02 MERGE OR CONCENTRATE? SOME INSIGHTS FOR ANTITRUST POLICY
— *Margarida Catalão-Lopes*
- 8/02 DISENTANGLING THE MINIMUM WAGE PUZZLE: ANALYSIS OF WORKER ACCESSIONS AND SEPARATIONS FROM A LONGITUDINAL MATCHED EMPLOYER-EMPLOYEE DATA SET
— *Pedro Portugal, Ana Rute Cardoso*
- 9/02 THE MATCH QUALITY GAINS FROM UNEMPLOYMENT INSURANCE
— *Mário Centeno*
- 10/02 HEDONIC PRICES INDEXES FOR NEW PASSENGER CARS IN PORTUGAL (1997-2001)
— *Hugo J. Reis, J.M.C. Santos Silva*
- 11/02 THE ANALYSIS OF SEASONAL RETURN ANOMALIES IN THE PORTUGUESE STOCK MARKET
— *Miguel Balbina, Nuno C. Martins*
- 12/02 DOES MONEY GRANGER CAUSE INFLATION IN THE EURO AREA?
— *Carlos Robalo Marques, Joaquim Pina*
- 13/02 INSTITUTIONS AND ECONOMIC DEVELOPMENT: HOW STRONG IS THE RELATION?
— *Tiago V.de V. Cavalcanti, Álvaro A. Novo*

2003

- 1/03 FOUNDING CONDITIONS AND THE SURVIVAL OF NEW FIRMS
— *P.A. Geroski, José Mata, Pedro Portugal*
- 2/03 THE TIMING AND PROBABILITY OF FDI: AN APPLICATION TO THE UNITED STATES MULTINATIONAL ENTERPRISES
— *José Brandão de Brito, Felipa de Mello Sampayo*
- 3/03 OPTIMAL FISCAL AND MONETARY POLICY: EQUIVALENCE RESULTS
— *Isabel Correia, Juan Pablo Nicolini, Pedro Teles*

- 4/03** FORECASTING EURO AREA AGGREGATES WITH BAYESIAN VAR AND VECM MODELS
— *Ricardo Mourinho Félix, Luís C. Nunes*
- 5/03** CONTAGIOUS CURRENCY CRISES: A SPATIAL PROBIT APPROACH
— *Álvaro Novo*
- 6/03** THE DISTRIBUTION OF LIQUIDITY IN A MONETARY UNION WITH DIFFERENT PORTFOLIO RIGIDITIES
— *Nuno Alves*
- 7/03** COINCIDENT AND LEADING INDICATORS FOR THE EURO AREA: A FREQUENCY BAND APPROACH
— *António Rua, Luís C. Nunes*
- 8/03** WHY DO FIRMS USE FIXED-TERM CONTRACTS?
— *José Varejão, Pedro Portugal*
- 9/03** NONLINEARITIES OVER THE BUSINESS CYCLE: AN APPLICATION OF THE SMOOTH TRANSITION AUTOREGRESSIVE MODEL TO CHARACTERIZE GDP DYNAMICS FOR THE EURO-AREA AND PORTUGAL
— *Francisco Craveiro Dias*
- 10/03** WAGES AND THE RISK OF DISPLACEMENT
— *Anabela Carneiro, Pedro Portugal*
- 11/03** SIX WAYS TO LEAVE UNEMPLOYMENT
— *Pedro Portugal, John T. Addison*
- 12/03** EMPLOYMENT DYNAMICS AND THE STRUCTURE OF LABOR ADJUSTMENT COSTS
— *José Varejão, Pedro Portugal*
- 13/03** THE MONETARY TRANSMISSION MECHANISM: IS IT RELEVANT FOR POLICY?
