Assessing the short-term forecasting power of confidence indices*

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Abstract

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This paper assesses the predictive power of the main confidence indices available in Brazil to forecast economic activity. More specifically, we consider a set of economic activity variables and, for each of those, compare the predictive power of a univariate autoregressive model to that of a similar model that includes confidence index. Preliminary results using the Diebold Mariano test suggest that the Industry Confidence Index (ICI) provides relevant information, for both present and the near future, on some economic activity variables of interest to the economic agents.

Keywords: confidence indices, economic activity, forecasting.

JEL Classification: C32, E17, E27

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1. Introduction

A proper assessment of the current level of economic activity is of utmost importance to the decisions of the economic agents. Nonetheless, measures of economic activity are released with some time lag, leading agents to search for leading/coincident indicators to help their decision-making process. An important class of such measures is composed of confidence indices, measures that aim at capturing the perception of determined groups of economic agents about the current and future development of some key variables.

A relevant empirical question is, thus, whether confidence indices contain any piece of relevant information about the current/future behavior of the level / rate of growth of economic activity. As shown in Curtin (2000), this issue has been under debate since the release of the first confidence surveys[1]. There is still no consensus in the literature, but, according to Dées and Brinca (2013), most authors find a statistically significant relationship between measures of confidence and the current and future behavior of economic variables. Mourogane and Roma (2003), Ludvigson (2004) and Wilcox (2007) for the US, Kwan and Cotsomitis (2006) for Canada and Easaw and Heravi (2004) for the UK find that consumers confidence tends to reduce forecasting errors of models that include traditional macroeconomic variables. On the other hand, Smith (2009) for the UK, Al-Eyd *et al.* (2009) for OECD countries and Claveria *et al.* (2007) for Euro area members show that the predictive power of those indices is weak and limited to a few cases, or even inexistent.

In Brazil, the increasing importance given to confidence indices is reflected in both the increase in the number of confidence indices and in the amount of media coverage dedicated to their release. Nonetheless, there is a lack of research on assessing the relevance of those indicators to help predicting current/future economic variables. Such an assessment is relevant for the design and implementation of monetary policy, since it tries to indentify the potential of those indices to provide additional pieces of information about the current state of the economy and signals about its future path.

[1] George Katona at the University of Michigan's Survey Research Center constructed the first consumer survey in 1946. This was the precursor to the University of Michigan's Index of Consumer Sentiment. Using the 1953 sample of this survey, Klein and Lansing (1955) found that surveys questions on buying intentions, feeling of financial well-being and price expectations predict consumer expenditures on durable goods.

For the Brazilian case, one of the few papers is that of Bentes (2006), which aims at identifying the predictive power of the Consumer Confidence Index (ICC), computed by the Federação de Bens, Serviços e Turismo (Fecomercio) do Estado de São Paulo, with respect to different consumption categories, after controlling for some macroeconomic variables, such as unemployment, industrial production and inflation. The results obtained by that author are highly heterogeneous, with emphasis on the positive effect for automobiles.

This paper aims at taking a step towards assessing the predictive power of the main confidence indices available for the Brazilian economy as a whole. More specifically, the proposed exercise is to consider a set of economic activity variables and, for each of those, compare the predictive power of a univariate autoregressive model against a similar model that on top of the autoregressive part includes an appropriate confidence index. Our preliminary results point out that the Industry Confidence Index (ICI) provides relevant information, for both present and the near future, on some economic activity variables of interest to the economic agents.

An important limitation of confidence measures is that those are subjective assessments, which might stem from a mix statistical modeling and judgment, of the current and future environment where economic agents make their decisions. Furthermore, as shown by Dominitz and Manski (2004), such indices might be contaminated by measurement errors since their survey questions might be ambiguous and their qualitative aspect might hinder quantitative assessments. Anyhow, we follow the literature and assume that the indices used in this paper are good approximations for the agents' perceptions about the economic environment and, hence, would be good candidates for improving the prediction of economic activity variables.

The sections of this paper are organized as following. In the next section, we describe both the confidence indices and the variables used by this work to measure the Brazilian economic activity. Section 3 describes the methodology and our estimation strategy. We present our results in section 4, while we conclude and discuss further extensions in section 5.

