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# Psychological Biases and Economic Expectations: Some Further Evidence<sup>\*</sup>

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## **Abstract**

This paper investigates possible psychological biases using a confidence survey of 30 industrial sectors in Brazil during the 1999Q3-2009Q4 period. The econometric approach builds on the work of Bovi (2009) by considering the significance of discrepancies between ex-post evaluations and ex-ante expectations but extends the analysis by considering sectoral evidence from industry experts instead of aggregate evidence from lay people. The evidence, even in the case of perceptions of general economic conditions, indicates that the presence of important psychological biases cannot be discarded.

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# 1 Introduction

Expectations play a central role in economics, and strong theoretical assumptions appear to have reached a higher level of formality in terms of rational expectations that provide a counterpoint to the concept of adaptive expectations that embodied the idea that economic agents could incur in systematic forecast errors [see Begg (1982) for an overview].

The growing field of behavioral economics highlights different economic situations where the strong assumptions of rationality incorporated in traditional models do not seem to hold. Thus, such studies often address some salient anomalies that accrue from standard economic analysis and involve, for example, issues pertaining to fairness, attitudes toward risk and time discounting [see e.g. Camerer and Loewenstein (2004)]. The related- more realistic psychological foundations- often involve decision making processes that incorporate heuristic procedures and therefore represent short-cuts that contrast with many of the idealized economic models.

The literature on cognitive psychology highlights the pervasiveness of psychological biases in connection with the approximative character of the aforementioned heuristic processes [see Kahneman and Tversky (1973, 1974, 1982)]. The growing availability of confidence surveys provides an opportunity for the careful evaluation of apparently self-incoherent assessments by economic agents.

Bovi (2009) is motivated by the literature on cognitive psychology to assess the differences between ex-ante expectations and subsequent realizations, in terms of the so-called “survey” forecast error (SFE). The author investigates the significance of such discrepancies in the context of lay people in 10 European countries and the evidence appears to favor the existence of psychological biases.

The present paper aims to contribute to this stream of literature by extending the approach advanced by Bovi (2009) in the Brazilian case in at least four aspects;

- a) The analysis considers the discrepancies between ex-ante expectations and ex-post results evaluations concerning general economic conditions and a firm’s conditions as evaluated by the firm’s representatives. In that sense, expert assessments should in principle be less prone to the referred biases than

expectations involving lay people. Thus, the present analysis provides a more conservative assessment of psychological biases;

- b) The analysis considers a 6-month horizon rather than 12 months in the assessment of expectation discrepancies and therefore could support the significance of psychological biases if they are suggested by the empirical tests;
- c) The focus of the analysis is disaggregated by considering sector-specific evidence;
- d) An exploratory exercise attempts to detect possible abrupt shifts in some sectoral indicators that could motivate discrepancies between ex-ante expectations and ex-post realizations;

The paper is organized as follows. The second section discusses the data construction and provides an initial descriptive assessment of the common factors (in expectation discrepancies) in terms of a dynamic factor analysis. The third section describes the econometric estimations used to identify the significance of those discrepancies at the sectoral level. The fourth section provides some final comments.

## 2. Empirical analysis: descriptive aspects

### 2.1 Data construction

The main data source is a business survey conducted by the Brazilian Confederation of Industries (Sondagem Industrial-Confederação Nacional da Indústria-CNI). The survey was initially conducted on a quarterly basis and more recently on a monthly basis. The survey includes questions on *ex-ante* expectations and *ex-post* results evaluations concerning general economic conditions and the conditions at the respondent's firm's conditions in terms of a 6 months forward and backward time horizon. As previously noted, the central objective of the paper is to identify possible biases in terms of discrepancies between those perceptions. It is worth noting that Bovi (2009) undertakes a similar analysis for consumers, but with a 12-month horizon and a focus on lay-people's biases. Thus, discrepancies identified in the present study, which uses a shorter time horizon, would provide stronger evidence for the prevalence of psychological biases. Moreover, the sectoral evidence accruing from a business survey should in principle reflect experts' assessments and be less prone to the psychological biases that are apparently present in consumer confidence surveys.