— *Bernardino Adão, Isabel Correia, Pedro Teles*
- 14/03** THE IMPACT OF INTEREST-RATE SUBSIDIES ON LONG-TERM HOUSEHOLD DEBT: EVIDENCE FROM A LARGE PROGRAM
— *Nuno C. Martins, Ernesto Villanueva*
- 15/03** THE CAREERS OF TOP MANAGERS AND FIRM OPENNESS: INTERNAL VERSUS EXTERNAL LABOUR MARKETS
— *Francisco Lima, Mário Centeno*
- 16/03** TRACKING GROWTH AND THE BUSINESS CYCLE: A STOCHASTIC COMMON CYCLE MODEL FOR THE EURO AREA
— *João Valle e Azevedo, Siem Jan Koopman, António Rua*
- 17/03** CORRUPTION, CREDIT MARKET IMPERFECTIONS, AND ECONOMIC DEVELOPMENT
— *António R. Antunes, Tiago V. Cavalcanti*
- 18/03** BARGAINED WAGES, WAGE DRIFT AND THE DESIGN OF THE WAGE SETTING SYSTEM
— *Ana Rute Cardoso, Pedro Portugal*
- 19/03** UNCERTAINTY AND RISK ANALYSIS OF MACROECONOMIC FORECASTS: FAN CHARTS REVISITED
— *Álvaro Novo, Maximiano Pinheiro*

2004

- 1/04 HOW DOES THE UNEMPLOYMENT INSURANCE SYSTEM SHAPE THE TIME PROFILE OF JOBLESS DURATION?
— *John T. Addison, Pedro Portugal*
- 2/04 REAL EXCHANGE RATE AND HUMAN CAPITAL IN THE EMPIRICS OF ECONOMIC GROWTH
— *Delfim Gomes Neto*
- 3/04 ON THE USE OF THE FIRST PRINCIPAL COMPONENT AS A CORE INFLATION INDICATOR
— *José Ramos Maria*
- 4/04 OIL PRICES ASSUMPTIONS IN MACROECONOMIC FORECASTS: SHOULD WE FOLLOW FUTURES MARKET EXPECTATIONS?
— *Carlos Coimbra, Paulo Soares Esteves*
- 5/04 STYLISTED FEATURES OF PRICE SETTING BEHAVIOUR IN PORTUGAL: 1992-2001
— *Mónica Dias, Daniel Dias, Pedro D. Neves*
- 6/04 A FLEXIBLE VIEW ON PRICES
— *Nuno Alves*
- 7/04 ON THE FISHER-KONIECZNY INDEX OF PRICE CHANGES SYNCHRONIZATION
— *D.A. Dias, C. Robalo Marques, P.D. Neves, J.M.C. Santos Silva*
- 8/04 INFLATION PERSISTENCE: FACTS OR ARTEFACTS?
— *Carlos Robalo Marques*
- 9/04 WORKERS' FLOWS AND REAL WAGE CYCLICALITY
— *Anabela Carneiro, Pedro Portugal*
- 10/04 MATCHING WORKERS TO JOBS IN THE FAST LANE: THE OPERATION OF FIXED-TERM CONTRACTS
— *José Varejão, Pedro Portugal*
- 11/04 THE LOCATIONAL DETERMINANTS OF THE U.S. MULTINATIONALS ACTIVITIES
— *José Brandão de Brito, Felipa Mello Sampayo*
- 12/04 KEY ELASTICITIES IN JOB SEARCH THEORY: INTERNATIONAL EVIDENCE
— *John T. Addison, Mário Centeno, Pedro Portugal*
- 13/04 RESERVATION WAGES, SEARCH DURATION AND ACCEPTED WAGES IN EUROPE
— *John T. Addison, Mário Centeno, Pedro Portugal*
- 14/04 THE MONETARY TRANSMISSION IN THE US AND THE EURO AREA: COMMON FEATURES AND COMMON FRICTIONS
— *Nuno Alves*
- 15/04 NOMINAL WAGE INERTIA IN GENERAL EQUILIBRIUM MODELS
— *Nuno Alves*
- 16/04 MONETARY POLICY IN A CURRENCY UNION WITH NATIONAL PRICE ASYMMETRIES
— *Sandra Gomes*
- 17/04 NEOCLASSICAL INVESTMENT WITH MORAL HAZARD
— *João Ejarque*
- 18/04 MONETARY POLICY WITH STATE CONTINGENT INTEREST RATES
— *Bernardino Adão, Isabel Correia, Pedro Teles*