2. Data

Currently, there are several confidence indices available for the Brazilian economy. In the top half of Table 1, we present the confidence indices considered in this paper. From Fundação Getúlio Vargas (FGV), we included the confidence indices based on the Consumer Survey (the Consumer Confidence Index – ICC and the Coincident Indicator of Unemployment - ICD) and the Manufacturing Industry Survery (Industry Confidence Index – ICI and the confidence indices for the capital goods and for the construction material sectors). We also consider two other consumer confidence indices for our analysis: the National Confidence Index (INC), from the Associação de Comércio de São Paulo (ACSP); National Consumer Confidence Index (INEC), from the Confederação Nacional da Indústria (CNI). Finally, we include the Business Confidence Index (ICEI) from CNI and the Markit's Purchasing Manager's Index (PMI).

Table 1: Confidence indices and measures of activity level used in the analysis

Variable [a)]	Acronym	Source	Frequency	Releasing date* for period t
Confidence indices				
Industry Confidence Index	ICI	FGV	Monthly	25th of month t
Industry Confidence Index - Capital Goods	BK.ICI	FGV	Monthly	25th of month t
Industry Confidence Index - Construction Material	MC.ICI	FGV	Monthly	25th of month t
Consumer Confidence Index	ICC	FGV	Monthly	25th of month t
Coincident Indicator of Unemployment	ICD	FGV	Monthly	10th of month t+1
Purchasing Manager's Index	PMI	Markit	Monthly	1st of month t+1
National Confidence Index	INC	ACSP	Monthly	10th of month t+1
National Consumer Confidence Index [b)]	INEC	CNI	Quarterly [b)]	30th of month t
Business Confidence Index [b)]	ICEI	CNI	Quarterly [b)]	15th of month t
Activity Level Variables				
Physical Production Index for Manufacturing Industry	PIM - Manufacturing	PIM/IBGE	Monthly	1st of month t+2
Physical Production Index for Civil for Construction Materials	PIM - Construction	PIM/IBGE	Monthly	1st of month t+2
Physical Production Index for Capital Goods	PIM - Capital Goods	PIM/IBGE	Monthly	1st of month t+2
Unemployment Rate	Unemployment	PME/IBGE	Monthly	10th of month t+2
Retail Sales Volume Index	PMC - Restrict	PMC/IBGE	Monthly	15th of month t+2
Extended Retail Sales Volume Index	PMC - Extended	PMC/IBGE	Monthly	15th of month t+2
Househol Consumption Expenditures in GDP	GDP - Consumption	SCN/IBGE	Quarterly	At the end of the second month of t+1
Manufacturing Industry in GDP	GDP - Manufacturing	SCN/IBGE	Quarterly	At the end of the second month of t+1
Civil Construction in GDP	GDP - Constuction	SCN/IBGE	Quarterly	At the end of the second month of t+1
Gross Fixed Capital formation in GDP	GDP - FBCF	SCN/IBGE	Quarterly	At the end of the second month of t+1

Sources: Fundação Getúlio Vargas (FGV), Markit, Associação Comercial de São Paulo (ACSP) and survey from Instituto Brasileiro de Geografia e Estatística (IBGE): Monthly Survey of Industry - Physical Production (PIM), Monthly Employment Survey (PME), Monthly Survey of Trade (PMC) and National Accounts System (SCN).

a) Seasol adjusted data. INC, INEC and ICEI were seasonal adjutes by the authors using X12-ARIMA.

b) Data was transformed into quarterly series since 2010 using quarterly averages.

* Approximation based on the latest releases.

There are other confidence indices for the Brazilian that were not included in our analyzes, either because they do not cover the country as a whole (*e.g.*, the Consumer Confidence Index of Rio Grande do Sul, from the Centro de Estudos e Pesquisas em Administração da Universidade Federal do Rio Grande do Sul) or, because their time span is too short (*e.g.*, Services Sector Survey and the Construction Survey, from FGV).

Table 1 also shows the variables used to capture the level of economic activity, computed by the Instituto Brasileiro de Geografia e Estatística (IBGE). From the Monthly Survey of Industry (PIM), the Physical Production Indices for Manufacturing, Capital Goods and Construction Materials were used[2]. From the Monthly Survey of Trade (PMC), we considered the Extended Retail Sales Volume Index (PMC – Extended), which includes vehicles and construction inputs, and the (restrict) Retail Sales Volume Index (PMC– Restrict). Regarding the Quarterly National Accounts, the GDP components for household consumption expenditures, manufacturing industry, civil construction industry and gross fixed capital formation were used.

