RESUMO

Este trabalho tem por objetivo identificar os coeficientes sazonais de algumas variáveis econômicas (produção industrial, exportações e importações), isentos das mudanças estruturais registradas na economia. O estudo verifica se os planos de estabilização implementados pelo governo nos últimos quinze anos afetaram o padrão sazonal daquelas séries.

Para tanto aplica-se o X-12-ARIMA, o novo método de dessazonalização de séries desenvolvido pelo U.S. Bureau of the Census. O uso desse método torna-se necessário, porque os demais métodos conhecidos impedem testar nossa hipótese, ao não permitirem o emprego de intervenções, não obtendo assim os melhores estimadores para os coeficientes sazonais.

O estudo cobre o período que vai de 1980 a 1997 e os resultados confirmam a nossa hipótese de mudança no padrão sazonal no período.

As nossas variáveis econômicas foram - de um ou de outro modo - atingidas pelos planos de estabilização implementados nos últimos quinze anos.

PALAVRAS-CHAVE

Sazonalidade; X-11-ARIMA; X-12-ARIMA.

ABSTRACT

The objective of this research is to identify seasonal coefficients free from structural changes for Brazilian time series related to industrial production, exports and imports. The study aims to test wheter the stabilization plans implemented by the

govern over the last fifteen years affected the seasonal pattern of our economic time series.

In order to do that, the X-12-ARIMA, the new method to adjust time series for seasonal effects developed by the U.S. Bureau of the Census, will be used. The use of this new method it is necessary because, if our hypothesis is true, the standard methods employed to adjust Brazilian time series for seasonal effects may fail in obtaining the best estimators for the seasonal coefficients. The X-12-ARIMA is a method which filters the time series allowing for corrective interventions.

The study covers the period from 1980 to 1997 and the results confirm the hypothesis of changes in the seasonal coefficients during this period.

KEY WORDS

Seasonality; X-11-ARIMA; X-12-ARIMA.

SUMÁRIO

PADRÃO SAZONAL DA PRODUÇÃO INDUSTRIAL, EXPORTAÇÕES E IMPORTAÇÕES: UMA APLICAÇÃO DO X-12-ARIMA

*Arício Xavier de Oliveira**

I. INTRODUÇÃO

A economia brasileira foi submetida desde o ano de 1986 a sucessivos planos de estabilização. Para os estudiosos da conjuntura - aqueles que tentam entender e explicar os movimentos de curto prazo das variáveis econômicas - a conseqüência daqueles planos foi muitas vezes modificar a estrutura das séries de tempo, dificultando ou falseando a análise. Porém as conseqüência não ficam apenas para quem estuda a conjuntura, mas alcança também a quem executa a política econômica, que deveria se orientar por indicadores conjunturais confiáveis. O problema, em última análise, deve-se a que a análise conjuntural faz uso de componentes não observados (tendência, ciclo, sazonalidade), extraídos das séries temporais segundo métodos estatísticos, que nem sempre conseguem isolá-los adequadamente.

O que falta a tais métodos ? Os distúrbios que surgem nas variáveis econômicas, em conseqüência dos planos de estabilização - e não somente por esses planos (que fique bem claro) - são quebras estruturais, mudanças na tendência, etc, traduzidas em alterações no nível das séries, na sua inclinação, etc. Logo, o método de decomposição de séries que permita tratar esses fenômenos pode produzir uma melhor informação que os demais.

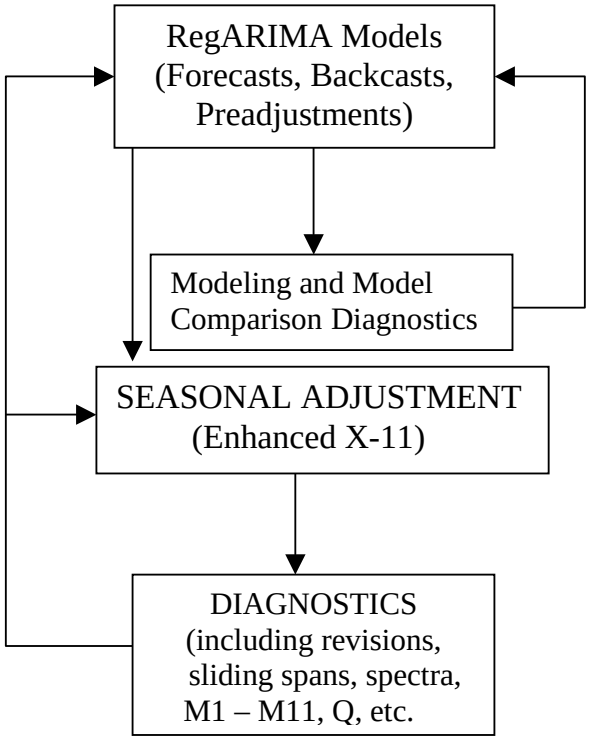
*Agradecimentos ao aluno que participou da pesquisa que originou o presente relatório como auxiliar de pesquisas, Edson Paulo Domingues.

Os métodos de extração do componente sazonal conhecidos até hoje - ou até o surgimento do X-12 - desde o clássico de médias móveis, passando pelo Census X-11 e outros menos referidos, chegando finalmente ao X-11-ARIMA de Estela Dagum, não propiciam recursos e/ou flexibilidade para incorporar os fenômenos descritos. A grande contribuição do X-12-ARIMA, a nosso ver, foi justamente preencher essa lacuna, ao incorporar conceitos da técnica de análise de intervenção na pré-filtragem das séries, como veremos adiante.

II. O MÉTODO X-12-ARIMA: UM RÁPIDO PANORAMA

O X-12-ARIMA é uma evolução direta do X-11-ARIMA do Canadá ou de Estela Dagum, como é conhecido. As suas principais características e avanços estão descritos em Findley et alii (1996), praticamente a única bibliografia existente a respeito. O diagrama mostrado a seguir consta na página 3 de Findley et alii (1996) e é bastante elucidativo:

X-12-ARIMA



Os avanços do X-12-ARIMA se deram nos vários módulos mostrados no diagrama anterior, mas principalmente pela inclusão do RegARIMA, um programa já existente no U.S. Bureau of the Census, que foi renovado e introduzido aqui como uma rotina preliminar ao ajustamento sazonal propriamente dito, o qual é realizado no âmbito do X-12-ARIMA com as técnicas (melhoradas) do X-11-ARIMA. O RegARIMA permite uma série de ajustes prévios, que vão desde a correção por dias úteis, anos bissextos, variáveis definidas pelo usuário (que assim pode introduzir características locais), até à identificação automática e estimação simultânea de "outliers" (tipos AO, LS, TC) (vide Chen et alii, 1990). A filtragem inicial realiza-se quase que mediante uma função de transferência, excetuando-se o fato de que o RegARIMA não permite a especificação de denominadores nas variáveis de entrada.

A identificação dos ARIMAS realiza-se com o instrumental conhecido, a função de autocorrelação e a função de autocorrelação parcial. É nessa fase - a do RegARIMA - que são identificadas as eventuais mudanças significativas na estrutura das séries de tempo, se elas foram ou não incorporadas pelo processo gerador das séries. Se não o foram, são "denunciadas" em sua maioria pela presença de "outliers", que deverão estar associados em geral a eventos econômicos conhecidos.

Somente depois de submetida a esses filtros, que eliminam componentes identificáveis e que nada têm a ver com a sazonalidade, é que a série temporal é submetida ao módulo seguinte, um X-11 melhorado.

Usando a notação de Findley et alii (1996), já usual na literatura de séries de tempo (vide Box, Jenkins and Reinsel, 1994), a fase do RegARIMA ficaria assim:

$$\phi_p(B)\,\Phi_P(B^s)\,(1-B)^d\,(1-B^s)^D\,(Y_t - \Sigma\beta_i X_{it}) = \theta_q(B)\,\Theta_Q(B^s)a_t \text{ , } i = 1 \text{ até } r \text{ .}$$

Note-se que X representa todos os ajustes prévios (dias úteis, variáveis definidas, "outliers", intervenções, etc) aos quais a variável Y é submetida, antes do estabelecimento do seu padrão sazonal. Observe-se ainda que o modelo deve

cumprir as propriedades de estacionariedade, invertibilidade, normalidade dos erros e variância constante.

Depois dessa etapa inicial e decisiva de filtragem da série - e que caracteriza o X-12 - seguem-se os procedimentos de decomposição e extração do componente sazonal, minuciosamente descrito em Findley et alii (1996), cuja discussão não é objeto dessa pesquisa.

O que apresentamos a seguir é o esquema de decomposição de séries multiplicativas - a melhor alternativa identificada para as séries em estudo - uma transcrição parcial do citado trabalho de Findley et alii (1996):

PROCEDIMENTOS DO X-11 PARA A DECOMPOSIÇÃO DE SÉRIES DE TEMPO

Supondo que $Y_t = T_t . S_t . I_t .$

Sendo T_t = tendência, S_t = sazonalidade e I_t = irregularidades, uma série temporal mensal sem "outliers" Y_t, pode ser assim decomposta:

Estágio 1 (estimativas iniciais)

(i) Tendência inicial estimada:

$$T_t^{(1)} = (1/24)Y_{t-6} + (1/12)Y_{t-5} +...+ (1/12)Y_t +...+ (1/12)Y_{t+5} + (1/24)Y_{t+6}$$

(ii) Razão SI inicial: $SI_t^{(1)} = Y_t / T_t^{(1)}$.

(iii)Fator sazonal inicial via média móvel sazonal “3 x 3”:

$S\hat{}_t^{(1)} = (1/9)SI^{(1)}_{t-24} + (2/9)SI^{(1)}_{t-12} + (3/9)SI^{(1)}_{t} + (2/9)SI^{(1)}_{t+12} + (1/9)SI^{(1)}_{t+24}$, onde S^= S calculado

(iv) Fator sazonal inicial:

$S^{(1)}_t = S\hat{}^{(1)}_t / (1/24)S\hat{}^{(1)}_{t-6} + (1/12)S\hat{}^{(1)}_{t-5} +...+ (1/12)S\hat{}^{(1)}_{t+5} + (1/24)S\hat{}^{(1)}_{t+6}$, onde S^= S calculado.

(v) Ajustamento sazonal inicial: $A^{(1)}_t = Y_t / S^{(1)}_t$

Estágio 2 (fatores sazonais e ajustamento sazonal)

(i) Tendência intermediária: $T^{(2)}_t = \Sigma\, h_j^{(2H+1)} A^{(1)}_{t+j}$, j=-H até H, onde H=pesos de Henderson

(ii) $SI^{(2)}_t = Y_t / T^{(2)}_t$

(iii)Fator sazonal preliminar via média móvel sazonal “3 x 5” :

$S\hat{}^{(2)}_t = (1/15)SI^{(2)}_{t-36} + (2/15)SI^{(2)}_{t-24} + (3/15)SI^{(2)}_{t-12} + (3/15)SI^{(2)}_{t} + (3/15)SI^{(2)}_{t+12} + (2/15)SI^{(2)}_{t+24} +(1/15)SI^{(2)}_{t+36}$

(iv) Fator sazonal :

$S^{(2)}_t = S\hat{}^{(2)}_t / (1/24)S\hat{}^{(2)}_{t-6} + (1/12)S\hat{}^{(2)}_{t-5} +...+ (1/12)S\hat{}^{(2)}_{t+5} + (1/24)S\hat{}^{(2)}_{t+6}$

(v) Ajustamento sazonal : $A^{(2)}_t = Y_t / S^{(2)}_t$

Estágio 3 (Estimativa final da tendência de Henderson e do componente irregular)

(i) Tendência final: $T^{(3)}_t = \Sigma\, h^{2,H+1}_j A^{(2)}_{t+j}$, j = -H até H

(ii) Componente irregular: $I^{(3)}_t = A^{(2)}_t / T^{(3)}_t$

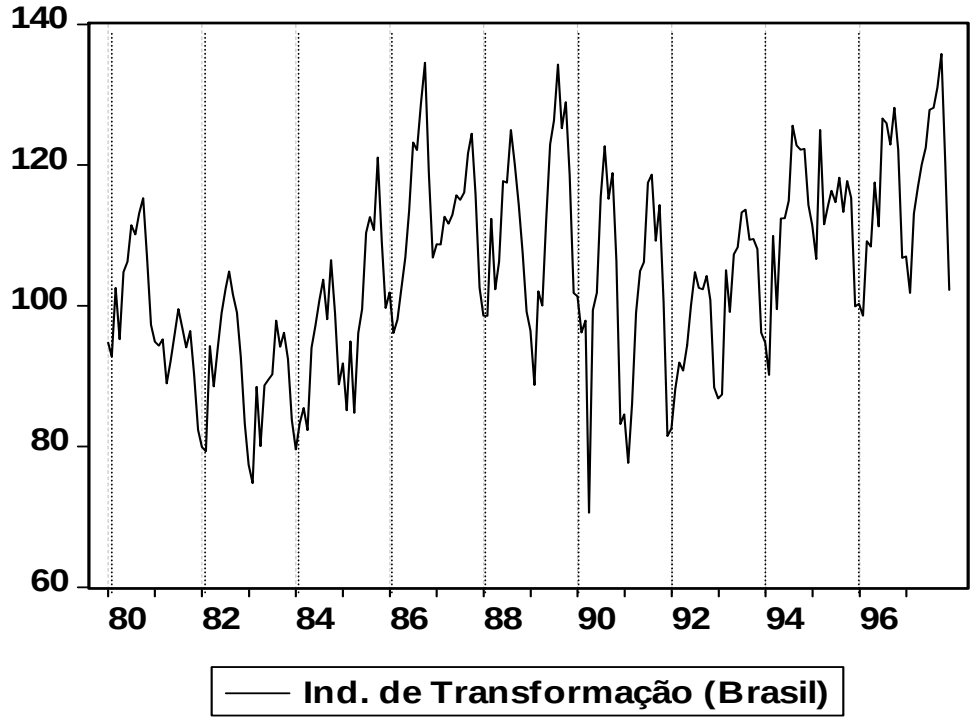
Síntese da decomposição de uma série mensal multiplicativa:

$$Y_t = T^{(3)}_t \,.\, S^{(2)}_t \,.\, I^{(3)}_t$$

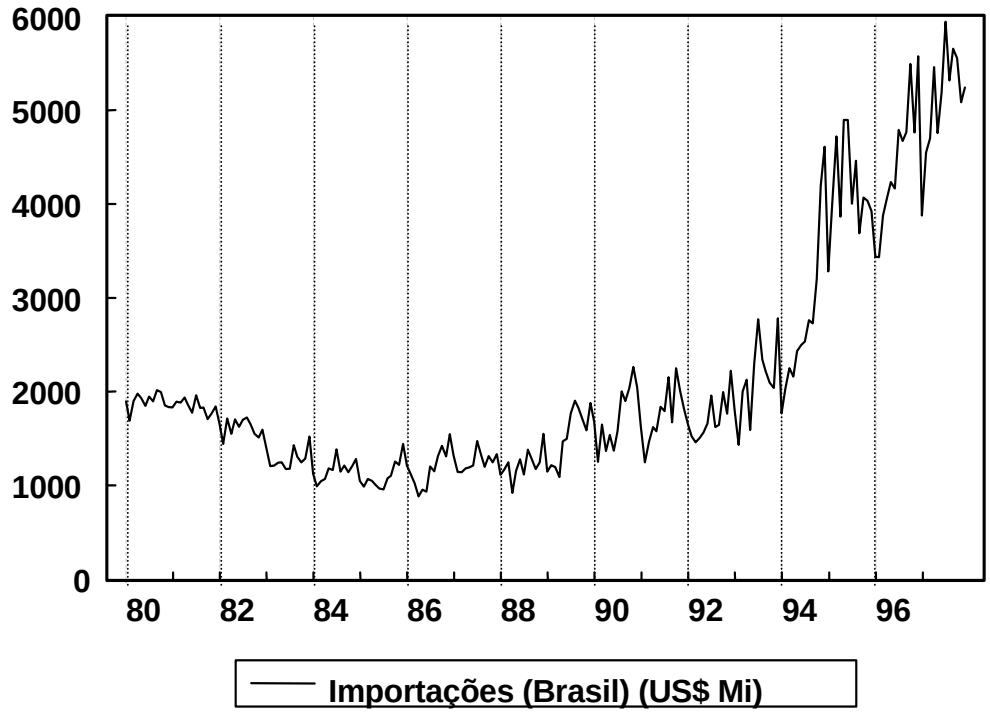
III. AS VARIÁVEIS ECONÔMICAS OBJETO DE ESTUDO

As séries de tempo selecionadas para a aplicação do X-12-ARIMA encontram-se entre as principais da nossa conjuntura econômica e certamente teriam sido afetadas de um ou de outro modo por mudanças de regime na condução da economia.