This study had special access to unpublished data in terms of the proportion of respondents who chose a particular option on the questionnaire for each case. More specifically, this study was able to match the responses results to concerning *ex-ante* and *ex-post* questions with quarterly data to enable a larger sample. Thus, the final sample covers the 1999Q3-2009Q4 period. The question pertaining to *ex-ante* expectations for the next 6 months allowed for 5 options (very pessimistic, pessimistic, will remain the same, confident, very confident) whereas the question referring to *ex-post* evaluation of the previous 6 months allowed for 5 analogous options, though with different phrasing (a lot worse, a little worse, the same, a little better, a lot better). The analysis focuses on assessments referring to general economic conditions and specific firm's conditions for each of the 5 logical levels and for 30 industrial sectors.<sup>1</sup>

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<sup>1</sup> A very heterogeneous sector referring to miscellaneous industries was excluded.

## 2.2 Common sectoral patterns: exploratory analysis

The notion that a reduced number of unobserved factors can explain the variance in the observed data is widespread especially in the context of the applied macroeconomic literature. In the context of confidence surveys, Carriero and Marcellino (2011) consider the possibility of a dynamic factor structure in the case of sectoral confidence indicators across 10 European countries. In fact, common patterns are likely to arise in the presence of common shared shocks by the different countries. The authors defend the relevance of composite coincident indexes that provide a synthetic indicator based on questions from confidence surveys in Europe. The parsimonious factor structure is obtained from very aggregate sectors (industry, consumers, services, building and retail) and based on the strong links within the EEC may provide some guidance regarding the prevailing overall confidence.

In the present paper, we also consider a dynamic factor analysis based on confidence survey data but our purpose is entirely distinct because we explore common patterns regarding confidence for Brazilian manufacturing industries with respect to discrepancies between ex-post results evaluations and ex-ante expectations for 30 industrial sectors. Next, a dynamic factor approach is considered along the lines of Bai and Ng (2002) that can be summarized in terms of the general expression for a panel setup with time dimension  $T$  and cross-section dimension  $N$  as given by:

$$X = F^0 \Lambda^0 + e \quad (1)$$

$$(T \times N) \quad (T \times r) \quad (r \times N) \quad (T \times N)$$

where  $X$  stands for the panel array of the variables of interest and  $r$  denotes the number of common factors corresponding to the matrix of common factors  $F^0$  with the associated factor loadings given by  $\Lambda^0$ . Moreover,  $e$  pertains to an idiosyncratic component of  $X$ . The authors, under specific penalty criteria, advance test statistics for determining the optimal number of common factors taking as a reference the relevant asymptotic results in that panel context. Estimates for the individual elements of the matrices  $F^0$  and  $\Lambda^0$  are obtained upon the solution of the following optimization problem:

$$V(k) = \min_{\Lambda, F^k} (NT)^{-1} \sum_{i=1}^N \sum_{t=1}^T (X_{it} - \lambda_i^k F_t^k)^2 \quad (2)$$

Thus, the common factors and their associated loadings are obtained by the minimization of the sum of the squared residuals. The authors advance different test statistics that

embody penalty criteria. In particular, the optimal choice of the number of factors could be considered in terms of the minimization of the following statistics:

$$IC_{p1}(k) = \ln(V(k, \hat{F}^k)) + k \left( \frac{N+T}{NT} \right) \ln \left( \frac{NT}{N+T} \right) \quad (3)$$

$$IC_{p2}(k) = \ln(V(k, \hat{F}^k)) + k \left( \frac{N+T}{NT} \right) \ln C_{NT}^2 \quad (4)$$

where  $C_{NT} = \min\{\sqrt{N}, \sqrt{T}\}$ .

The corresponding results of the dynamic factor analysis model are presented in Table 1.

**Table 1**  
**Dynamic Factor Analysis for discrepancies between ex-ante expectations and ex-post realizations**

<b>general economic conditions</b>					
<b>Test Statistic</b>	<b>categories for ex-ante expectations and ex-post results evaluation</b>				
	<b>a lot worse</b>	<b>a little worse</b>	<b>the same</b>	<b>a little better</b>	<b>a lot better</b>
IC <sub>p1</sub>	-0.528 (1)	-1.246 (4)	-0.484 (1)	-0.976 (3)	-0.059 (1)
IC <sub>p2</sub>	-0.496 (1)	-1.176 (1)	-0.460 (1)	-0.943 (1)	-0.035 (1)
<b>firm's conditions</b>					
<b>Test Statistic</b>	<b>categories for ex-ante expectations and ex-post results evaluation</b>				
	<b>a lot worse</b>	<b>a little worse</b>	<b>the same</b>	<b>a little better</b>	<b>a lot better</b>
IC <sub>p1</sub>	-0.139 (1)	-0.354 (2)	-0.051 (1)	-0.214 (1)	-0.045 (1)
IC <sub>p2</sub>	-0.115 (1)	-0.319 (1)	-0.027 (1)	-0.190 (1)	-0.022 (1)