Table 2: Descriptive Statistics of confidence indices and activity level measures

Variable		Beginning of the sample	Obs.	Mean	Standard deviation	Minimum	Maximum
Confidence Indices							
Monthly	ICI	Apr/1995	233	98,8	10,4	69,5	117,5
	ICI - Current Situation (ICI - ISA)	Apr/1995	233	99,1	11,8	67,3	121,3
	ICI - Expectations (ICI - IE)	Apr/1995	233	98,5	9,5	71,7	116,6
	BK.ICI	Apr/1995	233	95,9	18,7	51,1	128,2
	BK.ICI - Current Situation (BK.ICI - ISA)	Apr/1995	233	96,7	21,4	45,6	139,4
	BK.ICI - Expectations (BK.ICI - IE)	Apr/1995	233	95,0	17,4	47,2	124,8
	MC.ICI	Apr/1995	233	102,3	13,9	55,8	136,7
	MC.ICI - Current Situation (MC.ICI - ISA	Apr/1995	233	102,5	14,9	42,8	143,6
	MC.ICI - Expectations (MC.ICI - IE)	Apr/1995	233	102,1	14,4	68,3	129,7
	ICC	Sep/2005	108	112,0	7,5	94,7	127,8
	ICC - Current Situation (ICC - ISA)	Sep/2005	108	119,5	15,1	96,8	147,8
	ICC - Expectations (ICC - IE)	Sep/2005	108	108,0	5,2	93,1	119,4
	ICD	Sep/2008	106	78,4	14,4	60,4	101,9
	PMI	Nov/2005	103	51,0	3,6	38,1	57,8
	INC	Apr/2005	113	141,1	13,8	113,9	170,7
Quarterly	INEC	1st Q/2001	54	109,8	4,9	97,1	117,8
	ICEI	2nd Q/1999	61	58,0	4,9	46,9	69,7
Activity Level Variables							
Monthly	PIM - Manufacturing	Jan/1995	230	109,0	13,4	87,3	130,8
	PIM - Construction Material	Jan/1995	230	109,8	13,1	87,0	137,1
	PIM - Capital Goods	Jan/1995	230	129,9	38,3	76,0	198,8
	Unemployment	Mar/2002	146	8,5	2,4	4,6	13,2
	PMC - Restrict	Jan/2000	175	77,9	20,8	53,5	116,2
	PMC - Extended	Jan/2003	139	81,2	21,2	49,6	114,8
Quarterly	GDP	1st Q/1996	69	128,2	21,1	100,1	165,3
	GDP - Household Consumption	1st Q/1996	74	131,3	25,8	98,5	178,7
	GDP - Manufacturing	1st Q/1996	74	113,8	12,3	94,0	132,9
	GDP - Construction	1st Q/1996	74	123,9	18,8	101,3	160,4
	GDP - GFCF	1st Q/1996	74	130,0	32,1	93,5	189,4

Sources: Fundação Getúlio Vargas (FGV), Markit, Associação Comercial de São Paulo (ACSP) e Instituto Brasileiro de Geografia e Estatística (IBGE). For ICI, current situation and expectations have weight 50%, for the ICC current situation and expectation have weight 2/5 and 3/5, respectively. Further information can be obtained from the methodological notes available at FGV's site.

[2] The data from PIM have suffered a change in the methodology, to incorporate the classification CNAE 2.0, from IBGE. The original series were discontinued Feb 2014. Using the new classification, the starting date would be 2002, thus, in order to have more data, for those series from PIM, we chose to keep using the original series and stop our analyses at February 2014.

The sample considered in this paper was determined by the availability of the confidence indices, and thus, varies depending on the particular index at study. Table 2 shows the starting point of the sample for each index, the total number of observations and some descriptive statistics. In some sense, this table also helps emphasizing three limitations of this paper. First, the available time series have a relative short time span (ranging from 50 to 222 observations), which might hinder the power of our tests. Second, confidence indices are qualitative, usually summarized in a scale from 0 to 200, values higher than 100 indicating optimism[3]. Therefore, the relationship between the confidence index and the predicted variable could depend on the level of the confidence index (with different patterns depending whether the actual level is lower or higher than 100), something that is not explored in this paper. Finally, this paper only considers some of the several possible relationships that could be tested, though it focus on the simplest and less subjective type of forecasting models.

In the next section, we will describe our strategy to test the predictive power of the aforementioned confidence indices.