- 19/04** MONETARY POLICY WITH SINGLE INSTRUMENT FEEDBACK RULES
— *Bernardino Adão, Isabel Correia, Pedro Teles*
- 20/04** ACCOUNTING FOR THE HIDDEN ECONOMY: BARRIERS TO LAGALITY AND LEGAL FAILURES
— *António R. Antunes, Tiago V. Cavalcanti*
- 2005**
- 1/05** SEAM: A SMALL-SCALE EURO AREA MODEL WITH FORWARD-LOOKING ELEMENTS
— *José Brandão de Brito, Rita Duarte*
- 2/05** FORECASTING INFLATION THROUGH A BOTTOM-UP APPROACH: THE PORTUGUESE CASE
— *Cláudia Duarte, António Rua*
- 3/05** USING MEAN REVERSION AS A MEASURE OF PERSISTENCE
— *Daniel Dias, Carlos Robalo Marques*
- 4/05** HOUSEHOLD WEALTH IN PORTUGAL: 1980-2004
— *Fátima Cardoso, Vanda Geraldés da Cunha*
- 5/05** ANALYSIS OF DELINQUENT FIRMS USING MULTI-STATE TRANSITIONS
— *António Antunes*
- 6/05** PRICE SETTING IN THE AREA: SOME STYLIZED FACTS FROM INDIVIDUAL CONSUMER PRICE DATA
— *Emmanuel Dhyne, Luis J. Álvarez, Hervé Le Bihan, Giovanni Veronese, Daniel Dias, Johannes Hoffmann, Nicole Jonker, Patrick Lünnemann, Fabio Rumler, Jouko Vilmunen*
- 7/05** INTERMEDIATION COSTS, INVESTOR PROTECTION AND ECONOMIC DEVELOPMENT
— *António Antunes, Tiago Cavalcanti, Anne Villamil*
- 8/05** TIME OR STATE DEPENDENT PRICE SETTING RULES? EVIDENCE FROM PORTUGUESE MICRO DATA
— *Daniel Dias, Carlos Robalo Marques, João Santos Silva*
- 9/05** BUSINESS CYCLE AT A SECTORAL LEVEL: THE PORTUGUESE CASE
— *Hugo Reis*
- 10/05** THE PRICING BEHAVIOUR OF FIRMS IN THE EURO AREA: NEW SURVEY EVIDENCE
— *S. Fabiani, M. Druant, I. Hernando, C. Kwapił, B. Landau, C. Loupias, F. Martins, T. Mathä, R. Sabbatini, H. Stahl, A. Stokman*
- 11/05** CONSUMPTION TAXES AND REDISTRIBUTION
— *Isabel Correia*
- 12/05** UNIQUE EQUILIBRIUM WITH SINGLE MONETARY INSTRUMENT RULES
— *Bernardino Adão, Isabel Correia, Pedro Teles*
- 13/05** A MACROECONOMIC STRUCTURAL MODEL FOR THE PORTUGUESE ECONOMY
— *Ricardo Mourinho Félix*
- 14/05** THE EFFECTS OF A GOVERNMENT EXPENDITURES SHOCK
— *Bernardino Adão, José Brandão de Brito*
- 15/05** MARKET INTEGRATION IN THE GOLDEN PERIPHERY – THE LISBON/LONDON EXCHANGE, 1854-1891
— *Rui Pedro Esteves, Jaime Reis, Fabiano Ferramosca*
- 2006**
- 1/06** THE EFFECTS OF A TECHNOLOGY SHOCK IN THE EURO AREA
— *Nuno Alves, José Brandão de Brito, Sandra Gomes, João Sousa*

- 2/02** THE TRANSMISSION OF MONETARY AND TECHNOLOGY SHOCKS IN THE EURO AREA
— *Nuno Alves, José Brandão de Brito, Sandra Gomes, João Sousa*
- 3/06** MEASURING THE IMPORTANCE OF THE UNIFORM NONSYNCHRONIZATION HYPOTHESIS
— *Daniel Dias, Carlos Robalo Marques, João Santos Silva*
- 4/06** THE PRICE SETTING BEHAVIOUR OF PORTUGUESE FIRMS EVIDENCE FROM SURVEY DATA
— *Fernando Martins*
- 5/06** STICKY PRICES IN THE EURO AREA: A SUMMARY OF NEW MICRO EVIDENCE