Note: the optimal number of factors is reported in parentheses and the statistics considered a maximum number of factors of k=15

The evidence, for both general economic conditions and specific firm's conditions, clearly indicates a very small number of common unobserved factors. In fact, if one considers the statistic  $IC_{p2}$  the results suggest the existence of a single common factor for all of the expectation categories. The statistic  $IC_{p1}$  mostly corroborates such a pattern, although it suggests a larger number of factors (3 or 4) in some isolated cases.

Taken together, the evidence indicates that expectation discrepancies display significant common patterns across different industrial sectors. This study considers sector-specific assessments made by firms in the Brazilian manufacturing industry and thus contrasts with the analogous study by Bovi (2009) that addresses the broad perceptions of lay people who are in principle more prone to psychological biases. Nevertheless, the present study, based on experts' perceptions, yield some interesting results because even in the case of a firm's conditions, the discrepancies appear to display a predominantly common pattern across sectors for all of the expectation categories. In other words, despite the use of expert's opinions, it appears that the opinions expressed largely reflect the general mood about the overall economy rather than sector-specific aspects of it. In the next section, econometric analyses are conducted at the sectoral level for each logical category to evaluate the relevance of the previously noted psychological biases.

### 3 Econometric evidence on psychological biases

The econometric analysis is conducted using simple regressions of the aforementioned discrepancy on a vector of ones. More precisely:

$$SFE\_COND \equiv Q = \beta_z + u_y \quad (1)$$

where  $SFE\_COND$  denotes the survey forecast error defined as the difference between the ex-post evaluation and the ex-ante expectation with respect to either the general economic conditions or the firm's conditions. Each value is approximated by the percentage of the respondents who indicated a particular intensity level for the change (in terms of the 5 categories described in the data section). The regression on a vector of ones leads to t-statistics that allow us to test for significant differences in means between the referred percentages. Thus, significant coefficients would favor the presence of



psychological biases. Although the suggested test procedure is closely related to that of Bovi (2009), some important contrasts have already been highlighted, including the use of sectoral perceptions that are not based on lay people. The corresponding results are presented in Tables 2 and 3.

**Table 2**  
**Discrepancies between ex-ante expectations and ex-post realizations (regression coefficients reflecting mean difference) - general economic conditions**

Industrial sector	categories for ex-ante expectations and ex-post results evaluation				
	a lot worse	a little worse	the same	a little better	a lot better
<b>Extractive</b>	-0.009 (0.004)	-0.207 (0.000)	0.024 (0.379)	0.157 (0.000)	0.035 (0.001)
<b>Food</b>	-0.006 (0.001)	-0.198 (0.000)	0.020 (0.274)	0.155 (0.000)	0.029 (0.000)
<b>Beverages</b>	-1.43E-04 (0.948)	-0.189 (0.000)	-0.008 (0.744)	0.166 (0.000)	0.032 (0.003)
<b>Tobacco</b>	-0.002 (0.806)	-0.176 (0.014)	0.036 (0.581)	0.128 (0.023)	0.014 (0.392)
<b>Textiles</b>	-3.09E-04 (0.849)	-0.178 (0.000)	-0.010 (0.655)	0.153 (0.001)	0.034 (0.000)
<b>Clothing and accessories</b>	-0.008 (0.000)	-0.254 (0.000)	0.018 (0.331)	0.206 (0.000)	0.037 (0.000)
<b>Leather and artifacts</b>	0.004 (0.132)	-0.240 (0.000)	0.047 (0.110)	0.151 (0.001)	0.037 (0.006)
<b>Footwear</b>	-0.005 (0.081)	-0.173 (0.000)	-0.069 (0.005)	0.209 (0.000)	0.038 (0.000)
<b>Wood</b>	-0.005 (0.014)	-0.161 (0.000)	-0.057 (0.002)	0.175 (0.000)	0.047 (0.001)
<b>Paper and cellulose</b>	-0.001 (0.636)	-0.251 (0.000)	0.014 (0.634)	0.206 (0.000)	0.032 (0.004)
<b>Editing, printing and recording</b>	-0.012 (0.001)	-0.196 (0.000)	0.014 (0.510)	0.169 (0.000)	0.025 (0.003)
<b>Oil coke and refining</b>	-0.013 (0.143)	-0.099 (0.148)	-0.009 (0.842)	0.109 (0.103)	0.012 (0.166)
<b>Ethanol</b>	-0.007 (0.336)	-0.201 (0.000)	0.084 (0.017)	0.093 (0.037)	0.030 (0.034)
<b>Chemicals</b>	-0.002 (0.427)	-0.162 (0.001)	-0.003 (0.875)	0.143 (0.002)	0.023 (0.000)
<b>Pharmaceuticals</b>	-0.030 (0.228)	-0.062 (0.101)	-0.013 (0.707)	0.091 (0.041)	0.015 (0.083)