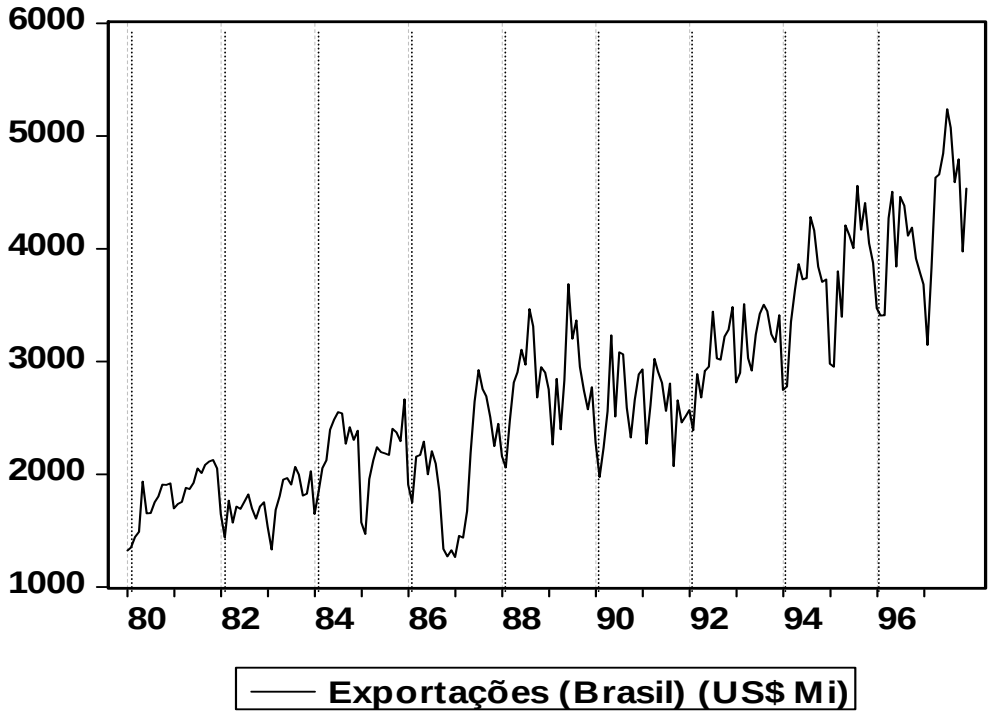
A primeira delas mostrada no gráfico a seguir, é a Produção da Indústria de Transformação (Índice de base fixa – 1991=100), levantada pelo IBGE, e nossa principal referência, quando se trata de olhar o desempenho da atividade econômica e os eventuais efeitos da política econômica. A simples inspeção visual revela um deslocamento para cima na curva no período 1986/1989, efeito sem dúvida do Plano Cruzado, uma queda para patamar inferior nos anos 1990/1993, associada ao Plano Collor, e uma ascensão contínua a partir de 1994, ano do Plano Real, afora, naturalmente, a pronunciada sazonalidade da produção industrial.



A segunda delas são as Importações (em US$ milhões – FOB), atualmente divulgadas pelo Ministério da Indústria, do Comércio e do Turismo. Tratando-se de valor e estando a preços correntes, compreende um efeito quantum e um efeito preço. Esta separação somente no último mês foi disponibilizada como resultado de um projeto conjunto IPEA-FUNCEX. Certamente estudos futuros deverão investigar seus efeitos, se existirem, na sazonalidade. A inspeção visual da série mostra dois momentos nítidos de mudança de comportamento das importações: o primeiro a partir de 1990, com o início da abertura da economia para o exterior no governo Collor e o segundo, a partir de 1994, com o Plano Real e o aumento da abertura da economia que se registra e o consequente crescimento do coeficiente de importação, tanto nos produtos produzidos internamente, quanto no consumo doméstico de uma forma geral.



As Exportações (em US$ milhões – FOB), a terceira e última das variáveis econômicas que examinaremos, também divulgadas pelo Ministério da Indústria, Comércio e do Turismo, carregam - da mesma forma que as Importações - um efeito quantum e um efeito preço. O que se pode observar, frente ao seu gráfico, é que existe uma nítida tendência de crescimento das Exportações, que vem desde o ano de 1992, deixando de ser apenas movimentos compensatórios às recessões internas. A taxa de crescimento é que fica abaixo daquela alcançada pelas Importações, gerando déficits comerciais. Mas este tema não é preocupação da pesquisa.



IV. RESULTADOS DA PESQUISA

1. INTRODUÇÃO

Os procedimentos propriamente ditos para a obtenção dos coeficientes sazonais para as três variáveis, foram precedidos pela construção dos filtros (fase do RegARIMA), obedecendo o seguinte roteiro:

(a) – Identificação dos processos ARIMA;

(b) – Identificação dos “outliers”;

(c) – Pesquisa de efeitos calendário.

Um dos efeitos mais importantes registrados na literatura de modelagem de séries de tempo mensais, trata-se do conhecido efeito calendário, ou a influência dos dias do mês no comportamento da variável, o qual abrange vários aspectos. No nosso trabalho pesquisamos dois deles: o chamado efeito da composição do mês (total das segundas, terças, quartas, etc), isto é, a importância dos dias da semana e o outro efeito, o total de dias úteis disponíveis no mês.

Os dias úteis não são os mesmos para todas as variáveis: para exportações e importações, que dependem de uma operação burocrática para o seu registro, os dias considerados foram contados de segunda a sexta-feira (exceto feriados), enquanto que para a produção industrial os sábados foram incluídos (sempre descontando feriados).

Foram levantados os dias úteis (total e segundo os dias da semana) e feriados para o período 1980/1997.

O período de pesquisa dos coeficientes sazonais foi a princípio o compreendido pelos anos 1980/1997. Todavia o X-12-ARIMA reserva os últimos doze meses para fins de simulação, de tal forma que a modelagem é conduzida para o período 1980/1996.

2. INDÚSTRIA DE TRANSFORMAÇÃO

2.1. Efeitos da composição do mês

Os resultados do RegARIMA são os seguintes:

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0016	0.01143	0.14
User-defined			
SG	0.0139	0.00484	2.88
TR	0.0195	0.00433	4.51
QA	0.0096	0.00404	2.38
QI	0.0255	0.00389	6.55
SX	0.0120	0.00408	2.94
SB	0.0005	0.00500	0.10
Automatically Identified Outliers			
LS1981.Mar	-0.1369	0.02675	-5.12
AO1984.Feb	0.0848	0.01887	4.49
TC1985.Apr	-0.1356	0.02469	-5.49
LS1990.Mar	-0.1088	0.02633	-4.13
AO1990.Apr	-0.2701	0.01987	-13.59
TC1991.Apr	0.1255	0.02585	4.86
AO1992.Feb	0.1103	0.01930	5.72

Chi-squared Tests for Groups of Regressors

Regression Effect	df	Chi-Square	P-Value
User-defined	6	153.54	0.00

```
ARIMA Model: ([5] 1 0)(2 0 0)
  Nonseasonal differences: 1
                                      Standard
Parameter          Estimate           Errors
-------------------------------------------
Nonseasonal AR
  Lag 5             -0.1784          0.06665

Seasonal AR
  Lag 12             0.6528          0.06817
  Lag 24             0.2331          0.06953

Variance        0.10310E-02
-------------------------------------------
```

Os resultados do filtro prévio mostram-se muito significativos. A composição do mês é importante, ou seja, não é indiferente para a produção industrial possuir o mês mais ou menos quintas-feiras. Ao contrário, constata-se que a produção da indústria é beneficiada em meses que possuem mais quintas-feiras, em primeiro lugar, e mais terças, em segundo, porque seus coeficientes são os mais elevados. Já o sábado aparece não estatisticamente significativo.

Quanto aos “outliers” estatisticamente significativos, alguns deles podem ser associados a fatos econômicos relevantes. Os “outliers” de março e abril de 1990 dizem respeito ao Plano Collor e o seu sinal (negativo) confirma a queda da produção havida na época. Já o de abril de 1991 pode estar associado ao chamado Plano Collor II.

Passada essa fase, em que a série de produção industrial foi filtrada e da qual foram eliminados os efeitos acima descritos, que nada têm a ver com a sazonalidade propriamente dita, o resultado da filtragem é submetido às rotinas do X-11 para a obtenção dos coeficientes sazonais.

A quantidade e variedade de testes no processo de obtenção dos coeficientes de sazonalidade é muito grande e nos fixaremos em alguns deles, que avaliam a sua qualidade final.

O teste que avalia as séries ajustadas, embora não detecte sazonalidade residual, acusa mudanças significativas no nível da série nos últimos três anos, invalidando os resultados do teste.

```
Test for the presence of residual seasonality.

       No evidence of residual seasonality in the entire series at the
          1 per cent level. F =   1.16

       No evidence of residual seasonality in the last 3 years at the
          1 per cent level. F =   0.48

       No evidence of residual seasonality in the last 3 years at the
          5 per cent level.

Note:  sudden large changes in the level of the adjusted series
       will invalidate the results of this test for the last three year
       period.
```

Uma bateria de testes avalia a qualidade dos resultados dos procedimentos estatísticos, para a obtenção dos coeficientes sazonais da Indústria de Transformação, reprovando-os em dois dos onze ítens - naqueles que avaliam a flutuação nos anos recentes:

```
F 3. Monitoring and Quality Assessment Statistics
       All the measures below are in the range from 0 to 3 with an
       acceptance region from 0 to 1.

  1.   The relative contribution of the irregular over three       M1 = 0.188
       months span (from Table F 2.B).

  2.   The relative contribution of the irregular component        M2 = 0.118
       to the stationary portion of the variance (from Table
       F 2.F).

  3.   The amount of month to month change in the irregular        M3 = 0.138
       component as compared to the amount of month to month
       change in the trend-cycle (from Table F2.H).

  4.   The amount of autocorrelation in the irregular as           M4 = 0.626
       described by the average duration of run (Table F 2.D).
```

5.	The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular (from Table F 2.E).	M5 = 0.336
6.	The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal (from Table F 2.H).	M6 = 0.440
7.	The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).	M7 = 0.324
8.	The size of the fluctuations in the seasonal component throughout the whole series.	M8 = 0.650
9.	The average linear movement in the seasonal component throughout the whole series.	M9 = 0.115
10.	Same as 8, calculated for recent years only.	M10= 1.147
11.	Same as 9, calculated for recent years only.	M11= 1.147

*** ACCEPTED *** at the level 0.38

*** Check the 2 above measures which failed.

*** Q (without M2) = 0.41 ACCEPTED.

Por último mostramos os coeficientes sazonais obtidos em quatro períodos de nove anos, uma divisão arbitrada pelo X-11 com o intuito de avaliar a estabilidade dos coeficientes:

S 1. Monthly means of Seasonal Factors for ITRANSF.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	87.47	86.33 min	86.71 min	87.26	1.32	86.93
February	86.50 min	86.36	86.86	87.03 min	0.77	86.69 min
March	94.35	95.23	96.64	97.30	3.13	95.93
April	93.10	93.05	93.59	94.23	1.26	93.51
May	98.74	100.02	98.94	100.99	2.28	99.70
June	105.22	104.75	104.81	103.64	1.52	104.58
July	110.34	109.91	108.99	108.78	1.43	109.48
August	112.73 max	112.70 max	111.69 max	110.48 max	2.03	111.88 max
September	110.04	109.81	108.73	107.72	2.15	109.04
October	110.56	109.66	108.47	108.43	1.97	109.24
November	103.75	103.76	103.54	104.36	0.79	103.85
December	87.13	87.85	89.69	88.81	2.94	88.41

A simples inspeção visual dos coeficientes de sazonalidade é suficiente para notarmos que os meses de setembro e outubro - e mesmo o de agosto - já não possuem a mesma intensidade sazonal dos anos 80. Trata-se, ao que parece, de uma mudança estrutural em curso.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	85.73	113.53	27.80
Span 2	85.85	113.71	27.86
Span 3	84.92	115.03	30.10
Span 4	84.82	114.08	29.26
All spans	84.82	115.03	30.21

S 2. Percentage of months flagged as unstable.

Seasonal Factors	4 out of 108 (3.7 %)
Trading Day Factors	108 out of 101 (106.9 %)
Final Seasonally Adjusted Series	108 out of 108 (100.0 %)
Month-to-Month Changes in SA Series	14 out of 107 (13.1 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

2.2. Efeitos dos dias úteis trabalhados

Essa alternativa mostra os resultados ao considerarmos o total de dias úteis, ao invés de tratá-los em separado, isto é, segundo a composição do mês.

Resultados do RegARIMA:

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0001	0.01227	0.01
User-defined			
DUT	0.0310	0.00203	15.26
Automatically Identified Outliers			
AO1982.Aug	0.1562	0.02245	6.96
TC1985.Apr	-0.1214	0.02665	-4.56
LS1990.Mar	-0.1426	0.02909	-4.90
AO1990.Apr	-0.2292	0.02094	-10.95

ARIMA Model: ([5] 1 0)(2 0 0)
Nonseasonal differences: 1

Parameter	Estimate	Standard Errors
Nonseasonal AR		
Lag 5	-0.0885	0.06852
Seasonal AR		
Lag 12	0.4734	0.06418
Lag 24	0.4081	0.06631
Variance	0.11610E-02	

Ao considerarmos o total de dias úteis, além de ser altamente significativo, redunda na simplificação do filtro, devido a redução de “outliers”. Continuam significativos aqueles relativos ao Plano Collor, desaparecendo o do Plano Collor II.

Da mesma forma o teste mostra instabilidade nos últimos anos.

```
Test for the presence of residual seasonality.

      No evidence of residual seasonality in the entire series at the
         1 per cent level. F =   0.55

      No evidence of residual seasonality in the last 3 years at the
         1 per cent level. F =   0.28

      No evidence of residual seasonality in the last 3 years at the
         5 per cent level.

Note: sudden large changes in the level of the adjusted series will
      invalidate the results of this test for the last three year period.
```

A bateria de testes não modifica as conclusões a que chegamos na outra alternativa:

```
F 3.  Monitoring and Quality Assessment Statistics
         All the measures below are in the range from 0 to 3 with an
         acceptance region from 0 to 1.

      1. The relative contribution of the irregular over three    M1 = 0.225
         months span (from Table F 2.B).


      2. The relative contribution of the irregular component     M2 = 0.145
         to the stationary portion of the variance (from Table
         F 2.F).

      3. The amount of month to month change in the irregular     M3 = 0.155
         component as compared to the amount of month to month
         change in the trend-cycle (from Table F2.H).

      4. The amount of autocorrelation in the irregular as        M4 = 0.431
         described by the average duration of run (Table F 2.D).

      5. The number of months it takes the change in the trend-   M5 = 0.357
         cycle to surpass the amount of change in the irregular
         (from Table F 2.E).

      6. The amount of year to year change in the irregular as    M6 = 0.340
         compared to the amount of year to year change in the
         seasonal (from Table F 2.H).

      7. The amount of moving seasonality present relative to     M7 = 0.354
         the amount of stable seasonality (from Table F 2.I).

      8. The size of the fluctuations in the seasonal component   M8 = 0.656
         throughout the whole series.
```

```
    9. The average linear movement in the seasonal component    M9 = 0.111
       throughout the whole series.

   10. Same as 8, calculated for recent years only.            M10= 1.227

   11. Same as 9, calculated for recent years only.            M11= 1.227

            *** ACCEPTED *** at the level  0.38

            *** Check the 2 above measures which failed.

            *** Q (without M2) = 0.41 ACCEPTED.
```

Por fim, os coeficientes sazonais obtidos em quatro períodos de nove anos:

S 1. Monthly means of Seasonal Factors for ITRANSF.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	86.23 min	85.84 min	86.33 min	86.60 min	0.89	86.25 min
February	90.48	89.99	90.14	91.29	1.44	90.47
March	93.74	93.87	94.92	95.62	2.01	94.56
April	96.43	96.52	97.00	97.55	1.16	96.89
May	99.62	100.03	100.43	101.02	1.41	100.30
June	105.09	105.26	104.67	104.36	0.86	104.84
July	106.53	106.10	105.64	104.85	1.60	105.75
August	108.78	108.54	108.21	106.53	2.11	107.99
September	110.76 max	110.64 max	109.38 max	108.39 max	2.18	109.76 max
October	109.18	108.85	108.37	107.93	1.16	108.56
November	106.34	106.72	106.48	107.20	0.81	106.70
December	86.72	87.05	87.38	87.94	1.42	87.29

Ao compararmos os coeficientes sazonais obtidos com filtros distintos, vemos que ao utilizarmos o total de dias úteis, ao invés da composição do mês, o coeficiente sazonal máximo passa de agosto para setembro e o menor recua, na maior parte dos períodos, de fevereiro para janeiro. Essa é uma questão a se investigar, que passa pela escolha do filtro, embora intuitivamente estejamos mais com a segunda alternativa.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	84.67	111.60	26.93
Span 2	85.49	112.26	26.78
Span 3	84.95	112.70	27.75
Span 4	84.95	110.69	25.74
All spans	84.67	112.70	28.03

S 2. Percentage of months flagged as unstable.

