A leading index for the Colombian economic activity*

Luis Fernando Melo V.**

Fabio Nieto***

Mario Ramos V.**

Abstract

In this paper, we propose a methodology for calculating a leading index of the economic activity based on a modification of Stock and Watson's (1989, 1991, 1992) approach. We use Kalman filter techniques for estimating the state space representation of the leading index model. The methodology is applied to the Colombian economy and the resulting index leads six months the Melo et al. (2002) coincident index (in semi-annual growth rates). As an intermediate result, we also develop an updating process of the coincident index.

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** Banco de la República.
*** Universidad Nacional de Colombia.

1. **Introduction**

The design of a leading index for the state of the economy of a country is a major concern because it permits to lead the turning points of the economy or, in a global manner, the dynamics of the economic activity. This information is very useful for economic policy decision making.

Usually, the design of such an index is accomplished by means of a weighted average of a group of variables that has been specified a priori and that are expected to lead, reasonably well, the latent process of interest. The weights are selected in a heuristic way determined by the particular context. In the case of a leading index for the economic activity, the chosen variables are supposed to have an intrinsic capacity for leading the movements of the state of the economy. This has been the traditional approach of the National Bureau of Economic Research (NBER) in the United States, and it has been used in some other countries as well, although in some cases with certain modifications (OECD, for example).

The construction of a leading index requires, first of all, to obtain the so-called reference cycle for the economy, which is a statistical estimate of the latent state of the economy (an unobservable stochastic process). This estimate is also considered as a coincident index of the economic activity. With respect to this index, a given economic variable can be qualified as lagged, coincident with or leading the state of the economy.

As noted above, an optimal estimate of the coincident index for the state of the economy is a crucial step in the design of a leading index. On this point, Nieto and Melo (2001) have proposed an appropriate methodology for computing a coincident index for the economic activity, which is based on a modification to Stock and Watson's (1989, 1991, 1992) procedures. Their results were then applied by Melo *et al.* (2002) in the design of a coincident index for the Colombian economy.

Stock and Watson's approach for computing a leading index uses a state space model with observable coincident and leading variables, where the leading characteristic is determined with respect to the coincident index. The leading index is defined as the *prediction* of the 6-months-ahead change of the state of the economy based on the available coincident and leading observed information at present.

In Colombia, some exercises have been conducted to this aim by using the NBER or OECD approaches [see, Melo *et al.* (1988), Ripoll *et al.* (1995), Maurer and Uribe (1996) and Maurer *et al.* (1996)]. The drawback of the NBER procedure is, however, that it is not defined exactly a priori the subject to be indicated, or estimated, and is not clear that this estimate is optimal under some conventional statistical criterion. Consequently, it is desirable to develop a procedure for computing a leading index that takes into account the previous raised points.

In section 2 we present the basic statistical model (specification, estimation, and validation) and the way of computing the leading index. Some improvements to the Nieto and Melo (2001) coincident index are considered in section 3. In section 4 we present the results obtained in an empirical application to the Colombian economy. Conclusions are presented in the last section.

2. The statistical model

2.1 Specification and basic assumptions

The model to be proposed is a modified version of those presented by Stock and Watson (1989, 1991, 1992). Following this approach, we define the *state of the economy* as a *latent* stochastic process, which we denote as $\{C_t\}$.

Stock and Watson's philosophy for computing an economic leading index is based on the fact that one has an available set of seasonally-adjusted coincident variables, which are additionally integrated of order 1, I(1), $X_{1t},...,X_{nt}$, and another set of stationary leading variables[1], $Y_{1t},...,Y_{qt}$, which are related to $\{C_t\}$ by means of the equations[2]:

$$\Delta X_{it} = \gamma_i \Delta C_t + \Delta u_{it}, \qquad (1)$$

$$\Delta C_t = \mu_c + \lambda_{cc}(L)\Delta C_{t-1} + \lambda_{cy}(L)\mathbf{Y}_{t-1} + \nu_{c,t} \qquad (2)$$

$$\mathbf{Y}_t = \mu_y + \lambda_{yc}(L)\Delta C_{t-1} + \lambda_{yy}(L)\mathbf{Y}_{t-1} + \nu_{y,t}, \qquad (3)$$

where $i = 1,...n$; $t = 1,...N$; N denotes the sample period length, and $\mathbf{Y}_t = (Y_{1t},...,Y_{qt})'$, with L the lag operator. As in the Nieto and Melo (2001)'s paper, hereafter referred to as N-M, γ_i is a constant indicating the weight of C_t in the variable X_{it}, and u_{it} is a stochastic component that is specific to X_{it} and independent of C_t. This specific process follows the stationary autoregressive model

$$D_i(L)u_{it} = \varepsilon_{it}, \qquad (4)$$

where $D_i(L) = 1 - d_{i1}(L) - ... - d_{ik}L^k$, and ε_{it} a Gaussian white noise process with variance σ_i^2. Furthermore, we assume that the processes ε_{it} are mutually independent, which in turn implies mutual independence among the processes u_{it}. On the other hand, μ_c and μ_y denote intercepts in the corresponding equations; $\lambda_{cc}(L)$, $\lambda_{cy}(L)$, $\lambda_{yc}(L)$, and $\lambda_{yy}(L)$ are polynomials in the lag operator L, with corresponding scalar, vector or matrix coefficients; and $\nu_{c,t}$ and $\nu_{y,t}$ are Gaussian white noise processes with respective variances $\sigma_{\nu c}^2$ and $\Sigma_{\nu y}$, which are independent among each other as well as with the process $\varepsilon_t = (\varepsilon_{1t},...,\varepsilon_{nt})'$.

Equation (2) reflects the leading character of Y variables with respect to ΔC_t, and also the dependence of this variable on its lagged values. Equation (3) indicates the possible feedback effect of ΔC_t on $\mathbf{Y}_t$. Jointly, these equations determine a vector autoregressive model (VAR) for the process $(\Delta C_t, Y_{1t},...,Y_{qt})$, where the first component is *not observable*.

[1] Then if a candidate for leading variable is I(1), the variable is considered in first differences.
[2] The equations (2), (3) and (4) are the same as in Stock and Watson's Model, while equation (1) is modified according to Nieto and Melo's (2001) results.

2.2 **Model estimation**

In order to estimate the unknown parameters of the model above described and the unobservable process ΔC_t, we rewrite the model in state space form, as indicated in Appendix A[3]. Then, we use the maximum likelihood method for parameter estimation and the Kalman filter for estimating ΔC_t using the information up to time t. For checking the adequacy of the model we use the same procedure as in N-M.

Following Stock and Watson's approach, the *leading index* is given by $L_t = C_{t+6|t} - C_{t|t}$, where $C_{t+j|t}$, $j = 0,1,...$, denotes the prediction of C_{t+j} given the information up to time t. It is important to note that the information used in the context of the leading index is given by both the coincident and leading variables. We denote $C^c_{t/t}$ as the coincident index of N-M, which, as a statistical estimate, is based only on the coincident variables.

Since the Kalman filter only provides the sequence of estimates $\{\Delta C_{t|t}\}$, it is necessary to make an integration of this process to obtain the required leading index. This is accomplished by means of the formula

$$L_t = \sum_{i=1}^{6} \Delta C_{t+i|t} \quad .$$

According to Stock and Watson, L_t will be a leading index for C_t if L_t and M_t are very close, where M_t is defined as the difference between $C^c_{t+6|t+6}$ and $C^c_{t/t}$.

3. Improvements to the coincident index methodology

Before going through the estimation of the leading index model, we consider two improvements to the methodology of calculating the coincident index of N-M. One is

[3] This representation is an extension of the one described in N-M.

about the identifiability of the model and the other is about the procedure of updating the index.

3.1. Identifiability of the coincident index

Although the Colombian coincident index obtained by Melo *et al.* (2002). and N-M is adequate for tracking the state of the economy, an *identifiability* problem has been detected by the authors. Indeed, Nieto (2003) obtained some results related to this topic on the basis of Bickel and Docksum's (1977) identifiability definition.

Based on analytical and simulation results about the likelihood function of the coincident model, the author found that the weights of the latent process, coefficients γ_i in equation (1), are highly responsible for the identification problem. In order to obtain the identifiability property of the model, he suggests an approach in which the autoregressive parameters of the intrinsic processes, coefficients d_{ij} in equation (4), are estimated before the likelihood function maximization, and the latent process coefficients are restricted to be nonnegative.

3.2. Proposal for Updating the Coincident Index

Most of the techniques currently used to estimate unobservable series have the updating property in which the complete series is prone to revision as new data become available, the N-M methodology for calculating the coincident index is not an exception. Even though the results of the estimation have been very robust for different samples, there are minor changes in the coincident index when the sample is updated.

In this section we propose a methodology that avoids this updating problem for the estimation of the coincident index. This technique is implemented using a two-step methodology. First, a new state space model (updating model) is estimated. In this model the coincident index is part of the observed vector of variables, and the main parameters of the model are assumed to follow a random walk. Second, the Kalman filter for N-M model is calculated once we get the new observation.

3.2.1. Nieto and Melo's Model

As described by N-M, the coincident index model is specified by three equations. The first equation shows a contemporaneous relationship between the observed variables $X_{1t},\ldots,X_{nt,}$ and the index $\{C_t\}$:

$$X_{it} = \beta_{it} + \gamma_i C_t + u_{it}\,, \qquad (5)$$

where β_{it} is a deterministic component that can include seasonal dummies, the second equation describes the dynamic of $\{C_t\}$:

$$C_t = \delta + \phi_1^* C_{t-1} + \ldots + \phi_{p+1}^* C_{t-p-1} + \eta_t\,, \qquad (6)$$

and the third equation indicates the model for u_{it}, the stochastic component inherent to X_{it}:

$$u_{it} = d_{i1} u_{i,t-1} + \ldots + d_{ik} u_{i,t-k} + \varepsilon_{it}\,, \qquad (7)$$

where $\{\varepsilon_{it}\}$ and $\{\eta_t\}$ are Gaussian independent white noise processes with variances σ_i^2 and 1, respectively, $i = 1,2,\ldots,n$, $t = 1,2,\ldots,N$, n corresponds to the number of observed variables and N to the length of the sample period.

3.2.2. The Updating Model

The first step of the proposed methodology consists in estimating an updating model. The idea of this approach is to update the estimation of the main parameters of the N-M model as a new observation becomes available, and then to use the estimated parameters in the Kalman filter updating equations of N-M, in order to calculate the new value of the coincident index.

The basic assumptions of the updating model are that the $\{C_t\}$ is "observed" up to time N, and that the main parameters of the N-M model are stochastic, following each of them a random walk process. Defining the vector $\boldsymbol{a}_t$ as the set of the parameters to be updated[4], we have that:

$$a_t = (\gamma_{1,t}, \gamma_{2,t}, \ldots, \gamma_{n,t}, \phi^*_{1,t}, \phi^*_{2,t}, \ldots, \phi^*_{p+1,t})' \qquad (8)$$

and that its stochastic dynamic is given by:

$$a_t = a_{t-1} + v_t, \qquad t = N+1, \ldots, \qquad (9)$$

where $\{v_t\}$ is a Gaussian white noise process with variance-covariance matrix Σ_v.

Let $X_t = (X_{1t}, X_{2t}, \ldots, X_{nt})'$, $\beta_t = (\beta_{1t}, \beta_{2t}, \ldots, \beta_{nt})'$, $\gamma_t = (\gamma_{1t}, \gamma_{2t}, \ldots, \gamma_{nt})'$, $u_t = (u_{1t}, \ldots, u_{nt})'$ and $\varepsilon_t = (\varepsilon_{1t}, \ldots, \varepsilon_{nt})'$. Then equations (5) and (7) can be rewritten in the following vectorial form:

$$X_t = \beta_t + \gamma_t C_t + u_t, \qquad (10)$$

$$D(B) u_t = \varepsilon_t, \qquad (11)$$

where $D(B) = I_n - D_1 B - \ldots - D_k B^k$, with B as the lag operator, I_n the identity matrix of order n and $D_i = \mathrm{diag}\{d_{1i}, \ldots, d_{ni}\}$.

Then, if we apply the filter $D(B)$ to both sides of equation (10), we obtain:

$$X^*_t = \beta^*_t + \gamma_t C_t - D_1 \gamma_{t-1} C_{t-1} - \ldots - D_k \gamma_{t-k} C_{t-k} + \varepsilon_t \qquad (12)$$

where $X^*_t = D(B) X_t$ and $\beta^*_t = D(B) \beta_t$

The observation equation of the new state space model is obtained considering both equations (12) and (6) as follows:

$$Y_t = d_t + Z_t \alpha_t + e_t \qquad (13)$$

where:

$$Y_t = \left(X_t^{*\prime}, C_t\right)', \; d_t = \left(\beta_t^{*\prime}, \delta\right)', \; e_t = \left(\varepsilon_t', \eta_t\right)', \; \alpha_t = \left(\gamma_t', \gamma_{t-1}', \ldots, \gamma_{t-k}', \phi^*_{1,t}, \ldots, \phi^*_{p+1,t}\right)'$$

[4] As noted in expression (8), the parameters β_{it} and d_{ij} specified in equations (5) and (7) are not included in the updating vector $\boldsymbol{a}_t$. The parameters d_{ij} are not included since they are fixed according to the recommendations of Nieto (2003). And the parameters β_{it} are not included in this vector because they are obtained in the seasonal adjustment before the estimation of the model.

and $$Z_t = \begin{pmatrix} I_n C_t & -D_1 C_{t-1} & \cdots & -D_k C_{t-k} & \mathbf{0} \\ & 0 & & & C_{t-1}\ C_{t-2} \ldots C_{t-p-1} \end{pmatrix}$$

Given equation (9) and the previous definition of the state vector α_t, the transition equation of the model is defined as:

$$\alpha_t = T\alpha_{t-1} + R\varsigma_t \qquad (14)$$

where,

$$T = \begin{pmatrix} I_n & & 0 & 0 & | & \\ & & & & | & 0 \\ & I_{kn} & & 0 & | & \\ - & - & - & - & - & - \\ & 0 & & & | & I_{p+1} \end{pmatrix}, \quad R = \begin{pmatrix} I_n & 0 \\ 0 & 0 \\ 0 & I_{p+1} \end{pmatrix} \quad \text{and} \quad \varsigma_t = \nu_t .$$

In practical terms, the observable vector $\boldsymbol{Y}_t$ can be easily calculated since the parameters d_{ij} are fixed according to the results of Nieto (2003). The initial value of the state vector, its initial variance covariance matrix, and the parameters $d_{ij,}$ and $\{C_t\}$ are all taken from the estimations of N-M[5]. The sample variance-covariance matrix of ν_t is used as the initial value of Σ_ν, where ν_t is computed as the first difference of $\boldsymbol{a}_t$.[6]

3.2.3. Procedure for updating the index

The updating procedure is implemented using a two-step methodology. First, the updating model is estimated computing a diffuse Kalman filter following the De Jong (1991a, 1991b) algorithm[7], and using the observations $t=1,2,\ldots,N+1$. In this way we obtain an estimation of $\boldsymbol{a}_{N+1} = (\gamma_{1,N+1}, \gamma_{2,N+1}, \ldots, \gamma_{n,N+1}, \phi^*_{1,N+1}, \phi^*_{2,N+1}, \ldots, \phi^*_{p+1,N+1})'$. Second, these parameter estimates are used for computing the Kalman filter of the N-M model for $t=N+1$. In this

[5] $$C_t = \begin{cases} C^C_{t/t} & t = 1,2,\ldots,N \\ C^C_{t/t-1} & t = N+1 \end{cases}$$
where the super-index C denotes the estimations from N-M.

[6] If there are estimations of previous updating models, all the required initial values can be taken from the former estimation.

[7] The De Jong methodology is used since the updating model is nonstationary.

way, we obtain the coincident index for the time *N+1* while the previous values of the index remain unchanged from prior estimations.

4. An empirical application of the leading index methodology

Now, we apply the leading index methodology to the Colombian economic activity for the monthly sample period 1980:01 – 2001:12. The coincident variables (*X*) are taken from N-M. For the selection of a plausible set of leading variables (*Y*) we take into account some characteristics such as data periodicity (monthly), opportunity (lag less than or equal to 2 periods), and availability from January 1980. A list of all variables that were considered is shown in Appendix B. Each variable was analyzed by means of economic as well as statistical criteria. The latter is based on unit root tests (Dickey-Fuller and KPSS) for determining the order of integration of the transformed series (in logs) and the Franses and Hobijn (1997) test for checking seasonal unit roots. The results of unit root tests are presented in Table C1 (Appendix C). Where we can see that, all of the series, except for four, show some evidence of a unit root. Only volume of coffee exports (Expo_caf), gasoline production (Pro_gas), Rainfall (Precip) and Livestock sacrifice (Sganem) can be considered as I(0). The seasonal unit root test statistics are summarized in Table C2 (Appendix C). The results show that three of the time series are seasonally integrated, I(12), Sales Index excluding combustibles (Ivtot), real minimum wage (Salarmin) and international departures of passengers by air transport (Sapint).

Following Altissimo *et al.* (2000), the variables are considered as leading according to co-movement statistics and tests of predictive power with respect to two reference series: the coincident index ($C^{c}_{t/t}$) from N-M and the industrial production (IPR_t). The co-movement was analyzed using the cross correlation function between each variable and the reference series from 6 lags up to 12 leads (Appendix D, Tables D1 and D2)[8]. Following this criteria, a variable is considered as leading if these cross correlations show a lead period of at least 6 months.

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[8] The estimation of the cross correlation function was implemented using a double prewhitening methodology. See Brockwell and Davis (1991) for more details.

The predictive power of a variable is measured as its capacity for forecasting growth rates of the reference series according to two statistics: predictive content and marginal predictive content (Appendix D, Tables D3 and D4). The former is obtained as the result of ranking the R^2 of the following regression (In the Tables, 1 indicates that the variable is associated with the highest R^2, 2 with the second highest R^2, and so on):

$$\ln(R_{t+k}) - \ln(R_t) = \alpha_0 + \sum_{j=0}^{5} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=0}^{6} \beta_i \Delta \ln(W_{t-i}) + \varepsilon_t^*, \quad \textit{for } k = 1,6,12 ,$$

where R_t is the reference series and W_t is a candidate for a leading variable[9].

The marginal predictive content is evaluated with the F statistic, which is used to test whether a candidate variable enters significantly into a regression of the growth of the reference series that includes six or twelve lags of the growth of the candidate variable and twelve lags of the reference series. Then, the equation to be estimated is:

$$\Delta \ln(R_t) = \alpha_0 + \sum_{j=1}^{12} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=1}^{k} \beta_i \Delta \ln(W_{t-i}) + \varepsilon_t \quad \textit{for } k = 6,12$$

Based on the previous criteria, we selected 13 leading series of the Colombian economic activity. The selected series represent several sectors of the economy, including the external, the financial and the building sector as well as the expectations of the industrial production and economic conditions. The final set of leading variables are the following: number of orders at the end of the month (f_p5), expectations about the economic situation during the next six months (f_p10), business conditions (clineg), confidence indicator (incon), real checking accounts (dccr), real money supply M1 (m1r), real savings accounts (ahor_r), real buildings loans approved (rpreap), real buildings loans granted (rpreen), approved building area (areacon), interest rate of 90-day certificate of deposits for banks and corporations (cdt), real interest rate of 90-day certificate of deposits for banks and corporations (cdttr), and consumption good imports in real terms (impr_bco).

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[9] This equation includes seasonal dummies when *IPR* is used as the reference series.

The optimum group of leading series that are included in the model was obtained from the analysis of the estimation results for different combinations of the 13 selected series. The best model is chosen according to some statistical criteria which includes Akaike's information criterion (AIC), residual diagnostics, model stability and the leading performance of the resulting index.

The leading performance of the index is evaluated comparing the leading index $L_t = C_{t+6|t} - C_{t|t}$ with $M_t = C^c_{t+6/t+6} - C^c_{t/t}$. Then, if L_t and M_t are very close, L_t can be considered as a leading index for $C^c_{t/t}$ and in turn for $\{C_t\}$, the unobserved state of the economy. A negative value of the index L_t indicates a forecast of negative growth for the economic activity over the next six months.

A number of remarks related to the estimation stage of the model are in order here:

1. The seasonal components of the series are modeled using dummy variables as in N-M, but in order to reduce computational time, the coincident and leading variables were seasonally adjusted before they were included in the state space model. The adjustment is done by regressing these series on seasonal dummies.