— *L. J. Álvarez, E. Dhyne, M. Hoeberichts, C. Kwapil, H. Le Bihan, P. Lünnemann, F. Martins, R. Sabbatini, H. Stahl, P. Vermeulen and J. Vilmunen*
- 6/06** NOMINAL DEBT AS A BURDEN ON MONETARY POLICY
— *Javier Díaz-Giménez, Giorgia Giovannetti, Ramon Marimon, Pedro Teles*
- 7/06** A DISAGGREGATED FRAMEWORK FOR THE ANALYSIS OF STRUCTURAL DEVELOPMENTS IN PUBLIC FINANCES
— *Jana Kremer, Cláudia Rodrigues Braz, Teunis Brosens, Geert Langenus, Sandro Momigliano, Mikko Spolander*
- 8/06** IDENTIFYING ASSET PRICE BOOMS AND BUSTS WITH QUANTILE REGRESSIONS
— *José A. F. Machado, João Sousa*
- 9/06** EXCESS BURDEN AND THE COST OF INEFFICIENCY IN PUBLIC SERVICES PROVISION
— *António Afonso, Vítor Gaspar*
- 10/06** MARKET POWER, DISMISSAL THREAT AND RENT SHARING: THE ROLE OF INSIDER AND OUTSIDER FORCES IN WAGE BARGAINING
— *Anabela Carneiro, Pedro Portugal*
- 11/06** MEASURING EXPORT COMPETITIVENESS: REVISITING THE EFFECTIVE EXCHANGE RATE WEIGHTS FOR THE EURO AREA COUNTRIES
— *Paulo Soares Esteves, Carolina Reis*
- 12/06** THE IMPACT OF UNEMPLOYMENT INSURANCE GENEROSITY ON MATCH QUALITY DISTRIBUTION
— *Mário Centeno, Alvaro A. Novo*
- 13/06** U.S. UNEMPLOYMENT DURATION: HAS LONG BECOME LONGER OR SHORT BECOME SHORTER?
— *José A.F. Machado, Pedro Portugal e Juliana Guimarães*
- 14/06** EARNINGS LOSSES OF DISPLACED WORKERS: EVIDENCE FROM A MATCHED EMPLOYER-EMPLOYEE DATA SET
— *Anabela Carneiro, Pedro Portugal*
- 15/06** COMPUTING GENERAL EQUILIBRIUM MODELS WITH OCCUPATIONAL CHOICE AND FINANCIAL FRICTIONS
— *António Antunes, Tiago Cavalcanti, Anne Villamil*
- 16/06** ON THE RELEVANCE OF EXCHANGE RATE REGIMES FOR STABILIZATION POLICY
— *Bernardino Adao, Isabel Correia, Pedro Teles*
- 17/06** AN INPUT-OUTPUT ANALYSIS: LINKAGES VS LEAKAGES
— *Hugo Reis, António Rua*
- 2007**
- 1/07** RELATIVE EXPORT STRUCTURES AND VERTICAL SPECIALIZATION: A SIMPLE CROSS-COUNTRY INDEX
— *João Amador, Sónia Cabral, José Ramos Maria*

- 2/07** THE FORWARD PREMIUM OF EURO INTEREST RATES
— *Sónia Costa, Ana Beatriz Galvão*
- 3/07** ADJUSTING TO THE EURO
— *Gabriel Fagan, Vítor Gaspar*
- 4/07** SPATIAL AND TEMPORAL AGGREGATION IN THE ESTIMATION OF LABOR DEMAND FUNCTIONS
— *José Varejão, Pedro Portugal*
- 5/07** PRICE SETTING IN THE EURO AREA: SOME STYLISED FACTS FROM INDIVIDUAL PRODUCER PRICE DATA
— *Philip Vermeulen, Daniel Dias, Maarten Dossche, Erwan Gautier, Ignacio Hernando, Roberto Sabbatini, Harald Stahl*
- 6/07** A STOCHASTIC FRONTIER ANALYSIS OF SECONDARY EDUCATION OUTPUT IN PORTUGAL
— *Manuel Coutinho Pereira, Sara Moreira*
- 7/07** CREDIT RISK DRIVERS: EVALUATING THE CONTRIBUTION OF FIRM LEVEL INFORMATION AND OF MACROECONOMIC DYNAMICS
— *Diana Bonfim*
- 8/07** CHARACTERISTICS OF THE PORTUGUESE ECONOMIC GROWTH: WHAT HAS BEEN MISSING?