<b>Soaps and detergents</b>	-0.010 (0.045)	-0.218 (0.000)	0.020 (0.538)	0.175 (0.000)	0.033 (0.004)
<b>Rubber</b>	-0.008 (0.185)	-0.159 (0.001)	0.009 (0.699)	0.127 (0.004)	0.031 (0.030)
<b>Plastic</b>	-0.007 (0.007)	-0.180 (0.000)	-0.022 (0.340)	0.169 (0.000)	0.039 (0.004)
<b>Non-metallic minerals</b>	-0.008 (0.000)	-0.183 (0.000)	0.009 (0.635)	0.137 (0.000)	0.046 (0.000)
<b>Basic metallurgy</b>	-0.002 (0.475)	-0.156 (0.000)	-0.020 (0.401)	0.142 (0.000)	0.035 (0.012)
<b>Metal products</b>	-0.008 (0.004)	-0.174 (0.000)	-0.011 (0.577)	0.155 (0.000)	0.037 (0.000)
<b>Machinery and equipment</b>	-0.001 (0.250)	-0.155 (0.001)	-0.015 (0.460)	0.145 (0.001)	0.027 (0.001)
<b>Office machinery and computers</b>	0.003 (0.657)	-0.287 (0.000)	0.073 (0.161)	0.200 (0.000)	0.010 (0.597)
<b>Machinery, apparatus and electric materials</b>	-0.005 (0.060)	-0.137 (0.001)	-0.014 (0.531)	0.129 (0.001)	0.028 (0.003)
<b>Electronic and communications materials</b>	-0.004 (0.172)	-0.202 (0.000)	-0.009 (0.768)	0.193 (0.000)	0.021 (0.022)
<b>Hospital equipments</b>	-0.007 (0.007)	-0.180 (0.000)	0.050 (0.034)	0.114 (0.007)	0.022 (0.003)
<b>Vehicle assembly</b>	-0.010 (0.000)	-0.178 (0.000)	0.025 (0.348)	0.134 (0.002)	0.029 (0.004)
<b>Other transportation equipment</b>	-0.010 (0.101)	-0.244 (0.000)	0.067 (0.060)	0.159 (0.002)	0.028 (0.019)
<b>Furniture</b>	-0.009 (0.002)	-0.239 (0.000)	-0.011 (0.599)	0.203 (0.000)	0.056 (0.000)
<b>Recycling</b>	0.003 (0.873)	-0.132 (0.011)	-0.282 (0.001)	0.136 (0.035)	0.013 (0.216)

Note: p-values are reported in parentheses and reflect robust standard errors [see Newey and West (1987)]

**Table 3**  
**Discrepancies between ex-ante expectations and ex-post realizations (regression coefficients reflecting mean difference) – firm's conditions**