2. In preliminary exercises, the estimated leading index presented high volatility. In order to reduce the volatility, we transform the leading series using a low pass filter, based on Baxter and King's (1995) approach, which smooths high frequency irregular variations. We use a filter that removes components of periodicity less than 5 months.

3. The order of the polynomials of the system, conformed by equations (2) and (3), were chosen based on the minimization of the root mean square forecast error[10] (RMSFE) of the coincident index, using a VAR model with the variables included in those equations. The coincident index was taken from the estimation in N-M.

[10] The forecasts of the coincident index were done out of sample using a rolling technique.

Taken into account the large number of hyperparameters and the complexity of the estimation routines, we consider lag orders of 0, 1 and 2 for the polynomials λ_{yc} and $\lambda_{yy,}$ and lags from 5 to 12 for the polynomial λ_{cc}. The order of polynomial λ_{cy} was fixed to 5 lags.

4. The maximum likelihood estimation of the leading index model uses numerical algorithms that required initial values of the hyperparameters. The initial values for the parameters γ of equation (1) are selected from the estimations in N-M. The values for the parameters of the equations (2) and (3) are taken from the VAR model used to select the polynomials orders. Following Nieto (2003) and considering equations (1) and (4), the values of the parameters of the polynomial *D(L)* in equation (4) are obtained from the fitting of time series regression models with AR errors, to each coincident series x_{it} [11].

The statistics for selecting the best leading index model are presented in Tables E1 and E2 of Appendix E and based on these results, we select the model 102 as the final model. The model includes as the leading variables real money supply (m1r), real interest rate of 90-day certificate of deposits for banks and corporations (cdttr), approved building area (areacon), consumption good imports in real terms (impr_bco), business conditions (clineg) and confidence indicator (incon)[12]. These series are plotted in Figure 1. The selected series includes opinions and expectations of industrial production and economic activity, indicators from building and monetary sectors, and external trade. These sectors show different features about the future economic activity.

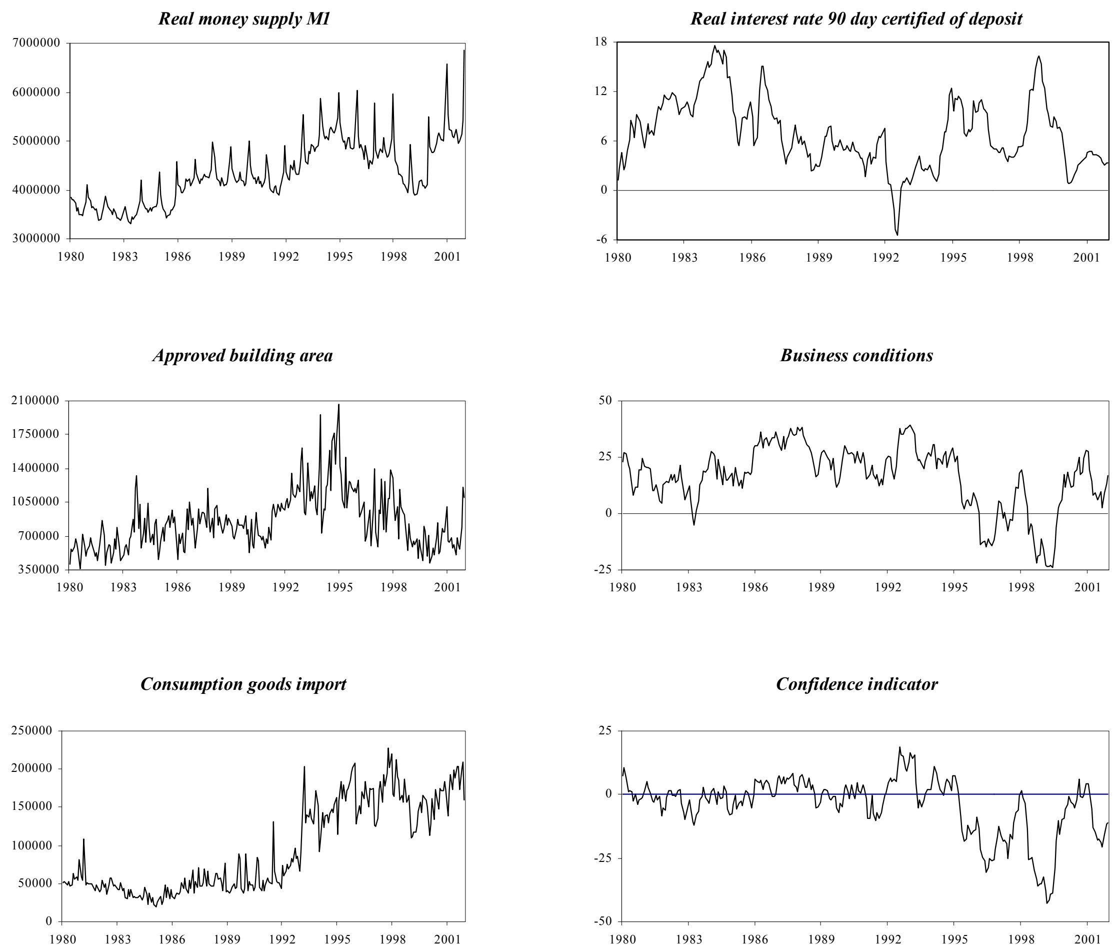
The approved building area (areacon) indicates the supply intention of the building sector. A positive shock to this sector generates a demand to other parts of the economy. Furthermore, the building sector is labor force intensive and its dynamics has an important incidence over the total wage earnings and, consequently, over the aggregate demand.

[11] In this procedure, C_t is replaced by its estimate from N-M and the autoregressive orders of the estimated polynomials are obtained using AIC criteria.

[12] All the series in real terms are deflated by CPI.

Since consumption good imports (impr_bco) are associated with sales expectations; they can be considered as a demand component related to the consumption expectations.

Figure 1. Leading series in levels



Money supply (m1r) indicates the evolution of transactions in the economy. Several works [see, Bravo and Franken (2001), CIF (1999)] evidence a leading relationship of monetary variables (m1r, m2r) on the economic activity.

The real interest rate (cdttr) affects both consumption and saving decisions and the composition of the portfolio of financial assets. Thus, it determines the future allocation of investment resources.

The economic agent expectations play an important role to predict the economic activity. The selected variables include two series that give an idea of the formation of the expectations**.** Business conditions (Clineg) is a composite indicator of the current and future economic conditions. The confidence indicator (Incon) is a variable that captures the production expectations of the firms. The definition of this variable is associated with the stock, orders and production expectations for the next three months.

The following are the estimation results of the final leading index model:

Table 1. Parameter estimates of equation 1

Parameter	Variable	Estimate	Std
γ1	F_p1	0.252	0.022
γ2	F_p6	0.183	0.018
γ3	Prcem	0.122	0.010
γ4	Ipr	0.214	0.014
γ5	Iem_ob	0.743	0.047
γ6	Efecrc	0.022	0.007
γ7	Energa	0.130	0.009
γ8	Impres	0.090	0.011
γ9	Cart_sbr	0.284	0.019
Equation (1) : $X_{it} = \gamma_i C_t + u_{it}$			

Table 2. Parameter estimates of equation 2

parameter	Estimate [*]	Parameter	Estimate	parameter	Estimate	parameter	Estimate
$\lambda_{cy,1,1}$	-0.073	$\lambda_{cy,3,1}$	-2.396	$\lambda_{cy,5,1}$	-1.474	μ_c	0.023
	(0.041)		(0.109)		(0.065)		(0.063)
$\lambda_{cy,1,2}$	1.592	$\lambda_{cy,3,2}$	6.598	$\lambda_{cy,5,2}$	3.434	$\lambda_{cc,1}$	-0.062
	(0.091)		(0.261)		(0.203)		(0.040)
$\lambda_{cy,1,3}$	0.789	$\lambda_{cy,3,3}$	3.957	$\lambda_{cy,5,3}$	2.354	$\lambda_{cc,2}$	-0.042
	(0.133)		(0.124)		(0.147)		(0.033)
$\lambda_{cy,1,4}$	0.996	$\lambda_{cy,3,4}$	2.736	$\lambda_{cy,5,4}$	0.663	$\lambda_{cc,3}$	0.095
	(0.055)		(0.100)		(0.045)		(0.009)
$\lambda_{cy,1,5}$	1.194	$\lambda_{cy,3,5}$	5.516	$\lambda_{cy,5,5}$	4.055	$\lambda_{cc,4}$	0.011
	(0.105)		(0.188)		(0.207)		(0.050)
$\lambda_{cy,1,6}$	0.618	$\lambda_{cy,3,6}$	2.221	$\lambda_{cy,5,6}$	0.340	$\lambda_{cc,5}$	0.051
	(0.153)		(0.272)		(0.127)		(0.022)
$\lambda_{cy,2,1}$	1.219	$\lambda_{cy,4,1}$	2.643	$\lambda_{cy,6,1}$	0.673	$\lambda_{cc,6}$	0.013
	(0.186)		(0.135)		(0.080)		(0.018)
$\lambda_{cy,2,2}$	-4.464	$\lambda_{cy,4,2}$	-5.921	$\lambda_{cy,6,2}$	-1.100	$\lambda_{cc,7}$	-0.001
	(0.131)		(0.420)		(0.044)		(0.015)
$\lambda_{cy,2,3}$	-2.385	$\lambda_{cy,4,3}$	-3.777	$\lambda_{cy,6,3}$	-0.802		
	(0.029)		(0.149)		(0.067)		
$\lambda_{cy,2,4}$	-1.974	$\lambda_{cy,4,4}$	-1.780	$\lambda_{cy,6,4}$	-0.067		
	(0.079)		(0.099)		(0.027)		
$\lambda_{cy,2,5}$	-3.187	$\lambda_{cy,4,5}$	-6.030	$\lambda_{cy,6,5}$	-1.559		
	(0.164)		(0.207)		(0.055)		
$\lambda_{cy,2,6}$	-1.784	$\lambda_{cy,4,6}$	-1.344	$\lambda_{cy,6,6}$	0.214		
	(0.010)		(0.216)		(0.019)		

[*] Standard errors are reported in parentheses

Equation (2):

$$\Delta C_t = \mu_c + \lambda_{cc,1}\Delta C_{t-1} + \lambda_{cc,2}\Delta C_{t-2} + \ldots + \lambda_{cc,p3+1}\Delta C_{t-p3-1} + \boldsymbol{\lambda}'_{\boldsymbol{cy,1}}\boldsymbol{Y}_{\boldsymbol{t-1}} + \boldsymbol{\lambda}'_{\boldsymbol{cy,2}}\boldsymbol{Y}_{\boldsymbol{t-2}} + \ldots + \boldsymbol{\lambda}'_{\boldsymbol{cy,p4+1}}\boldsymbol{Y}_{\boldsymbol{t-p4-1}} + \nu_{c,t}$$

$\lambda_{cy,i,j}$ denotes the element of the row j of the $\lambda_{cy,i}$ vector

Table 3. Parameter estimates of equation 3

Parameter *	Variables (**)					
	Y1	Y2	Y3	Y4	Y5	Y6
μ_y	0.005	0.002	0.002	0.001	0.002	0.000
	(0.010)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)
$\lambda_{yc,1}$	-0.019	0.003	-0.008	0.003	-0.008	-0.008
	(0.010)	(0.011)	(0.011)	(0.013)	(0.010)	(0.010)
$\lambda_{yc,2}$	-0.024	-0.009	-0.016	0.000	-0.018	-0.020
	(0.009)	(0.013)	(0.010)	(0.011)	(0.011)	(0.010)
$\lambda_{yc,3}$	-0.011	0.003	-0.009	-0.002	-0.007	-0.005
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
$\lambda_{yy,1,1}$	2.015	-0.201	-0.019	-0.080	0.124	0.015
	(0.030)	(0.069)	(0.010)	(0.020)	(0.021)	(0.018)
$\lambda_{yy,1,2}$	-0.002	2.139	-0.050	0.134	-0.208	-0.199
	(0.037)	(0.034)	(0.040)	(0.014)	(0.022)	(0.019)
$\lambda_{yy,1,3}$	0.043	0.153	1.952	0.045	-0.154	-0.159
	(0.004)	(0.019)	(0.014)	(0.039)	(0.024)	(0.028)
$\lambda_{yy,1,4}$	0.090	0.030	-0.007	1.891	-0.078	-0.055
	(0.036)	(0.017)	(0.023)	(0.032)	(0.021)	(0.026)
$\lambda_{yy,1,5}$	-0.203	0.145	-0.129	0.214	2.137	0.241
	(0.039)	(0.030)	(0.018)	(0.043)	(0.026)	(0.054)
$\lambda_{yy,1,6}$	0.174	0.055	0.223	0.034	-0.117	1.941
	(0.049)	(0.043)	(0.019)	(0.020)	(0.021)	(0.070)
$\lambda_{yy,2,1}$	-1.924	0.288	-0.037	0.098	-0.223	-0.064
	(0.042)	(0.091)	(0.012)	(0.029)	(0.035)	(0.028)
$\lambda_{yy,2,2}$	-0.056	-1.969	0.171	-0.213	0.344	0.318
	(0.062)	(0.057)	(0.066)	(0.014)	(0.035)	(0.037)
$\lambda_{yy,2,3}$	-0.049	-0.180	-1.836	-0.017	0.209	0.267
	(0.007)	(0.036)	(0.023)	(0.060)	(0.027)	(0.035)
$\lambda_{yy,2,4}$	-0.116	-0.021	0.001	-1.855	0.148	0.154
	(0.040)	(0.039)	(0.025)	(0.041)	(0.014)	(0.026)
$\lambda_{yy,2,5}$	0.373	-0.223	0.189	-0.271	-2.068	-0.400
	(0.052)	(0.028)	(0.055)	(0.045)	(0.039)	(0.066)
$\lambda_{yy,2,6}$	-0.385	-0.104	-0.339	-0.050	0.317	-1.649
	(0.069)	(0.031)	(0.023)	(0.011)	(0.046)	(0.096)
$\lambda_{yy,3,1}$	0.854	-0.136	0.067	-0.081	0.186	0.083
	(0.031)	(0.054)	(0.023)	(0.011)	(0.026)	(0.023)
$\lambda_{yy,3,2}$	0.029	0.758	-0.156	0.109	-0.223	-0.221
	(0.037)	(0.043)	(0.039)	(0.013)	(0.013)	(0.028)
$\lambda_{yy,3,3}$	0.035	0.106	0.748	0.033	-0.107	-0.163
	(0.012)	(0.020)	(0.022)	(0.046)	(0.014)	(0.024)
$\lambda_{yy,3,4}$	0.070	-0.028	-0.044	0.833	-0.144	-0.146
	(0.034)	(0.038)	(0.011)	(0.034)	(0.020)	(0.028)
$\lambda_{yy,3,5}$	-0.185	0.132	-0.040	0.188	0.880	0.276
	(0.032)	(0.031)	(0.046)	(0.028)	(0.038)	(0.032)
$\lambda_{yy,3,6}$	0.248	0.079	0.121	-0.051	-0.250	0.523
	(0.037)	(0.017)	(0.020)	(0.030)	(0.016)	(0.056)

* Standard errors are reported in parentheses.

(**) Y1 =m1r, Y2=cdttr, Y3= areacon, Y4= impr_bco, Y5= clineg, Y6= incon

Equation 3:

$$\boldsymbol{Y_t} = \boldsymbol{\mu_y} + \lambda_{yc,1}\Delta C_{t-1} + \lambda_{yc,2}\Delta C_{t-2} + \ldots + \lambda_{yc,p1+1}\Delta C_{t-p1-1} + \lambda_{yy,1}\boldsymbol{Y_{t-1}} + \lambda_{yy,2}\boldsymbol{Y_{t-2}} + \ldots + \lambda_{yy,p2+1}\boldsymbol{Y_{t-p2-1}} + \boldsymbol{v_{y,t}}$$

$\lambda_{yy,i,j}$ denotes the elements of the row j of the $\lambda_{yy,i}$ matrix

Table 4. Components of equation 4

Variable	Parameter				
	d_{i1}	d_{i2}	d_{i3}	d_{i4}	σ_i^2
F_p1	0.85	0.11			0.04
F_p6	0.85	0.10			0.06
Prcem	0.30	0.27	0.17	0.12	0.05
Ipr					0.02
Iem_ob	0.95				0.08
Efecrc	0.50	0.21	0.20		0.04
Energa	0.68	0.00	0.18		0.01
Impres	0.38	0.25	0.30		0.10
Cart_sbr	1.30	-0.18	0.00	-0.17	0.01
Equation (4): $u_{it} = d_{i1}u_{i,t-1} + ... + d_{ik}u_{i,t-k} + \varepsilon_{it}$					

The CUSUM and CUSUMSQ statistics for the marginal prediction errors associated with equations (3) and (4) are plotted in Figures F1 and F2 of Appendix F. These graphs show no evidence of miss-specification of the model.

The resulting leading index $L_t = \sum_{i=1}^{6} \Delta C_{t+i|t}$ and M_t= $C^c_{t+6/t+6} - C^c_{t/t}$ are plotted in Figure 2. The index L_t has a good leading performance since this time series follows very close the turning points of M_t.

Figure 2. Leading index and (RC6)

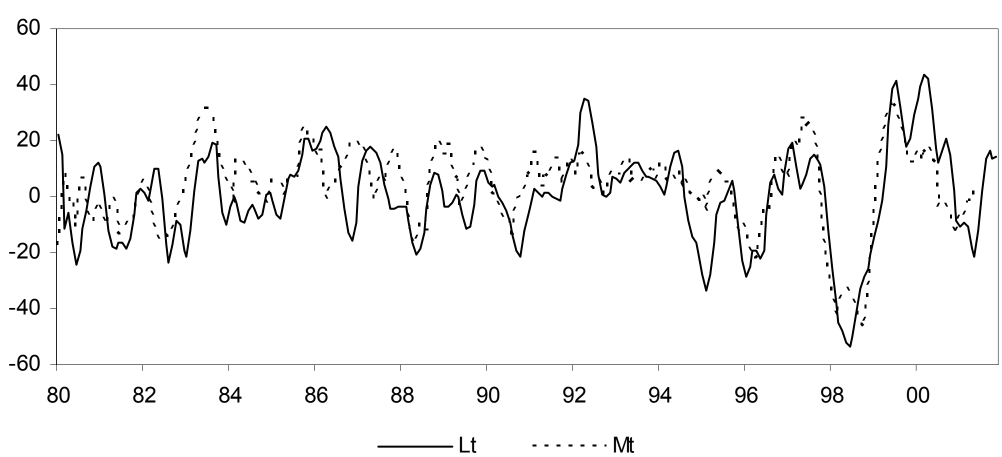


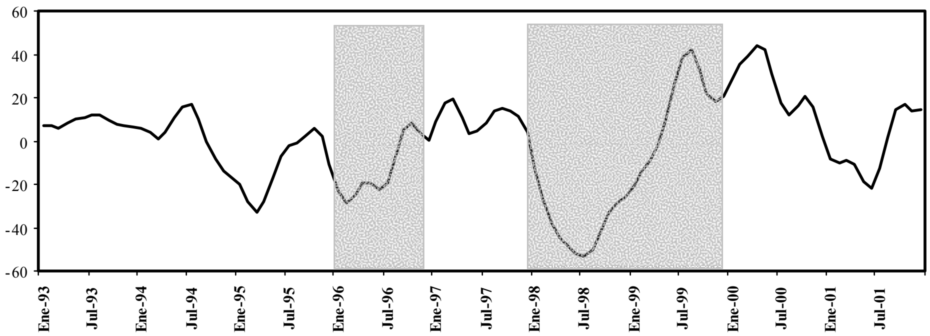
Figure 3 presents the evolution of the leading index compared to future semi-annual growths of some measures of the Colombian economic activity from 1993 to 2001[13]. As proxies of the Colombian economic activity, we use the coincident index from N-M ($C^{c}_{t/t}$), the logarithm of the industrial production index (*LIPR*), and the logarithm of gross domestic product (*LGDP*). The two periods of deceleration of the economy for this sample period are represented with gray shadows.