Seasonal Factors	2 out of 108 (1.9 %)
Trading Day Factors	108 out of 101 (106.9 %)
Final Seasonally Adjusted Series	92 out of 108 (85.2 %)
Month-to-Month Changes in SA Series	0 out of 107 (0.0 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

```
Threshold values used for Maximum Percent Differences to flag months
as unstable

Seasonal Factors                          Threshold =  3.0 %
Trading Day Factors                       Threshold =  2.0 %
Final Seasonally Adjusted Series          Threshold =  3.0 %
Month-to-Month Changes in SA Series       Threshold =  3.0 %
```

3. IMPORTAÇÕES

3.1. Efeitos da composição do mês

Da mesma forma pesquisamos se a composição do mês é significativa para as importações.

Resultados do RegARIMA:

```
-------------------------------------------------------------
                   Parameter      Standard
Variable            Estimate         Error       t-value
-------------------------------------------------------------
Constant              0.0060       0.01265          0.47

User-defined
  SG                  0.0352       0.01510          2.33
  TR                  0.0343       0.01390          2.47
  QA                  0.0209       0.01454          1.43
  QI                  0.0560       0.01384          4.04
  SX                  0.0459       0.01504          3.05
-------------------------------------------------------------

Chi-squared Tests for Groups of Regressors
-------------------------------------------------------------
Regression Effect         df    Chi-Square       P-Value
-------------------------------------------------------------
User-defined               5         37.41          0.00
-------------------------------------------------------------
```

```
ARIMA Model: ([1 3 11] 1 0)(2 0 0)
  Nonseasonal differences: 1
                                    Standard
Parameter            Estimate         Errors
-------------------------------------------
Nonseasonal AR
  Lag 1               -0.3533        0.06363
  Lag 3                0.1563        0.06342
  Lag 11               0.1592        0.06882

Seasonal AR
  Lag 12               0.2748        0.07543
  Lag 24               0.1945        0.07342

Variance             0.11492E-01
-------------------------------------------
```

Os resultados mostram que em meses com maior número de quintas e sextas-feiras importam-se mais, e menos em meses com uma maior quantidade de quartas-feiras.

Incrivelmente não foram identificados “outliers”, embora se saiba que a série de Importações sofre vez ou outra “intervenções administrativas”, que deveriam aparecer eventualmente como anormalidades no processo gerador. Sendo assim, o modelo ARIMA encontrado estaria sendo suficiente para absorver todas as flutuações, inclusive aquelas oriundas dos planos de estabilização.

O teste para a presença de sazonalidade residual:

```
Test for the presence of residual seasonality.

       No evidence of residual seasonality in the entire series at the
          1 per cent level. F =   0.30

       No evidence of residual seasonality in the last 3 years at the
          1 per cent level. F =   0.21

       No evidence of residual seasonality in the last 3 years at the
          5 per cent level.

 Note: sudden large changes in the level of the adjusted series
       will invalidate the results of this test for the last three year
       period.
```

Embora “outliers” não tenham sido identificados, o teste mostra a instabilidade dos últimos anos, uma constante nas séries examinadas.

O resumo de um conjunto de testes:

```
F 3. Monitoring and Quality Assessment Statistics
        All the measures below are in the range from 0 to 3 with an
        acceptance region from 0 to 1.

    1. The relative contribution of the irregular over three        M1 = 1.562
       months span (from Table F 2.B).

    2. The relative contribution of the irregular component         M2 = 0.190
       to the stationary portion of the variance (from Table
       F 2.F).

    3. The amount of month to month change in the irregular         M3 = 0.850
       component as compared to the amount of month to month
       change in the trend-cycle (from Table F2.H).

    4. The amount of autocorrelation in the irregular as            M4 = 0.345
       described by the average duration of run (Table F 2.D).

    5. The number of months it takes the change in the trend-       M5 = 0.582
       cycle to surpass the amount of change in the irregular
       (from Table F 2.E).

    6. The amount of year to year change in the irregular as        M6 = 0.249
       compared to the amount of year to year change in the
       seasonal (from Table F 2.H).

    7. The amount of moving seasonality present relative to         M7 = 0.746
       the amount of stable seasonality (from Table F 2.I).

    8. The size of the fluctuations in the seasonal component       M8 = 1.460
       throughout the whole series.

    9. The average linear movement in the seasonal component        M9 = 0.381
       throughout the whole series.

    10. Same as 8, calculated for recent years only.               M10= 2.225

    11. Same as 9, calculated for recent years only.               M11= 2.225

        *** CONDITIONALLY ACCEPTED *** at the level 0.82

        *** Check the 4 above measures which failed.

        *** Q (without M2) = 0.90 CONDITIONALLY ACCEPTED.
```

O teste para os últimos anos é bastante claro: as flutuações tornam não confiáveis os coeficientes sazonais calculados com a inclusão desses anos. Não é surpresa, porque todos conhecemos a desenvoltura com que se comportaram as importações nos anos recentes, quebrando os padrões anteriores.

Finalmente os coeficientes sazonais para vários períodos:

S 1. Monthly means of Seasonal Factors for IMPORTACOES.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	92.69	92.31	89.30 min	89.89 min	3.80	90.99
February	90.26	93.79	92.85	91.39	3.91	92.13
March	90.34	89.99	90.79	92.34	2.62	90.88
April	87.82 min	88.94 min	91.68	93.31	6.25	90.52 min
May	92.03	93.46	95.79	95.46	4.08	94.25
June	95.78	97.73	101.67	99.32	6.16	98.72
July	104.58	102.59	101.16	103.79	3.38	102.98
August	109.11	107.76	106.48	104.91	4.00	107.00
September	105.92	103.72	102.76	101.64	4.21	103.43
October	107.45	106.59	106.70	106.60	0.81	106.81
November	111.16	108.72	105.48	107.37	5.38	108.09
December	113.37 max	113.32 max	112.53 max	111.56 max	1.62	112.67 max

A instabilidade nos coeficientes é muito elevada, comprovada mesmo visualmente. O menor coeficiente sazonal chega a recuar de abril para janeiro, ao se incluir os anos mais recentes. A intensidade também se dilui mais nos períodos recentes, enquanto nos antigos se concentrava nos últimos meses do ano.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	84.05	114.40	30.34
Span 2	84.05	114.09	30.04
Span 3	87.76	116.96	29.21
Span 4	86.77	113.53	26.76
All spans	84.05	116.96	32.92

S 2. Percentage of months flagged as unstable.

Seasonal Factors	48 out of 108 (44.4 %)
Trading Day Factors	103 out of 101 (102.0 %)
Final Seasonally Adjusted Series	98 out of 108 (90.7 %)
Month-to-Month Changes in SA Series	65 out of 107 (60.7 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

3.2. Efeitos dos dias úteis trabalhados

A alternativa mostra a conclusão com o total dos dias úteis. Os resultados do RegARIMA são os seguintes:

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0060	0.01298	0.46
User-defined			
DUT	0.0302	0.00547	5.52

ARIMA Model: ([1 3 11] 1 0)(2 0 0)
Nonseasonal differences: 1

Parameter	Estimate	Standard Errors
Nonseasonal AR		
Lag 1	-0.3571	0.06381
Lag 3	0.1771	0.06378
Lag 11	0.1362	0.06863
Seasonal AR		
Lag 12	0.3107	0.07565
Lag 24	0.1691	0.07467
Variance	0.11721E-01	

O total de dias úteis trabalhados é significativo para o volume de importações, confirmando a alternativa anterior, mais detalhada.

Os “outliers” também não foram identificados, ou seja, a mudança do filtro não interferiu na sua obtenção.

Presença de sazonalidade no resíduo:

```
Test for the presence of residual seasonality.

      No evidence of residual seasonality in the entire series at the
         1 per cent level. F =   0.37

      No evidence of residual seasonality in the last 3 years at the
         1 per cent level. F =   0.26

      No evidence of residual seasonality in the last 3 years at the
         5 per cent level.

Note: sudden large changes in the level of the adjusted series
      will invalidate the results of this test for the last three year
      period.
```

Este teste tem sido coerente com todas as séries: os últimos anos têm sido problemáticos do ponto de vista da obtenção de coeficientes sazonais.

Resumo de um conjunto de testes:

```
F 3.  Monitoring and Quality Assessment Statistics
         All the measures below are in the range from 0 to 3 with an
         acceptance region from 0 to 1.

      1. The relative contribution of the irregular over three    M1 = 1.518
         months span (from Table F 2.B).

      2. The relative contribution of the irregular component     M2 = 0.187
         to the stationary portion of the variance (from Table
         F 2.F).

      3. The amount of month to month change in the irregular     M3 = 0.790
         component as compared to the amount of month to month
         change in the trend-cycle (from Table F2.H).

      4. The amount of autocorrelation in the irregular as        M4 = 0.475
         described by the average duration of run (Table F 2.D).

      5. The number of months it takes the change in the trend-   M5 = 0.632
         cycle to surpass the amount of change in the irregular
         (from Table F 2.E).

      6. The amount of year to year change in the irregular as    M6 = 0.225
         compared to the amount of year to year change in the
         seasonal (from Table F 2.H).
```

```
7.  The amount of moving seasonality present relative to     M7 = 0.767
    the amount of stable seasonality (from Table F 2.I).

8.  The size of the fluctuations in the seasonal component   M8 = 1.461
    throughout the whole series.

9.  The average linear movement in the seasonal component    M9 = 0.382
    throughout the whole series.

10. Same as 8, calculated for recent years only.            M10= 2.251

11. Same as 9, calculated for recent years only.            M11= 2.251

    *** CONDITIONALLY ACCEPTED *** at the level 0.83

    *** Check the 4 above measures which failed.

    *** Q (without M2) = 0.91 CONDITIONALLY ACCEPTED.
```

Mais uma coerência: as flutuações exageradas registradas nos últimos anos impedem a confiabilidade nos coeficientes sazonais.

O conjunto de coeficientes sazonais para os vários períodos:

S 1. Monthly means of Seasonal Factors for IMPORTACOES.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	94.43	93.30	90.08 min	89.98 min	4.95	91.87
February	91.70	92.26	90.22	90.17	2.32	91.07 min
March	90.34	89.93 min	91.27	92.81	3.21	91.11
April	88.65 min	92.15	93.48	95.60	7.84	92.59
May	93.97	94.66	97.12	98.15	4.44	96.04
June	97.12	98.90	101.87	102.34	5.38	100.15
July	100.61	99.77	98.34	100.01	2.31	99.65
August	106.33	104.53	104.28	103.01	3.23	104.48
September	106.30	103.52	103.09	100.68	5.58	103.30
October	108.65	107.49	106.85	106.94	1.68	107.45
November	107.65	107.41	106.44	105.32	2.22	106.67
December	114.53 max	114.68 max	114.14 max	112.73 max	1.74	114.00 max

A instabilidade dos coeficientes sazonais parece aumentar com essa forma de dias úteis no filtro inicial. Os vários testes mostram isso, inclusive esse último, com o ponto de mínimo ora se situando em abril, ora em março e, finalmente, em janeiro.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	84.50	115.94	31.43
Span 2	86.69	116.01	29.33
Span 3	85.11	118.24	33.13
Span 4	84.39	114.20	29.81
All spans	84.39	118.24	33.85

S 2. Percentage of months flagged as unstable.

Seasonal Factors	34 out of 108 (31.5 %)
Trading Day Factors	108 out of 101 (106.9 %)
Final Seasonally Adjusted Series	108 out of 108 (100.0 %)
Month-to-Month Changes in SA Series	48 out of 107 (44.9 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

4. EXPORTAÇÕES

4.1. Efeitos da composição do mês

Os resultados do RegARIMA são os seguintes:

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0046	0.00745	0.62
User-defined			
SG	0.0453	0.01188	3.81
TR	0.0307	0.01133	2.71
QA	0.0253	0.01161	2.18
QI	0.0533	0.01119	4.76
SX	0.0430	0.01168	3.68
Automatically Identified Outliers			
TC1985.Jan	-0.4081	0.07187	-5.68
TC1986.Oct	-0.4085	0.07212	-5.66
LS1987.May	0.3263	0.06986	4.67

Chi-squared Tests for Groups of Regressors

Regression Effect	df	Chi-Square	P-Value
User-defined	5	63.04	0.00

ARIMA Model: ([1 11] 1 [2])(1 0 0)
Nonseasonal differences: 1

Parameter	Estimate	Standard Errors
Nonseasonal AR		
Lag 1	-0.3659	0.06338
Lag 11	0.3532	0.06044
Seasonal AR		
Lag 12	0.3955	0.06912
Nonseasonal MA		
Lag 2	0.1991	0.06861
Variance	0.72708E-02	

A composição do mês revela-se também importante para as exportações e os dias mais significativos são as segundas e as quintas-feiras.

Alguns “outliers” foram identificados e talvez estejam associados a alguns fatos econômicos. Há um “outlier” em outubro de 1986, com sinal negativo, que talvez seja uma consequência do Plano Cruzado que estimulou a demanda interna. O outro situa-se em maio de 1987, vésperas do Plano Bresser.

Vejamos agora a presença de sazonalidade nos resíduos:

```
Test for the presence of residual seasonality.

       No evidence of residual seasonality in the entire series at the
          1 per cent level. F =   0.48

       * Residual seasonality present in the last 3 years at the
          1 per cent level. F =   3.34

 Note: sudden large changes in the level of the adjusted series
       will invalidate the results of this test for the last three year
       period.
```

O teste, além de acompanhar os anteriores relativos às outras variáveis em estudo, no que toca à instabilidade dos últimos anos, acusa sazonalidade nos resíduos nos últimos anos, sinal de que o filtro e as rotinas do X-11 não foram suficientes para eliminá-la.

É evidente que com os resultados aantes relatados os coeficientes sazonais mostrados adiante, de antemão encontram-se prejudicados.

Resumo de um conjunto de testes:

```
F 3.  Monitoring and Quality Assessment Statistics
          All the measures below are in the range from 0 to 3 with an
          acceptance region from 0 to 1.

      1.  The relative contribution of the irregular over three    M1 = 0.965
          months span (from Table F 2.B).

      2.  The relative contribution of the irregular component     M2 = 0.745
          to the stationary portion of the variance (from Table
          F 2.F).

      3.  The amount of month to month change in the irregular     M3 = 0.632
          component as compared to the amount of month to month
          change in the trend-cycle (from Table F2.H).

      4.  The amount of autocorrelation in the irregular as        M4 = 0.410
          described by the average duration of run (Table F 2.D).

      5.  The number of months it takes the change in the trend-   M5 = 0.706
          cycle to surpass the amount of change in the irregular
          (from Table F 2.E).

      6.  The amount of year to year change in the irregular as    M6 = 0.312
          compared to the amount of year to year change in the
          seasonal (from Table F 2.H).

      7.  The amount of moving seasonality present relative to     M7 = 0.560
          the amount of stable seasonality (from Table F 2.I).

      8. The size of the fluctuations in the seasonal component    M8 = 0.987
          throughout the whole series.

      9. The average linear movement in the seasonal component     M9 = 0.195
          throughout the whole series.

      10. Same as 8, calculated for recent years only.            M10= 1.258

      11. Same as 9, calculated for recent years only.            M11= 1.207

          *** ACCEPTED *** at the level  0.67

          *** Check the 2 above measures which failed.

          *** Q (without M2) = 0.66 ACCEPTED.
```

Esse conjunto de testes somente confirma a má qualidade dos coeficientes obtidos, já denunciada anteriormente.

Os coeficientes sazonais para os vários períodos:

S 1. Monthly means of Seasonal Factors for EXPORTACOES.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	90.06	90.50	90.30	89.40	1.23	90.06
February	87.25 min	87.54 min	89.30 min	89.32 min	2.36	88.39 min
March	95.08	93.74	94.56	96.30	2.73	94.91
April	101.56	101.68	100.68	98.86	2.86	100.67
May	101.34	101.27	101.67	101.91	0.63	101.56
June	106.03	106.04	102.73	105.45	3.23	105.03
July	109.28	109.47	107.18	106.57	2.72	108.09
August	110.05 max	109.74 max	108.63 max	107.28 max	2.58	108.89 max
September	103.54	104.40	104.19	104.00	0.83	104.05
October	98.24	99.07	100.96	101.89	3.72	100.10
November	98.76	98.39	99.81	99.89	1.52	99.23
December	97.66	97.65	100.10	99.79	2.51	98.84

Os coeficientes sazonais - máximo e mínimo - mantiveram-se nos mesmos meses, porém a variância entre os anos é muito grande.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	83.26	115.94	32.68
Span 2	83.86	113.41	29.54
Span 3	85.81	109.57	23.77
Span 4	85.44	109.38	23.94
All spans	83.26	115.94	32.68

S 2. Percentage of months flagged as unstable.