— *João Amador, Carlos Coimbra*
- 9/07** TOTAL FACTOR PRODUCTIVITY GROWTH IN THE G7 COUNTRIES: DIFFERENT OR ALIKE?
— *João Amador, Carlos Coimbra*
- 10/07** IDENTIFYING UNEMPLOYMENT INSURANCE INCOME EFFECTS WITH A QUASI-NATURAL EXPERIMENT
— *Mário Centeno, Alvaro A. Novo*
- 11/07** HOW DO DIFFERENT ENTITLEMENTS TO UNEMPLOYMENT BENEFITS AFFECT THE TRANSITIONS FROM UNEMPLOYMENT INTO EMPLOYMENT
— *John T. Addison, Pedro Portugal*
- 12/07** INTERPRETATION OF THE EFFECTS OF FILTERING INTEGRATED TIME SERIES
— *João Valle e Azevedo*
- 13/07** EXACT LIMIT OF THE EXPECTED PERIODOGRAM IN THE UNIT-ROOT CASE
— *João Valle e Azevedo*
- 14/07** INTERNATIONAL TRADE PATTERNS OVER THE LAST FOUR DECADES: HOW DOES PORTUGAL COMPARE WITH OTHER COHESION COUNTRIES?
— *João Amador, Sónia Cabral, José Ramos Maria*
- 15/07** INFLATION (MIS)PERCEPTIONS IN THE EURO AREA
— *Francisco Dias, Cláudia Duarte, António Rua*
- 16/07** LABOR ADJUSTMENT COSTS IN A PANEL OF ESTABLISHMENTS: A STRUCTURAL APPROACH
— *João Miguel Ejarque, Pedro Portugal*
- 17/07** A MULTIVARIATE BAND-PASS FILTER
— *João Valle e Azevedo*
- 18/07** AN OPEN ECONOMY MODEL OF THE EURO AREA AND THE US
— *Nuno Alves, Sandra Gomes, João Sousa*
- 19/07** IS TIME RIPE FOR PRICE LEVEL PATH STABILITY?
— *Vítor Gaspar, Frank Smets, David Vestin*

- 20/07** IS THE EURO AREA M3 ABANDONING US?
— *Nuno Alves, Carlos Robalo Marques, João Sousa*
- 21/07** DO LABOR MARKET POLICIES AFFECT EMPLOYMENT COMPOSITION? LESSONS FROM EUROPEAN COUNTRIES
— *António Antunes, Mário Centeno*
- 2008**
- 1/08** THE DETERMINANTS OF PORTUGUESE BANKS' CAPITAL BUFFERS
— *Miguel Boucinha*
- 2/08** DO RESERVATION WAGES REALLY DECLINE? SOME INTERNATIONAL EVIDENCE ON THE DETERMINANTS OF RESERVATION WAGES
— *John T. Addison, Mário Centeno, Pedro Portugal*
- 3/08** UNEMPLOYMENT BENEFITS AND RESERVATION WAGES: KEY ELASTICITIES FROM A STRIPPED-DOWN JOB SEARCH APPROACH
— *John T. Addison, Mário Centeno, Pedro Portugal*
- 4/08** THE EFFECTS OF LOW-COST COUNTRIES ON PORTUGUESE MANUFACTURING IMPORT PRICES
— *Fátima Cardoso, Paulo Soares Esteves*
- 5/08** WHAT IS BEHIND THE RECENT EVOLUTION OF PORTUGUESE TERMS OF TRADE?