As shown, all the variables coincide in anticipating about six months (or two quarters for *GDP*) the slowdown of the economic activity of 1996 and the 1998 recession. This is an expected result for the proxies of the economic activity, since these variables represent future semester growths of the economic activity. This also confirms a good leading performance of the index L_t, since this variable does not contain future observed information.[14]

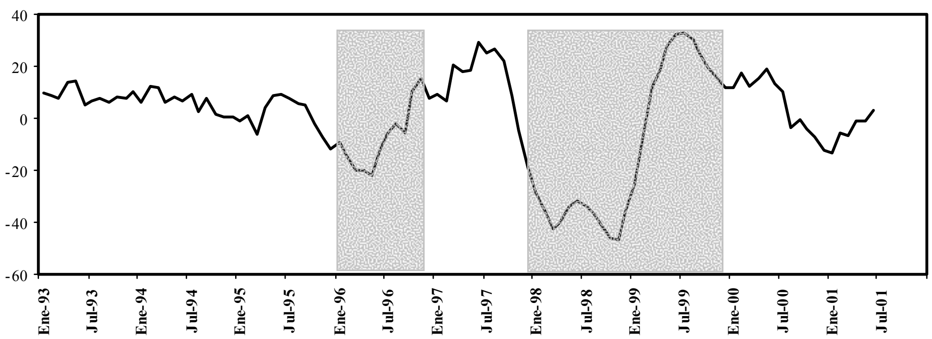
[13] Then, we compare L_t with X_{t+6} - X_t, where X is any of the proxies of the Colombian economic activity. We use 2 leads instead of 6 for the *GDP* since this series has quarterly periodicity, all the other series are in a monthly basis.

[14] The index L_t is defined in terms of information up to the time t but the economic activity proxies, plotted in Figure 3, use information up to t+6 (or t+2 for *GDP*).

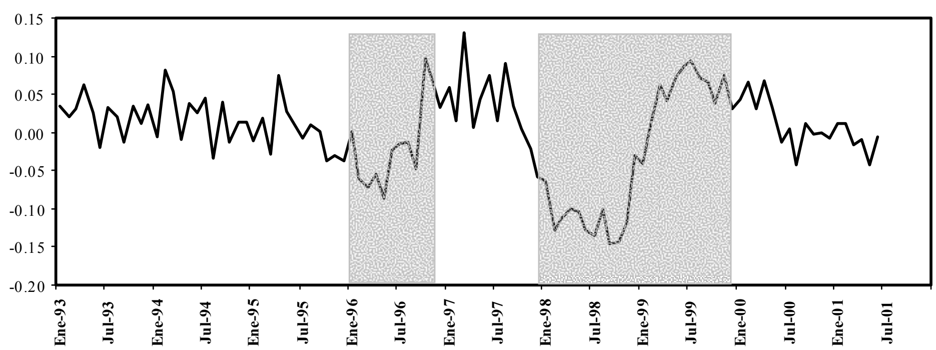
Figure 3. Leading index and some reference series



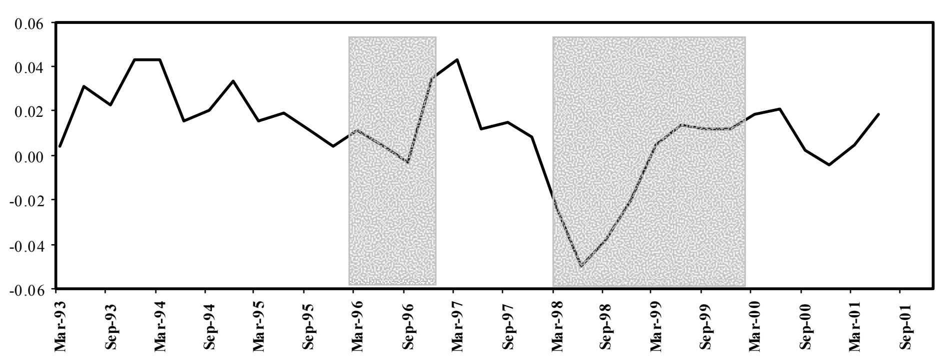
$L_t = C_{t+6/t} - C_{t/t}$



$M_t = C^c_{t+6/t+6} - C^c_{t/t}$



$LIPR_{t+6} - LIPR_t$



$LGDP_{t+2} - LGDP_t$

5. Conclusions

This paper concludes a research project regarding the design of coincident and leading economic indexes. The other papers that are part of the project are Nieto and Melo (2001), Melo *et al*. (2002) and Nieto (2003). The statistical models used are modified version of those presented by Stock and Watson (1989, 1991, 1992). The modifications were introduced because we found some identification problems with Stock and Watson's coincident index model as well as a lack of the steady-state property.

The approach used in this work, different from that of NBER, allow us to estimate a leading index for the Colombian economic activity. The resulting index leads six months Melo *et al.* (2002) coincident index. The leading-index model includes the same coincident variables as Melo *et al.* (2002) and, as leading variables, consumption goods imports in real terms (impr_bco), approved building area (areacon), business conditions (clineg), confidence indicator (incon), real interest rate of 90-day certificate of deposits for banks and corporations (cdttr) and real money supply M1 (m1r).

Even though we have implemented several modifications to the original Stock and Watson approach, there are still some problems in the estimation process of the models. This issue could be considered as an interesting subject for future research.

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APPENDIX A

State Space representation of the Leading Index Model

Let

$$\lambda_{cc}(L) = \lambda_{c0} + \lambda_{c1}(L) + ... + \lambda_{cp_3} L^{p_3}$$

with λ_{cj} a real number, $j = 0,1,..., p_3$;

$$\lambda_{cy}(L) = \lambda_{cy,0}' + \lambda_{cy,1}' L + .. + \lambda_{cy,p_4}' L^{p_4}$$

where $\lambda_{cy,j}'$ denotes a row vector of dimension $1 \times q$, $j = 0,1,..., p_4$;

$$\lambda_{yc}(L) = \lambda_{yc,0} + \lambda_{yc,1} L + ... + \lambda_{yc,p_1} L^{p_1}$$

with $\lambda_{yc,j}$ a column vector of dimension $q \times 1$, $j = 0,1,..., p_1$, and

$$\lambda_{yy}(L) = \Lambda_0 + \Lambda_1 L + ... + \Lambda_{p_2} L^{p_2}$$

where Λ_j a $q \times q$ matrix, $j = 0,1,..., p_2$.

Now, let $P = \max\{p_3, p_1\}$, $Q = \max\{p_4, p_2\}$, $\lambda_{cj} = 0$ if $j > p_3$, $\lambda_{yc,j} = 0$ if $j > p_1$, $\lambda'_{cy,j} = 0'$ if $j > p_4$, and $\Lambda_j = 0$ if $j > p_2$. Also, we set $\mathbf{W}_t = (\Delta\mathbf{X}_t', \mathbf{Y}_t')'$ with $\Delta\mathbf{X}_t = (\Delta X_{1t},..., \Delta X_{nt})'$,

$$\alpha_t = (\Delta C_t, \Delta C_{t-1},..., \Delta C_{t-P}, \mathbf{Y}_t', \mathbf{Y}_{t-1}',..., \mathbf{Y}_{t-Q}', \Delta\mathbf{u}_t', \Delta\mathbf{u}_{t+1|t}',..., \Delta\mathbf{u}_{t+r-1|t}')',$$

where $\mathbf{u}_{t+j|t}$ and r are defined as in N-M;

$$\mathbf{c}_t = (\mu_c, 0,...,0, \mu_y', \mathbf{0}',...,\mathbf{0}',\mathbf{0}')'$$

and

$$\eta_t = (\nu_{ct}, \nu_{yt}', \varepsilon_t')'.$$

Then, a state space model for equations (1)-(3) is given by

$$\mathbf{W}_t = \mathbf{Z}\alpha_t$$

as the observation equation and

$$\alpha_t = \mathbf{c}_t + T\alpha_{t-1} + R\eta_t$$

as the system equation, where

$$T = \begin{pmatrix} T_{11} & T_{12} & 0 \\ T_{21} & T_{22} & 0 \\ 0 & 0 & T_{33} \end{pmatrix},$$

$$R = \begin{pmatrix} R_1 \\ R_2 \\ R_3 \end{pmatrix}$$

and

$$\mathbf{Z} = \begin{pmatrix} \gamma & \mathbf{0} & \cdots & \mathbf{0} & | & 0 & \mathbf{0} & \cdots & \mathbf{0} & | & I & \mathbf{0} & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{0} & \cdots & \mathbf{0} & | & I & \mathbf{0} & \cdots & \mathbf{0} & | & 0 & \mathbf{0} & \cdots & \mathbf{0} \end{pmatrix}$$

with $\gamma = (\gamma_1, ..., \gamma_n)'$,

$$T_{11} = \begin{pmatrix} \lambda_{c0} & \lambda_{c1} & \cdots & \lambda_{cP} \\ & I & & \mathbf{0} \end{pmatrix},$$

$$T_{12} = \begin{pmatrix} \lambda'_{cy,0} & \lambda'_{cy,1} & \cdots & \lambda'_{cy,Q} \\ & 0 & & \end{pmatrix},$$

$$T_{21} = \begin{pmatrix} \lambda_{yc,0} & \lambda_{yc,1} & \cdots & \lambda_{yc,P} \\ & 0 & & \end{pmatrix},$$

$$T_{22} = \begin{pmatrix} \Lambda_0 & \Lambda_1 & \cdots & \Lambda_Q \\ & I & & 0 \end{pmatrix},$$

$$T_{33} = \begin{pmatrix} \mathbf{0} & & I & \\ D_r & D_{r-1} & \cdots & D_1 \end{pmatrix},$$

where the matrices D_j are defined as in N-M;

$$R_1 = \begin{pmatrix} 1 & \mathbf{0} \\ \mathbf{0} & \mathbf{0} \end{pmatrix},$$

$$R_2 = \begin{pmatrix} \mathbf{0} & I & \mathbf{0} \\ \mathbf{0} & 0 & \mathbf{0} \end{pmatrix},$$

$$R_3 = \begin{pmatrix} \mathbf{0} & I \\ \mathbf{0} & \Psi_1 \\ \vdots & \vdots \\ \mathbf{0} & \Psi_{r-2} \\ \mathbf{0} & \Psi_{r-1} \end{pmatrix},$$

with the Ψ_j matrices defined by N-M.

As initial conditions for this state space model we propose to

$$\alpha_0 = \left(\frac{\delta}{1-\hat{\phi}(1)}, \ldots, \frac{\delta}{1-\hat{\phi}(1)}, \mu_y', \ldots, \mu_y', \mathbf{0}', \ldots, \mathbf{0}' \right)'$$

as the initial vector, where δ and $\hat{\phi}(1)$ are estimated parameters in the coincident index of N-M, and $R\Sigma_0 R'$ as the variance matrix of the initial state, where $\Sigma_0 = \text{diag}\{1, \Sigma_{v_y}, \Sigma_\varepsilon\}$, with $\Sigma_\varepsilon = \text{diag}\{\sigma_1{}^2, \ldots, \sigma_n{}^2\}$.

APPENDIX B

Table B1. Data description and sources

	Description	Acronym	source	Frequency	Start
I.	**External Trade**				
1.	Total real exports (FOB).	EXPOR	DANE	Monthly	Jan-1980
2.	Exports of bananas in real terms.	EX_BAN	DANE	Monthly	Jan-1980
3.	Exports of coffee in real terms.	EX_CAF	DANE	Monthly	Jan-1980
4.	Exports of coal in real terms.	EX_CARB	DANE	Monthly	Jan-1980
5.	Exports of flowers in real terms.	EX_FLO	DANE	Monthly	Jan-1980
6.	Real non traditional exports (FOB).	EXPONTR	DANE	Monthly	Jan-1980
7.	Real traditional Exports (FOB). Including Coffee, coal, oil and ferronickel	EXPORTA	DANE	Monthly	Jan-1980
8.	Real traditional Exports (FOB). Including Coffee, coal, oil, ferronickel, gold and emerald.	EXPORTB	DANE	Monthly	Jan-1980
9.	Real traditional Exports (FOB). Including Coffee, coal, oil, ferronickel and emerald	EXPORTC	DANE	Monthly	Jan-1980
10.	Volume of coffee exports.	EXPO_CAF	Fedecafé	Monthly	Jan-1958
11.	Consumption good imports in real terms.	IMPR_BCO	DANE	Monthly	Jan-1980
12.	Capital goods imports in real terms.	IMPR_BCA	DANE	Monthly	Jan-1980
13.	Intermediate goods imports in real terms.	IMPR_BIN	DANE	Monthly	Jan-1980
14.	Total real imports (CIF).	IMPR_TOT	DANE	Monthly	Jan-1980
15.	Total real imports excluding capital and durable goods.	IMPRES	DANE	Monthly	Jan-1980
16.	Net international reserves.	RESINT	Banco de la República	Monthly	Jan-1960
II.	**Agricultural Sector**				
17.	Real value of coffee crop.	PCOCAFE	Fedecafé	Monthly	Jan-1956
18.	Livestock price	PR_GAN	Feria de Medellín	Monthly	Jan-1960
19.	Coffee production.	PRCAFE	Fedecafé	Monthly	Jan-1956
20.	Rainfall	PRECIP	IDEAM	Monthly	Jan 1979
21.	Livestock sacrifice	SGANEM	DANE	Monthly	Jan-1979
III.	**Commercial Sector**				
22.	Sales index excluding combustibles.	IVTOT	DANE	Monthly	Jan-1985
23.	Car sales.	V_AUTO	Fedemetal - Colmotores	Monthly	Jan-1970
IV.	**Building Sector**				
24.	Approved building area	AREACON	Camacol-DANE	Monthly	Jan-1978
25.	Real building loans approved.	RPREAP	ICAVI	Monthly	Jan-1973
26.	Real building loans granted	RPREEN	ICAVI	Monthly	Jan-1973
27.	Production of cement.	PRCEM	DANE	Monthly	Jan-1939
V.	**Energy Sector**				
28.	Demand of energy.	ENERD	ISA	Monthly	Jan-1979
29.	Demand of energy and gas.	ENERGA	ISA	Monthly	Jan-1979
30.	Gasoline production.	PRO_GAS	Ecopetrol	Monthly	Jan-1975
31.	Oil production.	PRPET	Ecopetrol	Monthly	Jan-1929

Table B1. (continued)

	Description	Acronym	source	Frequency	Start
VI.	**Prices**				
32.	Inflation (CPI annual increase).	INFLA	DANE	Monthly	Jan-1954
33.	Consumer price index excluding food.	IPC_SINA	DANE	Monthly	Jan-1954
34.	Consumer price Index (CPI).	IPCTOT	DANE	Monthly	Jan-1954
35.	Producer price Index (PPI).	IPP	Banco de la República	Monthly	Jan-1970
36.	Producer price index, imports.	IPP_M	Banco de la República	Monthly	Jan-1970
37.	PPI, materials for construction	IPP_MAT	Banco de la República	Monthly	Jan-1970
38.	PPI, produced and consumed.	IPP_PYC	Banco de la República	Monthly	Jan-1970
39.	Producer price index, exports.	IPP_X	Banco de la República	Monthly	Jan-1970
40.	Real exchange rate index (ITCR).	ITCR	Banco de la República	Monthly	Jan-1975
41.	International oil prices.	PPTROL	FMI	Monthly	Jan-1957
42.	Terms of trade (PPI exports / PPI imports).	TI	Banco de la República	Monthly	Jan-1970
VII.	**Opinions and Expectations of the Production**				
43.	Business conditions: Current economics conditions and Expectations about economic situation during the next six months.	CLINEG	Based on the business survey of Fedesarrollo.	Monthly	Jan-1980
44.	Current economic conditions.	F_P1	Question 1 Business Survey (Fedesarrollo)	Monthly	Jan-1980
45.	Production activity compared with previous month	F_P2	Question 2 Business Survey (Fedesarrollo)	Monthly	Jan-1980
46.	Stocks at the end of the month.	F_P3	Question 3 Business Survey (Fedesarrollo)	Monthly	Jan-1980
47.	Received orders compared with previous month	F_P4	Question 4 Business Survey (Fedesarrollo)	Monthly	Jan-1980
48.	Number of orders at the end of the month	F_P5	Question 5 Business Survey (Fedesarrollo)	Monthly	Jan-1980
49.	Number of orders.	F_P6	Question 6 Business Survey (Fedesarrollo)	Monthly	Jan-1980
50.	Installed capacity, given the current situation of demand	F_P7	Question7 Business Survey (Fedesarrollo)	Monthly	Jan-1980
51.	Production expectation for the next 3 months	F_P8	Question 8 Business Survey (Fedesarrollo)	Monthly	Jan-1980
52.	Price expectations for the next 3 months.	F_P9	Question 9 Business Survey (Fedesarrollo)	Monthly	Jan-1980
53.	Expectations about the economic situation during the next six months.	F_P10	Question 10 Business Survey (Fedesarrollo)	Monthly	Jan-1980
54.	Actual installed capacity given the number of orders, or expected demand for the next 12 months (year)	F_P11	Question 11 Business Survey (Fedesarrollo)	Monthly	Jan-1980
55.	Confidence indicator: stocks, orders and production expectations for the next 3 months.	INCON	Based on the business survey of Fedesarrollo.	Monthly	Jan-1980
VIII.	**Industrial Sector**				
56.	Index of industrial employment for skilled workers.	IEM_EM	DANE	Monthly	Jan-1980

Table B1. (concluded)

	Description	Acronym	source	Frequency	Start
57.	Index of industrial employment for unskilled workers.	IEM_OB	DANE	Monthly	Jan-1980
58.	Index of total industrial employment.	IEM_TOT	DANE	Monthly	Jan-1980
59.	Industrial production index excluding coffee threshing.	IPR	DANE	Monthly	Jan-1980
60.	Consumer goods. Industrial production index excluding coffee threshing 1/.	IPRCON	DANE	Monthly	Jan-1980
61.	Intermediate goods, Industrial production index excluding coffee threshing.	IPRINT	DANE	Monthly	Jan-1980
62.	Capital goods Industrial production index excluding coffee threshing,	IPRK	DANE	Monthly	Jan-1980
63.	Real wage manufacturing industries.	SALAR	DANE	Monthly	Jul-1970
64.	Real wage of skilled workers of manufacturing industries.	SALAREM	DANE	Monthly	Jan-1980
65.	Real minimum wage.	SALARMIN	DANE	Monthly	Jan-1980
66.	Real wage of unskilled workers of manufacturing industries.	SALAROB	DANE	Monthly	Jan-1980
IX.	**Monetary Sector**				
67.	Real savings accounts.	AHOR_R	Banco de la República	Monthly	Jan-1980
68.	Real Monetary Base (deflated by CPI).	BASER	Banco de la República	Monthly	Jan-1980
69.	Loan portfolio of the financial system.	CART_SBR	Banco de la República	Monthly	Jan-1980
70.	Interest rates of 90-day certificate of deposits for banks and corporations.	CDT	Banco de la República	Monthly	Jan-1980
71.	Real interest rates of 90-day certificate of deposits for banks and corporations.	CDTTR	Banco de la República	Monthly	Jan-1980
72.	Real checking accounts.	DCCR	Banco de la República	Monthly	Jan-1980
73.	Currency in circulation in real terms.	EFECR	Banco de la República	Monthly	Jan-1980
74.	Currency in circulation excluding transactions tax.	EFECRC	Banco de la República	Monthly	Jan-1980
75.	Real money supply Ml (deflated by CPI).	M1R	Banco de la República	Monthly	Jan-1980
76.	M2 (deflated by CPI).	M2R	Banco de la República	Monthly	Jan-1980
77.	M3 plus bonds (deflated by CPI).	M3BIPC	Banco de la República	Monthly	Jan-1980
78.	M3 plus bonds (deflated by PPI).	M3BIPP	Banco de la República	Monthly	Jan-1980
79.	Real portfolio ICAVI.	RCAVS	ICAVI	Monthly	Jan-1976
X.	**Air Transport**				
80.	Flight load.	CNAC	Aerocivil	Monthly	Jan-1968
81.	Entries foreign passengers traveling by air transport	ENPINT	Aerocivil	Monthly	Jan-1971
82.	Domestic passengers by air transport	PNAC	Aerocivil	Monthly	Jan-1971
83.	International departures of passengers by air transport	SAPINT	Aerocivil	Monthly	Jan-1968