Seasonal Factors	31 out of 108 (28.7 %)
Trading Day Factors	96 out of 101 (95.0 %)
Final Seasonally Adjusted Series	98 out of 108 (90.7 %)
Month-to-Month Changes in SA Series	42 out of 107 (39.3 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

4.2. Efeitos dos dias úteis trabalhados

Resultados do RegARIMA:

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0046	0.00760	0.60
User-defined			
DUT	0.0282	0.00390	7.24
Automatically Identified Outliers			
TC1985.Jan	-0.3992	0.07244	-5.51
TC1986.Oct	-0.4096	0.07308	-5.60
LS1987.May	0.3100	0.07114	4.36

ARIMA Model: ([1 11] 1 [2])(1 0 0)
Nonseasonal differences: 1

Parameter	Estimate	Standard Errors
Nonseasonal AR		
Lag 1	-0.3415	0.06555
Lag 11	0.3400	0.06219
Seasonal AR		
Lag 12	0.4004	0.06969
Nonseasonal MA		
Lag 2	0.2125	0.06907
Variance	0.75392E-02	

Os dias úteis considerados como um todo também são muito significativos, tal qual na alternativa anterior, em que eram considerados segundo a composição do mês.

Os “outliers” também apareceram nas mesmas datas: outubro de 1986 (talvez efeito do Plano Cruzado) e maio de 1987 (talvez antecipação ao Plano Bresser), afora um outro ao qual não conseguimos associar algum evento importante.

Presença de sazonalidade nos resíduos:

```
Test for the presence of residual seasonality.

       No evidence of residual seasonality in the entire series at the
          1 per cent level. F = 0.54

       No evidence of residual seasonality in the last 3 years at the
          1 per cent level. F = 2.64

       Residual seasonality present in the last 3 years at the
          5 per cent level.

Note:  sudden large changes in the level of the adjusted series
       will invalidate the results of this test for the last three year
       period.
```

Do mesmo modo o teste acusa a existência de sazonalidade nos resíduos e a mudança do filtro de dias úteis trabalhados não foi suficiente para modificar o resultado.

Resumo de testes:

```
F 3. Monitoring and Quality Assessment Statistics
        All the measures below are in the range from 0 to 3 with an
        acceptance region from 0 to 1.

    1.  The relative contribution of the irregular over three     M1 = 0.997
        months span (from Table F 2.B).

    2.  The relative contribution of the irregular component      M2 = 0.631
        to the stationary portion of the variance (from Table
        F 2.F).

    3.  The amount of month to month change in the irregular      M3 = 0.599
        component as compared to the amount of month to month
        change in the trend-cycle (from Table F2.H).

    4.  The amount of autocorrelation in the irregular as         M4 = 0.108
        described by the average duration of run (Table F 2.D).

    5.  The number of months it takes the change in the trend-    M5 = 0.697
        cycle to surpass the amount of change in the irregular
        (from Table F 2.E).
```

```
6.  The amount of year to year change in the irregular as      M6 = 0.248
    compared to the amount of year to year change in the
    seasonal (from Table F 2.H).

7.  The amount of moving seasonality present relative to       M7 = 0.519
    the amount of stable seasonality (from Table F 2.I).

8.  The size of the fluctuations in the seasonal component     M8 = 1.055
    throughout the whole series.

9.  The average linear movement in the seasonal component      M9 = 0.258
    throughout the whole series.

10. Same as 8, calculated for recent years only.              M10= 1.202

11. Same as 9, calculated for recent years only.              M11= 1.144


    *** ACCEPTED *** at the level  0.62

    *** Check the 3 above measures which failed.

    *** Q (without M2) = 0.62 ACCEPTED.
```

Os resultados são bem incisivos: as flutuações e irregularidades encontradas nos últimos anos tornam os coeficientes sazonais não confiáveis.

Os coeficientes de sazonalidade (apesar e embora) obtidos para os vários períodos:

S 1. Monthly means of Seasonal Factors for EXPORTAÇÕES.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	89.88	88.86	89.62	89.20	1.15	89.37
February	86.71 min	87.28 min	87.33 min	87.88 min	1.34	87.32 min
March	94.88	93.91	95.20	96.62	2.89	95.16
April	103.24	102.82	101.32	100.44	2.79	101.92
May	101.90	102.42	103.27	104.35	2.41	103.02
June	105.41	105.50	103.99	103.14	2.28	104.48
July	108.06 max	107.47 max	105.85	105.56	2.37	106.69 max
August	107.18	106.93	106.06 max	105.58 max	1.51	106.41
September	103.97	105.06	104.74	103.54	1.46	104.34
October	99.13	99.64	101.03	102.31	3.21	100.57
November	100.12	100.11	101.51	101.88	1.77	100.93
December	98.45	99.23	100.12	100.08	1.70	99.50

Pouco ou nada a comentar, porque os teste já mostrados invalidam os coeficientes sazonais obtidos para o último período.

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	83.50	112.31	28.80
Span 2	84.97	110.27	25.30
Span 3	84.38	107.82	23.44
Span 4	85.04	108.33	23.29
All spans	83.50	112.31	28.80

S 2. Percentage of months flagged as unstable.

Seasonal Factors	19 out of 108 (17.6 %)
Trading Day Factors	84 out of 101 (83.2 %)
Final Seasonally Adjusted Series	60 out of 108 (55.6 %)
Month-to-Month Changes in SA Series	27 out of 107 (25.2 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

V. CONCLUSÃO

Conhecer um novo método de dessazonalização e tentar resolver com o seu emprego alguns problemas nessa área que estão sendo enfrentados pelos especialistas, foram as razões que nos atrairam para a realização dessa pesquisa.

É fato sabido que diversos eventos econômicos, registrados em nossa economia, mudaram o comportamento de inúmeras variáveis, dificultando a análise econômica e, principalmente, falseando a obtenção de componentes não observados, como a tendência e a sazonalidade, conseguidos usualmente segundo técnicas estatísticas não apropriadas.

O X-12-ARIMA, com recursos de filtragem, permite a modelagem de componentes que nada têm a ver com a sazonalidade, usando os princípios da técnica de análise de intervenção, identificando "outliers" e mesmo permitindo a inserção de outras variáveis, constituindo-se em um enorme avanço frente às demais técnicas.

Contudo os resultados alcançados nessa pesquisa com o seu emprego não foram totalmente satisfatórios. Talvez até devido ao enorme poder de análise e de testes propiciados pelo programa, rigoroso em apontar as fragilidades do ajustamento sazonal, que certamente passariam desapercebidas em outro ambiente.

O certo é que todos os coeficientes sazonais obtidos para as séries estudadas, para o período mais recente, foram reprovados, identificando-se grande instabilidade nos últimos anos. Conclui-se então que as mudanças estruturais, suspeitadas como consequência do Plano Real, ou ainda estão em curso, ou não puderam ser tratadas de forma conveniente, ou o período é ainda muito pequeno para tanto. De um lado, talvez o X-12-ARIMA possa ainda ser aperfeiçoado - e arriscaríamos aqui a dizer que com a inclusão da alternativa de "outliers' tipo IO (vide Chen et alii,1990) - e, do outro, o aprofundamento no seu conhecimento e prática talvez ajude a superar uma eventual limitação.

VI. BIBLIOGRAFIA

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VII. APÊNDICE: INDÚSTRIA DE TRANSFORMAÇÃO (O RELATÓRIO DO X-12-ARIMA)

Nos capítulos anteriores constam excertos das saídas do computador relativas aos casos analisados. Na verdade, conforme já comentamos, as informações para análise propiciadas pelo programa são muito mais volumosas e abrangem um sem número de aspectos não comentados em nossa pesquisa. Selecionamos aquilo que nos pareceu mais relevante e que respondia às nossas indagações. Entretanto, para que se tenha uma idéia de toda a informação disponibilizada pelo X-12-ARIMA, agregamos uma saída (quase) completa referente à Indústria de Transformação e ao caso em que se analisam os efeitos da composição do mês.

```
                U.S. Department of Commerce, Bureau of the Census

      X-12-ARIMA monthly seasonal adjustment Method, Release Version 0.1.2


          This method modifies the X-11 variant of Census Method II
        by J. Shiskin A.H. Young and J.C. Musgrave of February, 1967.
       and the X-11-ARIMA program based on the methodological research
       developed by Estela Bee Dagum, Chief of the Seasonal Adjustment
         and Time Series Staff of Statistics Canada, September, 1979.

Primary Programmers: Brian Monsell, Mark Otto


Series Title- Indústria de Transformação - Brasil (IBGE) - (1991=100)
Series Name- ITRANSF
05/11/98  09:24:27.55

       -Period covered- 1st month,1980 to 12th month,1996.
       -Type of run - multiplicative seasonal adjustment.
       -Sigma limits for graduating extreme values are 1.5 and 2.5.
       -3x3 moving average used in section 1 of each iteration,
        3x5 moving average in section 2 of iterations B and C,
        moving average for final seasonal factors chosen by Global MSR.
       -Sliding spans analysis performed.
       -Spectral plots generated for selected series.
       -Spectral plots generated for series starting in 1989.Jan.
```

```
Indústria de Transformação - Brasil (IBGE) - (1991=100)                    PAGE 1,
SERIES ITRANSF

Line #
------
    1:  series  title=”Indústria de Transformação - Brasil (IBGE) – (1991=100”)
    2:  name="ITRANSF"
    3:  start=1980.01
    4:  data=
    5:   94.8    92.8   102.5    95.2   104.8   106.3   111.5   110.2   113.2   115.3   106.9    97.3
    6:   94.9    94.3    95.3    89.0    92.1    95.9    99.5    96.8    94.1    96.4    90.3    82.3
    7:   79.9    79.3    94.3    88.5    94.0    99.0   102.4   104.9   101.6    99.0    92.7    83.2
    8:   77.4    74.8    88.5    80.0    88.7    89.5    90.3    97.9    94.1    96.2    92.4    83.7
    9:   79.6    83.2    85.5    82.3    94.0    97.1   100.8   103.7    98.1   106.5    98.9    88.8
   10:   91.8    85.1    94.9    84.8    96.1    99.5   110.4   112.6   110.8   121.1   109.2    99.7
   11:  101.9    96.1    98.0   102.4   106.8   113.5   123.2   122.1   128.8   134.5   118.9   106.9
   12:  108.7   108.7   112.7   111.7   112.9   115.7   115.1   116.1   121.7   124.5   115.8   102.6
   13:   98.6    98.5   112.4   102.3   106.3   117.8   117.5   125.0   120.1   114.3   107.6    99.2
   14:   96.5    88.7   102.1   100.0   112.1   123.0   126.3   134.3   125.2   128.9   118.6   101.8
   15:  101.3    96.2    97.9    70.6    99.4   101.9   115.4   122.7   115.2   118.9   106.4    83.2
   16:   84.6    77.7    86.1    99.0   104.9   106.2   117.5   118.6   109.2   114.3   100.5    81.5
   17:   82.6    88.2    92.0    90.8    94.4   100.0   104.8   102.6   102.3   104.2   100.8    88.4
   18:   86.8    87.4   105.0    99.1   107.3   108.3   113.3   113.7   109.4   109.5   108.1    96.2
   19:   94.8    90.2   109.9    99.5   112.4   112.4   114.9   125.6   122.8   122.2   122.3   114.3
   20:  111.4   106.6   125.0   111.6   114.2   116.3   114.7   118.2   113.3   117.8   115.4    99.9
   21:  100.3    98.6   109.2   108.4   117.5   111.3   126.6   126.0   122.9   128.2   122.2   106.8
   22:  107.0   101.8   113.1   116.9   120.1   122.5   127.8   128.1   131.0   135.8   120.3   102.3
   23:      )
   24:  span=(1980.1,1996.12
   25:      }
   26:
   27:  transform {function=log}
   28:
   29:  regression{ variables = (const)
   30:       user = (SG TR QA QI SX SB)
   31:       start = 1980.01
   32:       file = "DUSGSBDU.prn"
   33:       format = "(1F3.0,5f4.0)"
   34:       usertype = td
   35:       save = (rmx)
   36:      }
   37:
   38:   # identify {diff=(0,1)  sdiff=(0,1)}
   39:
   40:arima{
   41:model =([5] 1 0)(2 0 0)
   42:      }
   43:  check{
   44:  print=(all)
   45:      }
   46:  outlier{types=all}
   47:
   48:  x11{}
   49:
   50:  slidingspans { outlier = keep }
   51:
   52:
```

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 2

A 1 Time series data (for the span analyzed)
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
1980	95. 112.	93. 110.	103. 113.	95. 115.	105. 107.	106. 97.	1251.
1981	95. 100.	94. 97.	95. 94.	89. 96.	92. 90.	96. 82.	1121.
1982	80. 102.	79. 105.	94. 102.	89. 99.	94. 93.	99. 83.	1119.
1983	77. 90.	75. 98.	89. 94.	80. 96.	89. 92.	90. 84.	1054.
1984	80. 101.	83. 104.	86. 98.	82. 107.	94. 99.	97. 89.	1119.
1985	92. 110.	85. 113.	95. 111.	85. 121.	96. 109.	100. 100.	1216.
1986	102. 123.	96. 122.	98. 129.	102. 135.	107. 119.	114. 107.	1353.
1987	109. 115.	109. 116.	113. 122.	112. 125.	113. 116.	116. 103.	1366.
1988	99. 118.	99. 125.	112. 120.	102. 114.	106. 108.	118. 99.	1320.
1989	97. 126.	89. 134.	102. 125.	100. 129.	112. 119.	123. 102.	1358.
1990	101. 115.	96. 123.	98. 115.	71. 119.	99. 106.	102. 83.	1229.
1991	85. 118.	78. 119.	86. 109.	99. 114.	105. 101.	106. 82.	1200.
1992	83. 105.	88. 103.	92. 102.	91. 104.	94. 101.	100. 88.	1151.
1993	87. 113.	87. 114.	105. 109.	99. 110.	107. 108.	108. 96.	1244.
1994	95. 115.	90. 126.	110. 123.	100. 122.	112. 122.	112. 114.	1341.
1995	111. 115.	107. 118.	125. 113.	112. 118.	114. 115.	116. 100.	1364.
1996	100. 127.	99. 126.	109. 123.	108. 128.	118. 122.	111. 107.	1378.
AVGE	93. 112.	91. 115.	101. 112.	95. 115.	103. 107.	107. 95.	

Table Total- 21183.00 Mean- 103.84 Std. Dev.- 13.05
Min - 70.60 Max - 134.50

```
MODEL DEFINITION
Transformation
  Log(y)

Regression Model
  Constant + User-defined

ARIMA Model
  ([5] 1 0)(2 0 0)

regARIMA Model Span
  From 1980.Jan to 1996.Dec


MODEL ESTIMATION/EVALUATION
  Exact ARMA likelihood estimation
  Max total ARMA iterations              200
  Max ARMA iter's w/in an IGLS iterati    40
  Convergence tolerance             1.00E-05

OUTLIER DETECTION
  From 1980.Jan to 1996.Nov
  Observations    203
  Types      AO, LS and TC
  Method      add one
  Critical |t| for AO outliers          3.8
  Critical |t| for LS outliers          3.8
  Critical |t| for TC outliers          3.8


The following time series values might later be identified as outliers
when data are added or revised. They were not identified as outliers
in this run either because their test t-statistics were slightly below
the critical value or because they were eliminated during the backward
deletion step of the identification procedure, when a non-robust
t-statistic is used.
-------------------------------------------------
Outlier               t(AO)    t(LS)    t(TC)
-------------------------------------------------
AO1987.Feb             3.26     2.20     3.19
LS1987.Jun            -0.72    -3.29    -2.67
AO1988.Mar             3.33     2.00     2.78
LS1988.Dec             2.59     3.32     3.17
AO1995.May            -3.58             -3.36
-------------------------------------------------

Average percentage standard error in within-sample forecasts:
 Last year:  6.76   Last-1 year: 14.23   Last-2 year:  3.99
 Last three years:  8.32

 Estimation converged in  5 ARMA iterations,  87 function evaluations
```

Regression Model

Variable	Parameter Estimate	Standard Error	t-value
Constant	0.0016	0.01143	0.14
User-defined			
SG	0.0139	0.00484	2.88
TR	0.0195	0.00433	4.51
QA	0.0096	0.00404	2.38
QI	0.0255	0.00389	6.55
SX	0.0120	0.00408	2.94
SB	0.0005	0.00500	0.10
Automatically Identified Outliers			
LS1981.Mar	-0.1369	0.02675	-5.12
AO1984.Feb	0.0848	0.01887	4.49
TC1985.Apr	-0.1356	0.02469	-5.49
LS1990.Mar	-0.1088	0.02633	-4.13
AO1990.Apr	-0.2701	0.01987	-13.59
TC1991.Apr	0.1255	0.02585	4.86
AO1992.Feb	0.1103	0.01930	5.72

Chi-squared Tests for Groups of Regressors

Regression Effect	df	Chi-Square	P-Value
User-defined	6	153.54	0.00

ARIMA Model: ([5] 1 0)(2 0 0)
Nonseasonal differences: 1

Parameter	Estimate	Standard Errors
Nonseasonal AR		
Lag 5	-0.1784	0.06665
Seasonal AR		
Lag 12	0.6528	0.06817
Lag 24	0.2331	0.06953
Variance	0.10310E-02	

Likelihood Statistics

Effective number of observations (nefobs)	203
Number of parameters estimated (np)	18
Log likelihood	401.5066
Transformation Adjustment	-940.9400
Adjusted Log likelihood (L)	-539.4334
AIC	1114.8668
F-corrected-AIC	1118.5842
Hannan Quinn	1138.9938
BIC	1174.5045

DIAGNOSTIC CHECKING

Sample Autocorrelations of the Residuals

Lag	1	2	3	4	5	6	7	8	9	10	11	12
ACF	-0.01	0.04	-0.02	-0.05	0.01	-0.11	-0.02	-0.11	0.01	0.03	-0.09	-0.04
SE	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Q	0.01	0.37	0.46	0.97	1.01	3.69	3.80	6.18	6.19	6.35	8.26	8.60
DF	0	0	0	1	2	3	4	5	6	7	8	9
P	0.000	0.000	0.000	0.325	0.604	0.297	0.434	0.289	0.402	0.499	0.409	0.475

Lag	13	14	15	16	17	18	19	20	21	22	23	24
ACF	0.02	0.01	-0.02	0.08	-0.08	-0.07	0.14	-0.01	0.05	-0.02	0.01	-0.14
SE	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08
Q	8.72	8.75	8.81	10.37	11.82	12.91	17.44	17.45	18.08	18.21	18.25	22.93
DF	10	11	12	13	14	15	16	17	18	19	20	21
P	0.559	0.645	0.719	0.663	0.621	0.609	0.357	0.424	0.450	0.508	0.571	0.348

Lag	25	26	27	28	29	30	31	32	33	34	35	36
ACF	0.02	0.05	-0.12	0.03	-0.12	-0.03	-0.04	-0.03	-0.03	0.06	0.07	-0.06
SE	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Q	23.01	23.58	26.96	27.19	30.49	30.72	31.14	31.43	31.59	32.42	33.61	34.64
DF	22	23	24	25	26	27	28	29	30	31	32	33
P	0.401	0.427	0.306	0.346	0.248	0.283	0.311	0.346	0.387	0.397	0.389	0.389

The P-values approximate the probability of observing a Q-value at least this large when the model fitted is correct. When DF is positive, small values of P, customarily those below 0.05, indicate model inadequacy.