<b>Industrial sector</b>	<b>categories for ex-ante expectations and ex-post results evaluation</b>				
	<b>a lot worse</b>	<b>a little worse</b>	<b>the same</b>	<b>a little better</b>	<b>a lot better</b>
<b>Extractive</b>	0.025 (0.001)	0.134 (0.000)	0.178 (0.000)	-0.256 (0.000)	-0.081 (0.000)
<b>Food</b>	0.012 (0.000)	0.145 (0.000)	0.202 (0.000)	-0.287 (0.000)	-0.072 (0.000)
<b>Beverages</b>	0.012 (0.013)	0.144 (0.000)	0.191 (0.000)	-0.259 (0.000)	-0.088 (0.000)
<b>Tobacco</b>	0.006 (0.317)	0.116 (0.000)	0.255 (0.000)	-0.348 (0.000)	-0.029 (0.008)
<b>Textiles</b>	0.013 (0.000)	0.145 (0.000)	0.146 (0.000)	-0.267 (0.000)	-0.037 (0.000)

<b>Clothing and accessories</b>	0.018 (0.000)	0.161 (0.000)	0.222 (0.000)	-0.323 (0.000)	-0.077 (0.000)
<b>Leather and artifacts</b>	0.020 (0.000)	0.180 (0.000)	0.125 (0.000)	-0.283 (0.000)	-0.043 (0.000)
<b>Footwear</b>	0.015 (0.000)	0.163 (0.000)	0.177 (0.000)	-0.287 (0.000)	-0.068 (0.000)
<b>Wood</b>	0.022 (0.000)	0.167 (0.000)	0.121 (0.000)	-0.256 (0.000)	-0.054 (0.000)
<b>Paper and cellulose</b>	0.016 (0.002)	0.173 (0.000)	0.141 (0.000)	-0.252 (0.000)	-0.077 (0.000)
<b>Editing, printing and recording</b>	0.012 (0.001)	0.121 (0.000)	0.216 (0.000)	-0.256 (0.000)	-0.094 (0.000)
<b>Oil coke and refining</b>	0.021 (0.001)	0.074 (0.001)	0.199 (0.000)	-0.224 (0.000)	-0,070 (0.000)
<b>Ethanol</b>	0,018 (0.057)	0.128 (0.000)	0.178 (0.000)	-0.248 (0.000)	-0.077 (0.000)
<b>Chemicals</b>	0.009 (0.001)	0.126 (0.000)	0.165 (0.000)	-0.254 (0.000)	-0.045 (0.000)
<b>Pharmaceuticals</b>	0.008 (0.011)	0.127 (0.000)	0.241 (0.000)	-0.297 (0.000)	-0.079 (0.000)
<b>Soaps and detergents</b>	0.014 (0.001)	0.148 (0.000)	0.232 (0.000)	-0.306 (0.000)	-0.088 (0.000)
<b>Rubber</b>	0.026 (0.016)	0.141 (0.000)	0.124 (0.000)	-0.234 (0.000)	-0.057 (0.000)
<b>Plastic</b>	0.023 (0.000)	0.149 (0.000)	0.155 (0.000)	-0.274 (0.000)	-0.054 (0.000)
<b>Non-metallic minerals</b>	0.022 (0.000)	0.148 (0.000)	0.155 (0.000)	-0.254 (0.000)	-0.071 (0.000)
<b>Basic metallurgy</b>	0.023 (0.000)	0.118 (0.000)	0.112 (0.000)	-0.201 (0.000)	-0.052 (0.000)
<b>Metal products</b>	0.024 (0.000)	0.140 (0.000)	0.152 (0.000)	-0.255 (0.000)	-0.060 (0.000)
<b>Machinery and equipment</b>	0.016 (0.000)	0.134 (0.000)	0.134 (0.000)	-0.230 (0.000)	-0.054 (0.000)
<b>Office machinery and computers</b>	0.013 (0.127)	0.147 (0.000)	0.206 (0.000)	-0.307 (0.000)	-0.059 (0.000)
<b>Machinery, apparatus and electric materials</b>	0.010 (0.017)	0.137 (0.000)	0.134 (0.000)	-0.240 (0.000)	-0.040 (0.000)
<b>Electronic and communications materials</b>	0.022 (0.003)	0.161 (0.000)	0.136 (0.000)	-0.266 (0.000)	-0.052 (0.000)
<b>Hospital equipment</b>	0.008 (0.014)	0.136 (0.000)	0.195 (0.000)	-0.286 (0.000)	-0.052 (0.000)
<b>Vehicle assembly</b>	0.016 (0.002)	0.122 (0.000)	0.149 (0.000)	-0.230 (0.000)	-0.057 (0.000)
<b>Other transportation equipment</b>	0.012 (0.007)	0.138 (0.000)	0.217 (0.000)	-0.294 (0.000)	-0.073 (0.000)
<b>Furniture</b>	0.029 (0.000)	0.193 (0.000)	0.172 (0.000)	-0.323 (0.000)	-0.071 (0.000)
<b>Recycling</b>	0.003 (0.300)	0.140 (0.000)	0.162 (0.001)	-0.286 (0.000)	-0.019 (0.076)