APPENDIX C

Table C1. Unit Root Test

Variable	ADF Statistic Ho: $X_t \sim I_1(1)$	ADF Critical Value (α = 5%)	ADF Ljung-Box (p-value)[1/]	KPSS Statistic Ho: $X_t \sim I_1(0)$	KPSS Critical Value (α = 5%)
Expor	τ_μ = -0.06	-2.87	0.38	η_μ = 2.41	0.46
Ex_ban	τ_μ = -2.47	-2.87	0.73	η_μ = 2.22	0.46
Ex_caf	τ = -0.51	-1.94	0.53	η_μ = 0.20	0.46
Ex_flo	τ_μ = -0.79	-2.87	0.37	η_μ = 2.43	0.46
Expontr	τ_μ = -0.43	-2.87	0.43	η_μ = 2.40	0.46
Exporta	τ_μ = -1.04	-2.87	0.45	η_μ = 2.19	0.46
Exportb	τ_μ = -1.06	-2.87	0.31	η_μ = 2.23	0.46
Exportc	τ_μ = -1.06	-2.87	0.31	η_μ = 2.22	0.46
Ex_carb	τ_μ = -1.94	-2.87	0.42	η_μ = 2.05	0.46
expo_caf	τ_μ = -3.17	-2.87	0.34	η_μ = 0.39	0.46
Impr_bco	τ_μ = -0.06	-2.87	0.42	η_μ = 2.12	0.46
Impr_bca	τ_μ = -1.07	-2.87	0.54	η_μ = 2.07	0.46
Impr_bin	τ_μ = -0.70	-2.87	0.44	η_μ = 2.43	0.46
Impr_tot	τ_μ = -0.27	-2.87	0.73	η_μ = 2.21	0.46
Impres	τ_τ = -2.10	-3.43	0.32	η_τ = 0.42	0.15
Resint	τ_μ = -1.37	-2.87	0.45	η_μ = 1.42	0.46
Pcocafe	τ = -0.52	-1.94	0.31	η_μ = 0.52	0.46
Pr_gan	τ_μ = -1.56	-2.87	0.32	η_μ = 2.47	0.46
Prcafe	τ = -0.17	-1.94	0.62	η_μ =0.21	0.46
precip	τ_μ = -3.94	-2.87	0.46	η_μ = 0.11	0.46
Sganem	τ_μ = -3.23	-2.87	0.40	η_μ = 0.18	0.46
Ivtot	τ_τ = -3.95	-3.43	0.33	η_τ = 0.18	0.15
v_auto	τ_μ = -1.93	-2.87	0.60	η_μ = 1.51	0.46

Table C1. (continued)

variable	ADF Statistic Ho: $X_t \sim I_1(1)$	ADF Critical Value (α = 5%)	ADF Ljung-Box (p-value)[1/]	KPSS Statistic Ho: $X_t \sim I_1(0)$	KPSS Critical Value (α = 5%)
Areacon	τ_μ = -2.01	-2.87	0.85	η_μ = 0.58	0.46
Rpreap	τ = -0.18	-1.94	0.77	η_μ = 0.39	0.46
Rpreen	τ = -0.39	-1.94	0.45	η_μ = 0.38	0.46
Prcem	τ_μ = -1.78	-2.87	0.41	η_μ = 1.94	0.46
Enerd	τ_μ = -3.85	-2.87	0.31	η_μ = 2.38	0.46
Energa	τ_μ = -2.33	-2.87	0.52	η_μ = 2.46	0.46
Pro_gas	τ_τ = -5.53	-3.43	0.44	η_τ = 0.07	0.15
Prpet	τ_μ = -1.68	-2.87	0.36	η_μ = 2.27	0.46
Infla	τ = -0.23	-1.94	0.36	η_μ = 2.51	0.46
Ipc_sina	τ = -0.88	-1.94	0.32	η_μ = 2.51	0.46
Ipctot	τ = -0.12	-1.94	0.37	η_μ = 2.51	0.46
Ipp	τ = -0.25	-1.94	0.42	η_μ = 2.49	0.46
Ipp_m	τ_μ = -2.46	-2.87	0.33	η_μ = 2.44	0.46
ipp_mat	τ_μ = -1.73	-2.87	0.51	η_μ = 2.49	0.46
Ipp_pyc	τ_μ = -2.29	-2.87	0.67	η_μ = 2.50	0.46
Ipp_x	τ_μ = -1.26	-2.87	0.41	η_μ = 2.44	0.46
Itcr	τ_μ = -1.07	-2.87	0.44	η_μ = 0.69	0.46
pptrol	$\tau = -1.08$	-1.94	0.56	η_μ = 1.49	0.46
Ti	τ_μ = -2.93	-2.87	0.31	η_μ = 1.57	0.46
Clineg	τ = -0.06	-1.94	0.31	η_μ = 0.71	0.46
f_pl	τ = -0.01	-1.94	0.45	η_μ = 0.52	0.46
f_p2	τ_μ = -2.95	-2.87	0.38	η_μ = 0.60	0.46

Table C1. (continued).

variable	ADF Statistic Ho: $X_t \sim I_1(1)$	ADF Critical Value ($\alpha = 5\%$)	Ljung-Box (p-value)[1/]	KPSS Statistic Ho: $X_t \sim I_1(0)$	KPSS Critical Value ($\alpha = 5\%$)
f_p3	τ_μ = -2.86	-2.87	0.53	η_μ = 0.79	0.46
f_p4	τ = -0.15	-1.94	0.37	η_μ = 0.62	0.46
f_p5	τ_μ = -2.97	-2.87	0.49	η_μ = 0.65	0.46
f_p6	τ = -0.26	-1.94	0.37	η_μ = 0.74	0.46
f_p7	τ_μ = -2.68	-2.87	0.49	η_μ = 0.70	0.46
f_p8	τ = -0.14	-1.94	0.45	η_μ = 0.58	0.46
f_p9	τ_μ =-0.88	-2.87	0.86	η_μ = 1.98	0.46
f_p10	τ = -0.13	-1.94	0.57	η_μ = 0.98	0.46
f_pl1	τ_μ = -1.91	-2.87	0.30	η_μ = 0.70	0.46
iem_em	τ = -0.70	-1.94	0.55	η_μ = 0.52	0.46
iem_ob	τ = -1.06	-1.94	0.94	η_μ = 1.61	0.46
iem_tot	τ = -0.87	-1.94	1.00	η_μ = 1.20	0.46
Incon	τ = -0.25	-1.94	0.30	η_μ = 0.86	0.46
Ipr	τ_μ = -1.57	-2.87	0.33	η_μ = 2.22	0.46
Iprcon	τ_μ = -2.04	-2.87	0.34	η_μ = 2.25	0.46
Iprin	τ_μ = -1.50	-2.87	0.35	η_μ = 2.28	0.46
Iprk	τ_μ = -1.31	-2.87	0.56	η_μ = 1.67	0.46
Salar	τ_μ = -0.82	-2.87	0.79	η_μ = 2.43	0.46
Salarem	τ_μ = -0.08	-2.87	0.59	η_μ = 2.41	0.46
Salarmin	τ_μ = -1.98	-2.87	0.97	η_μ = 0.35	0.46
Salarob	τ_τ = -3.49	-3.43	0.44	η_τ = 0.18	0.15
ahor_r	τ_μ = -1.59	-2.87	0.39	η_μ = 2.31	0.46

Table C1. (concluded)

variable	ADF Statistic Ho: $X_t \sim I_1(1)$	ADF Critical Value (α = 5%)	Ljung-Box (p-value)[1/]	KPSS Statistic Ho: $X_t \sim I_1(0)$	KPSS Critical Value (α = 5%)
Baser	τ_μ = -1.87	-2.87	0.66	η_μ = 1.35	0.46
cart_sbr	τ_μ = -1.65	-2.87	0.52	η_μ = 2.31	0.46
Cdt	τ = -0.98	-1.94	0.37	η_μ = 1.37	0.46
Cdttr	τ_μ = -2.64	-2.87	0.33	η_μ = 0.73	0.46
Dccr	τ_μ = -2.16	-2.87	0.88	η_μ = 0.69	0.46
Efecr	τ_τ = -3.21	-3.43	0.30	η_τ = 0.17	0.15
Efecrc	τ_μ = -0.46	-1.94	0.48	η_μ = 2.38	0.46
m1r	τ_μ = -1.20	-2.87	0.50	η_μ = 1.86	0.46
m2r	τ_μ = -1.23	-2.87	0.53	η_μ = 2.39	0.46
m3bipc	τ_μ = -1.03	-2.87	0.93	η_μ = 2.40	0.46
m3bipp	τ_μ = -0.68	-2.87	0.34	η_μ = 2.41	0.46
Rcavs	τ_μ = -2.06	-2.87	0.80	η_μ = 2.20	0.46
Cnac	τ_μ = -2.18	-2.87	0.43	η_μ = 1.62	0.46
Enpint	τ_μ = -0.40	-2.87	0.37	η_μ = 2.15	0.46
Pnac	τ_μ = -0.63	-2.87	0.34	η_μ = 1.83	0.46
Sapint	τ_μ = -0.39	-2.87	0.62	η_μ = 2.15	0.46

[1/] p-value of the Ljung-Box test for the residuals of the regression used in the ADF test

Table C2. Seasonal unit root test

Variable	FRANSES – HOBIJN				
	Statistic $H_o = X_t \sim I_{12}$ **(1)**	**Critical Value** (α = 5%)	**Statistic** $H_o = X_t \sim I_{1.12}$ **(1,1)**	**Critical Value** (α = 5%)	**Ljung-Box (p-value)** [1/]
expor	$t(\pi_2) = -8.72$	-5.63	$F(\pi_1. \pi_2) = 42.58$	19.70	0.39
ex_ban	$t(\pi_2) = -7.24$	-5.63	$F(\pi_1. \pi_2) = 32.85$	19.70	0.30
ex_caf	$t(\pi_2) = -7.20$	-5.63	$F(\pi_1. \pi_2) = 33.21$	19.70	0.38
ex_carb	$t(\pi_2) = -7.51$	-5.63	$F(\pi_1. \pi_2) = 32.09$	19.70	0.40
ex_flo	$t(\pi_2) = -7.43$	-5.63	$F(\pi_1. \pi_2) = 34.89$	19.70	0.61
expontr	$t(\pi_2) = -9.47$	-5.63	$F(\pi_1. \pi_2) = 50.04$	19.70	0.38
exporta	$t(\pi_2) = -6.78$	-5.63	$F(\pi_1. \pi_2) = 24.66$	19.70	0.44
exportb	$t(\pi_2) = -6.35$	-5.64	$F(\pi_1. \pi_2) = 24.19$	20.97	0.41
exportc	$t(\pi_2) = -6.32$	-5.64	$F(\pi_1. \pi_2) = 23.88$	20.97	0.40
expo_caf	$t(\pi_2) = -8.08$	-5.63	$F(\pi_1. \pi_2) = 58.00$	19.70	0.34
impr_bco	$t(\pi_2) = -7.34$	-5.63	$F(\pi_1. \pi_2) = 31.01$	19.70	0.37
impr_bca	$t(\pi_2) = -9.31$	-7.90	$F(\pi_1. \pi_2) = 50.12$	36.87	0.34
impr_bin	$t(\pi_2) = -9.32$	-5.63	$F(\pi_1. \pi_2) = 50.30$	19.70	0.37
impr_tot	$t(\pi_2) = -9.20$	-7.90	$F(\pi_1. \pi_2) = 48.39$	36.87	0.39
impres	$t(\pi_2) = -9.77$	-5.63	$F(\pi_1. \pi_2) = 51.29$	19.70	0.41
resint	$t(\pi_2) = -7.56$	-5.63	$F(\pi_1. \pi_2) = 33.13$	19.70	0.74
pcocafe	$t(\pi_2) = -12.91$	-5.63	$F(\pi_1. \pi_2) = 133.02$	19.70	0.41
pr_gan	$t(\pi_2) = -16.12$	-5.63	$F(\pi_1. \pi_2) = 140.83$	19.70	0.46
prcafe	$t(\pi_2) = -12.32$	-5.63	$F(\pi_1. \pi_2) = 91.81$	19.70	0.32
precip	$t(\pi_2) = -6.10$	-5.63	$F(\pi_1. \pi_2) = 54.71$	19.70	0.48
sganem	$t(\pi_2) = -9.42$	-7.90	$F(\pi_1. \pi_2) = 49.05$	36.87	0.36
ivtot	$t(\pi_2) = -7.05$	-7.90	$F(\pi_1. \pi_2) = 29.14$	36.87	0.35
v_auto	$t(\pi_2) = -9.75$	-5.63	$F(\pi_1. \pi_2) = 65.91$	19.70	0.38
areacon	$t(\pi_2) = -8.48$	-7.90	$F(\pi_1. \pi_2) = 43.11$	36.87	0.58
rpreap	$t(\pi_2) = -7.47$	-5.63	$F(\pi_1. \pi_2) = 34.43$	19.70	0.48
rpreen	$t(\pi_2) = -8.28$	-5.63	$F(\pi_1. \pi_2) = 40.31$	19.70	0.72
prcem	$t(\pi_2) = -8.25$	-5.63	$F(\pi_1. \pi_2) = 37.87$	19.70	0.40
enerd	$t(\pi_2) = -8.12$	-5.63	$F(\pi_1. \pi_2) = 34.82$	19.70	0.53
energa	$t(\pi_2) = -9.55$	-5.63	$F(\pi_1. \pi_2) = 56.51$	19.70	0.31
pro_gas	$t(\pi_2) = -9.65$	-5.63	$F(\pi_1. \pi_2) = 58.50$	19.70	0.34

Table C2. (continued)

Variable	FRANSES - HOBIJN				
	Statistic $H_o = X_t \sim I_{12}(1)$	**Critical Value** ($\alpha = 5\%$)	**Statistic** $H_o = X_t \sim I_{1.12}(1,1)$	**Critical Value** ($\alpha = 5\%$)	**Ljung-Box (p-value)** [1/]
prpet	$t(\pi_2)$ = -13.15	-5.63	$F(\pi_1.\ \pi_2)$ = 92.79	19.70	0.63
infla	$t(\pi_2)$ = -7.77	-5.63	$F(\pi_1.\ \pi_2)$ = 30.22	19.70	0.38
ipc_sina	$t(\pi_2)$ = -7.17	-5.63	$F(\pi_1.\ \pi_2)$ = 25.86	19.70	0.55
ipctot	$t(\pi_2)$ = -7.77	-5.63	$F(\pi_1.\ \pi_2)$ = 30.21	19.70	0.37
ipp	$t(\pi_2)$ = -13.13	-5.64	$F(\pi_1.\ \pi_2)$ = 94.92	20.97	0.41
ipp_m	$t(\pi_2)$ = -14.65	-7.90	$F(\pi_1.\ \pi_2)$ = 117.85	36.87	0.39
ipp mat	$t(\pi_2)$ = -15.28	-5.63	$F(\pi_1.\ \pi_2)$ = 120.41	19.70	0.53
ipp_pyc	$t(\pi_2)$ = -14.02	-5.64	$F(\pi_1.\ \pi_2)$ = 109.22	20.97	0.34
Ipp_x	$t(\pi_2)$ = -9.96	-5.64	$F(\pi_1.\ \pi_2)$ = 62.91	20.97	0.33
itcr	$t(\pi_2)$ = -11.59	-7.90	$F(\pi_1.\ \pi_2)$ = 71.60	36.87	0.39
pptrol	$t(\pi_2)$ = -11.02	-5.63	$F(\pi_1.\ \pi_2)$ = 68.28	19.70	0.38
ti	$t(\pi_2)$ = -9.99	-5.63	$F(\pi_1.\ \pi_2)$ = 63.91	19.70	0.54
Clineg	$t(\pi_2)$ = -14.39	-5.63	$F(\pi_1.\ \pi_2)$ = 142.71	19.70	0.72
f_pl	$t(\pi_2)$ = -16.41	-5.63	$F(\pi_1.\ \pi_2)$ = 144.32	19.70	0.44
f_p2	$t(\pi_2)$ = -8.57	-5.63	$F(\pi_1.\ \pi_2)$ = 46.53	19.70	0.31
f_p3	$t(\pi_2)$ = -13.29	-7.90	$F(\pi_1.\ \pi_2)$ = 116.84	36.87	0.77
f_p4	$t(\pi_2)$ = -6.71	-5.63	$F(\pi_1.\ \pi_2)$ = 34.31	19.70	0.43
f_p5	$t(\pi_2)$ = -8.42	-5.63	$F(\pi_1.\ \pi_2)$ = 47.75	19.70	0.41
f_p6	$t(\pi_2)$ = -10.38	-5.63	$F(\pi_1.\ \pi_2)$ = 65.89	19.70	0.46
f_p7	$t(\pi_2)$ = -13.32	-5.63	$F(\pi_1.\ \pi_2)$ = 108.15	19.70	0.60
f_p8	$t(\pi_2)$ = -15.41	-5.63	$F(\pi_1.\ \pi_2)$ = 138.89	19.70	0.36
f_p9	$t(\pi_2)$ = -5.82	-5.63	$F(\pi_1.\ \pi_2)$ = 25.80	19.70	0.58
f_p10	$t(\pi_2)$ = -9.44	-5.63	$F(\pi_1.\ \pi_2)$ = 53.80	19.70	0.32
f_p11	$t(\pi_2)$ = -13.33	-5.63	$F(\pi_1.\ \pi_2)$ = 108.49	19.70	0.50
Iem_em	$t(\pi_2)$ = -11.80	-5.63	$F(\pi_1.\ \pi_2)$ = 71.03	19.70	0.31
iem_ob	$t(\pi_2)$ = -10.41	-5.63	$F(\pi_1.\ \pi_2)$ = 61.44	19.70	0.33
iem_tot	$t(\pi_2)$ = -9.89	-5.63	$F(\pi_1.\ \pi_2)$ = 54.41	19.70	0.36
Incon	$t(\pi_2)$ = -11.45	-7.90	$F(\pi_1.\ \pi_2)$ = 75.75	36.87	0.51
ipr	$t(\pi_2)$ = -6.20	-5.64	$F(\pi_1.\ \pi_2)$ = 24.97	20.97	0.53
Iprcon	$t(\pi_2)$ = -8.00	-5.64	$F(\pi_1.\ \pi_2)$ = 40.18	20.97	0.60
Iprin	$t(\pi_2)$ = -9.63	-5.63	$F(\pi_1.\ \pi_2)$ = 62.77	19.70	0.44

Table C2. (Concluded)

Variable	FRANSES - HOBIJN				
	Statistic $H_o = X_t \sim I_{12}(1)$	**Critical Value** ($\alpha = 5\%$)	**Statistic** $H_o = X_t \sim I_{1.12}(1,1)$	**Critical Value** ($\alpha = 5\%$)	**Ljung-Box (p-value)** [1/]
Iprk	$t(\pi_2) = -8.51$	-5.63	$F(\pi_1.\ \pi_2) = 42.78$	19.70	0.38
salar	$t(\pi_2) = -6.33$	-5.63	$F(\pi_1.\ \pi_2) = 28.63$	19.70	0.71
Salarem	$t(\pi_2) = -6.53$	-5.63	$F(\pi_1.\ \pi_2) = 30.06$	19.70	0.47
Salarob	$t(\pi_2) = -7.07$	-5.63	$F(\pi_1.\ \pi_2) = 35.70$	19.70	0.64
Salarmin	$t(\pi_2) = -4.28$	-5.63	$F(\pi_1.\ \pi_2) = 19.49$	19.70	0.58
ahor_r	$t(\pi_2) = -12.58$	-7.90	$F(\pi_1.\ \pi_2) = 85.05$	36.87	0.67
baser	$t(\pi_2) = -15.96$	-5.63	$F(\pi_1.\ \pi_2) = 135.83$	19.70	0.72
cart_sbr	$t(\pi_2) = -9.18$	-5.63	$F(\pi_1.\ \pi_2) = 44.93$	19.70	0.31
Cdt	$t(\pi_2) = -9.55$	-5.63	$F(\pi_1.\ \pi_2) = 50.45$	19.70	0.31
Cdttr	$t(\pi_2) = -14.23$	-5.63	$F(\pi_1.\ \pi_2) = 135.52$	19.70	0.45
Dccr	$t(\pi_2) = -13.30$	-7.90	$F(\pi_1.\ \pi_2) = 113.43$	36.87	0.53
efecr	$t(\pi_2) = -8.43$	-5.63	$F(\pi_1.\ \pi_2) = 46.83$	19.70	0.35
efecrc	$t(\pi_2) = -11.63$	-7.90	$F(\pi_1.\ \pi_2) = 71.93$	36.87	0.32
Mlr	$t(\pi_2) = -12.95$	-7.90	$F(\pi_1.\ \pi_2) = 93.60$	36.87	0.50
m2r	$t(\pi_2) = -8.83$	-5.63	$F(\pi_1.\ \pi_2) = 43.13$	19.70	0.32
m3bipc	$t(\pi_2) = -12.42$	-5.63	$F(\pi_1.\ \pi_2) = 85.70$	19.70	0.33
m3bipp	$t(\pi_2) = -14.13$	-5.63	$F(\pi_1.\ \pi_2) = 107.39$	19.70	0.70
Rcavs	$t(\pi_2) = -13.31$	-5.63	$F(\pi_1.\ \pi_2) = 89.83$	19.70	0.36
cnac	$t(\pi_2) = -7.38$	-5.63	$F(\pi_1.\ \pi_2) = 34.43$	19.70	0.38
enpint	$t(\pi_2) = -8.35$	-5.63	$F(\pi_1.\ \pi_2) = 38.89$	19.70	0.43
pnac	$t(\pi_2) = -11.04$	-5.63	$F(\pi_1.\ \pi_2) = 73.73$	19.70	0.38
sapint	$t(\pi_2) = -5.58$	-5.63	$F(\pi_1.\ \pi_2) = 17.59$	19.70	0.62