Sample Autocorrelations of the Residuals

```
      -1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0
       +----+----+----+----+----+----+----+----+----+----+
   1                       .   |   .                       -0.006
   2                       .   |X  .                        0.042
   3                       .  X|   .                       -0.021
   4                       .  X|   .                       -0.049
   5                       .   |   .                        0.014
   6                       .XXX|   .                       -0.113
   7                       .  X|   .                       -0.023
   8                       .XXX|   .                       -0.106
   9                       .   |   .                        0.007
   10                      .   |X  .                        0.028
   11                      . XX|   .                       -0.094
   12     ---------        .  X|   .      ---------        -0.040
   13                      .   |X  .                        0.023
   14                      .   |   .                        0.012
   15                      .   |   .                       -0.016
   16                      .   |XX .                        0.084
   17                      . XX|   .                       -0.081
   18                      . XX|   .                       -0.070
   19                      .   |XXXX                       0.142
   20                      .   |   .                       -0.006
   21                      .   |X  .                        0.053
   22                      .  X|   .                       -0.024
   23                      .   |   .                        0.013
   24     ---------        XXXX|   .      ---------        -0.142
   25                      .   |   .                        0.018
   26                      .   |X  .                        0.049
   27                      .XXX|   .                       -0.120
   28                      .   |X  .                        0.031
   29                      .XXX|   .                       -0.118
   30                      .  X|   .                       -0.031
   31                      .  X|   .                       -0.041
   32                      .  X|   .                       -0.034
   33                      .  X|   .                       -0.026
   34                      .   |X  .                        0.058
   35                      .   |XX .                        0.069
   36     ---------        . XX|   .      ---------        -0.064
```

Sample Partial Autocorrelations of the Residuals

Lag	1	2	3	4	5	6	7	8	9	10	11	12
PACF	-0.01	0.04	-0.02	-0.05	0.01	-0.11	-0.03	-0.10	0.00	0.02	-0.10	-0.07
SE	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Lag	13	14	15	16	17	18	19	20	21	22	23	24
PACF	0.03	-0.01	-0.04	0.08	-0.10	-0.10	0.14	-0.01	0.03	-0.01	-0.01	-0.16
SE	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Lag	25	26	27	28	29	30	31	32	33	34	35	36
PACF	0.04	0.05	-0.09	0.01	-0.14	-0.06	-0.02	-0.07	-0.05	0.09	-0.06	-0.11
SE	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Sample Partial Autocorrelations of the Residuals

```
        -1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0
         +----+----+----+----+----+----+----+----+----+----+
    1                        .   |   .                      -0.006
    2                        .   |X  .                       0.042
    3                        .  X|   .                      -0.021
    4                        .  X|   .                      -0.052
    5                        .   |   .                       0.015
    6                        .XXX|   .                      -0.109
    7                        .  X|   .                      -0.028
    8                        .XXX|   .                      -0.100
    9                        .   |   .                       0.004
    10                       .   |X  .                       0.023
    11                       .XXX|   .                      -0.101
    12       ---------       . XX|   .      ---------       -0.067
    13                       .   |X  .                       0.028
    14                       .   |   .                      -0.011
    15                       .  X|   .                      -0.038
    16                       .   |XX .                       0.079
    17                       . XX|   .                      -0.097
    18                       . XX|   .                      -0.096
    19                       .   |XXXX                       0.141
    20                       .   |   .                      -0.006
    21                       .   |X  .                       0.030
    22                       .   |   .                      -0.008
    23                       .   |   .                      -0.010
    24       ---------       XXXX|          ---------       -0.158
    25                       .   |X  .                       0.042
    26                       .   |X  .                       0.047
    27                       . XX|   .                      -0.091
    28                       .   |   .                       0.012
    29                       XXXX|   .                      -0.144
    30                       . XX|   .                      -0.062
    31                       .  X|   .                      -0.022
    32                       . XX|   .                      -0.068
    33                       .  X|   .                      -0.054
    34                       .   |XX .                       0.091
    35                       . XX|   .                      -0.061
    36       ---------       .XXX|   .      ---------       -0.114
```

```
Histogram of the Standardized and Mean-Centered Residuals
 Standard
 Deviations   Frequency

 Outlier [##

    -3   +
         |####
    -2   +######
         |#############
    -1   +#########################
         |#####################################
     0   +#########################################
         |#################################
     1   +###################
         |###########
     2   +#####
         |###
     3   +#

One '#'= 1 observation[s]

Residuals with |t|>3.25
Obs    t-value
-----------------
1990.Nov  -4.51
1995.Apr  -3.51

Summary Statistics for the Unstandardized Residuals
Minimum               -0.130
Maximum                0.086
Median                 0.003
Robust Std Dev         0.030
```

FORECASTING
Origin 1996.Dec
Number 12

Forecasts and Standard Errors of the Prior Adjusted and Transformed Data

Date	Data	Forecast	Forecast Error	Standard Error	t-value
1997.Jan	4.67	4.66	0.01	0.033	0.28
1997.Feb	4.62	4.61	0.01	0.046	0.19
1997.Mar	4.73	4.73	0.00	0.056	-0.08
1997.Apr	4.76	4.71	0.05	0.065	0.77
1997.May	4.79	4.77	0.02	0.072	0.25
1997.Jun	4.81	4.75	0.06	0.077	0.80
1997.Jul	4.85	4.85	0.00	0.082	0.06
1997.Aug	4.85	4.80	0.05	0.086	0.60
1997.Sep	4.88	4.82	0.05	0.090	0.59
1997.Oct	4.91	4.84	0.07	0.094	0.76
1997.Nov	4.79	4.78	0.01	0.098	0.06
1997.Dec	4.63	4.70	-0.07	0.102	-0.68

Confidence intervals with coverage probability (0.95000)
On the Original Scale

Date	Lower	Forecast	Upper
1997.Jan	99.44	106.03	113.07
1997.Feb	92.24	100.90	110.37
1997.Mar	101.79	113.60	126.77
1997.Apr	97.95	111.21	126.26
1997.May	102.32	117.92	135.90
1997.Jun	99.03	115.18	133.97
1997.Jul	108.40	127.22	149.31
1997.Aug	102.80	121.68	144.03
1997.Sep	104.14	124.25	148.23
1997.Oct	105.10	126.40	152.02
1997.Nov	98.66	119.59	144.98
1997.Dec	89.72	109.61	133.90

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 3

A 5 RegARIMA trading day component
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	146.1	140.0	140.3	142.4	143.6	140.2	
	146.1	140.0	143.0	145.0	138.4	144.4	142.4
1981	143.6	138.3	143.0	143.2	140.0	143.0	
	145.0	140.3	142.4	143.6	140.2	146.1	142.4
1982	140.0	138.3	144.4	143.6	140.3	142.4	
	143.6	143.0	143.2	140.0	143.0	145.0	142.2
1983	140.3	138.3	146.1	140.0	143.0	143.2	
	140.0	144.4	143.6	140.3	142.4	143.6	142.1
1984	143.0	139.6	143.6	140.2	146.1	140.0	
	143.0	145.0	138.4	144.4	143.6	140.3	142.3
1985	146.1	138.3	140.0	143.0	145.0	138.4	
	144.4	143.6	140.2	146.1	140.0	143.0	142.3
1986	145.0	138.3	140.3	142.4	143.6	140.2	
	146.1	140.0	143.0	145.0	138.4	144.4	142.2
1987	143.6	138.3	143.0	143.2	140.0	143.0	
	145.0	140.3	142.4	143.6	140.2	146.1	142.4
1988	140.0	140.2	146.1	140.0	143.0	143.2	
	140.0	144.4	143.6	140.3	142.4	143.6	142.2
1989	143.0	138.3	145.0	138.4	144.4	143.6	
	140.3	146.1	140.0	143.0	143.2	140.0	142.1
1990	144.4	138.3	143.6	140.2	146.1	140.0	
	143.0	145.0	138.4	144.4	140.0	140.3	142.0
1991	146.1	138.3	140.0	143.0	145.0	138.4	
	144.4	143.6	140.2	146.1	140.0	143.0	142.3
1992	145.0	138.4	143.0	143.2	140.0	143.0	
	145.0	140.3	142.4	143.6	140.2	146.1	142.5
1993	140.0	138.3	144.4	143.6	140.3	142.4	
	143.6	143.0	143.2	140.0	143.0	145.0	142.2
1994	140.3	138.3	146.1	140.0	143.0	143.2	
	140.0	144.4	143.6	140.3	142.4	143.6	142.1
1995	143.0	138.3	145.0	138.4	144.4	143.6	
	140.3	146.1	140.0	143.0	143.2	140.0	142.1
1996	144.4	141.9	140.0	143.0	145.0	138.4	
	144.4	143.6	140.2	146.1	140.0	143.0	142.5
AVGE	143.2	138.8	143.2	141.6	143.1	141.5	
	143.2	143.1	141.6	143.2	141.2	143.4	

Table Total- 29021.78 Mean- 142.26 Std. Dev.- 42.33
Min - 138.29 Max - 146.05

A 5.A RegARIMA trading day component forecasts
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1997	145.0	138.3	140.3	142.4	143.6	140.2	
	146.1	140.0	143.0	145.0	138.4	144.4	142.2

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 4

A 7 RegARIMA AO outlier component
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1981	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1982	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1984	100.0	108.8	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.7
1985	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1986	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1987	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1988	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1989	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1990	100.0	100.0	100.0	76.3	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	98.0
1991	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1992	100.0	111.7	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	101.0
1993	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1994	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1995	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1996	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVGE	100.0	101.2	100.0	98.6	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	

Table Total- 20396.84 Mean- 99.98 Std. Dev.- 1.95
Min - 76.33 Max - 111.66

A 7.A RegARIMA AO outlier component forecasts
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1997	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0

Industria de Transformação - Brasil (IBGE) - (1991=100) PAGE 5,
SERIES

A 8 RegARIMA level change outlier component
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	127.9	127.9	127.9	127.9	127.9	127.9	
	127.9	127.9	127.9	127.9	127.9	127.9	127.9
1981	127.9	127.9	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	114.2
1982	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1983	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1984	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1985	111.5	111.5	111.5	97.4	101.4	104.3	
	106.4	107.9	109.0	109.7	110.3	110.6	107.6
1986	110.9	111.1	111.2	111.3	111.4	111.4	
	111.4	111.4	111.5	111.5	111.5	111.5	111.3
1987	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1988	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1989	111.5	111.5	111.5	111.5	111.5	111.5	
	111.5	111.5	111.5	111.5	111.5	111.5	111.5
1990	111.5	111.5	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	101.9
1991	100.0	100.0	100.0	113.4	109.2	106.3	
	104.4	103.1	102.1	101.5	101.0	100.7	103.5
1992	100.5	100.4	100.2	100.2	100.1	100.1	
	100.1	100.0	100.0	100.0	100.0	100.0	100.1
1993	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1994	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1995	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1996	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVGE	109.4	109.4	107.7	107.7	107.7	107.7	
	107.7	107.7	107.7	107.7	107.7	107.7	

Table Total- 22026.77 Mean- 107.97 Std. Dev.- 11.02
Min - 97.35 Max - 127.86

A 8.A RegARIMA level change outlier component forecasts
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1997	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0 100.0	100.0

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 6,
SERIES ITRANSF

B 1 Original series (prior adjusted)
(adjusted for regARIMA factors)
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
1980	51. 60.	52. 62.	57. 62.	52. 62.	57. 60.	59. 53.	687.
1981	52. 62.	53. 62.	60. 59.	56. 60.	59. 58.	60. 51.	691.
1982	51. 64.	51. 66.	59. 64.	55. 63.	60. 58.	62. 51.	705.
1983	49. 58.	49. 61.	54. 59.	51. 61.	56. 58.	56. 52.	665.
1984	50. 63.	49. 64.	53. 64.	53. 66.	58. 62.	62. 57.	701.
1985	56. 72.	55. 73.	61. 72.	61. 76.	65. 71.	69. 63.	794.
1986	63. 76.	63. 78.	63. 81.	65. 83.	67. 77.	73. 66.	854.
1987	68. 71.	71. 74.	71. 77.	70. 78.	72. 74.	73. 63.	861.
1988	63. 75.	63. 78.	69. 75.	66. 73.	67. 68.	74. 62.	832.
1989	61. 81.	58. 82.	63. 80.	65. 81.	70. 74.	77. 65.	856.
1990	63. 81.	62. 85.	68. 83.	66. 82.	68. 76.	73. 59.	866.
1991	58. 78.	56. 80.	61. 76.	61. 77.	66. 71.	72. 57.	814.
1992	57. 72.	57. 73.	64. 72.	63. 73.	67. 72.	70. 61.	800.
1993	62. 79.	63. 80.	73. 76.	69. 78.	76. 76.	76. 66.	874.
1994	68. 82.	65. 87.	75. 86.	71. 87.	79. 86.	78. 80.	943.
1995	78. 82.	77. 81.	86. 81.	81. 82.	79. 81.	81. 71.	960.
1996	69. 88.	70. 88.	78. 88.	76. 88.	81. 87.	80. 75.	967.
AVGE	60. 73.	60. 75.	66. 74.	64. 75.	67. 71.	70. 62.	

Table Total- 13870.93 Mean- 67.99 Std. Dev.- 10.01
Min - 48.51 Max - 87.78

B 1.A Forecasts of (prior adjusted) original series
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
1997	73. 87.	73. 87.	81. 87.	78. 87.	82. 86.	82. 76.	980.