— *Fátima Cardoso, Paulo Soares Esteves*
- 6/08** EVALUATING JOB SEARCH PROGRAMS FOR OLD AND YOUNG INDIVIDUALS: HETEROGENEOUS IMPACT ON UNEMPLOYMENT DURATION
— *Luis Centeno, Mário Centeno, Álvaro A. Novo*
- 7/08** FORECASTING USING TARGETED DIFFUSION INDEXES
— *Francisco Dias, Maximiano Pinheiro, António Rua*
- 8/08** STATISTICAL ARBITRAGE WITH DEFAULT AND COLLATERAL
— *José Fajardo, Ana Lacerda*
- 9/08** DETERMINING THE NUMBER OF FACTORS IN APPROXIMATE FACTOR MODELS WITH GLOBAL AND GROUP-SPECIFIC FACTORS
— *Francisco Dias, Maximiano Pinheiro, António Rua*
- 10/08** VERTICAL SPECIALIZATION ACROSS THE WORLD: A RELATIVE MEASURE
— *João Amador, Sónia Cabral*
- 11/08** INTERNATIONAL FRAGMENTATION OF PRODUCTION IN THE PORTUGUESE ECONOMY: WHAT DO DIFFERENT MEASURES TELL US?
— *João Amador, Sónia Cabral*
- 12/08** IMPACT OF THE RECENT REFORM OF THE PORTUGUESE PUBLIC EMPLOYEES' PENSION SYSTEM
— *Maria Manuel Campos, Manuel Coutinho Pereira*
- 13/08** EMPIRICAL EVIDENCE ON THE BEHAVIOR AND STABILIZING ROLE OF FISCAL AND MONETARY POLICIES IN THE US
— *Manuel Coutinho Pereira*
- 14/08** IMPACT ON WELFARE OF COUNTRY HETEROGENEITY IN A CURRENCY UNION
— *Carla Soares*
- 15/08** WAGE AND PRICE DYNAMICS IN PORTUGAL
— *Carlos Robalo Marques*

- 16/08** IMPROVING COMPETITION IN THE NON-TRADABLE GOODS AND LABOUR MARKETS: THE PORTUGUESE CASE
— *Vanda Almeida, Gabriela Castro, Ricardo Mourinho Félix*
- 17/08** PRODUCT AND DESTINATION MIX IN EXPORT MARKETS
— *João Amador, Luca David Opromolla*
- 18/08** FORECASTING INVESTMENT: A FISHING CONTEST USING SURVEY DATA
— *José Ramos Maria, Sara Serra*
- 19/08** APPROXIMATING AND FORECASTING MACROECONOMIC SIGNALS IN REAL-TIME
— *João Valle e Azevedo*
- 20/08** A THEORY OF ENTRY AND EXIT INTO EXPORTS MARKETS
— *Alfonso A. Irarrazabal, Luca David Opromolla*
- 21/08** ON THE UNCERTAINTY AND RISKS OF MACROECONOMIC FORECASTS: COMBINING JUDGEMENTS WITH SAMPLE AND MODEL INFORMATION
— *Maximiano Pinheiro, Paulo Soares Esteves*
- 22/08** ANALYSIS OF THE PREDICTORS OF DEFAULT FOR PORTUGUESE FIRMS
— *Ana I. Lacerda, Russ A. Moro*
- 23/08** INFLATION EXPECTATIONS IN THE EURO AREA: ARE CONSUMERS RATIONAL?
— *Francisco Dias, Cláudia Duarte, António Rua*