Note: p-values are reported in parentheses and reflect robust standard errors [see Newey and West (1987)]

In the case of general economic conditions, the discrepancies prevail in many of the sectors, as shown in Table 2, but in 50 out of 150 cases, we cannot reject the null hypothesis of mean 0 for discrepancies when the confidence level of 5 % is used as a reference. In other words, in one third of the cases there is no potential evidence of psychological biases but that potential issue cannot be discarded for the majority of the sectors. Moreover, it is worth noting that agreements between expectations and results tend to more strongly prevail in the extreme categories (“a lot worse” and “a lot better”), with 23 cases. In particular, in the case of the more pessimistic category, agreement seems to be stronger. Therefore, it appears that in the intermediate categories there is more room for expectation discrepancies. Although there is some potential for psychological biases, the consideration of the perceptions of general economic conditions, which typically reflect expectations regarding the trajectories of macroeconomic indicators such as unemployment, the inflation, the interest rate and the exchange rate, may often follow the expectations of bank analysts who may hold somewhat similar expectations and yet are potentially less prone to temporal expectation discrepancies.

A more interesting setting refers to expectations of firm’s conditions because sector-specificities should be more conducive to expectation discrepancies when the respondent’s perceptions are not based on the general perceptions of macroeconomic experts. In the case of specific sectors, the perceptions of firm’s conditions should ideally reflect sector-specific conditions and prevailing backward and forward linkages across sectors that could propagate different economic shocks.

In the case of firm’s conditions as shown in Table 3, the results are stronger in the sense that one observes evidence favoring conformity between ex-ante expectations and ex-post evaluations in only 5 out the 150 cases and those cases are once more concentrated on the extremes ( 4 from the “a lot worse” extreme and 1 from the “ a lot better” extreme). Therefore, the results show non-negligible signs that psychological biases appear to be relevant for the majority of sectors.<sup>2</sup>

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<sup>2</sup> Sectoral discrepancies regarding expectations of firm’s conditions could reflect macroeconomic expectations even if such macroeconomic expectations are relatively stable. For example, exchange rates trajectories are likely to be perceived differently across sectors depending on the degree of international trade in the sector.

Therefore, the evidence of discrepancies that favor psychological biases could be especially suggestive in the present application in contrast with Bovi (2009), because we are considering the sectoral expectations of experts, not lay people and a shorter time horizon of 6 months instead of 12 months. Despite, the short temporal window of 6 months, the respondents could in principle still be concerned about significant changes in economic fundamentals within that period that could lead to shifts in entrepreneur's perceptions. This aspect is not considered by Bovi (1989). In the present study, we conduct an exploratory analysis of three monthly sectoral indicators given by hours worked, real sales and capacity utilization for the period from February 2003 to December 2009 and that were available for 19 industrial sectors. Table 4 in the appendix presents the results with normality tests and indications of abrupt changes under a 2 standard error criterion. In fact, this criterion would be particularly appealing under the prevalence of normality. The considered sectors essentially match a subset of those from our previous analysis and we cannot reject the null hypothesis of normality in 52 out of the 57 cases at a 5 % significance level.

Thus, a criterion for abnormal shifts based on a 2 standard error benchmark can be easily used. When one considers the entire period for those indicators which extends for more than 6 years, it is possible to identify more abrupt changes, but even in sectors with relatively few changes one still observes the possibility of psychological biases, as indicated by the aforementioned significance tests reported from the regressions. Moreover, the abrupt changes pertain to the entire sample period and are not only to specific 6-month windows. Thus, the possibility of psychological biases of the type discussed in the present paper cannot be discarded.