[1/] p-value of the Ljung-Box test for the residuals of the regression used in the Franses and Hobijn test

APPENDIX D

Table D1. Cross-correlations with the Industrial Production Index (IPR)
[Corr (IPR_t, X_{t-k})]

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
expor	6	0.11	0.06	0.05	-0.09	-0.03	-0.04	-0.09	-0.05	0.09	0.03	-0.05	0.07	-0.03	0.04	0.11	0.00	-0.02	0.03	0.00	0.03	-0.05
ex_ban	9	-0.13	0.06	0.07	-0.03	-0.05	0.06	-0.04	-0.05	0.01	0.00	-0.04	0.01	-0.01	0.00	0.00	0.10	-0.08	-0.13	0.03	-0.01	-0.03
ex_caf	8	-0.11	0.06	0.01	0.04	0.02	-0.06	-0.03	0.01	0.10	0.07	-0.04	-0.07	-0.05	-0.07	0.07	-0.08	-0.11	0.03	-0.03	0.09	-0.01
ex_carb	0	0.12	0.06	0.04	-0.01	0.08	0.04	-0.06	0.02	0.12	0.00	-0.06	0.09	-0.05	0.05	-0.03	-0.02	-0.07	0.09	-0.01	0.01	0.09
ex_flo	1	-0.13	0.06	0.00	0.00	-0.08	-0.01	0.02	-0.09	-0.07	-0.13	-0.01	-0.04	-0.07	0.10	-0.02	0.02	-0.03	0.01	-0.03	-0.01	-0.03
expontr	0	0.19	0.06	0.12	-0.08	0.04	0.10	-0.08	-0.10	0.19	0.00	-0.01	0.01	-0.02	-0.03	0.00	0.06	-0.02	0.00	0.06	-0.07	-0.06
expotra	-2	-0.11	0.06	0.00	-0.01	-0.03	-0.10	-0.11	0.02	0.07	0.08	-0.01	0.00	-0.07	-0.01	0.05	-0.02	-0.06	0.06	-0.02	0.04	-0.09
expotrb	-2	-0.11	0.06	0.00	-0.03	-0.03	-0.09	-0.11	0.03	0.10	0.08	-0.04	0.01	-0.07	-0.03	0.06	-0.03	-0.03	0.06	-0.01	0.03	-0.07
expotrc	-2	-0.11	0.06	-0.01	-0.02	-0.02	-0.08	-0.11	0.04	0.09	0.08	-0.03	0.02	-0.07	0.00	0.08	-0.01	-0.03	0.08	-0.01	0.04	-0.07
impr_bco	9	-0.14	0.06	-0.06	0.01	0.03	0.05	-0.02	0.01	0.12	0.07	-0.03	0.05	-0.01	0.01	-0.03	0.02	0.07	-0.14	-0.08	-0.04	0.05
impr_bca	0	0.21	0.06	-0.03	0.08	0.05	0.02	-0.05	0.06	0.21	0.08	-0.06	0.01	0.09	0.00	-0.03	-0.02	0.03	-0.13	-0.04	0.02	-0.05
impr_bin	0	0.18	0.06	0.04	0.00	-0.07	0.07	0.09	-0.02	0.18	0.02	0.00	0.01	0.04	0.00	-0.02	0.04	-0.02	0.00	-0.01	-0.01	-0.16
impr_tot	0	0.22	0.06	0.02	0.02	-0.03	0.05	0.02	0.01	0.22	0.10	-0.07	0.05	0.04	0.02	-0.03	0.02	0.09	-0.12	0.04	0.00	-0.10
impres	0	0.22	0.06	0.00	0.01	-0.06	0.06	0.07	-0.03	0.22	0.06	-0.05	0.01	0.04	0.04	-0.12	0.00	0.02	0.00	-0.03	-0.07	-0.15
resint	-5	-0.11	0.00	-0.11	0.09	-0.05	-0.04	-0.10	-0.03	-0.07	-0.02	-0.01	0.06	0.07	-0.01	0.02	0.00	0.03	-0.02	0.02	-0.04	-5
expo_caf	1	0.12	0.06	-0.01	0.02	0.02	-0.05	0.00	0.03	0.08	0.12	0.00	-0.02	-0.02	-0.08	0.09	-0.11	-0.07	0.07	-0.03	0.12	0.00
pcocafer	11	-0.14	0.06	0.10	-0.06	-0.04	0.03	0.01	-0.09	0.06	0.03	0.04	0.02	0.06	0.01	0.04	0.01	-0.05	-0.09	-0.07	-0.14	-0.07
pr_gan	5	0.14	0.06	0.10	-0.01	0.00	0.05	-0.03	0.05	0.01	0.03	0.01	-0.12	-0.03	0.14	-0.07	0.03	0.02	-0.07	0.02	0.04	-0.05

Table D1. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
prcafe	-6	0.12	0.06	0.12	0.01	0.00	0.04	-0.01	-0.02	0.01	-0.03	0.08	-0.02	0.07	0.00	-0.01	-0.05	-0.09	-0.09	-0.07	-0.10	-0.06
precip	5	-0.14	0.06	0.01	0.02	-0.03	0.00	0.06	-0.08	-0.05	-0.06	-0.08	-0.13	0.12	-0.14	0.00	-0.05	-0.03	-0.09	0.01	0.02	-0.02
sganem	0	0.31	0.06	-0.03	0.07	-0.10	0.10	-0.05	-0.13	0.31	-0.02	-0.02	0.06	-0.02	0.02	-0.05	-0.09	0.05	-0.02	0.02	0.08	-0.20
ivtot	0	0.28	0.06	-0.10	0.00	-0.04	0.11	0.01	0.09	0.28	0.07	-0.01	0.13	-0.05	0.12	-0.09	0.00	0.05	0.04	0.06	-0.09	-0.04
v_auto	0	0.22	0.06	0.07	-0.05	0.06	0.10	0.13	0.04	0.22	0.09	-0.01	0.02	0.00	0.03	0.08	-0.02	-0.08	0.17	0.03	0.08	-0.03
areacon	5	0.16	0.06	0.07	0.01	-0.02	0.13	-0.10	0.06	0.12	0.03	0.14	-0.02	0.06	0.16	0.07	-0.08	0.00	0.05	0.01	0.08	-0.02
rpreen	0	0.28	0.06	0.00	0.00	-0.07	0.07	0.04	0.00	0.28	0.03	0.03	0.10	-0.03	-0.02	0.09	0.09	0.06	0.04	-0.09	0.14	0.04
rpreap	0	0.19	0.06	0.06	0.06	-0.10	0.14	-0.01	0.02	0.19	0.03	-0.01	0.10	0.02	0.06	0.15	0.06	-0.01	0.08	-0.14	0.03	0.01
prcem	0	0.21	0.06	0.15	-0.02	0.09	0.04	0.05	0.08	0.21	-0.01	-0.01	0.03	0.15	0.06	0.00	-0.08	-0.02	0.04	0.04	-0.09	-0.02
enerd	0	0.45	0.06	0.00	0.17	0.08	0.01	-0.04	-0.18	0.45	0.00	-0.01	0.12	0.05	0.08	0.08	0.02	0.12	-0.02	0.03	-0.01	-0.10
energa	0	0.41	0.06	0.06	0.13	0.14	0.08	-0.07	-0.18	0.41	0.00	-0.08	0.03	0.07	0.08	0.08	0.04	0.06	-0.02	0.00	0.01	-0.09
pro_gas	5	0.12	0.06	-0.08	-0.12	0.05	-0.03	-0.04	0.02	0.11	-0.03	-0.05	0.09	-0.02	0.12	0.04	-0.02	-0.01	-0.02	-0.02	0.01	-0.09
prpet	-4	0.12	0.06	-0.02	-0.01	0.12	-0.01	-0.08	0.00	0.04	-0.07	-0.01	-0.10	-0.04	0.06	0.06	-0.10	0.01	0.03	0.00	-0.08	-0.08
infla	10	-0.11	0.06	0.02	0.01	0.07	0.04	0.00	-0.05	0.08	0.06	0.07	-0.09	0.01	0.00	-0.03	-0.07	-0.04	-0.10	-0.11	0.03	0.00
ipc_sina	0	0.10	0.06	0.03	0.04	0.00	0.02	-0.04	-0.08	0.10	0.03	0.06	-0.10	-0.03	-0.06	-0.10	-0.09	0.03	-0.06	-0.07	0.04	0.06
ipctot	10	-0.12	0.06	0.03	0.02	0.07	0.04	-0.02	-0.06	0.08	0.05	0.07	-0.09	-0.03	0.01	-0.04	-0.08	-0.03	-0.08	-0.12	0.01	0.01
ipp	10	-0.15	0.06	-0.03	0.02	0.10	-0.03	0.06	-0.07	0.05	0.07	0.05	-0.02	-0.08	0.06	-0.07	-0.01	0.01	-0.12	-0.15	0.07	-0.04
ipp_m	7	-0.10	0.06	-0.02	0.02	-0.06	-0.04	0.07	0.08	0.01	0.02	0.10	-0.09	0.04	0.08	-0.05	-0.10	0.09	0.10	0.00	0.05	-0.05
ipp_mat	-1	0.16	0.06	0.03	0.09	-0.01	-0.05	-0.01	0.16	-0.05	-0.04	0.05	-0.08	0.09	-0.07	0.06	-0.05	-0.02	0.08	0.05	0.01	0.02
ipp_pyc	10	-0.12	0.06	-0.03	0.02	0.09	-0.06	0.03	-0.08	0.07	0.04	0.02	-0.03	-0.10	0.09	-0.03	0.04	0.02	-0.11	-0.12	0.06	-0.04

Table D1. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	k	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ipp_x	-3	-0.17	0.06	-0.13	0.17	0.01	-0.17	-0.06	0.00	0.08	0.12	0.00	0.09	0.14	0.00	-0.02	-0.06	0.03	-0.01	0.09	-0.06	-0.02
itcr	-5	0.19	0.06	-0.11	0.19	0.05	-0.18	-0.08	-0.03	0.09	0.09	-0.01	0.10	0.12	-0.03	0.01	-0.04	0.00	-0.05	0.09	0.08	-0.01
pptrol	-2	-0.13	0.06	-0.07	0.02	0.03	-0.06	-0.13	-0.01	0.02	-0.03	0.01	0.03	0.12	0.10	-0.09	-0.02	0.09	-0.01	0.12	0.04	-0.10
ti	2	0.15	0.06	-0.01	0.05	-0.03	0.00	-0.10	0.03	0.04	-0.05	0.15	0.08	0.05	-0.05	-0.02	-0.11	0.00	0.06	0.02	-0.05	-0.03
clineg	0	0.25	0.06	-0.06	-0.01	-0.02	0.07	-0.05	-0.03	0.25	0.24	0.06	0.17	0.14	0.02	0.02	0.00	0.06	-0.04	-0.05	0.01	0.05
f_p1	0	0.38	0.06	0.00	0.02	-0.05	0.14	0.03	-0.10	0.38	0.24	0.09	0.08	0.05	0.08	0.05	-0.02	0.01	-0.04	-0.06	0.04	0.04
f_p2	0	0.55	0.06	-0.04	-0.01	0.03	-0.07	0.06	-0.13	0.55	0.05	0.02	0.23	0.02	0.08	0.00	0.07	0.00	-0.03	0.03	0.01	0.10
f_p3	7	-0.18	0.06	0.11	-0.15	0.03	0.03	-0.01	-0.04	-0.09	-0.04	-0.02	-0.08	0.03	0.05	0.01	-0.18	0.06	0.09	-0.07	-0.03	-0.07
f_p4	0	0.43	0.06	0.04	-0.11	0.06	0.02	0.08	-0.12	0.43	0.10	0.09	0.14	0.10	0.07	0.04	0.01	-0.03	0.01	0.00	-0.05	0.05
f_p5	0	0.29	0.06	-0.07	0.04	-0.11	-0.03	-0.04	-0.13	0.29	0.07	0.11	0.14	0.10	0.09	-0.03	0.02	0.03	0.01	-0.08	0.01	0.08
f_p6	0	0.25	0.06	-0.04	-0.02	-0.11	-0.01	0.07	-0.16	0.25	0.16	0.09	0.13	0.12	0.07	0.03	0.01	0.03	-0.01	-0.08	0.05	0.00
f_p7	0	-0.19	0.06	0.03	0.01	-0.05	0.03	-0.09	-0.03	-0.19	-0.17	-0.08	-0.15	-0.03	0.01	-0.05	-0.07	0.00	-0.02	0.12	-0.04	0.01
f_p8	2	0.21	0.06	-0.01	-0.07	-0.01	-0.01	-0.09	0.07	0.00	0.14	0.21	0.08	0.14	-0.02	-0.04	0.12	0.03	-0.01	-0.09	0.08	0.05
f_p9	3	0.17	0.06	0.01	-0.09	-0.08	0.09	0.03	0.05	-0.04	-0.04	0.06	0.17	0.02	-0.01	-0.08	0.08	0.06	0.02	0.09	-0.03	-0.02
f_p10	3	0.21	0.06	-0.10	-0.07	-0.01	-0.04	-0.09	0.05	0.08	0.16	0.09	0.21	0.15	-0.03	-0.02	0.05	0.08	-0.01	-0.03	0.01	0.03
f_p11	3	-0.18	0.06	0.07	-0.05	0.02	-0.02	0.04	-0.05	-0.15	-0.10	-0.11	-0.18	0.07	-0.02	-0.01	-0.07	-0.06	0.06	0.06	-0.03	-0.06
iem_em	10	-0.14	0.06	0.13	-0.13	0.03	0.05	0.09	0.03	0.08	0.00	0.00	0.03	0.04	0.06	-0.03	-0.03	0.04	-0.01	-0.14	-0.04	0.01
iem_ob	0	0.26	0.06	0.11	0.03	0.03	0.13	0.10	0.18	0.26	0.06	0.08	0.21	-0.10	0.06	-0.06	0.00	-0.02	0.05	-0.06	-0.05	0.00
iem_tot	0	0.28	0.06	0.13	-0.06	0.07	0.09	0.08	0.18	0.28	0.07	0.07	0.11	0.02	0.06	-0.06	0.01	0.00	0.04	-0.11	-0.02	0.02
incon	0	0.21	0.06	-0.06	0.00	-0.10	0.01	0.03	-0.06	0.21	0.18	0.12	0.18	0.08	0.04	-0.01	0.07	0.06	-0.07	-0.10	0.12	0.08

Table D1. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
iprcon	0	0.73	0.06	0.05	0.17	0.00	0.07	0.00	-0.01	0.73	-0.04	0.07	0.04	0.01	-0.03	-0.01	0.00	-0.04	-0.01	-0.04	0.06	0.00
iprin	0	0.64	0.06	0.00	0.01	-0.01	0.07	-0.02	-0.04	0.64	0.00	-0.14	-0.04	0.03	0.19	0.09	-0.08	0.07	0.03	0.02	-0.02	-0.10
iprk	0	0.18	0.06	0.16	-0.06	-0.04	0.06	0.02	-0.01	0.18	-0.12	0.06	0.06	-0.02	-0.03	0.13	-0.05	-0.09	0.07	-0.05	0.06	-0.07
salar	3	0.12	0.06	-0.02	-0.09	-0.05	-0.03	-0.05	-0.11	0.06	0.09	0.05	0.12	-0.05	-0.05	0.03	-0.03	0.05	0.11	0.01	-0.05	-0.03
salarem	0	0.20	0.06	0.06	-0.04	0.01	-0.01	-0.12	-0.06	0.20	0.04	-0.05	0.08	-0.08	0.02	0.04	0.01	0.01	0.08	-0.13	-0.10	0.17
salarmin	3	0.14	0.06	-0.02	-0.02	-0.04	-0.06	0.03	0.08	0.11	-0.08	-0.09	0.14	-0.08	0.06	-0.01	-0.05	-0.03	0.03	0.00	0.07	0.13
salarob	0	0.18	0.06	0.02	0.00	-0.03	0.05	-0.10	-0.04	0.18	0.01	-0.06	0.14	-0.09	-0.02	0.05	-0.07	0.09	0.05	-0.13	-0.03	0.15
ahor_r	7	0.19	0.06	-0.06	-0.03	0.02	-0.08	-0.05	-0.01	0.07	0.06	-0.02	0.12	-0.02	0.15	-0.14	0.19	0.07	0.08	0.12	-0.13	0.00
baser	3	0.23	0.06	0.09	0.04	0.04	0.02	-0.04	0.01	0.05	0.15	0.05	0.23	0.04	0.04	0.08	-0.03	0.03	0.10	0.00	-0.03	-0.09
cart_sbr	7	0.13	0.06	0.02	0.08	-0.06	-0.09	0.06	0.11	0.05	0.06	0.00	0.06	-0.01	0.02	0.00	0.13	0.00	-0.04	-0.11	-0.08	-0.05
cdt	11	-0.15	0.06	0.01	0.02	0.00	0.09	0.11	-0.02	-0.04	0.06	-0.02	-0.01	-0.06	-0.13	-0.08	-0.13	-0.07	-0.13	0.00	-0.15	0.00
cdttr	11	-0.18	0.06	0.00	-0.05	0.04	0.08	0.11	0.03	-0.03	0.03	0.01	0.03	-0.07	-0.07	0.01	-0.07	-0.09	-0.06	0.01	-0.18	-0.01
dccr	-2	-0.12	0.06	0.02	0.00	0.06	0.05	-0.12	0.11	0.07	0.07	0.08	0.10	0.05	0.12	0.01	0.05	0.12	0.01	0.08	-0.02	-0.06
efecr	2	0.16	0.06	0.05	-0.08	-0.13	0.05	0.13	0.04	0.01	0.08	0.16	0.08	-0.03	0.05	0.10	0.06	-0.02	0.02	-0.04	0.10	0.03
efecrc	2	0.16	0.06	0.04	-0.03	-0.11	0.06	0.14	0.04	-0.02	0.10	0.16	0.09	0.00	0.03	0.07	0.08	-0.02	0.01	-0.05	0.08	0.04
m1r	2	0.14	0.06	0.06	0.01	0.03	0.02	-0.04	0.10	0.00	0.13	0.14	0.08	0.06	0.08	0.04	0.11	0.09	0.01	0.05	0.03	-0.01
m2r	11	-0.14	0.06	0.05	-0.01	0.01	0.03	-0.04	-0.01	0.01	0.11	0.01	0.11	0.02	0.02	-0.03	0.14	-0.02	0.06	0.05	-0.14	0.00
M3bipc	11	-0.13	0.06	0.02	0.01	0.00	0.04	-0.05	0.02	0.10	0.07	0.10	0.06	0.05	-0.01	0.03	0.09	0.04	0.04	0.04	-0.13	0.02
M3bipp	11	-0.11	0.06	0.05	-0.02	0.00	0.09	-0.11	0.00	0.07	0.04	0.07	-0.02	0.03	-0.04	0.06	0.03	-0.02	0.00	0.01	-0.11	0.02

Table D1. (Concluded)

Series (Xt)	***| Maximum |***		***STD***	***K***																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
rcavs	1	0.13	0.06	0.02	0.03	0.06	0.08	0.08	0.05	0.03	0.13	0.08	0.09	-0.02	-0.03	0.09	0.05	0.00	0.02	-0.06	-0.07	0.03
cnac	1	-0.15	0.06	0.11	0.06	-0.04	0.01	-0.03	-0.09	0.10	-0.15	-0.12	0.10	0.11	0.03	0.02	-0.01	-0.04	-0.01	-0.03	0.04	-0.05
enpint	0	0.25	0.06	-0.01	-0.10	0.05	-0.01	0.00	0.17	0.25	0.09	0.17	0.03	0.03	-0.05	-0.07	0.02	0.08	-0.04	0.06	-0.01	0.03
pnac	-1	0.13	0.06	-0.01	0.03	0.03	0.03	-0.05	0.13	-0.08	-0.01	0.00	0.13	0.00	0.06	-0.04	-0.07	0.02	-0.09	-0.04	-0.04	0.00
sapint	0	-0.17	0.06	-0.12	-0.04	-0.05	0.05	0.00	0.14	-0.17	-0.03	0.06	0.05	0.00	-0.03	-0.04	0.02	0.00	-0.03	0.00	0.01	0.01