3. Methodology and estimation strategy

As mentioned before, this paper considers a set of variables concerning the growth rate of economic activity and for each of them, compares the predictive power of a univariate autoregressive model (equation 1) against the predictive power of a similar model that includes a confidence index (equation 2):

$$\text{Univariate: } y_{t+h} = \alpha + \beta_i \sum_{i=1}^{P} y_{t-i} + \varepsilon_{t+h} \quad (1)$$

$$\text{Extendend model: } y_{t+h} = \alpha + \beta_i \sum_{i=1}^{P} y_{t-i} + \gamma_j \sum_{j=0}^{K} ic_{t-j} + \varepsilon_{t+h} \quad (2)$$

where $y_t = \Delta \ln \mathrm{Y_t}$, $ic_t = \Delta \ln IC_t$. $\mathrm{Y_t}$ is period's *t* value of the variable capturing the level of economic activity and IC_t is period's *t* value of the confidence index. The forecasting horizon for the above equations is h.

[3] Nonetheless, there are exceptions, *e.g.*, the Purchasing Managers' Index (PMI) and the Business Confidence Index (ICEI), which range from 0 to 100, values of 50 or higher would be considered optimism.

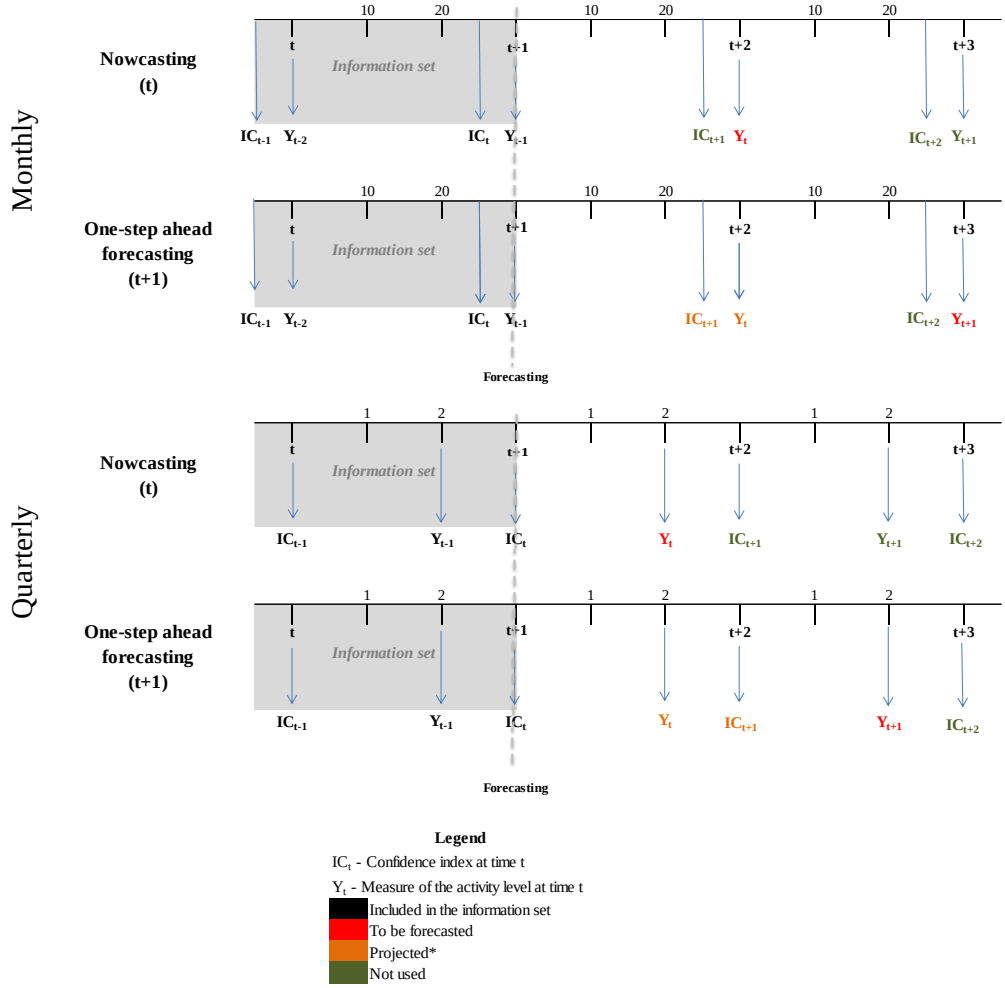
For the pseudo-out-of-sample forecast, there are two possible approaches. We could estimate a model to make a one-step-ahead prediction and then obtain the forecast for h steps by iteration. We could, alternatively, build a model aimed directly at forecasting h steps ahead, using Y_{t+h} as the dependent variable (direct forecast). Even though what is the best approach to follow is an empirical question, theory suggests that direct forecasts are more robust to misspecifications, whereas the iterative procedure would be more efficient in the case the model is correctly specified[4]. In this paper, as shown in Equations (1) and (2), we will follow the second approach.