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 7,
SERIES ITRANSF

C 17 Final weights for irregular component
From 1980.Jan to 1996.Dec
Observations 204
Lower sigma limit 1.5
Upper sigma limit 2.5

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	S.D.
1980	100.0	77.7	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.0
1981	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	57.2	1.0
1982	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.0
1983	100.0	100.0	100.0	100.0	69.8	100.0	
	100.0	95.6	100.0	100.0	100.0	42.7	0.9
1984	100.0	100.0	75.6	100.0	100.0	0.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.1
1985	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.3
1986	100.0	48.2	51.3	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.5
1987	100.0	0.0	100.0	100.0	100.0	100.0	
	0.0	39.1	100.0	100.0	100.0	100.0	1.6
1988	100.0	100.0	36.4	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	68.7	1.9
1989	100.0	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.9
1990	100.0	100.0	100.0	100.0	96.6	87.9	
	100.0	100.0	63.1	100.0	100.0	0.0	1.9
1991	100.0	100.0	74.5	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	0.0	1.7
1992	95.3	100.0	100.0	100.0	100.0	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.8
1993	100.0	100.0	100.0	100.0	18.6	100.0	
	100.0	100.0	100.0	100.0	100.0	100.0	1.5
1994	0.0	100.0	100.0	100.0	100.0	100.0	
	70.1	100.0	100.0	100.0	100.0	0.0	1.3
1995	78.1	100.0	100.0	100.0	0.0	100.0	
	100.0	59.2	100.0	100.0	100.0	100.0	1.2
1996	100.0	100.0	100.0	100.0	100.0	93.2	
	100.0	100.0	100.0	100.0	100.0	100.0	1.2

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 8,
SERIES

D 8 Final unmodified SI ratios
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	88.8	91.1	101.0	92.8	101.5	105.3	
	105.4	107.6	107.2	106.9	103.1	89.4	100.0
1981	87.5	90.3	101.3	94.8	101.1	104.0	
	107.6	109.2	105.2	107.1	102.4	89.0	100.0
1982	89.2	88.7	100.1	93.6	101.0	104.3	
	106.8	110.3	107.7	108.8	101.3	91.0	100.2
1983	88.5	87.6	98.8	93.6	102.0	102.9	
	105.9	110.7	106.2	110.4	104.0	93.3	100.3
1984	89.1	87.5	94.7	92.7	100.6	107.3	
	108.2	109.0	107.3	110.8	102.4	92.8	100.2
1985	90.8	87.5	94.8	93.6	99.2	103.6	
	107.3	108.1	107.4	111.4	103.6	92.0	99.9
1986	92.3	91.1	91.5	94.0	96.5	103.7	
	106.3	108.2	110.4	112.7	103.9	89.2	100.0
1987	91.0	94.5	95.0	94.7	99.3	101.2	
	100.7	105.9	109.8	111.1	105.4	89.2	99.8
1988	89.2	88.9	97.6	92.8	94.8	105.7	
	109.0	113.7	110.9	108.9	101.5	92.7	100.5
1989	90.0	84.5	91.3	92.2	97.6	106.5	
	111.3	113.7	110.9	112.0	102.6	89.6	100.2
1990	86.2	85.5	93.9	91.6	95.0	101.6	
	112.1	116.6	114.1	113.2	105.8	84.3	100.0
1991	84.2	83.2	91.9	91.2	98.1	105.5	
	112.8	115.3	109.8	111.7	103.8	83.4	99.3
1992	84.1	84.7	95.7	94.6	101.0	105.3	
	109.3	110.6	108.2	107.9	105.1	86.8	99.4
1993	87.3	87.8	100.1	94.5	104.6	104.2	
	108.2	109.1	104.7	107.1	103.4	90.6	100.1
1994	92.0	88.5	101.5	94.9	103.5	101.6	
	104.4	108.8	105.3	105.6	102.8	94.1	100.2
1995	91.6	90.5	102.0	96.8	96.9	101.4	
	104.2	104.4	105.0	107.1	104.7	92.6	99.8
1996	90.1	89.8	100.1	96.3	101.6	99.4	
	107.0	106.3	105.9	106.2	106.1	91.4	100.0
AVGE	88.9	88.3	97.1	93.8	99.7	103.7	
	107.4	109.9	108.0	109.3	103.6	90.1	

Table Total- 20400.03 Mean- 100.00 Std. Dev.- 8.25
Min - 83.23 Max - 116.62

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 9,
SERIES ITRANSF

D 8.A F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	12487.1945	11	1135.19950	155.990**
Residual	1397.2568	192	7.27738	
Total	13884.4514	203		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
183.2163	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	535.3754	16	33.460965	8.599**
	684.8635	176	3.891270	

**Moving seasonality present at the one percent level.

COMBINED TEST FOR THE PRESENCE OF IDENTIFIABLE SEASONALITY

IDENTIFIABLE SEASONALITY PRESENT

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 10

D 9 Final replacement values for SI ratios
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
1980	********	90.8	********	********	********	********
	********	********	********	********	********	********
1981	********	********	********	********	********	********
	********	********	********	********	********	89.7
1982	********	********	********	********	********	********
	********	********	********	********	********	********
1983	********	********	********	********	101.5	********
	********	110.7	********	********	********	92.3
1984	********	********	95.2	********	********	103.7
	********	********	********	********	********	********
1985	********	********	********	********	********	********
	********	********	********	********	********	********
1986	********	89.7	92.9	********	********	********
	********	********	********	********	********	********
1987	********	88.5	********	********	********	********
	107.4	108.2	********	********	********	********
1988	********	********	95.1	********	********	********
	********	********	********	********	********	91.7
1989	********	********	********	********	********	********
	********	********	********	********	********	********
1990	********	********	********	********	95.1	102.0
	********	********	112.7	********	********	88.5
1991	********	********	92.7	********	********	********
	********	********	********	********	********	88.3
1992	84.2	********	********	********	********	********
	********	********	********	********	********	********
1993	********	********	********	********	101.7	********
	********	********	********	********	********	********
1994	88.6	********	********	********	********	********
	105.1	********	********	********	********	91.0
1995	91.1	********	********	********	101.3	********
	********	105.4	********	********	********	********
1996	********	********	********	********	********	99.5
	********	********	********	********	********	********

D 9.A Moving seasonality ratio

	Jan	Feb	Mar	Apr	May	Jun
I	1.653	1.535	1.671	1.118	1.700	1.481
S	0.540	0.505	0.980	0.314	0.598	0.349
RATIO	3.060	3.040	1.705	3.564	2.846	4.241

	Jul	Aug	Sep	Oct	Nov	Dec
I	1.276	1.449	1.406	1.211	1.554	1.521
S	0.482	0.562	0.546	0.536	0.227	0.421
RATIO	2.645	2.579	2.574	2.260	6.850	3.611

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 11

D 10 Final seasonal factors
From 1980.Jan to 1996.Dec
Observations 204
Seasonal filter 3 x 5 moving average

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	88.4	89.5	100.4	93.6	101.1	104.2	
	106.4	109.2	106.6	107.9	102.5	90.4	100.0
1981	88.5	89.3	100.0	93.6	101.1	104.1	
	106.5	109.2	106.6	108.3	102.6	90.7	100.1
1982	88.7	88.9	99.2	93.6	101.0	103.9	
	106.7	109.3	106.7	108.9	102.8	91.1	100.1
1983	89.3	88.6	97.9	93.6	100.5	103.7	
	106.9	109.2	107.1	109.8	102.9	91.4	100.1
1984	89.9	88.3	96.6	93.6	99.9	103.4	
	107.0	109.1	107.6	110.6	103.3	91.5	100.1
1985	90.3	88.3	95.4	93.6	99.0	103.4	
	107.2	109.1	108.4	111.0	103.5	91.3	100.0
1986	90.5	88.2	94.6	93.5	98.3	103.5	
	107.6	109.5	109.1	111.2	103.6	90.9	100.1
1987	90.4	87.9	94.0	93.3	97.3	103.7	
	108.3	110.6	110.1	111.4	103.7	90.5	100.1
1988	89.6	87.1	93.6	92.9	96.9	103.9	
	109.3	112.0	110.6	111.5	103.8	89.9	100.1
1989	88.2	86.3	93.6	92.6	96.9	104.3	
	110.2	113.3	110.8	111.3	103.8	89.4	100.1
1990	87.1	85.5	94.0	92.6	97.7	104.6	
	110.8	113.6	110.2	110.8	103.8	89.0	100.0
1991	86.3	85.4	95.1	93.0	98.7	104.6	
	110.5	113.1	109.3	109.9	103.8	88.7	99.9
1992	86.4	86.0	96.7	93.7	100.1	104.2	
	109.5	111.7	107.9	108.9	103.8	89.0	99.8
1993	87.0	87.0	98.4	94.6	101.2	103.4	
	108.2	110.0	106.8	107.8	103.9	89.6	99.8
1994	88.1	88.2	99.8	95.4	101.8	102.6	
	107.1	108.3	105.8	106.9	104.1	90.5	99.9
1995	89.2	89.1	100.6	95.9	101.9	101.6	
	106.3	107.2	105.5	106.4	104.4	91.2	99.9
1996	89.8	89.7	100.9	96.1	101.8	101.0	
	105.9	106.6	105.4	106.3	104.7	91.8	100.0
AVGE	88.7	87.8	97.1	93.8	99.7	103.5	
	107.9	110.1	107.9	109.4	103.6	90.4	

Table Total- 20399.07 Mean- 100.00 Std. Dev.- 8.08
Min - 85.44 Max - 113.61

D 10.A Final seasonal component forecasts
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1997	90.1	89.9	100.8	96.3	101.6	100.6	
	105.7	106.3	105.5	106.4	104.9	91.9	100.0

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 12

D 11 Final seasonally adjusted data
(also adjusted for trading day)
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
1980	73. 72.	74. 72.	73. 74.	71. 74.	72. 75.	73. 75.	878.
1981	75. 64.	76. 63.	67. 62.	66. 62.	65. 63.	64. 62.	790.
1982	64. 67.	65. 67.	66. 67.	66. 65.	66. 63.	67. 63.	785.
1983	62. 60.	61. 62.	62. 61.	61. 62.	62. 63.	60. 64.	741.
1984	62. 66.	67. 66.	62. 66.	63. 67.	64. 67.	67. 69.	785.
1985	70. 71.	70. 72.	71. 73.	63. 75.	67. 75.	70. 76.	853.
1986	78. 78.	79. 80.	74. 83.	77. 83.	76. 83.	78. 81.	949.
1987	84. 73.	89. 75.	84. 78.	84. 78.	83. 80.	78. 78.	962.
1988	79. 77.	81. 77.	82. 76.	79. 73.	77. 73.	79. 77.	928.
1989	76. 82.	74. 81.	75. 81.	78. 81.	80. 80.	82. 81.	952.
1990	81. 73.	81. 75.	73. 76.	54. 74.	70. 73.	70. 67.	865.
1991	67. 74.	66. 73.	65. 71.	74. 71.	73. 69.	73. 64.	841.
1992	66. 66.	74. 65.	67. 67.	68. 67.	67. 69.	67. 68.	811.
1993	71. 73.	73. 72.	74. 72.	73. 73.	76. 73.	74. 74.	876.
1994	77. 77.	74. 80.	75. 81.	75. 81.	77. 83.	76. 88.	944.
1995	87. 77.	86. 75.	86. 77.	84. 77.	78. 77.	80. 78.	963.
1996	77. 83.	77. 82.	77. 83.	79. 83.	80. 83.	80. 81.	966.
AVGE	73. 73.	75. 73.	72. 73.	71. 73.	72. 73.	73. 73.	

Table Total- 14889.62 Mean- 72.99 Std. Dev.- 6.90
Min - 54.38 Max - 89.42

```
                Test for the presence of residual seasonality.

       No evidence of residual seasonality in the entire series at the
            1 per cent level. F =   1.16

       No evidence of residual seasonality in the last 3 years at the
            1 per cent level. F =   0.48

       No evidence of residual seasonality in the last 3 years at the
            5 per cent level.

Note:  sudden large changes in the level of the adjusted series
       will invalidate the results of this test for the last three year
       period.
```

D 12 Final trend cycle
(LS outliers included)
From 1980.Jan to 1996.Dec
Observations 204
Trend filter 13-term Henderson moving average
I/C ratio 1.28

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
1980	73. 72.	73. 73.	73. 73.	72. 74.	72. 75.	72. 75.	878.
1981	76. 64.	76. 63.	66. 63.	66. 62.	65. 63.	65. 63.	791.
1982	64. 67.	65. 67.	65. 66.	66. 65.	67. 64.	67. 63.	784.
1983	62. 61.	62. 61.	61. 62.	61. 62.	61. 62.	61. 62.	739.
1984	62. 65.	62. 66.	63. 66.	63. 67.	64. 67.	65. 68.	778.
1985	69. 71.	70. 72.	71. 74.	63. 75.	67. 76.	69. 76.	853.
1986	77. 79.	77. 80.	77. 81.	76. 82.	77. 83.	78. 83.	950.
1987	84. 78.	84. 78.	83. 77.	83. 78.	81. 78.	80. 79.	963.
1988	79. 77.	79. 76.	79. 75.	79. 75.	79. 74.	78. 74.	925.
1989	75. 81.	76. 81.	77. 81.	78. 81.	80. 81.	81. 81.	952.
1990	81. 73.	80. 74.	72. 74.	71. 74.	71. 72.	72. 70.	883.
1991	68. 73.	66. 72.	66. 72.	75. 71.	73. 69.	73. 68.	846.
1992	67. 66.	67. 66.	67. 66.	67. 67.	67. 68.	67. 70.	805.
1993	71. 73.	72. 72.	73. 72.	73. 73.	73. 73.	73. 73.	872.
1994	74. 78.	74. 79.	75. 81.	75. 82.	76. 84.	77. 85.	940.
1995	86. 78.	86. 77.	85. 77.	84. 77.	82. 77.	80. 77.	965.
1996	77. 82.	78. 82.	78. 83.	79. 83.	80. 82.	81. 82.	966.
AVGE	73. 73.	73. 73.	72. 73.	72. 73.	73. 73.	73. 74.	

Table Total- 14891.75 Mean- 73.00 Std. Dev.- 6.65
Min - 60.84 Max - 85.99

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 14

D 13 Final irregular component
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	S.D.
1980	100.1	101.4	100.1	98.6	100.0	100.9	
	99.2	99.0	101.2	99.6	101.1	99.3	0.9
1981	98.8	100.7	100.8	100.7	99.4	99.6	
	101.0	100.1	99.1	99.3	100.3	98.5	0.8
1982	100.7	99.8	100.7	99.7	99.7	100.1	
	99.9	100.8	100.9	100.0	98.9	100.2	0.6
1983	99.5	99.2	101.0	100.0	101.4	99.0	
	98.9	101.2	99.0	100.3	101.0	102.1	1.1
1984	99.4	108.3	98.5	99.4	100.9	103.8	
	101.0	99.7	99.5	99.9	98.9	101.3	2.8
1985	100.4	99.1	99.5	100.3	100.5	100.6	
	100.5	99.3	99.2	100.1	99.7	100.2	0.5
1986	101.3	102.8	96.5	100.6	98.6	100.7	
	99.3	99.2	101.4	101.4	100.1	97.8	1.7
1987	100.1	106.8	100.5	101.2	101.9	97.8	
	93.4	96.3	100.3	100.2	101.7	98.4	3.1
1988	99.2	101.6	103.7	99.6	97.7	101.6	
	99.7	101.6	100.4	97.8	97.9	103.3	2.0
1989	102.3	98.3	97.9	99.8	100.7	101.8	
	100.4	99.7	99.4	100.2	98.7	100.6	1.3
1990	99.7	101.1	101.2	76.3	97.9	97.1	
	100.4	101.3	102.1	101.0	101.5	95.1	7.1
1991	98.7	98.9	98.2	99.2	99.8	100.6	
	101.2	100.8	99.4	101.0	99.9	94.5	1.9
1992	98.2	111.0	99.7	101.3	100.8	100.7	
	99.4	98.8	100.2	99.3	101.5	97.8	3.4
1993	100.5	100.7	101.2	99.3	102.9	100.5	
	100.2	99.7	98.9	100.1	99.8	101.0	1.1
1994	103.8	99.5	100.8	98.8	101.4	99.2	
	98.1	101.3	100.3	99.3	98.7	103.5	1.8
1995	101.8	100.6	100.5	100.5	95.1	100.2	
	98.7	98.0	100.0	100.7	100.1	101.1	1.7
1996	99.8	99.8	99.1	100.2	100.1	98.8	
	101.4	99.8	100.4	99.7	101.1	99.3	0.7
S.D.	1.4	3.9	1.6	5.8	1.8	1.5	
	1.8	1.3	0.9	0.8	1.1	2.4	

Table Total- 20396.86 Mean- 99.98 Std. Dev.- 2.46
Min - 76.35 Max - 110.99

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 15

D 16 Combined adjustment factors
(includes seasonal, trading day factors)
From 1980.Jan to 1996.Dec
Observations 204

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980	129.1	125.2	140.8	133.3	145.3	146.1	
	155.4	152.9	152.4	156.5	141.8	130.5	142.4
1981	127.1	123.5	143.0	134.1	141.6	148.8	
	154.3	153.3	151.8	155.6	143.9	132.4	142.5
1982	124.3	122.9	143.2	134.4	141.7	147.9	
	153.2	156.3	152.8	152.5	146.9	132.1	142.4
1983	125.3	122.5	143.0	131.0	143.7	148.6	
	149.6	157.7	153.7	154.0	146.4	131.3	142.2
1984	128.5	123.3	138.8	131.3	145.9	144.8	
	153.0	158.1	148.8	159.7	148.3	128.3	142.4
1985	131.9	122.1	133.7	133.8	143.6	143.0	
	154.7	156.7	152.0	162.2	144.9	130.5	142.4
1986	131.3	121.9	132.7	133.2	141.1	145.2	
	157.2	153.4	156.0	161.2	143.4	131.3	142.3
1987	129.8	121.6	134.3	133.6	136.2	148.4	
	157.0	155.2	156.7	160.0	145.4	132.1	142.5
1988	125.4	122.2	136.7	130.1	138.6	148.9	
	153.0	161.7	158.8	156.4	147.8	129.2	142.4
1989	126.2	119.3	135.7	128.1	139.9	149.7	
	154.6	165.4	155.2	159.2	148.7	125.2	142.3
1990	125.7	118.2	135.0	129.8	142.6	146.5	
	158.4	164.7	152.5	160.0	145.4	124.8	142.0
1991	126.1	118.2	133.2	132.9	143.1	144.7	
	159.5	162.5	153.2	160.6	145.4	126.9	142.2
1992	125.2	118.9	138.3	134.2	140.1	149.0	
	158.8	156.8	153.7	156.5	145.6	130.0	142.3
1993	121.9	120.3	142.1	135.8	141.9	147.3	
	155.4	157.3	152.9	150.9	148.6	129.9	142.0
1994	123.7	121.9	145.7	133.5	145.5	147.0	
	149.9	156.4	152.0	150.0	148.2	130.0	142.0
1995	127.5	123.3	145.8	132.6	147.2	145.9	
	149.1	156.6	147.7	152.2	149.6	127.8	142.1
1996	129.7	127.2	141.2	137.4	147.5	139.7	
	152.9	153.1	147.9	155.3	146.6	131.2	142.5
AVGE	127.0	121.9	139.0	132.9	142.7	146.6	
	154.5	157.5	152.8	156.6	146.3	129.6	