Table D2. Cross-correlations with the Coincident Index (C_t) [Corr (C_t, X_{t-k})]

Series (Xt)	***| Maximum |***		***STD***	***K***																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
expor	0	0.13	0.06	0.03	-0.05	-0.02	0.01	-0.12	-0.02	0.13	0.01	0.05	0.00	0.03	0.06	0.07	0.03	-0.08	0.02	-0.04	0.02	-0.04
ex_ban	7	0.13	0.06	0.03	-0.03	-0.02	0.05	-0.02	0.03	0.04	-0.05	-0.05	-0.03	0.03	0.00	-0.08	0.13	-0.07	-0.02	-0.02	-0.11	0.01
ex_caf	0	0.10	0.06	0.01	0.07	0.02	-0.02	-0.02	0.02	0.10	0.02	0.02	-0.07	0.00	-0.03	0.08	-0.07	-0.06	0.02	0.00	0.07	0.05
ex_carb	0	0.12	0.06	0.06	0.02	0.07	-0.06	-0.02	0.02	0.12	-0.03	-0.07	0.02	-0.03	0.03	-0.01	-0.01	0.00	0.07	-0.03	0.03	0.06
ex_flo	5	0.14	0.06	0.01	-0.03	-0.09	0.00	-0.04	-0.06	0.02	-0.06	0.01	-0.05	-0.03	0.14	0.00	-0.02	-0.03	0.02	-0.07	0.01	-0.05
expontr	0	0.21	0.06	0.09	0.00	0.01	0.08	-0.06	-0.10	0.21	-0.01	0.11	-0.03	-0.01	0.00	-0.03	0.10	-0.08	0.05	0.01	0.02	-0.04
expotra	-2	-0.12	0.06	0.01	-0.02	0.04	-0.02	-0.12	0.02	0.10	0.06	0.04	-0.05	-0.02	0.03	0.05	0.00	-0.05	0.03	-0.04	0.01	-0.03
expotrb	-2	-0.14	0.06	0.02	-0.01	0.03	-0.01	-0.14	0.04	0.13	0.06	0.03	-0.06	-0.02	0.03	0.06	0.01	-0.02	0.03	-0.02	0.01	-0.02
expotrc	-2	-0.14	0.06	0.01	-0.01	0.03	0.01	-0.14	0.06	0.11	0.06	0.03	-0.05	-0.01	0.03	0.07	0.03	-0.02	0.05	-0.03	0.02	-0.03
impr_bco	7	0.15	0.06	-0.01	0.09	-0.03	0.13	0.01	0.05	0.12	0.03	0.03	0.02	0.00	-0.06	-0.09	0.15	0.09	-0.05	-0.12	-0.01	0.04
impr_bca	0	0.21	0.06	0.01	0.08	0.07	0.10	-0.02	0.04	0.21	0.01	-0.01	0.04	0.00	-0.05	-0.11	0.08	0.03	-0.12	-0.04	0.05	0.04
impr_bin	0	0.32	0.06	-0.03	0.11	-0.12	0.12	0.09	-0.14	0.32	-0.05	-0.01	-0.01	-0.06	0.02	-0.04	0.07	-0.06	0.04	-0.07	0.00	-0.04
impr_tot	0	0.30	0.06	0.03	0.11	-0.09	0.16	0.02	-0.05	0.30	0.01	-0.03	0.03	-0.04	-0.02	-0.08	0.12	0.03	-0.03	-0.09	0.03	0.01
impres	0	0.32	0.06	-0.02	0.15	-0.13	0.13	0.07	-0.11	0.32	-0.02	-0.02	-0.02	-0.05	0.01	-0.03	0.07	-0.03	0.04	-0.10	-0.01	-0.03
resint	7	0.14	0.06	-0.03	-0.06	0.10	-0.06	0.08	-0.10	0.04	-0.04	0.02	0.02	0.01	0.10	-0.05	0.14	-0.01	0.06	0.00	0.04	-0.05
expo_caf	7	-0.12	0.06	-0.02	0.05	0.02	-0.01	0.02	0.05	0.09	0.09	0.04	-0.01	0.01	-0.02	0.06	-0.12	-0.05	0.03	0.02	0.09	0.04
pcocafer	11	-0.11	0.06	0.01	-0.07	-0.02	0.07	0.01	-0.01	0.10	0.00	0.04	0.00	0.08	-0.01	0.04	-0.02	-0.03	-0.08	-0.06	-0.11	-0.02
pr_gan	3	-0.09	0.06	0.04	0.05	0.01	-0.03	-0.04	0.02	0.00	0.04	-0.03	-0.09	-0.03	0.09	-0.05	0.02	0.03	-0.07	0.02	0.07	-0.06

Table D2. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
prcafe	9	-0.11	0.06	0.02	0.02	-0.03	0.04	0.01	-0.05	0.07	-0.03	0.03	0.01	0.04	0.03	0.03	-0.08	-0.07	-0.11	-0.02	-0.10	0.02
precip	3	-0.14	0.06	0.03	0.06	-0.06	-0.01	-0.02	-0.11	0.03	-0.03	-0.05	-0.14	0.02	-0.01	0.03	-0.06	-0.09	-0.09	0.02	0.03	-0.01
sganem	0	0.31	0.06	0.00	0.12	-0.10	0.09	-0.09	-0.05	0.31	-0.05	0.06	-0.01	-0.03	-0.02	-0.03	-0.12	0.01	0.02	0.00	0.14	-0.15
ivtot	0	0.29	0.06	0.05	0.00	-0.04	0.15	-0.05	0.17	0.29	0.03	-0.02	0.09	-0.07	0.00	-0.02	-0.01	0.00	0.08	0.01	0.02	-0.01
v_auto	0	0.20	0.06	0.07	0.03	0.03	0.05	0.05	0.04	0.20	0.16	-0.05	0.04	-0.04	-0.02	0.03	-0.05	-0.08	0.18	0.02	0.07	0.00
areacon	0	0.19	0.06	0.03	0.12	-0.03	0.06	0.00	0.04	0.19	-0.01	0.10	0.01	0.01	0.12	0.00	-0.06	-0.03	0.02	0.04	0.05	0.03
rpreen	0	0.28	0.06	-0.04	0.12	-0.04	0.07	0.04	-0.02	0.28	-0.03	0.03	0.03	0.05	-0.06	0.13	0.11	0.04	0.07	-0.13	0.14	-0.01
rpreap	10	-0.19	0.06	0.03	0.06	0.00	0.08	0.00	0.04	0.17	0.02	0.02	0.10	-0.01	0.02	0.15	0.06	0.05	0.05	-0.19	0.06	-0.04
prcem	0	0.22	0.06	0.15	0.02	0.05	0.10	0.02	0.06	0.22	-0.12	0.06	0.00	0.08	0.03	0.03	-0.03	-0.03	0.00	0.00	-0.02	0.02
enerd	0	0.39	0.06	-0.12	0.17	0.05	0.01	-0.06	-0.16	0.39	-0.10	0.05	0.09	0.02	-0.03	0.08	0.03	0.06	-0.01	-0.06	0.03	-0.12
energa	0	0.29	0.06	0.02	0.12	0.11	0.09	-0.07	-0.18	0.29	-0.11	-0.05	-0.01	0.02	0.02	0.06	0.01	0.05	0.00	-0.03	0.04	-0.08
pro_gas	0	0.12	0.06	0.01	-0.05	-0.03	-0.01	0.03	0.03	0.12	-0.05	0.02	0.10	-0.04	0.04	-0.02	0.03	-0.02	-0.02	-0.03	-0.03	-0.10
prpet	3	-0.11	0.06	0.03	0.02	-0.01	0.00	-0.05	0.04	0.04	-0.06	0.03	-0.11	-0.02	0.08	0.04	-0.04	-0.01	0.06	-0.03	-0.08	-0.05
infla	-4	0.14	0.06	0.05	0.02	0.14	0.04	-0.01	-0.01	0.07	0.02	0.07	-0.05	0.03	0.00	-0.10	-0.01	0.05	-0.10	-0.08	-0.01	0.03
ipc_sina	-1	-0.10	0.06	0.03	0.05	0.01	0.03	-0.06	-0.10	0.00	0.01	0.09	-0.04	0.07	0.04	-0.09	-0.08	-0.01	-0.04	0.01	0.05	0.02
ipctot	-4	0.15	0.06	0.08	0.02	0.15	0.04	-0.02	-0.01	0.06	0.02	0.06	-0.05	0.00	0.00	-0.10	-0.01	0.05	-0.07	-0.08	-0.02	0.04
ipp	10	-0.14	0.06	0.01	-0.02	0.14	-0.02	0.10	-0.01	-0.01	0.05	0.01	-0.01	-0.07	-0.02	-0.06	0.01	0.05	-0.10	-0.14	0.04	-0.07
ipp_m	12	-0.11	0.06	-0.05	0.03	-0.08	-0.06	0.08	0.07	0.00	0.06	0.09	-0.08	0.03	0.01	-0.01	-0.09	0.06	0.06	0.00	0.02	-0.11
ipp_mat	10	0.10	0.06	0.02	0.05	0.01	-0.01	0.00	0.07	-0.06	0.05	0.07	-0.04	0.01	-0.10	0.10	-0.08	0.01	0.08	0.10	-0.03	0.03
ipp_pyc	10	-0.11	0.06	0.03	-0.08	0.06	-0.03	0.04	-0.08	0.00	0.00	-0.05	0.00	-0.07	0.04	-0.03	0.03	0.00	-0.10	-0.11	0.02	-0.08

Table D2. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ipp_x	1	0.12	0.06	-0.09	0.09	0.04	-0.10	-0.05	0.06	-0.01	0.12	0.07	0.08	0.05	-0.04	-0.05	0.00	0.02	-0.08	0.06	-0.02	0.02
itcr	3	0.10	0.06	-0.06	0.10	0.07	-0.09	-0.08	0.04	-0.01	0.07	0.08	0.10	0.04	-0.06	-0.04	0.02	0.00	-0.09	0.05	-0.04	0.04
pptrol	-2	-0.16	0.06	0.01	0.05	0.02	0.02	-0.16	0.01	-0.01	0.01	-0.02	0.03	0.11	-0.01	-0.15	-0.03	0.11	-0.04	0.05	0.02	-0.06
ti	2	0.14	0.06	-0.01	0.12	-0.10	0.00	-0.06	0.04	0.10	-0.01	0.14	0.03	0.02	-0.05	-0.03	-0.10	0.03	0.05	0.03	-0.01	-0.06
clineg	0	0.32	0.06	-0.03	0.04	-0.07	0.14	-0.06	-0.01	0.32	0.12	0.07	0.06	0.09	-0.01	-0.07	0.03	-0.02	0.06	-0.05	0.04	0.07
f_p1	0	0.43	0.06	0.07	0.09	-0.08	0.15	0.03	-0.01	0.43	0.08	0.10	-0.04	0.03	0.02	-0.01	0.02	-0.06	-0.04	-0.07	0.08	0.04
f_p2	0	0.52	0.06	0.00	-0.03	0.01	-0.06	0.09	-0.08	0.52	-0.04	0.04	0.16	-0.06	0.00	-0.03	0.06	-0.10	-0.03	-0.05	0.03	0.07
f_p3	7	-0.12	0.06	0.02	-0.06	0.04	0.07	-0.01	-0.04	-0.07	-0.03	0.05	-0.01	0.03	0.06	0.00	-0.12	0.05	0.06	-0.06	0.01	0.01
f_p4	0	0.39	0.06	0.03	-0.03	0.06	0.04	0.09	-0.06	0.39	-0.02	0.11	0.08	-0.01	0.03	-0.03	0.00	-0.07	-0.02	-0.07	-0.03	0.10
f_p5	0	0.31	0.06	-0.09	-0.01	-0.17	0.01	-0.01	-0.08	0.31	0.01	0.12	0.07	0.10	0.04	-0.06	-0.04	-0.06	-0.01	-0.14	0.00	0.02
f_p6	0	0.38	0.06	-0.06	0.07	-0.06	-0.02	0.04	-0.11	0.38	0.06	0.09	0.07	0.06	0.07	-0.03	0.01	0.01	-0.04	-0.11	0.06	-0.01
f_p7	0	-0.22	0.06	0.00	0.00	-0.09	-0.02	-0.06	-0.07	-0.22	-0.07	-0.03	-0.07	0.04	-0.02	-0.01	-0.06	0.01	0.01	0.11	-0.02	-0.02
f_p8	1	0.17	0.06	0.02	-0.05	0.02	-0.02	-0.01	0.00	0.03	0.17	0.09	0.09	0.06	-0.01	-0.08	0.06	0.04	-0.14	-0.04	-0.01	0.04
f_p9	-4	-0.12	0.06	0.05	-0.07	-0.12	0.07	-0.04	0.07	0.00	0.01	0.03	0.09	0.01	-0.05	-0.06	0.04	0.00	0.04	0.02	-0.02	-0.06
f_p10	3	0.15	0.06	-0.08	-0.01	-0.02	0.05	-0.09	0.00	0.14	0.13	0.11	0.15	0.07	-0.03	-0.09	0.03	0.02	-0.07	-0.05	-0.01	0.05
f_p11	0	-0.14	0.06	0.01	-0.02	-0.04	-0.05	0.07	-0.09	-0.14	-0.09	-0.05	-0.08	0.09	-0.08	-0.03	0.00	-0.06	0.08	0.05	0.00	-0.02
iem_em	-6	0.15	0.06	0.15	-0.06	0.08	-0.01	0.06	0.05	0.12	0.06	0.01	-0.04	-0.03	0.11	-0.04	0.00	0.03	0.02	-0.08	0.04	0.07
iem_ob	0	0.34	0.06	0.15	0.07	0.05	0.08	0.12	0.14	0.34	0.06	0.05	0.11	-0.25	0.01	-0.04	0.01	-0.05	0.04	-0.04	0.07	0.12
iem_tot	0	0.33	0.06	0.16	-0.04	0.10	0.01	0.06	0.13	0.33	0.07	0.04	0.02	-0.16	0.02	-0.05	0.02	-0.03	0.00	-0.11	0.07	0.11
incon	0	0.30	0.06	-0.02	0.00	-0.05	0.02	0.02	-0.05	0.30	0.07	0.07	0.14	-0.01	0.03	-0.05	0.01	0.03	-0.10	-0.09	0.08	0.03

Table D2. (Continued)

Series (Xt)	*| Maximum |*		*STD*	*K*																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
ipr	0	0.79	0.06	0.04	0.02	0.04	0.05	0.01	0.06	0.79	0.01	0.05	-0.02	-0.08	-0.11	-0.02	-0.02	0.03	0.04	-0.07	0.11	0.02
iprcon	0	0.61	0.06	0.06	0.09	0.02	0.11	0.00	-0.05	0.61	-0.08	0.13	-0.03	-0.03	-0.14	0.01	-0.03	-0.01	0.01	-0.12	0.18	0.00
iprin	0	0.58	0.06	0.03	0.07	-0.03	0.05	0.02	0.00	0.58	-0.05	0.06	-0.03	-0.02	0.06	0.08	-0.02	0.07	0.02	-0.08	0.02	-0.05
iprk	0	0.46	0.06	0.17	0.08	0.02	0.08	0.08	-0.03	0.46	-0.05	-0.04	0.06	-0.02	-0.04	0.05	0.10	-0.11	0.08	0.01	0.01	0.00
salar	0	0.15	0.06	0.01	-0.06	-0.09	0.00	-0.05	-0.12	0.15	0.11	0.09	0.13	-0.12	-0.05	-0.02	-0.06	0.02	0.08	-0.05	-0.04	0.08
salarem	0	0.16	0.06	0.03	-0.09	-0.04	0.01	-0.09	-0.11	0.16	0.10	0.14	0.08	-0.09	-0.03	-0.04	0.00	-0.03	0.09	-0.02	-0.07	0.05
salarmin	3	0.20	0.06	-0.09	-0.04	-0.06	-0.16	-0.01	-0.06	-0.04	0.05	0.01	0.20	-0.01	0.05	-0.01	-0.05	-0.07	0.05	0.03	-0.04	-0.05
salarob	0	0.15	0.06	-0.01	-0.04	-0.11	0.01	-0.04	-0.10	0.15	0.10	0.05	0.13	-0.12	-0.05	-0.01	-0.10	0.05	0.05	-0.08	-0.02	0.09
ahor_r	11	-0.15	0.06	-0.02	-0.01	0.00	-0.03	-0.03	0.08	0.04	0.11	-0.01	0.09	0.01	0.09	0.04	0.15	0.03	0.10	0.01	-0.15	-0.02
baser	3	0.24	0.06	0.04	0.11	0.05	0.08	0.03	0.03	0.03	0.16	0.06	0.24	0.01	0.03	0.04	-0.07	-0.02	0.04	0.09	-0.07	-0.04
cart_sbr	0	0.12	0.06	0.06	0.04	-0.07	-0.06	0.10	0.06	0.12	0.07	0.03	0.07	-0.02	0.06	0.03	0.12	-0.02	-0.07	-0.01	-0.05	-0.07
cdt	11	-0.14	0.06	0.09	-0.05	-0.03	0.06	0.02	0.10	-0.02	0.01	-0.09	-0.05	-0.01	-0.14	-0.04	-0.05	-0.07	-0.03	0.04	-0.14	0.01
cdttr	-1	-0.16	0.06	0.04	-0.12	-0.03	0.02	0.07	-0.16	-0.06	-0.04	-0.06	-0.05	-0.03	-0.09	0.01	-0.02	-0.13	0.02	-0.01	-0.13	-0.01
dccr	2	0.12	0.06	0.01	0.00	0.03	0.05	-0.08	0.08	0.06	0.08	0.12	0.07	-0.01	0.09	-0.04	0.01	0.11	-0.07	0.07	-0.00	-0.04
efecr	-4	-0.15	0.06	-0.04	-0.02	-0.15	0.03	0.15	-0.01	0.09	0.09	0.10	0.03	-0.08	0.02	0.05	0.01	-0.10	0.04	0.00	0.05	0.03
efecrc	-2	0.19	0.06	-0.05	0.00	-0.11	0.05	0.19	0.00	0.09	0.11	0.09	0.06	-0.05	0.03	0.02	0.05	-0.09	0.05	0.00	0.03	0.03
m1r	2	0.16	0.06	0.00	0.05	-0.05	0.03	-0.01	0.07	0.04	0.13	0.16	0.05	0.03	0.07	0.00	0.07	-0.01	-0.04	0.11	-0.01	0.05
m2r	11	-0.17	0.06	0.04	0.02	0.03	0.00	0.01	0.07	0.03	0.13	0.06	0.14	0.01	0.07	0.03	0.08	-0.08	0.06	0.09	-0.17	0.03
m3bipc	11	-0.15	0.06	0.02	0.04	-0.01	0.05	0.01	0.09	0.09	0.12	0.13	0.08	0.04	0.03	0.06	0.01	-0.02	0.05	0.05	-0.15	0.02
m3bipp	2	0.14	0.06	0.01	0.06	0.02	0.08	-0.06	0.07	0.10	0.02	0.14	0.03	0.04	0.02	0.04	0.00	-0.05	0.03	0.02	-0.14	0.06

Table D2. (Concluded)

Series (Xt)	***| Maximum |***		***STD***	***K***																		
	K	**value**		**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
rcavs	-2	0.09	0.06	0.01	0.09	0.03	0.08	0.09	0.04	0.02	0.07	0.09	0.03	-0.01	-0.06	0.05	0.04	0.00	0.05	-0.05	-0.05	-0.01
cnac	1	-0.13	0.06	0.09	0.06	-0.03	0.09	-0.03	-0.08	0.07	-0.13	-0.02	0.11	0.07	0.08	0.04	-0.05	-0.06	-0.05	-0.04	0.02	-0.01
enpint	-1	0.21	0.06	0.06	-0.08	0.01	-0.01	0.00	0.21	-0.19	0.16	0.10	0.00	0.08	0.05	-0.04	0.00	0.04	0.01	0.12	-0.07	0.06
pnac	-1	0.16	0.06	0.05	0.04	-0.01	0.08	-0.06	0.16	-0.13	0.11	-0.03	0.04	-0.03	-0.02	0.08	-0.02	-0.03	-0.13	-0.04	-0.04	-0.01
sapint	-1	0.15	0.06	-0.04	0.00	-0.05	0.06	-0.01	0.15	-0.08	0.07	0.01	0.04	0.01	0.04	0.01	0.03	0.01	-0.03	0.00	-0.03	0.05