In order to make our pseudo-out-of-sample forecasting exercise as close as possible to a real time analysis, we took into account the availability of confidence indices over time[5]. Figure 3 presents, for the monthly data, the timeline of the release of the confidence indices (IC) and the predicted variable (Y), built from the release dates shown in Table 1. Since our goal is to exploit the timeliness of confidence index to improve our short-run forecasts of the variables related to the level of economic activity, we compute the forecasts for the current level of economic activity (nowcasting, h=0) and for one step ahead (h=1).

In the case of the nowcasting exercise, as shown in the top half of Figure 3, the forecast for Y_t is computed in the beginning of the $t+1$ month, once Y_t and IC_t are released (and hence, belong to the information set, the area of Figures 3 shaded in gray).[6]

[4] See, *inter* alia, Elliot and Timmermann (2008), Marcellino, Stock and Watson (2006), and Ing (2003).
[5] Some variables such as GDP and its components are occasionally revised back in time. The data used in the analysis are the latest available vintage of the series in September 2014.
[6] The timeline depicted in Figure 3 was build based on the design of the indices derived from Consumer and Manufacturing Industry surveys, from FGV and from the physical production indices of PIM, IBGE. Nonetheless, the main features of this framework are still valid for other combination of variables. The same reasoning applies to the models that use quarterly data.

Figure 3 - Framework for nowcasting and one-step-ahead forecasting - monthly and quarterly data



For the one-step-ahead forecasting, since it is computed at the same point in time as the nowcasting, the information set is the same as before, the only change is that the predicted variable is Y_{t+1} instead of Y_t.

In the bottom half of Figure 3, we show the estimation strategy for the models that use quarterly data. The main differences are that the confidence indices used (ICI, INEC and ICEI) had to be converted to a quarterly frequency[7]. Similarly to the monthly data models, the forecast is done in period *t+1*, but with the difference that the last piece of information embodied in the information set is IC_t.

[7] The INEC and ICEI started to be released on a monthly basis in 2010, before that they were released every quarter.

The choice of the optimal number of lags for the models in this paper is based on the Bayesian Information Criterion (BIC). More specifically, among the AR models of order less than or equal to P given by equation (1), we choose the model with the lowest BIC value. The same criterion is used to select among the models with up to K lags of the confidence index and autoregressive terms of lower order or equal to P given by equation (2). In this paper, the maximum value for K and P is 6 and 4, respectively, for monthly data and quarterly data, so as to prevent losing too much information in our estimates.

After the choices of lags, we obtain the nowcasting and the one-step-ahead forecasts. Then, we move the window forward by one period (rolling-window) and compute the new predicted values based on the re-estimated models. We continue with this procedure until we reach the end of the sample. After collecting all the forecasts, we compute their root mean-squared forecasting errors.

We estimated our models using a moving window of fixed size, containing 60% of the available data, since for some series with smaller samples, smaller rolling windows would make estimation infeasible. Nonetheless it is important to highlight that the same exercise was performed using windows size of 55% and 65%, with no qualitative difference in the results.

Since the choices of lags for the autoregressive part of the equation (2) are independent of the choices for the models given in (1), the models chosen for a specific relationship between Y and IC are not necessarily nested. Thus, we decided to follow Giacomini and White (2006) and test their predictive power using a rolling window scheme. The predictive ability of the models is evaluated based on the statistics of Diebold and Mariano (1995) applied to the difference of the mean squared errors obtained when comparing the model without the confidence index and the model where the confidence index is included. We interpret the occurrence of a significant value for this statistic as an indication of predictive power gain from using a confidence index. While acknowledging the existence of a range of possibilities to be tested, in this paper we focused only on a few of the possible relationships involving the variables described in Table 1.

4. Results

Table 3 summarizes the results obtained from the nowcasting and from the one-step-ahead forecasting exercises, by presenting for each model its root mean square error

and its Diebold Mariano statistic against the best univariate model for the models' dependent variable[8]. According to the table, the Industry Confidence Index (ICI) provides relevant information, for both present and the near future of the growth of economic activity. In the case of the other indices, there was not sufficient evidence of a forecasting improvement, nonetheless, this could be a consequence of a lower test power due to the smaller number of observations.