Table Total- 29026.52 Mean- 142.29 Std. Dev.- 43.97
Min - 118.16 Max - 165.42

D 16.A Combined adjustment component forecasts
From 1997.Jan to 1997.Dec
Observations 12

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1997	130.6 154.4	124.3 148.9	141.5 150.9	137.0 154.2	145.9 145.2	141.1 132.7	142.2

E 4 Ratios of annual totals
From 1980 to 1996
Observations 17

Year	Unmodified (D11)	Modified (E3)
1980	142.41	142.41
1981	141.90	141.90
1982	142.49	142.49
1983	142.23	142.23
1984	142.45	143.81
1985	142.61	142.61
1986	142.52	142.52
1987	141.95	144.67
1988	142.15	142.15
1989	142.59	142.59
1990	142.07	141.77
1991	142.68	142.70
1992	142.00	142.22
1993	142.03	142.03
1994	142.10	142.19
1995	141.70	141.72
1996	142.67	142.67

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 17

E 5 Month-to-month percent changes in the original series
From 1980.Feb to 1996.Dec
Observations 203

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980		-2.1	10.5	-7.1	10.1	1.4	
	4.9	-1.2	2.7	1.9	-7.3	-9.0	0.4
1981	-2.5	-0.6	1.1	-6.6	3.5	4.1	
	3.8	-2.7	-2.8	2.4	-6.3	-8.9	-1.3
1982	-2.9	-0.8	18.9	-6.2	6.2	5.3	
	3.4	2.4	-3.1	-2.6	-6.4	-10.2	0.3
1983	-7.0	-3.4	18.3	-9.6	10.9	0.9	
	0.9	8.4	-3.9	2.2	-4.0	-9.4	0.4
1984	-4.9	4.5	2.8	-3.7	14.2	3.3	
	3.8	2.9	-5.4	8.6	-7.1	-10.2	0.7
1985	3.4	-7.3	11.5	-10.6	13.3	3.5	
	11.0	2.0	-1.6	9.3	-9.8	-8.7	1.3
1986	2.2	-5.7	2.0	4.5	4.3	6.3	
	8.5	-0.9	5.5	4.4	-11.6	-10.1	0.8
1987	1.7	0.0	3.7	-0.9	1.1	2.5	
	-0.5	0.9	4.8	2.3	-7.0	-11.4	-0.2
1988	-3.9	-0.1	14.1	-9.0	3.9	10.8	
	-0.3	6.4	-3.9	-4.8	-5.9	-7.8	0.0
1989	-2.7	-8.1	15.1	-2.1	12.1	9.7	
	2.7	6.3	-6.8	3.0	-8.0	-14.2	0.6
1990	-0.5	-5.0	1.8	-27.9	40.8	2.5	
	13.2	6.3	-6.1	3.2	-10.5	-21.8	-0.3
1991	1.7	-8.2	10.8	15.0	6.0	1.2	
	10.6	0.9	-7.9	4.7	-12.1	-18.9	0.3
1992	1.3	6.8	4.3	-1.3	4.0	5.9	
	4.8	-2.1	-0.3	1.9	-3.3	-12.3	0.8
1993	-1.8	0.7	20.1	-5.6	8.3	0.9	
	4.6	0.4	-3.8	0.1	-1.3	-11.0	1.0
1994	-1.5	-4.9	21.8	-9.5	13.0	0.0	
	2.2	9.3	-2.2	-0.5	0.1	-6.5	1.8
1995	-2.5	-4.3	17.3	-10.7	2.3	1.8	
	-1.4	3.1	-4.1	4.0	-2.0	-13.4	-0.8
1996	0.4	-1.7	10.8	-0.7	8.4	-5.3	
	13.7	-0.5	-2.5	4.3	-4.7	-12.6	0.8
AVGE	-1.2	-2.4	10.9	-5.4	9.5	3.2	
	5.1	2.5	-2.4	2.6	-6.3	-11.6	

Table Total- 77.89 Mean- 0.38 Std. Dev.- 8.14
Min - -27.89 Max - 40.79

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 18

E 6 Month-to-month percent changes in seasonally adjusted series
From 1980.Feb to 1996.Dec
Observations 203

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980		0.9	-1.8	-1.9	1.0	0.9	
	-1.4	0.4	3.1	-0.8	2.3	-1.1	0.2
1981	0.1	2.3	-12.7	-0.4	-2.0	-0.9	
	0.1	-2.0	-1.9	0.0	1.3	-1.0	-1.4
1982	3.5	0.3	2.1	0.0	0.8	0.9	
	-0.2	0.4	-0.9	-2.4	-2.8	-0.2	0.1
1983	-1.9	-1.2	1.3	-1.3	1.1	-2.4	
	0.2	2.9	-1.4	2.0	1.0	1.0	0.1
1984	-2.8	8.9	-8.7	1.8	2.8	4.1	
	-1.7	-0.5	0.5	1.2	0.0	3.7	0.8
1985	0.5	0.1	1.9	-10.7	5.6	3.9	
	2.6	0.7	1.5	2.4	0.9	1.4	0.9
1986	1.6	1.5	-6.3	4.1	-1.6	3.3	
	0.2	1.6	3.7	1.1	-0.6	-1.8	0.6
1987	2.8	6.8	-6.2	-0.3	-0.9	-5.9	
	-6.0	2.0	3.8	0.2	2.4	-2.5	-0.3
1988	1.2	2.6	2.0	-4.3	-2.5	3.2	
	-3.0	0.7	-2.2	-3.4	-0.3	5.5	-0.1
1989	-0.4	-2.8	1.3	3.7	2.7	2.5	
	-0.6	-0.6	-0.6	0.4	-1.5	2.0	0.5
1990	-0.9	1.0	-10.9	-25.0	28.2	-0.2	
	4.8	2.3	1.4	-1.6	-1.5	-9.0	-1.0
1991	0.7	-2.0	-1.7	15.2	-1.6	0.1	
	0.4	-0.9	-2.4	-0.1	-2.9	-7.1	-0.2
1992	2.7	12.4	-10.3	1.7	-0.5	-0.3	
	-1.7	-0.8	1.7	0.0	4.0	-1.8	0.6
1993	4.7	2.0	1.7	-1.2	3.6	-2.7	
	-0.9	-0.9	-1.0	1.5	0.2	1.8	0.7
1994	3.5	-3.5	2.0	-1.2	3.6	-1.0	
	0.3	4.8	0.6	0.8	1.3	6.5	1.5
1995	-0.6	-1.0	-0.9	-1.9	-7.8	2.7	
	-3.5	-1.9	1.6	0.9	-0.3	1.3	-0.9
1996	-1.1	0.2	-0.2	2.0	1.0	0.0	
	3.9	-0.6	1.0	-0.7	1.0	-2.4	0.3
AVGE	0.9	1.7	-2.8	-1.2	2.0	0.5	
	-0.4	0.4	0.5	0.1	0.3	-0.2	

Table Total- 28.68 Mean- 0.14 Std. Dev.- 4.24
Min - -25.01 Max - 28.15

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 19

E 7 Month-to-month percent changes in final trend cycle
From 1980.Feb to 1996.Dec
Observations 203

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
1980		-0.4	-0.5	-0.4	-0.3	-0.1	
	0.3	0.7	0.8	0.8	0.8	0.8	0.2
1981	0.6	0.3	-12.7	-0.3	-0.8	-1.1	
	-1.3	-1.2	-0.8	-0.3	0.3	0.8	-1.4
1982	1.2	1.3	1.1	1.0	0.8	0.5	
	0.0	-0.5	-1.1	-1.5	-1.7	-1.6	0.0
1983	-1.2	-0.8	-0.5	-0.4	-0.3	-0.1	
	0.3	0.6	0.8	0.7	0.3	0.0	0.0
1984	-0.2	0.0	0.4	0.9	1.2	1.2	
	1.0	0.8	0.7	0.8	1.0	1.2	0.8
1985	1.4	1.5	1.5	-11.5	5.4	3.8	
	2.7	1.9	1.6	1.5	1.3	0.9	1.0
1986	0.5	0.0	-0.2	-0.1	0.4	1.1	
	1.6	1.7	1.5	1.1	0.7	0.5	0.7
1987	0.4	0.1	-0.3	-1.0	-1.6	-1.9	
	-1.7	-1.0	-0.3	0.4	0.8	0.8	-0.4
1988	0.5	0.1	-0.2	-0.3	-0.5	-0.9	
	-1.2	-1.2	-1.0	-0.8	-0.5	0.0	-0.5
1989	0.6	1.1	1.6	1.8	1.7	1.4	
	0.8	0.1	-0.4	-0.4	-0.1	0.1	0.7
1990	-0.1	-0.4	-10.9	-0.6	-0.1	0.7	
	1.3	1.3	0.7	-0.6	-1.9	-2.9	-1.1
1991	-3.0	-2.2	-0.9	14.0	-2.1	-0.7	
	-0.3	-0.5	-1.0	-1.6	-1.9	-1.7	-0.2
1992	-1.2	-0.5	-0.1	0.1	0.0	-0.3	
	-0.4	-0.2	0.3	1.0	1.6	2.0	0.2
1993	2.0	1.7	1.2	0.6	0.0	-0.4	
	-0.6	-0.4	-0.1	0.2	0.5	0.7	0.4
1994	0.7	0.7	0.6	0.8	1.0	1.2	
	1.3	1.5	1.7	1.8	1.9	1.6	1.2
1995	1.0	0.2	-0.8	-1.9	-2.5	-2.5	
	-2.0	-1.2	-0.4	0.2	0.3	0.3	-0.8
1996	0.2	0.2	0.5	0.9	1.2	1.3	
	1.3	0.9	0.5	0.0	-0.4	-0.6	0.5
AVGE	0.2	0.2	-1.2	0.2	0.2	0.2	
	0.2	0.2	0.2	0.2	0.2	0.2	

Table Total- 15.57 Mean- 0.08 Std. Dev.- 2.08
Min - -12.75 Max - 13.99

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 20,
SERIES ITRANSF

F 2. Summary Measures
F 2.A: Average percent change without regard to sign over the indicated span

Span in months	A1 O	D11 CI	D13 I	D12 C	D10 S	A2 P	C18 TD	F1 mcd
1	5.88	1.81	1.53	0.84	4.57	0.83	2.48	1.41
2	8.08	2.59	1.73	1.64	7.03	1.12	2.10	2.55
3	10.80	3.35	1.76	2.38	10.02	1.36	1.40	3.52
4	12.75	3.88	1.71	3.05	11.89	1.57	2.26	4.26
5	14.40	4.44	1.68	3.63	13.71	1.75	1.81	4.84
6	15.07	4.84	1.60	4.15	14.42	1.91	1.74	5.35
7	14.73	5.18	1.57	4.58	14.00	2.05	2.25	5.75
8	13.63	5.52	1.64	4.93	12.34	2.19	1.87	6.05
9	12.16	5.85	1.51	5.26	10.60	2.30	1.37	6.30
10	9.78	6.04	1.56	5.50	7.31	2.42	2.37	6.60
11	8.28	6.29	1.64	5.74	4.64	2.68	1.91	6.99
12	6.58	6.43	1.68	5.92	0.53	2.84	1.32	7.37

Span in months	E1 Mod.O	E2 Mod.CI	E3 Mod.I
1	6.36	2.31	1.28
2	8.58	3.07	1.39
3	11.12	3.80	1.44
4	13.08	4.21	1.36
5	14.64	4.78	1.31
6	15.09	5.15	1.29
7	14.90	5.50	1.27
8	13.86	5.91	1.30
9	12.37	6.21	1.15
10	10.08	6.40	1.26
11	8.53	6.62	1.30
12	6.89	6.88	1.44

F 2.B: Relative contributions to the variance of the percent change in the components of the original series

Span in months	E3 I	D12 C	D10 S	A2 P	C18 TD	TOTAL	RATIO (X100)
1	5.47	2.32	69.46	2.30	20.45	100.00	74.16
2	3.23	4.49	82.80	2.09	7.40	100.00	81.17
3	1.85	5.05	89.69	1.66	1.74	100.00	90.46
4	1.16	5.81	88.30	1.54	3.19	100.00	93.65
5	0.82	6.30	89.84	1.46	1.58	100.00	97.59
6	0.71	7.39	89.04	1.56	1.30	100.00	102.53
7	0.71	9.21	86.02	1.85	2.21	100.00	102.64
8	0.90	13.05	81.61	2.56	1.88	100.00	97.14
9	0.90	18.59	75.67	3.58	1.27	100.00	97.03
10	1.65	31.27	55.21	6.06	5.81	100.00	95.28
11	2.54	49.14	32.18	10.69	5.45	100.00	92.15
12	4.41	74.27	0.59	17.05	3.69	100.00	99.55

F 2.C: Average percent change with regard to sign and standard deviation over indicated span

Span in	A1 O		D13 I		D12 C	
months	Avg.	S.D.	Avg.	S.D.	Avg.	S.D.
1	0.46	7.51	0.02	2.04	0.18	1.01
2	0.94	9.89	0.02	2.34	0.38	1.97
3	1.53	12.91	0.02	2.35	0.59	2.85
4	2.09	15.14	0.03	2.30	0.81	3.62
5	2.54	16.72	0.03	2.36	1.03	4.27
6	2.92	17.86	0.03	2.23	1.25	4.81
7	2.98	17.56	0.02	2.20	1.46	5.24
8	2.98	16.69	0.03	2.27	1.66	5.60
9	2.83	14.80	0.02	2.13	1.84	5.90
10	2.61	12.25	0.02	2.11	2.03	6.16
11	2.49	10.07	0.02	2.30	2.20	6.40
12	2.43	7.44	0.02	2.16	2.37	6.61

Span in	D10 S		D11 CI		F1 mcd	
months	Avg.	S.D.	Avg.	S.D.	Avg.	S.D.
1	0.20	5.94	0.20	2.39	0.08	1.99
2	0.50	8.78	0.41	3.35	0.19	3.47
3	0.82	11.55	0.63	4.15	0.30	4.65
4	1.12	13.46	0.86	4.82	0.42	5.47
5	1.35	15.03	1.09	5.40	0.52	6.09
6	1.48	15.95	1.30	5.79	0.61	6.54
7	1.37	15.54	1.51	6.10	0.68	6.88
8	1.14	14.38	1.71	6.39	0.73	7.17
9	0.86	12.59	1.89	6.59	0.78	7.45
10	0.51	9.57	2.06	6.80	0.83	7.76
11	0.19	6.13	2.24	7.06	0.87	8.07
12	0.01	0.67	2.40	7.19	0.92	8.39

F 2.D: Average duration of run

CI	I	C	mcd
2.11	1.61	7.00	3.41

F 2.E: I/C Ratio for months span

SPAN	1	2	3	4	5	6
I/C	1.83	1.06	0.74	0.56	0.46	0.39

SPAN	7	8	9	10	11	12
I/C	0.34	0.33	0.29	0.28	0.29	0.28

months for cyclical dominance: 3

F 2.F: Relative contribution of the components to the stationary portion of the variance in the original series

I	C	S	P	TD	Total
0.80	20.53	40.08	31.92	743.81	837.14

F 2.G: The autocorrelation of the irregulars for spans 1 to 14

SPAN	1	2	3	4	5	6	7
ACF	0.12	-0.15	-0.15	-0.10	-0.17	-0.03	0.02

SPAN	8	9	10	11	12	13	14
ACF	-0.04	0.08	0.09	-0.06	0.07	0.09	0.01

F 2.H: The final I/C Ratio from Table D12: 1.28
The final I/S Ratio from Table D10: 2.90

F 2.I:	Statistic	Prob. level
F-test for stable seasonality from Table B 1. :	87.194	0.00%
F-test for stable seasonality from Table D 8. :	155.990	0.00%
Kruskal-Wallis Chi Squared test for stable seasonality from Table D 8. :	183.216	0.00%
F-test for moving seasonality from Table D 8. :	8.599	0.00%

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 22,
SERIES ITRANSF

F 3. Monitoring and Quality Assessment Statistics
All the measures below are in the range from 0 to 3 with an acceptance region from 0 to 1.