Table D3. Predictive content for IPR

Series (W_t)	***Marginal predictive content***				***Predictive Content***								
	6 lags		***12 lags***		***1- step ahead***			***6- steps ahead***			***12- steps ahead***		
	F-Stat. [1/]	p-value	F-Stat.	p-value	R^2 [2/]	Rank[3/]	p-value	R^2	Rank	p-value	R^2	Rank	p-value
expor	1.14	0.34	1.12	0.35	0.82	62	0.34	0.75	55	0.74	0.06	68	0.96
ex_ban	0.91	0.49	1.29	0.23	0.82	77	0.65	0.75	64	0.84	0.06	65	0.95
ex_caf	2.92	0.01	1.80	0.05	0.83	19	0.01	0.76	39	0.50	0.07	48	0.86
ex_carb	0.75	0.61	0.56	0.87	0.81	83	0.79	0.75	82	1.00	0.06	82	1.00
ex_flo	0.86	0.52	0.71	0.74	0.82	70	0.48	0.75	75	0.94	0.06	54	0.90
expontr	0.59	0.74	1.39	0.17	0.82	75	0.58	0.75	44	0.58	0.06	83	1.00
expotra	1.57	0.16	1.26	0.25	0.82	45	0.18	0.75	51	0.68	0.08	28	0.47
expotrb	1.67	0.13	1.33	0.20	0.82	41	0.15	0.75	46	0.63	0.09	22	0.28
expotrc	1.65	0.14	1.32	0.21	0.82	42	0.16	0.75	47	0.62	0.09	21	0.27
Impr_bco	0.81	0.56	0.75	0.70	0.82	80	0.72	0.75	68	0.87	0.06	77	0.99
Impr_bca	0.70	0.65	1.10	0.36	0.82	63	0.36	0.75	63	0.84	0.06	64	0.94
Impr_bin	0.76	0.60	0.91	0.54	0.82	81	0.74	0.75	66	0.85	0.06	61	0.92
impr_tot	1.11	0.36	0.88	0.57	0.82	72	0.52	0.75	76	0.94	0.06	66	0.95
impres	0.71	0.65	0.77	0.68	0.81	82	0.77	0.75	72	0.89	0.06	58	0.91
resint	1.93	0.08	1.15	0.32	0.82	32	0.06	0.75	50	0.65	0.08	25	0.38
expo_caf	2.61	0.02	1.64	0.08	0.82	24	0.02	0.76	29	0.17	0.07	52	0.89
pcocafer	1.59	0.15	1.81	0.05	0.82	59	0.31	0.77	18	0.01	0.06	73	0.98
pr_gan	1.00	0.43	0.75	0.70	0.82	53	0.25	0.75	67	0.87	0.06	71	0.97
prcafe	1.68	0.13	1.98	0.03	0.82	58	0.30	0.76	25	0.06	0.06	75	0.98
precip	1.05	0.40	1.19	0.29	0.82	50	0.23	0.75	58	0.80	0.07	47	0.84
sganem	1.57	0.16	1.82	0.05	0.82	34	0.08	0.75	71	0.89	0.07	42	0.74
ivtot	1.91	0.08	1.11	0.35	0.82	27	0.04	0.75	56	0.74	0.06	62	0.93
V_auto	0.69	0.66	1.29	0.22	0.82	71	0.48	0.75	70	0.89	0.07	50	0.86
areacon	1.57	0.16	1.10	0.37	0.82	36	0.11	0.76	41	0.53	0.07	39	0.67
rpreen	0.44	0.85	1.70	0.07	0.82	79	0.70	0.76	37	0.47	0.08	33	0.56
rpreap	0.66	0.68	2.93	0.00	0.82	76	0.64	0.77	15	0.00	0.10	18	0.13
prcem	1.22	0.30	0.66	0.79	0.82	47	0.20	0.75	54	0.73	0.08	24	0.37
enerd	0.57	0.75	0.56	0.88	0.82	65	0.38	0.76	36	0.33	0.07	43	0.75
energa	0.56	0.76	0.63	0.82	0.82	66	0.42	0.75	69	0.88	0.06	63	0.93
pro_gas	0.91	0.49	0.90	0.55	0.82	52	0.25	0.75	57	0.78	0.06	81	1.00
prpet	1.02	0.41	1.23	0.26	0.82	46	0.19	0.75	53	0.71	0.06	67	0.96
infla	0.82	0.55	1.05	0.40	0.82	48	0.21	0.76	42	0.56	0.07	40	0.74
ipc_sina	1.09	0.37	1.44	0.15	0.82	39	0.14	0.75	52	0.70	0.07	46	0.84
ipctot	0.82	0.55	1.05	0.40	0.82	49	0.23	0.75	45	0.58	0.07	41	0.74
ipp	0.93	0.48	1.64	0.08	0.82	54	0.25	0.75	74	0.92	0.06	78	0.99
ipp_m	1.47	0.19	1.41	0.16	0.82	31	0.06	0.75	60	0.82	0.06	57	0.90
ipp_mat	0.39	0.89	0.55	0.88	0.82	74	0.56	0.75	77	0.95	0.08	32	0.52
ipp_pyc	0.72	0.63	1.35	0.19	0.82	61	0.34	0.75	79	0.97	0.06	80	1.00
ipp_x	1.14	0.34	1.08	0.38	0.82	44	0.17	0.76	38	0.47	0.08	36	0.61
itcr	0.89	0.51	0.96	0.49	0.82	51	0.24	0.76	40	0.51	0.08	38	0.63
pptrol	1.43	0.20	1.31	0.21	0.82	38	0.12	0.76	34	0.29	0.09	20	0.22
ti	1.47	0.19	1.14	0.33	0.82	35	0.09	0.75	62	0.84	0.06	72	0.98
clineg	6.91	0.00	3.81	0.00	0.84	3	0.00	0.78	9	0.00	0.15	10	0.00
F_p1	5.96	0.00	3.38	0.00	0.84	4	0.00	0.77	19	0.01	0.11	16	0.05
F_p2	4.42	0.00	3.27	0.00	0.83	10	0.00	0.77	17	0.00	0.14	12	0.00
F_p3	0.82	0.56	1.05	0.40	0.82	57	0.28	0.75	65	0.84	0.08	29	0.49
F_p4	3.22	0.00	3.79	0.00	0.83	15	0.00	0.78	10	0.00	0.15	11	0.00
F_p5	5.44	0.00	4.01	0.00	0.83	6	0.00	0.79	3	0.00	0.19	5	0.00
F_p6	8.35	0.00	4.80	0.00	0.85	1	0.00	0.79	4	0.00	0.16	8	0.00
F_p7	4.04	0.00	2.35	0.01	0.83	12	0.00	0.77	16	0.00	0.11	17	0.07
F_p8	5.37	0.00	3.33	0.00	0.83	7	0.00	0.78	14	0.00	0.14	13	0.00

Table D3. (Concluded)

Series (W_t)	Marginal predictive content				Predictive Content								
	6 lags		12 lags		1- step ahead			6- steps ahead			12- steps ahead		
	F-Stat. [1/]	p-value	F-Sta.t	p-value	R^2 [2/]	Rank[3/]	p-value	R^2	Rank	p-value	R^2	Rank	p-value
F_p9	0.74	0.62	0.81	0.64	0.82	67	0.45	0.75	80	0.97	0.06	56	0.90
F_p10	4.90	0.00	2.79	0.00	0.83	9	0.00	0.78	8	0.00	0.15	9	0.00
F_p11	2.95	0.01	1.81	0.05	0.83	17	0.01	0.77	21	0.01	0.11	15	0.05
iem_em	0.49	0.81	0.87	0.58	0.82	64	0.36	0.76	43	0.57	0.06	74	0.98
iem_ob	5.54	0.00	3.11	0.00	0.84	2	0.00	0.76	28	0.14	0.08	37	0.61
iem_tot	2.98	0.01	1.73	0.06	0.83	14	0.00	0.76	30	0.20	0.06	53	0.90
Incon	5.65	0.00	3.37	0.00	0.84	5	0.00	0.78	12	0.00	0.17	7	0.00
Ipr	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00
Iprcon	0.36	0.90	1.21	0.27	0.82	69	0.47	0.76	35	0.30	0.08	26	0.43
Iprin	1.32	0.25	1.25	0.25	0.82	43	0.16	0.76	24	0.05	0.08	31	0.51
Iprk	0.35	0.91	0.87	0.57	0.82	78	0.68	0.75	73	0.92	0.06	76	0.98
Salar	2.11	0.05	2.36	0.01	0.82	23	0.02	0.77	23	0.03	0.06	69	0.97
Salarem	2.45	0.03	2.22	0.01	0.83	20	0.01	0.76	27	0.12	0.06	79	1.00
Salarmin	2.67	0.02	2.13	0.02	0.83	16	0.00	0.76	33	0.29	0.08	27	0.46
salarob	1.79	0.10	2.40	0.01	0.82	26	0.03	0.77	22	0.01	0.06	55	0.90
ahor_r	1.54	0.17	2.85	0.00	0.82	25	0.03	0.79	6	0.00	0.18	6	0.00
baser	3.67	0.00	2.23	0.01	0.83	11	0.00	0.78	11	0.00	0.11	14	0.04
cart_sbr	1.33	0.24	1.49	0.13	0.82	40	0.15	0.75	49	0.64	0.09	23	0.30
cdt	2.31	0.04	2.01	0.02	0.83	21	0.01	0.81	1	0.00	0.23	1	0.00
cdttr	0.65	0.69	1.44	0.15	0.82	60	0.34	0.79	7	0.00	0.20	4	0.00
dccr	2.86	0.01	2.99	0.00	0.83	18	0.01	0.79	5	0.00	0.20	3	0.00
efecr	1.80	0.10	2.04	0.02	0.82	28	0.04	0.78	13	0.00	0.08	34	0.57
efecrc	1.74	0.11	2.01	0.03	0.82	29	0.04	0.77	20	0.01	0.07	45	0.81
m1r	3.85	0.00	3.46	0.00	0.83	13	0.00	0.81	2	0.00	0.22	2	0.00
m2r	1.45	0.20	2.17	0.01	0.82	55	0.26	0.76	26	0.08	0.08	35	0.61
m3bipc	1.03	0.41	1.17	0.31	0.82	56	0.27	0.76	31	0.21	0.07	44	0.78
m3bipp	0.47	0.83	0.95	0.50	0.82	68	0.45	0.75	48	0.64	0.07	51	0.87
rcavs	1.69	0.12	1.46	0.14	0.82	30	0.06	0.76	32	0.24	0.08	30	0.50
cnac	2.61	0.02	1.29	0.23	0.83	22	0.01	0.75	61	0.83	0.06	59	0.91
enpint	4.14	0.00	2.38	0.01	0.83	8	0.00	0.75	78	0.97	0.06	60	0.92
pnac	1.54	0.17	1.12	0.34	0.82	33	0.08	0.75	59	0.81	0.07	49	0.86
sapint	1.16	0.33	0.83	0.62	0.82	37	0.11	0.75	81	0.98	0.06	70	0.97

[1/] The F-stat. is associated to the Ho: $\beta_i=0$ (for i=1,2,…, k) for the following regression :

$$\Delta \ln(R_t) = \alpha_0 + \sum_{j=1}^{12} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=1}^{k} \beta_i \Delta \ln(W_{t-i}) + \sum_{m=1}^{11} \gamma_m S_m + \varepsilon_t \quad \text{for k} = 6,12$$

where R is the Industrial production index, S_m are seasonal dummies and W is a candidate leading variable.

[2/] The R^2 is calculated for the regression:

$$\ln(R_{t+k}) - \ln(R_t) = \alpha_0 + \sum_{j=0}^{5} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=0}^{6} \beta_i \Delta \ln(W_{t-i}) \sum_{m=1}^{11} \gamma_m S_m + \varepsilon_t^* \quad \text{for k} = 1,6,12$$

[3/] Rank indicates the ranking of the R^2 statistics, where 1 corresponds to the highest R^2, 2 the second highest and so on.

Table D4. Predictive content for the Coincident Index

Series (Wt)	Marginal predictive content				Predictive Content								
	6 lags		12 lags		1- step ahead			6- steps ahead			12- steps ahead		
	F-Stat. 1/	p-value	F-Stat.	p-value	R^2 2/	Rank 3/	p-value	R^2	Rank	p-value	R^2	Rank	p-value
expor	0.92	0.48	1.14	0.33	0.05	60	0.53	0.02	54	0.94	0.06	53	0.97
ex_ban	0.92	0.48	1.20	0.28	0.06	56	0.44	0.01	81	1.00	0.06	69	0.99
ex_caf	1.90	0.08	1.29	0.22	0.07	30	0.17	0.02	61	0.96	0.06	77	1.00
ex_carb	0.38	0.89	0.34	0.98	0.04	83	0.94	0.01	83	1.00	0.06	83	1.00
ex_flo	0.80	0.57	0.74	0.71	0.06	48	0.36	0.02	64	0.98	0.06	61	0.98
expontr	0.17	0.98	0.74	0.71	0.05	58	0.52	0.02	70	0.99	0.06	70	0.99
expotra	1.42	0.21	1.30	0.22	0.06	47	0.35	0.03	44	0.78	0.08	24	0.58
expotrb	1.46	0.19	1.34	0.20	0.06	44	0.32	0.03	42	0.71	0.09	16	0.35
expotrc	1.44	0.20	1.34	0.20	0.06	46	0.33	0.03	41	0.70	0.09	17	0.35
impr_bco	1.30	0.26	1.23	0.26	0.05	62	0.56	0.02	59	0.96	0.06	80	1.00
impr_bca	1.07	0.38	1.45	0.15	0.07	29	0.16	0.02	73	0.99	0.06	67	0.99
impr_bin	0.37	0.90	0.60	0.84	0.05	79	0.77	0.01	79	1.00	0.07	33	0.80
impr_tot	1.27	0.27	1.09	0.37	0.06	42	0.30	0.02	74	0.99	0.06	56	0.98
impres	0.45	0.84	0.58	0.86	0.05	74	0.72	0.01	82	1.00	0.07	36	0.84
resint	0.61	0.72	0.54	0.89	0.05	64	0.57	0.03	43	0.74	0.07	42	0.93
expo_caf	1.65	0.13	1.29	0.22	0.06	38	0.25	0.03	39	0.69	0.06	63	0.99
pcocafer	1.27	0.27	0.87	0.58	0.05	70	0.64	0.05	21	0.15	0.06	73	1.00
pr_gan	0.91	0.49	0.74	0.71	0.06	37	0.25	0.02	62	0.96	0.06	52	0.97
prcafe	1.20	0.31	0.92	0.52	0.05	75	0.72	0.03	35	0.64	0.06	49	0.97
precip	0.31	0.93	0.33	0.98	0.05	72	0.67	0.02	67	0.98	0.06	54	0.97
sganem	1.35	0.24	1.59	0.10	0.11	11	0.01	0.02	52	0.93	0.06	66	0.99
ivtot	0.08	1.00	0.08	1.00	0.04	82	0.82	0.02	56	0.95	0.06	82	1.00
v_auto	0.82	0.56	1.21	0.28	0.06	45	0.32	0.02	60	0.96	0.07	40	0.89
areacon	1.17	0.32	0.76	0.69	0.09	16	0.03	0.04	31	0.43	0.07	30	0.74
rpreen	0.51	0.80	1.15	0.32	0.05	59	0.52	0.04	29	0.39	0.09	18	0.35
rpreap	0.91	0.49	1.94	0.03	0.05	61	0.54	0.09	13	0.00	0.10	8	0.09
prcem	1.26	0.27	1.11	0.36	0.08	23	0.09	0.03	33	0.61	0.07	27	0.70
enerd	0.65	0.69	0.36	0.97	0.08	22	0.08	0.04	30	0.40	0.07	41	0.90
energa	0.80	0.57	0.50	0.91	0.06	35	0.25	0.02	49	0.91	0.06	81	1.00
pro_gas	0.63	0.70	0.61	0.84	0.07	34	0.23	0.02	50	0.93	0.06	74	1.00
prpet	0.59	0.74	0.89	0.56	0.06	41	0.30	0.02	63	0.97	0.06	62	0.99
infla	0.64	0.70	0.53	0.89	0.06	53	0.43	0.03	37	0.67	0.06	47	0.96
ipc_sina	0.62	0.71	0.69	0.76	0.06	52	0.40	0.02	55	0.95	0.06	79	1.00
ipctot	0.64	0.70	0.53	0.89	0.06	54	0.43	0.03	38	0.69	0.06	46	0.96
ipp	0.66	0.69	0.66	0.79	0.05	67	0.60	0.02	51	0.93	0.06	48	0.96
ipp_m	1.60	0.15	1.30	0.22	0.09	15	0.03	0.03	36	0.65	0.07	31	0.79
ipp_mat	0.62	0.71	0.55	0.88	0.05	63	0.57	0.02	57	0.95	0.09	14	0.30
ipp_pyc	0.55	0.77	0.56	0.87	0.05	73	0.70	0.02	66	0.98	0.06	55	0.98
ipp_x	1.25	0.28	1.11	0.36	0.08	20	0.06	0.05	22	0.19	0.08	26	0.65
itcr	0.71	0.64	0.85	0.59	0.07	28	0.13	0.04	26	0.30	0.07	28	0.72
pptrol	0.81	0.56	0.81	0.64	0.06	43	0.31	0.05	25	0.24	0.09	19	0.37
Ti	1.43	0.20	1.27	0.24	0.07	32	0.19	0.02	47	0.90	0.06	64	0.99
clineg	3.18	0.01	1.83	0.05	0.15	3	0.00	0.13	9	0.00	0.10	10	0.17
f_p1	1.87	0.09	1.19	0.29	0.12	9	0.00	0.07	18	0.04	0.07	35	0.83
f_p2	0.43	0.86	0.63	0.82	0.09	17	0.04	0.07	17	0.04	0.08	22	0.43
f_p3	0.73	0.63	1.03	0.42	0.06	40	0.27	0.02	65	0.98	0.06	44	0.95
f_p4	0.84	0.54	1.27	0.24	0.10	14	0.02	0.12	10	0.00	0.09	12	0.20
f_p5	1.54	0.17	2.00	0.03	0.12	8	0.00	0.15	5	0.00	0.12	6	0.03
f_p6	2.28	0.04	1.40	0.17	0.17	1	0.00	0.14	6	0.00	0.10	11	0.17
f_p7	1.31	0.25	0.82	0.63	0.13	6	0.00	0.10	11	0.00	0.08	23	0.50

Table D4. (Concluded)