Table 3 - Results for the test of predictive power

		Nowcasting			One step ahead		
	Index	Aggregate*	ISA	IE	Aggregate*	ISA	IE
Monthly							
PIM - Manufacturing Industry	ICI	XX	XXX	XX	X	-	-
PIM - Capital Goods	BK.ICI	-	-	X	X	X	-
PIM - Construction Material	MC.ICI	XX	XX	XX	XX	X	XX
PMI	Markit	-			-		
Unemployment Rate	ICD	-			-		
PMC - Extended	ICC	-	-	-	-	-	-
PMC - Extended	INC	-			-		
PMC - Restrict	ICC	-	-	-	-	-	-
PMC - Restrict	INC	-			-		
Quarterly							
Household Consumption	INEC	-			-		
PMC - Restrict	INEC	-			-		
PMC - Extended	INEC	-			-		
GDP - Manufacturing Industry	ICEI	-			-		
GDP - Manufacturing Industry	ICI	-	-	-	-	-	X
GDP - Construction Industry	MC.ICI	XX	XX	XX	-	-	-
GDP - GFCF	ICI	XX	XX	XX	X	X	-
GDP	INEC	-			-		
GDP	ICI	XX	XX	X	XX	XX	X
GDP	BK.ICI	X	XX	X	-	-	-
GDP	MC.ICI	-	X	-	-	-	-
GDP	ICEI	-			-		

"XXX", "XX" e "X" represent significant results at 1, 5 e 10% levels, respectively, and "-" indicates absence of significance at 10% level. The occurrence of a significant value for this statistic is interpreted as indicating the existence of predictive gain of including the confidence index in the model.

* Either ICI and sectors indices are comprised by the Current Situation (ISA) and Expectation (IE) indices, which are individually used in the regressions.

For monthly data, ICI and its components are found to have a greater predictive power against the best univariate model not only for the PIM –Manufacturing but also for the PIM – Construction Goods both for the present (T) and the near future (T+1).

For quarterly data, it is worth emphasizing that for the case of the growth of Construction industry and the Gross Fixed Capital formation as a percentage of the Gross Domestic Product (GDP) there is enough statistical evidence to claim (at a 5% significance level) that the Industry Confidence Index and its components improve upon the forecasts of the univariate model, two months before the release of the GDP data. For growth of GDP itself, there is also enough evidence to reject the null of the Industry Confidence Index does not help predicting GDP's growth.

[8] See Tables A.1 - A.4 in the Appendix for a greater detail of the results. The best univariate model is considered here to be the one that minimizes BIC.

5. Conclusion

In summary, the results presented in this paper suggest that among the confidence indices under analysis, the ICI and its components stand out in helping to improve univariate forecasts of variables capturing the level of economic activity, for both present (nowcasting) and the near future (one-step-ahead prediction).

It is important, however to highlight the main limitations of our results. First, the list of relationships used in this paper is quite limited, it is important to analyze the contribution of confidence indices for other variables of interest to economic agents. Second, the time series are short, which may compromise the power of the tests. Third, the results point towards predictive ability, which does not necessarily imply causality. Fourth, the models used in this paper do not take into account possible feedback effects or nonlinearities. Fifth, there is nothing that guarantees that the gain in predictive terms is still valid for other models with other exogenous variables of top of the indices of confidence. Finally, the sample includes periods of crisis, which may have led to important changes in the economic fundamentals.

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Appendix

Table A1: Descriptive Statistics of confidence indices and activity (dlog)