## **4 Final Comments**

This paper aimed to assess the presence of psychological biases in firm's expectations pertaining to perceptions of general economic conditions and firm's conditions by means of the evaluation of discrepancies between ex-post evaluations and ex-ante expectations of those conditions. The approach extends the analysis undertaken by Bovi (2009) in the context of lay people to firms' representatives in different industrial sectors. The exploratory analysis conducted through a dynamic factor analysis indicated that

discrepancies between those expectations appear to display a significant common pattern across sectors that can be considered consistent with herd behavior and a focus on more general aggregate expectations.

The core of the empirical analysis was centered around discrepancies tests based on the econometric estimations. The evidence for psychological biases is suggestive, even when one considers a firm's conditions and the exercise of some care due to the possibility of abrupt changes in a given sector. There are several immediate avenues for improving this line of research

- (a) The construction of confidence surveys should utilize more precise phrasing regarding ex-post evaluations and ex-ante expectations. Although the categories are logically equivalent, there could still be room for a framing effect. It is therefore important to make clear to respondents that those categories are logically equivalent, and any discrepancies between the two responses should reflect differences in the economic environment. The tentative evidence on psychological biases, even the case of sector experts, may indicate that their expectations are to some extent driven by the general mood about the economy rather than sector-specific knowledge even when the economic circumstances are more sectorally circumscribed;
- (b) This paper advanced the analysis by considering experts' perceptions at the sectoral level but it still relied on proportions of respondents that necessarily confers the analysis with a simplified and aggregate focus. Ideally, tests for discrepancies between ex-post evaluation and ex-ante expectations should make use of disaggregated data in order to highlight discrepancies at the individual level and preferably one should focus on common respondents in order to avoid rotational aspects in the interview design. Unfortunately, more disaggregated analysis are limited by confidentiality aspects in many cases.

# Appendix

**Table 4**  
Kolmogorov-Smirnov normality tests for changes in selected sectoral indicators in the  
Brazilian manufacturing industry (2003-2/2009-12)

Industry sector	Hours worked		Real sales		Capacity utilization	
	test statistic	p-value	test statistic	p-value	test statistic	p-value
Food and beverages	0.505 (2)	0.948	0.750 (4)	0.598	0.720 (3)	0.648
Textiles	0.929 (4)	0.331	1.187 (5)	0.109	1.055 (7)	0.200
Clothing	0.711 (5)	0.663	1.333 (5)	0.052	0.898 (4)	0.372
Leather and footwear	1.229 (4)	0.089	0.915 (4)	0.349	0.876 (4)	0.402
Wood	0.729 (4)	0.633	0.568 (2)	0.884	0.776 (3)	0.555
Paper and cellulose	0.549 (3)	0.906	0.668 (3)	0.735	0.544 (3)	0.912
Editing and printing	0.629 (5)	0.798	0.728 (4)	0.635	0.629 (3)	0.799
Refining and ethanol	1.592 (7)	0.011	0.537 (3)	0.919	1.487 (6)	0.021
Chemical products	0.527 (1)	0.929	0.540 (4)	0.916	0.946 (4)	0.311
Rubber and plastic	0.671 (2)	0.731	0.686 (2)	0.706	0.952 (2)	0.303
Non-metallic minerals	0.483 (4)	0.964	0.650 (3)	0.765	0.856 (2)	0.430
Basic metallurgy	0.662 (1)	0.746	0.949 (2)	0.307	1.655 (2)	0.007
Metal products	0.703 (5)	0.678	0.343 (3)	1,000	0.991 (4)	0.261
Machinery and equipment	0.669 (3)	0.733	0.851 (3)	0.437	0.629 (6)	0.798
Machinery, apparatus and electric materials	0.618 (2)	0.815	0.710 (2)	0.666	1.011 (5)	0.240
Electronic and communications materials	1.699 (4)	0.005	1.717 (3)	0.005	1.186 (3)	0.110
Automotive vehicles	1.144 (2)	0.134	0.682 (5)	0.713	0.850 (3)	0.440
Other transport. eq.	1.197 (7)	0.104	0.787 (4)	0.537	1.492 (3)	0.021
Furniture and misc.	0.576 (2)	0.873	0.481 (2)	0.966	0.879 (6)	0.397

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