Series (W_t)	Marginal predictive content				Predictive Content								
	6 lags		12 lags		1- step ahead			6- steps ahead			12- steps ahead		
	F-Stat. [1]	p-value	F-Stat.	p-value	R^2 [2]	Rank[3]	p-value	R^2	Rank	p-value	R^2	Rank	p-value
f_p8	1.19	0.31	1.69	0.07	0.08	19	0.06	0.07	16	0.04	0.09	15	0.34
f_p9	0.36	0.90	0.56	0.87	0.05	76	0.76	0.02	71	0.99	0.06	75	1.00
f_p10	3.48	0.00	2.14	0.02	0.14	4	0.00	0.16	4	0.00	0.13	5	0.01
f_p11	2.10	0.05	1.28	0.23	0.13	5	0.00	0.09	15	0.01	0.08	21	0.39
iem_em	0.21	0.97	0.32	0.98	0.06	51	0.40	0.02	53	0.94	0.06	58	0.98
iem_ob	0.91	0.49	0.62	0.82	0.08	24	0.09	0.03	45	0.82	0.07	32	0.79
iem_tot	0.42	0.87	0.30	0.99	0.06	36	0.25	0.02	48	0.90	0.06	45	0.95
incon	2.92	0.01	1.97	0.03	0.16	2	0.00	0.14	7	0.00	0.11	7	0.04
ipr	0.00	0.00	0.00	0.00	0.00	84	0.00	0.00	84	0.00	0.00	84	0.00
iprcon	0.23	0.97	0.35	0.98	0.05	57	0.49	0.02	68	0.98	0.06	50	0.97
iprin	0.29	0.94	0.36	0.98	0.07	26	0.12	0.03	34	0.62	0.06	59	0.98
iprk	0.08	1.00	0.14	1.00	0.05	78	0.76	0.02	69	0.98	0.06	72	1.00
salar	1.20	0.31	1.03	0.42	0.06	39	0.26	0.06	20	0.14	0.07	43	0.94
salarem	1.07	0.38	0.76	0.69	0.06	49	0.38	0.04	27	0.30	0.06	60	0.98
salarmin	0.19	0.98	0.51	0.90	0.05	77	0.76	0.02	58	0.95	0.07	39	0.89
salarob	1.19	0.31	1.21	0.28	0.07	31	0.19	0.06	19	0.10	0.07	38	0.88
ahor_r	1.75	0.11	2.19	0.01	0.10	13	0.01	0.18	3	0.00	0.20	3	0.00
baser	1.55	0.16	0.90	0.55	0.10	12	0.01	0.09	14	0.01	0.09	20	0.38
cart_sbr	0.40	0.18	0.55	0.88	0.05	65	0.59	0.02	76	0.99	0.06	68	0.99
cdt	2.91	0.01	2.19	0.01	0.13	7	0.00	0.31	1	0.00	0.26	1	0.00
cdttr	0.88	0.51	1.51	0.12	0.07	27	0.12	0.19	2	0.00	0.22	2	0.00
dccr	1.84	0.09	1.99	0.03	0.11	10	0.00	0.13	8	0.00	0.13	4	0.00
efecr	0.38	0.89	1.05	0.41	0.05	66	0.59	0.03	40	0.69	0.06	57	0.98
efecrc	0.29	0.94	0.96	0.49	0.05	71	0.65	0.02	46	0.89	0.06	65	0.99
M1r	0.92	0.48	1.92	0.03	0.08	25	0.09	0.09	12	0.00	0.10	9	0.11
M2r	0.71	0.64	0.74	0.71	0.06	55	0.43	0.05	24	0.22	0.08	25	0.60
M3bipc	0.80	0.57	0.61	0.83	0.07	33	0.23	0.04	28	0.33	0.07	34	0.81
M3bipp	0.54	0.78	0.56	0.87	0.06	50	0.39	0.02	75	0.99	0.06	78	1.00
rcavs	1.49	0.18	1.02	0.43	0.08	18	0.06	0.05	23	0.22	0.09	13	0.27
cnac	1.18	0.32	0.59	0.85	0.08	21	0.06	0.02	72	0.99	0.07	37	0.87
enpint	0.18	0.98	0.44	0.94	0.05	68	0.62	0.01	78	1.00	0.06	71	0.99
pnac	0.22	0.97	0.19	1.00	0.05	80	0.78	0.01	77	1.00	0.06	51	0.97
sapint	0.31	0.93	0.28	0.99	0.05	69	0.63	0.01	80	1.00	0.06	76	1.00

[1] The F-stat. is associated to the Ho: $\beta_i=0$ (for i=1,2,…, k) for the following regression:

$$\Delta \ln(R_t) = \alpha_0 + \sum_{j=1}^{12} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=1}^{k} \beta_i \Delta \ln(W_{t-i}) + \varepsilon_t \quad \text{for } k = 6,12$$

where R is the coincident index and W is a candidate leading variable.

[2] The R^2 is calculated for the regression:

$$\ln(R_{t+k}) - \ln(R_t) = \alpha_0 + \sum_{j=0}^{5} \alpha_j \Delta \ln(R_{t-j}) + \sum_{i=0}^{6} \beta_i \Delta \ln(W_{t-i}) + \varepsilon_t^{*} \quad \text{for } k = 1,6,12$$

[3] Rank indicates the ranking of the R^2 statistics, where 1 corresponds to the highest R^2, 2 the second highest and so on.

APPENDIX E

Table E1. Selection of the group of the leading series

Model Number	Number of leading series	Leading series	Cut-off periodicity of the Low Pass filter [1/]	Computational time in hours [2/]	Number of Hyperparameters of the model	Cusum square [3/]	AIC Value	AIC Rank [4/]	Cross - correlations Rank [5/]	Graphic bias [6/]
58	**4**	rpreap, incon, m1r, cdt	6	48:48	146	3	70700.8	1	6	0
68	**4**	rpreap, incon, cdttr ahor_r	4	36:14	117	1	75681.3	7	19	3
69	**4**	clineg dccr. Areacon, cdttr	4	38:25	121	1	75892.1	14	12	3
70	**4**	rpreap, incon, m1r, cdt	4	24:30	113	2	75781.4	10	14	2
71	**4**	rpreap, incon, cdttr ahor_r	5	45:41	117	2	74415.0	5	17	2
72	**5**	rpreen, incon, m1r, areacon, cdttr	4	67:50	159	1	76029.6	25	24	2
73	**6**	m1r, cdttr, areacon, impr_bco, clineg, incon	4	136:35	208	2	76065.9	28	1	2
74	**5**	rpreap, cdt, dccr, f_p10, impr_bco	4	57:16	151	5	76041.1	27	21	2
75	**5**	rpreen, incon,m1r, cdttr, clineg	4	62:11	159	1	75778.5	9	22	2
76	**5**	f_p10, ahor_r, m1r, areacon, cdttr	4	70:53	158	2	76029.5	24	4	2
77	**5**	f_p5, incon, m1r, areacon, impr_bco	4	59:49	163	2	75953.4	15	37	2
78	**5**	dccr, ahor_r, clineg, cdttr, areacon	4	76:10	163	1	76005.2	18	16	3
79	**6**	f_p5, fp_10, m1r, rpreen, impr_bco,cdttr	4	86:50	198	4	76247.6	36	28	2
80	**5**	f_p5, f_p10, impr_bco, ahor_r, areacon	4	48:05	150	2	76040.2	26	30	3
81	**5**	cdt, rpreen, impr_bco, m1r, f_p10	4	43:08	149	6	76094.0	29	35	2
82	**6**	m1r, cdttr, impr_bco, areacon, incon, f_p10	4	104:09	202	2	76148.6	32	2	2
83	**5**	f_p10, incon, cdttr, areacon, impr_bco	4	57:06	153	2	76008.2	20	20	3
84	**5**	f_p10, incon, m1r, rpreen, cdttr	4	51:05	149	2	75877.6	13	9	2
85	**6**	incon, m1r, ahor_r, impr_bco, areacon, cdttr	4	137:48	208	2	76129.7	30	36	2
86	**5**	m1r, rpreen, areacon, f_p5, f_p10	4	50:40	159	3	76024.1	23	3	2

Table E1. (concluded)

Model Number	Number of leading series	Leading series	Cut-off periodicity of the Low Pass filter [1/]	Computational time in hours [2/]	Number of Hyperparameters of the model	Cusum square [3/]	AIC		Cross - correlations Rank [5/]	Graphic bias [6/]
							Value	Rank [4/]		
87	**5**	rpreen, cdttr, impr_bco, clineg, ahor_r	4	66:52	160	1	75982.6	16	13	2
88	**5**	ahor_r, m1r, clineg, rpreen, impr_bco	4	51:15	160	2	76019.1	22	23	2
89	**5**	ahor_r, rpreen, areacon, f_p5, f_p10	4	59:37	151	3	76007.5	19	26	2
90	**6**	f_p5, ahor_r, m1r, areaon, rpreen, impr_bco	4	121:38	197	2	76172.4	35	31	3
91	**5**	m1r, rpreen, areacon, clineg, incon	4	68:01	160	2	75835.9	11	8	2
92	**6**	Clineg, incon, m1r, rpreen, impr_bco, cdttr	4	126:24	208	3	75986.8	17	34	2
93	**6**	Clineg, m1r, ahor_r, rpreen, impr_bco, cdttr	4	135:02	209	3	76130.8	31	15	2
94	**6**	f_p10, rpreen, areacon, m1r, impr_bco, y cdttr	4	98:04	208	3	76328.8	37	25	2
95	**5**	ahor_r, rpreen, areacon, clineg, incon	4	48:21	158	1	75763.3	8	7	3
96	**6**	f_p10, incon, rpreen, areacon, ahor_r, impr_bco	4	127:52	209	2	76012.8	21	11	3
97	**6**	f_p5, f_p10, ahor_r, areacon, impr_bco, cdttr	4	92:31	198	1	76168.6	34	27	3
98	**6**	Incon, clineg, ahor_r, rpreen, impr_bco y cdttr	4	132:20	209	1	75861.8	12	10	3
99	**6**	f_p10, ahor_r, m1r, impr_bco, rpreen, cdttr	4	116:15	208	4	76150.2	33	18	2
100	**5**	m1r, rpreen, areacon, f_p5 y f_p10	5	37:41	158	3	74494.9	6	32	1
101	**5**	m1r, rpreen, areacon, f_p5 y f_p10	6	134:37	159	2	73306.7	3	29	1
102	**6**	m1r, cdttr, areacon, impr_bco, clineg, incon	5	94:53	206	1	73914.0	4	5	1
103	**6**	m1r, cdttr, areacon, impr_bco, clineg, incon	6	154:07	208	1	72594.0	2	33	1

1/ The low pass filter is applied to the leading series for diminishing volatility

2/ Computational time for estimating the model using a P.C. with 1,5 GHz and 256 Mb of RAM memory. SAS-IML version 8.02.

3/ Number of residual series of the equation (3) that fall outside of the confidence intervals for the Cusum square test

4/ 1 corresponds to model with the lowest AIC, 2 to the second lowest and so on

5/ Ranking of the cross correlation between M_t and L_{t-k}: 1 corresponds to the model that has the maximum lead and the highest correlation at this lead, where $M_t = C^c_{t+6/t+6} - C^c_{t/t}$ and $L_t = C_{t+6/t} - C_{t/t}$

6/ Approximate number of months that are needed to shift L_t towards M_t in order to match them at the 1998 recession

Table E2. Cross-correlations between M_t and estimations of the Leading Index [Corr (M_t, L_{t-k})] [1/]

Model Number	| Maximum| k	value	Rank[2/]	k = -6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
58	-1	0.37	7	-0.09	-0.03	-0.17	-0.02	0.08	0.37	0.00	0.12	0.00	0.06	0.13	-0.05	-0.18
68	-1	0.22	20	0.07	0.12	0.11	0.06	0.15	0.22	-0.02	0.10	-0.13	0.02	0.01	0.03	-0.12
69	-1	0.25	13	0.03	0.14	0.11	0.05	0.11	0.25	0.00	0.08	-0.21	-0.06	0.02	0.10	-0.05
70	-1	0.24	15	0.00	0.14	0.17	0.16	-0.04	0.24	0.02	0.14	0.00	-0.04	-0.11	0.01	-0.02
71	-1	0.23	18	0.02	0.14	0.09	0.06	0.12	0.23	0.01	0.13	-0.16	-0.05	0.00	0.12	-0.05
72	-1	0.18	25	-0.12	0.16	0.06	0.12	0.04	0.18	0.03	0.13	-0.03	-0.04	-0.04	-0.02	0.01
73	1	0.20	1	-0.09	0.12	0.17	0.17	0.04	0.14	0.01	0.20	-0.06	-0.03	-0.06	0.02	0.01
74	-1	0.20	22	0.05	0.06	0.18	0.15	0.00	0.20	0.03	0.14	-0.07	0.01	-0.08	0.07	-0.08
75	-1	0.19	23	-0.05	0.16	0.05	0.17	0.09	0.19	0.06	0.15	-0.09	0.03	-0.02	0.00	0.01
76	1	0.18	4	0.00	0.14	0.05	0.09	0.14	0.17	0.02	0.18	-0.14	0.03	0.01	0.03	-0.04
77	-5	0.19	40	-0.06	0.19	0.12	-0.03	0.14	0.18	0.10	0.18	-0.13	0.00	0.01	0.00	-0.10
78	-1	0.23	17	0.04	0.10	0.10	0.04	0.22	0.23	-0.02	0.04	-0.19	0.00	0.05	0.06	-0.11
79	-2	0.27	29	0.04	0.07	0.10	0.07	0.27	0.18	-0.05	0.09	-0.16	0.11	0.04	-0.06	-0.17
80	-2	0.26	31	0.12	0.10	0.12	0.11	0.26	0.18	-0.04	0.06	-0.18	0.11	0.03	-0.06	-0.15
81	-4	0.22	38	0.02	0.04	0.22	0.16	0.03	0.19	-0.02	0.13	-0.03	0.01	-0.06	0.05	-0.07
82	1	0.19	2	-0.07	0.04	0.18	0.12	0.00	0.18	0.04	0.19	-0.03	-0.02	-0.06	0.09	-0.02
83	-1	0.22	21	0.13	0.04	0.11	0.20	-0.03	0.22	0.07	0.14	-0.09	-0.07	-0.07	0.14	-0.08
84	-1	0.26	10	0.02	-0.02	0.13	0.15	0.01	0.26	-0.01	0.13	-0.03	0.02	-0.06	0.06	-0.05
85	-4	0.22	39	-0.13	0.21	0.22	0.08	0.00	0.15	0.01	0.18	-0.07	-0.05	-0.03	0.03	-0.06
86	1	0.19	3	-0.09	0.14	0.08	0.04	0.18	0.18	0.02	0.19	-0.12	-0.01	0.02	-0.01	-0.09
87	-1	0.25	14	0.11	0.10	0.18	0.08	0.12	0.25	-0.05	0.06	-0.16	-0.02	0.02	0.05	-0.10
88	-1	0.19	24	-0.11	0.17	0.16	0.15	0.07	0.19	-0.02	0.11	-0.06	-0.07	0.01	-0.03	-0.01
89	-2	0.31	27	0.08	0.05	0.07	0.06	0.31	0.18	-0.06	0.04	-0.19	0.08	0.08	-0.03	-0.16
90	-2	0.25	32	0.03	0.07	0.13	0.08	0.25	0.18	-0.02	0.10	-0.15	0.09	0.06	-0.03	-0.14
91	-1	0.27	9	-0.07	0.19	0.10	0.17	0.10	0.27	0.00	0.04	-0.03	-0.12	0.01	0.04	0.00
92	-3	0.17	37	-0.07	0.11	0.15	0.17	0.02	0.16	0.03	0.13	-0.03	0.01	-0.07	0.02	0.02

Table E2. (Concluded)

Model Number	| Maximum| k	value	Rank [2/]	K -6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
93	-1	0.23	16	-0.07	0.13	0.15	0.11	0.05	0.23	-0.02	0.11	-0.08	-0.07	0.01	0.00	-0.02
94	-1	0.18	26	-0.02	0.02	0.13	0.14	0.04	0.18	-0.03	0.15	-0.02	0.02	-0.04	0.03	-0.03
95	-1	0.27	8	0.08	0.08	0.13	-0.02	0.17	0.27	-0.04	0.03	-0.16	-0.06	-0.01	0.10	-0.10
96	-1	0.25	12	0.03	0.08	0.17	0.01	0.08	0.25	0.00	0.11	-0.13	-0.03	0.00	0.05	-0.09
97	-2	0.28	28	0.11	0.09	0.12	0.11	0.28	0.17	-0.05	0.04	-0.18	0.12	0.02	-0.08	-0.16
98	-1	0.26	11	0.09	0.15	0.21	0.08	0.07	0.25	-0.04	0.05	-0.15	-0.03	-0.01	0.05	-0.09
99	-1	0.23	19	0.00	0.07	0.17	0.09	0.04	0.23	-0.02	0.16	-0.06	0.01	-0.02	0.05	-0.04
100	-2	0.21	33	-0.08	0.09	0.08	0.02	0.21	0.10	0.03	0.20	0.00	0.09	-0.04	-0.08	-0.07
101	-2	0.26	30	-0.05	0.04	0.07	0.01	0.26	0.21	0.09	0.04	0.08	-0.03	0.10	-0.07	-0.11
102	1	0.18	5	-0.13	0.09	0.14	0.02	0.17	0.13	0.04	0.18	-0.08	0.05	0.05	-0.04	-0.09
103	-2	0.20	34	-0.07	0.11	0.03	0.02	0.20	0.18	0.08	-0.02	0.10	-0.07	0.14	-0.08	-0.05

[1/] $M_t = C^e_{t+6/t+6} - C^e_{t/t}$ and $L_t = C_{t+6/t} - C_{t/t}$ where $C^e_{t/t}$ indicates the coincident index estimated in N-M (2001).

[2/] Ranking of the cross correlation between M_t and L_{t-k} : 1 corresponds to the model that has the maximum lead and the highest correlation at this lead.

APPENDIX F

Figure F1. CUSUM and CUSUMSQ test for the residuals associated with the coincident series

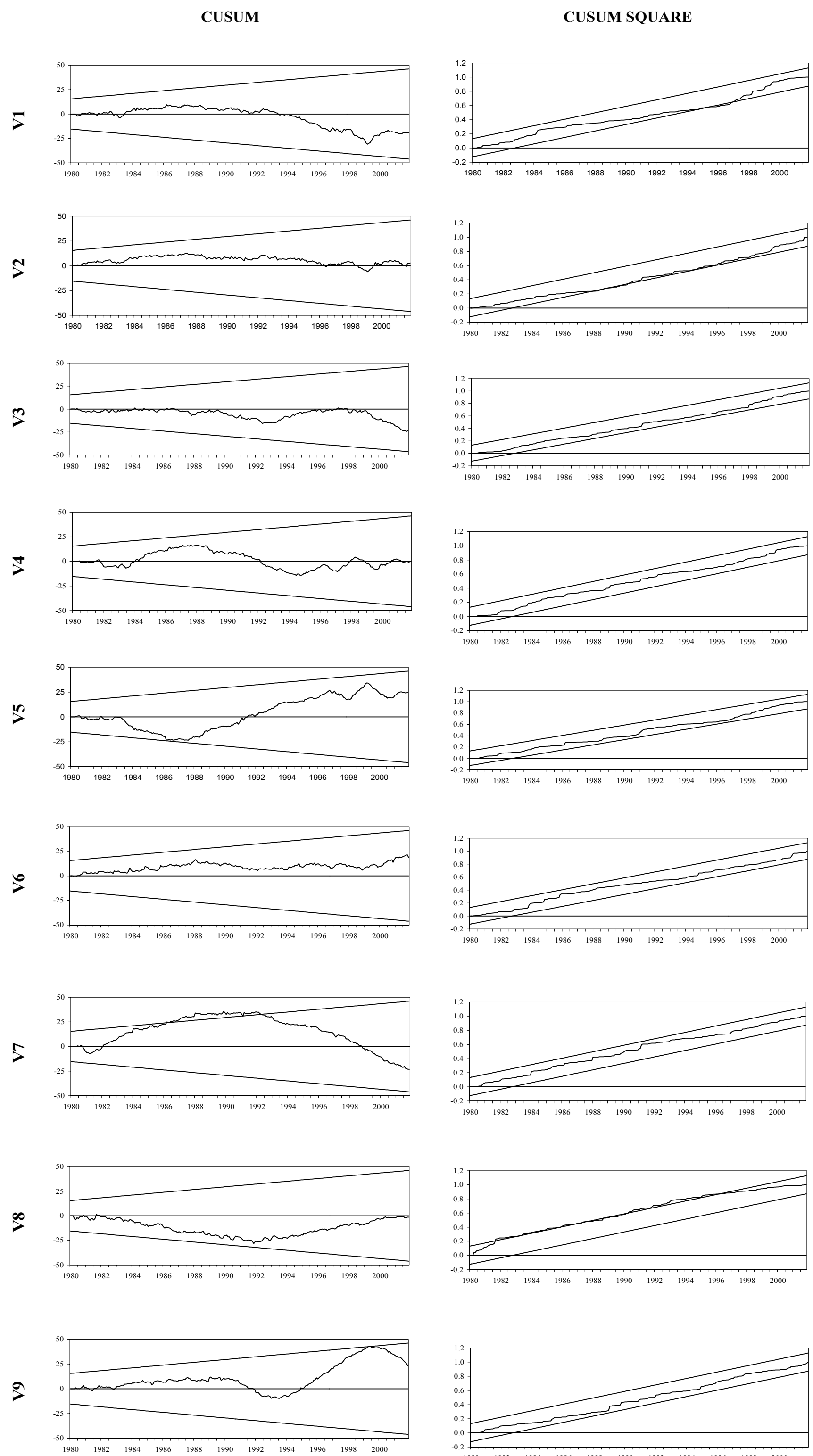

Figure F2. CUSUM and CUSUMSQ test for the residuals associated with the leading series