Variable			Beginning of the sample	Obs.	Mean	Standard deviation	Minimum	Maximum
Confidence Indices								
Monthly	ICI		May/1995	232	-0,001	0,036	-0,199	0,171
		ICI - Current Situation (ICI - ISA)	May/1995	232	-0,002	0,043	-0,230	0,241
		ICI - Expectations (ICI - IE)	May/1995	232	-0,001	0,033	-0,165	0,109
	BK.ICI		May/1995	232	-0,002	0,075	-0,379	0,271
		BK.ICI - Current Situation (BK.ICI - ISA)	May/1995	232	-0,003	0,096	-0,533	0,417
		BK.ICI - Expectations (BK.ICI - IE)	May/1995	232	-0,001	0,075	-0,370	0,245
	MC.ICI		May/1995	232	-0,001	0,057	-0,310	0,309
		MC.ICI - Current Situation (MC.ICI - ISA	May/1995	232	-0,001	0,071	-0,448	0,422
		MC.ICI - Expectations (MC.ICI - IE)	May/1995	232	0,000	0,061	-0,262	0,232
	ICC		Oct/2005	107	0,000	0,027	-0,134	0,058
		ICC - Current Situation (ICC - ISA)	Oct/2005	107	0,001	0,037	-0,152	0,094
		ICC - Expectations (ICC - IE)	Oct/2005	107	0,000	0,026	-0,124	0,065
	ICD		Oct/2008	105	-0,003	0,023	-0,079	0,069
	PMI		Nov/2005	102	-0,001	0,030	-0,098	0,088
	INC		May/2005	112	0,002	0,028	-0,070	0,070
Quarterly	INEC		2st Q/2001	53	0,001	0,028	-0,063	0,099
	ICEI		3rd Q/1999	60	-0,001	0,062	-0,117	0,185
Activity Level Variables								
Monthly	PIM - Manufacturing		Feb/1995	229	0,001	0,020	-0,125	0,062
	PIM - Construction Material		Feb/1995	229	0,001	0,017	-0,062	0,039
	PIM - Capital Goods		Feb/1995	229	0,002	0,045	-0,268	0,136
	Unemployment		Apr/2002	145	-0,007	0,028	-0,078	0,073
	PMC - Restrict		Feb/2000	174	0,004	0,009	-0,023	0,026
	PMC - Extended		Feb/2003	138	0,005	0,025	-0,102	0,082
Quarterly	GDP		2nd Q/1996	68	0,007	0,013	-0,042	0,044
	GDP - Household Consumption		2nd Q/1996	73	0,008	0,013	-0,030	0,046
	GDP - Manufacturing		2nd Q/1996	73	0,003	0,036	-0,110	0,142
	GDP - Construction		2nd Q/1996	73	0,005	0,025	-0,055	0,051
	GDP - GFCF		2nd Q/1996	73	0,008	0,037	-0,125	0,088

Sources: Fundação Getúlio Vargas (FGV), Markit, Associação Comercial de São Paulo (ACSP) e Instituto Brasileiro de Geografia e Estatística (IBGE).

Table A.2 - Root Mean Square Error for Nowcasting - Monthly Data

Endogenous	Index	Agg.	ISA	IE	Begin	End
PIM - Manufacturing	ICI	**0,77**	**0,81**	**0,78**	Apr-1995	Aug-2006
		(0,01)	(0,01)	(0,03)		
PIM - Capital Goods	BK.ICI	0,95	1,01	**0,89**	Apr-1995	Aug-2006
		(0,23)	(0,57)	(0,08)		
PIM - Construction Goods	MC.ICI	**0,72**	**0,91**	**0,79**	Apr-1995	Aug-2006
		(0,01)	(0,02)	(0,02)		
PMI	Markit	0,96			Feb-2006	Dec-2010
		(0,40)				
Unemployment Rate	ICD	1,02			Dec-2005	Dec-2010
		(0,70)				
PMC - Extended	ICC	1,06	1,09	1,04	Sep-2005	Jan-2011
		(0,92)	(0,85)	(0,92)		
PMC - Extended	INC	1,02			Sep-2005	Jan-2011
		0,82				
PMC - Restrict	ICC	1,13	1,25	1,10	Sep-2005	Jan-2011
		(0,96)	(0,91)	(0,90)		
PMC - Restrict	INC	1,04			Sep-2005	Jan-2011
		(0,71)				

p-values from Diebold-Mariano statistics in parentheses. Alternative hypothesis: model with confidence index has greater predictive power than the univariate model. In all models, the variables used were the first difference of the logarithm of the original variables. Values in bold indicate significance at 10% level.

Table A.3 - Root Mean Square Error for Nowcasting - Quarterly Data

Endogenous	Índice	Agg.	ISA	IE	Begin	End
Consumption expenditures	INEC	0,93			2001Q1	2009Q1
		(0,27)				
PMC - Restrict	INEC	1,11			2001Q1	2009Q1
		(0,90)				
PMC - Extended	INEC	1,06			2003Q2	2009Q4
		(0,63)				
GDP - Manufacturing	ICEI	0,93			1999Q2	2008Q2
		(0,35)				
GDP - Manufacturing	ICI	1,02	0,96	1,17	1996Q2	2007Q1
		(0,52)	(0,44)	(0,70)		
GDP - Construction	MC.ICI	**0,49**	**0,56**	**0,44**	1996Q2	2007Q1
		(0,02)	(0,04)	(0,02)		
GDP - GFCF	ICI	**0,38**	**0,45**	**0,39**	1996Q2	2007Q1
		(0,02)	(0,02)	(0,01)		
GDP	INEC	0,86			1999Q2	2008Q2
		(0,16)				
GDP	ICI	**0,43**	**0,48**	**0,46**	1996Q2	2007Q1
		(0,05)	(0,04)	(0,06)		
GDP	BK.ICI	**0,56**	**0,49**	**0,67**	1996Q2	2007Q1
		(0,06)	(0,05)	(0,05)		
GDP	MC.ICI	0,55	**0,59**	0,59	1996Q2	2007Q1
		(0,14)	(0,09)	(0,13)		
GDP	ICEI	0,81			2001Q1	2009Q1
		(0,23)				

p-values from Diebold-Mariano statistics in parentheses. Alternative hypothesis: model with confidence index has greater predictive power than the univariate model. In all models, the variables used were the first difference of the logarithm of the original variables. Values in bold indicate significance at 10% level.

Table A.4 - Root Mean Square Error for One-step Ahead Forecasting- Monthly Data

Endogenous	Index	Agg.	ISA	IE	Begin	End
PIM - Manufacturing	ICI	**0,88**	0,90	0,94	Apr-1995	Aug-2006
		(0,09)	(0,12)	(0,36)		
PIM - Capital Goods	BK.ICI	**0,87**	**0,90**	0,93	Apr-1995	Aug-2006
		(0,07)	(0,05)	(0,19)		
PIM - Construction Goods	MC.ICI	**0,86**	**0,91**	**0,88**	Apr-1995	Aug-2006
		(0,03)	(0,06)	(0,02)		
PMI	Markit	1,09			Feb-2006	Dec-2010
		(0,73)				
Unemployment Rate	ICD	1,00			Dec-2005	Dec-2010
		(0,53)				
PMC - Extended	ICC	1,01	1,00	1,04	Sep-2005	Jan-2011
		(0,71)	(0,48)	(0,96)		
PMC - Extended	INC	1,03			Sep-2005	Jan-2011
		(0,90)				
PMC - Restrict	ICC	1,06	1,04	1,04	Sep-2005	Jan-2011
		(0,82)	(0,84)	(0,72)		
PMC - Restrict	INC	1,07			Sep-2005	Jan-2011
		(0,84)				

p-values from Diebold-Mariano statistics in parentheses. Alternative hypothesis: model with confidence index has greater predictive power than the univariate model. In all models, the variables used were the first difference of the logarithm of the original variables. Values in bold indicate significance at 10% level.

Table A.5 - Root Mean Square Error for One-step Ahead Forecasting- Quarterly Data

Endogenous	Index	Agg.	ISA	IE	Begin	End
Consumption expenditures	INEC	1,04			2001Q1	2009Q1
		(0,84)				
PMC - Restrict	INEC	1,00			2001Q1	2009Q1
		(0,51)				
PMC - Extended	INEC	1,14			2003Q2	2009Q4
		(0,85)				
GDP - Manufacturing	ICEI	0,83			1999Q2	2008Q2
		(0,11)				
GDP - Manufacturing	ICI	1,01	0,98	**0,76**	1996Q2	2007Q1
		(0,52)	(0,46)	(0,06)		
GDP - Construction	MC.ICI	0,94	1,01	0,88	1996Q2	2007Q1
		(0,28)	(0,55)	(0,17)		
GDP - GFCF	ICI	**0,69**	**0,72**	0,86	1996Q2	2007Q1
		(0,10)	(0,08)	(0,34)		
GDP	INEC	0,89			1999Q2	2008Q2
		(0,21)				
GDP	ICI	**0,78**	**0,79**	**0,80**	1996Q2	2007Q1
		(0,04)	(0,04)	(0,06)		
GDP	BK.ICI	0,85	0,86	0,88	1996Q2	2007Q1
		(0,16)	(0,16)	(0,16)		
GDP	MC.ICI	0,93	1,00	0,88	1996Q2	2007Q1
		(0,15)	(0,47)	(0,11)		
GDP	ICEI	1,01			2001Q1	2009Q1
		(0,59)				

p-values from Diebold-Mariano statistics in parentheses. Alternative hypothesis: model with confidence index has greater predictive power than the univariate model. In all models, the variables used were the first difference of the logarithm of the original variables. Values in bold indicate significance at 10% level.