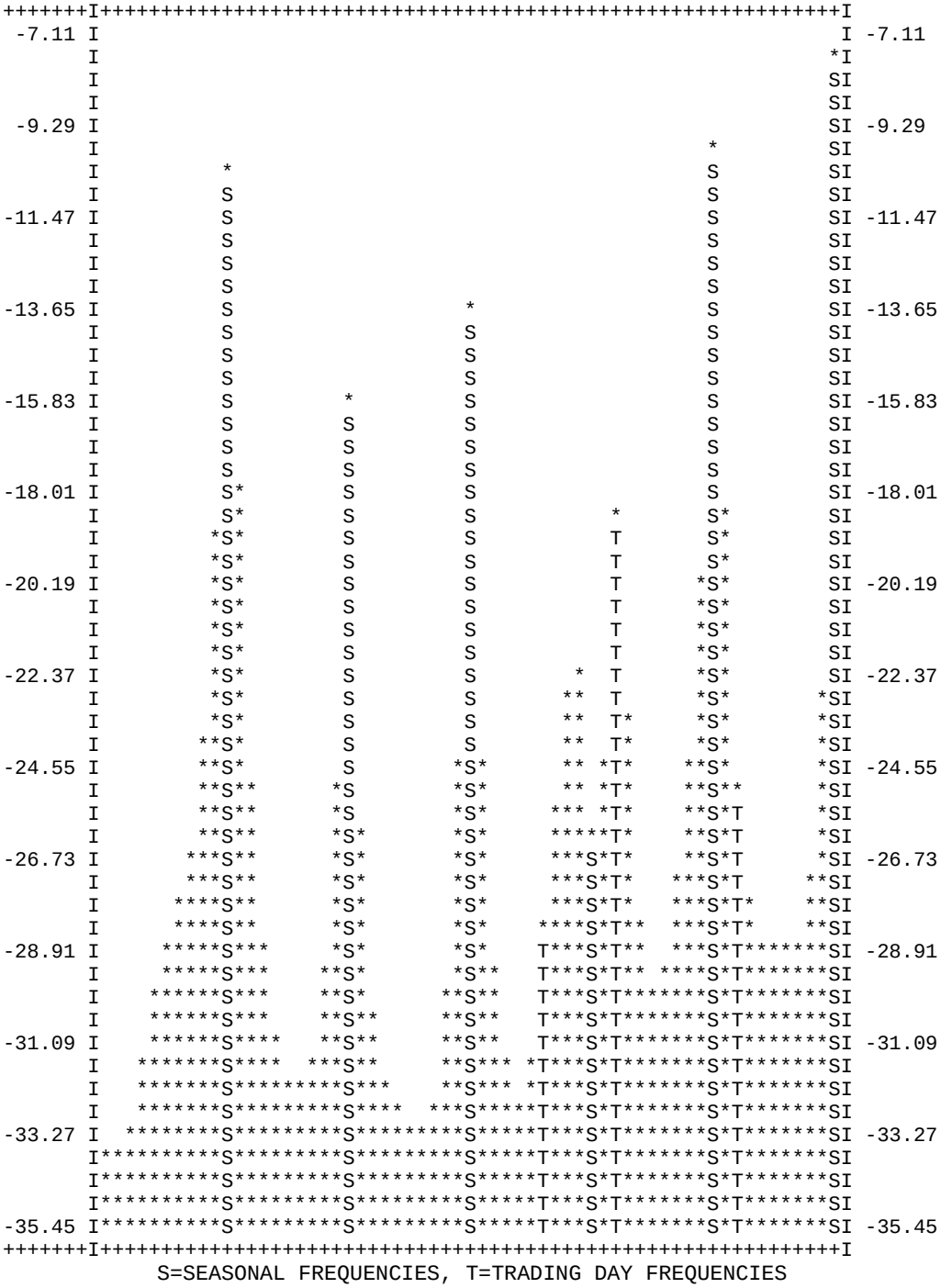
1.	The relative contribution of the irregular over three months span (from Table F 2.B).	M1 = 0.188
2.	The relative contribution of the irregular component to the stationary portion of the variance (from Table F 2.F).	M2 = 0.118
3.	The amount of month to month change in the irregular component as compared to the amount of month to month change in the trend-cycle (from Table F2.H).	M3 = 0.138
4.	The amount of autocorrelation in the irregular as described by the average duration of run (Table F 2.D).	M4 = 0.626
5.	The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular (from Table F 2.E).	M5 = 0.336
6.	The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal (from Table F 2.H).	M6 = 0.440
7.	The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).	M7 = 0.324
8.	The size of the fluctuations in the seasonal component throughout the whole series.	M8 = 0.650
9.	The average linear movement in the seasonal component throughout the whole series.	M9 = 0.115
10.	Same as 8, calculated for recent years only.	M10= 1.147
11.	Same as 9, calculated for recent years only.	M11= 1.147

*** ACCEPTED *** at the level 0.38

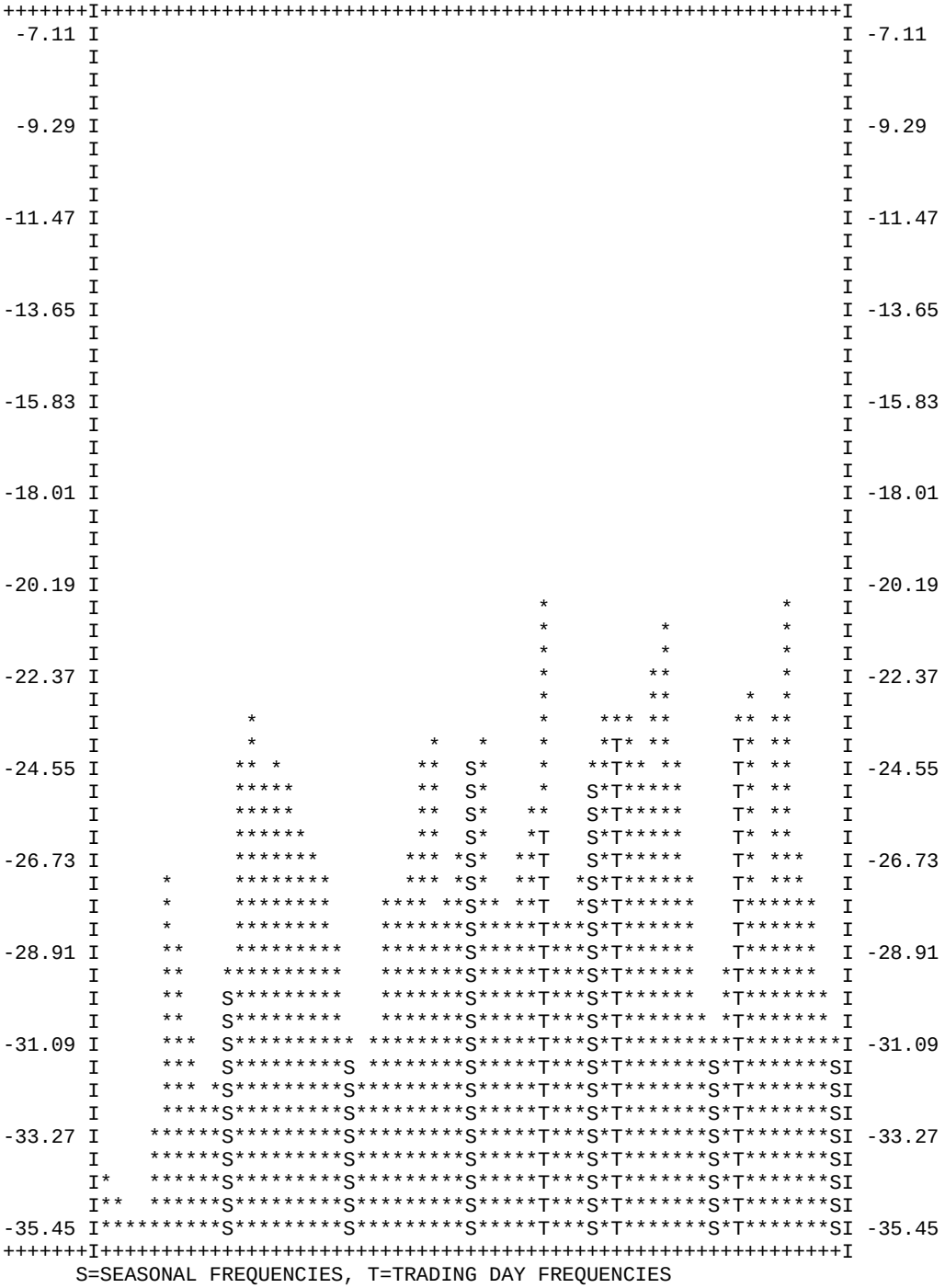
*** Check the 2 above measures which failed.

*** Q (without M2) = 0.41 ACCEPTED.

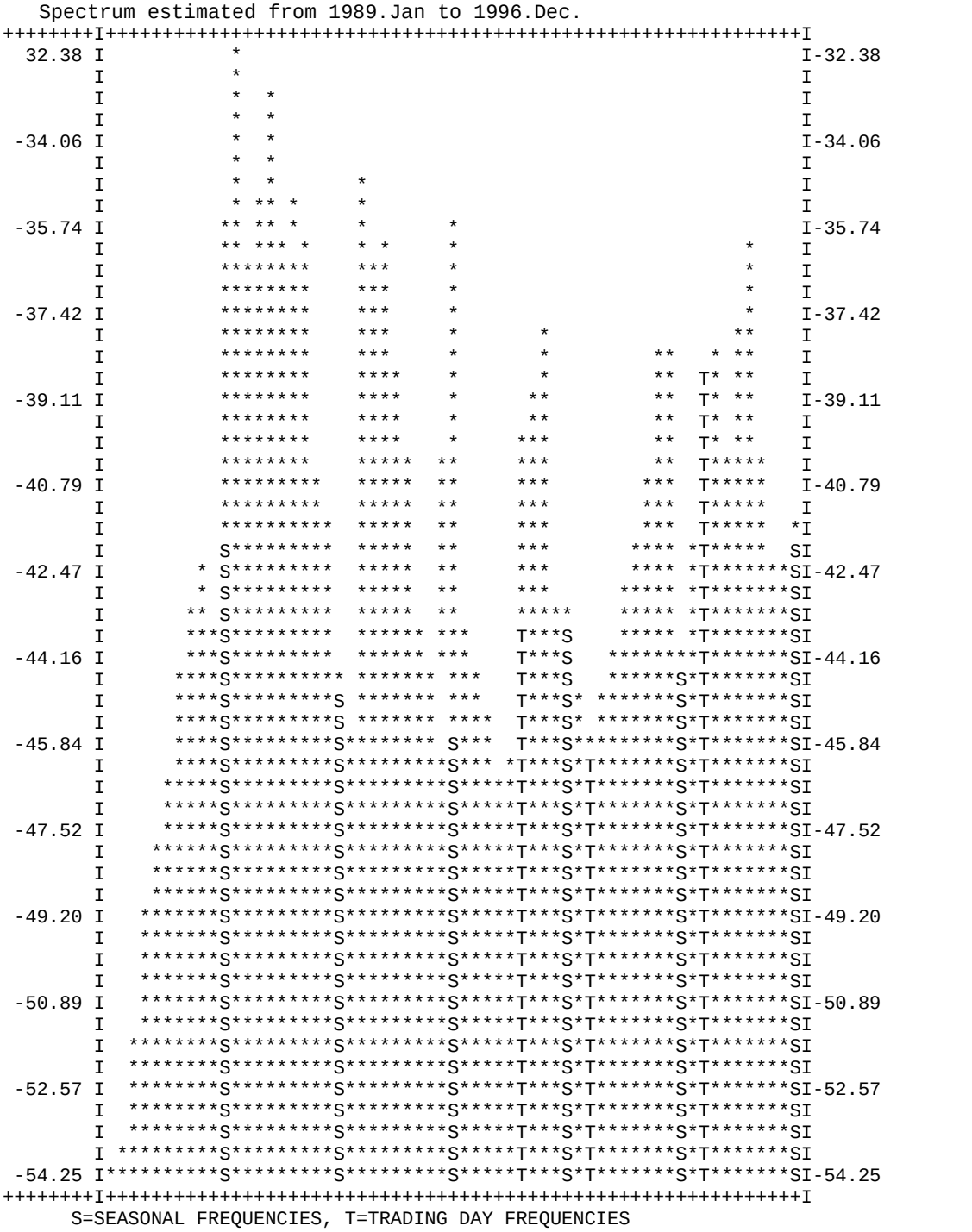
G.0 10*LOG(SPECTRUM) of the differenced, transformed Outlier Adjusted Data
(Table A11). Spectrum estimated from 1989.Jan to 1996.Dec.



G.1 10*LOG(SPECTRUM) of the differenced, transformed seasonally adjusted data (Table D11). Spectrum estimated from 1989.Jan to 1996.Dec.



G.2 10*LOG(SPECTRUM) of the modified irregular (Table E3).
Spectrum estimated from 1989.Jan to 1996.Dec.



S=SEASONAL FREQUENCIES, T=TRADING DAY FREQUENCIES

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 26,
SERIES ITRANSF

Sliding spans analysis

S 0. Summary of options selected for this run

Trading day factors analyzed
Year-to-year changes analyzed
Number of spans: 4
Length of spans: 96
Month of first observation in first span: 1
Year of first observation in first span: 1986
Name of series being adjusted: ITRANSF

Summary of tests for stable and moving seasonality from table D8 for each span

	Span 1	Span 2	Span 3	Span 4
Stable seasonality	122.52	114.75	68.35	70.82
Moving seasonality	2.90	5.00	16.01	16.58
m7	0.25	0.31	0.63	0.63
Identifiable seasonality?	yes	yes	yes	yes

yes = Identifiable seasonality probably present
??? = Identifiable seasonality probably not present
no = Identifiable seasonality not present

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 27,
SERIES ITRANSF

S 1. Monthly means of Seasonal Factors for ITRANSF.
(movements within a month should be small)

	Span 1	Span 2	Span 3	Span 4	Max % Diff.	All Spans
January	87.47	86.33 min	86.71 min	87.26	1.32	86.93
February	86.50 min	86.36	86.86	87.03 min	0.77	86.69 min
March	94.35	95.23	96.64	97.30	3.13	95.93
April	93.10	93.05	93.59	94.23	1.26	93.51
May	98.74	100.02	98.94	100.99	2.28	99.70
June	105.22	104.75	104.81	103.64	1.52	104.58
July	110.34	109.91	108.99	108.78	1.43	109.48
August	112.73 max	112.70 max	111.69 max	110.48 max	2.03	111.88 max
September	110.04	109.81	108.73	107.72	2.15	109.04
October	110.56	109.66	108.47	108.43	1.97	109.24
November	103.75	103.76	103.54	104.36	0.79	103.85
December	87.13	87.85	89.69	88.81	2.94	88.41

Summary statistics for mean seasonal factors

	Min	Max	Range
Span 1	85.73	113.53	27.80
Span 2	85.85	113.71	27.86
Span 3	84.92	115.03	30.10
Span 4	84.82	114.08	29.26
All spans	84.82	115.03	30.21

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 28,
SERIES ITRANSF

S 2. Percentage of months flagged as unstable.

Seasonal Factors	4 out of 108 (3.7 %)
Trading Day Factors	108 out of 101 (106.9 %)
Final Seasonally Adjusted Series	108 out of 108 (100.0 %)
Month-to-Month Changes in SA Series	14 out of 107 (13.1 %)

Recommended limits for percentages:

Seasonal Factors	15% is too high 25% is much too high
Month-to-Month Changes in SA Series	35% is too high 40% is much too high

Threshold values used for Maximum Percent Differences to flag months as unstable

Seasonal Factors	Threshold = 3.0 %
Trading Day Factors	Threshold = 2.0 %
Final Seasonally Adjusted Series	Threshold = 3.0 %
Month-to-Month Changes in SA Series	Threshold = 3.0 %

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 29,
SERIES ITRANSF

S 3.a Breakdowns of unstable Seasonal Factors
and Average Maximum Percent Differences across spans for
Seasonal Factors of ITRANSF.

January	:	2	(AMPD = 2.4)
February	:	0	(AMPD = 1.7)
March	:	0	(AMPD = 0.8)
April	:	0	(AMPD = 0.8)
May	:	0	(AMPD = 1.6)
June	:	0	(AMPD = 1.0)
July	:	0	(AMPD = 1.4)
August	:	0	(AMPD = 1.5)
September	:	0	(AMPD = 0.9)
October	:	0	(AMPD = 0.9)
November	:	0	(AMPD = 0.6)
December	:	2	(AMPD = 2.2)

1987	:	0	(AMPD = 1.0)
1988	:	1	(AMPD = 1.7)
1989	:	1	(AMPD = 1.6)
1990	:	0	(AMPD = 1.0)
1991	:	0	(AMPD = 0.9)
1992	:	1	(AMPD = 1.2)
1993	:	1	(AMPD = 2.0)
1994	:	0	(AMPD = 1.7)
1995	:	0	(AMPD = 0.8)

Summary Statistics for the Maximum Percent Differences across spans

Minimum	:	0.07
25th Percentile	:	0.67
Median	:	1.12
75th Percentile	:	1.82
->85th Percentile	:	2.22<-
Maximum	:	4.62
Standard Deviation	:	1.65

```
Histogram of the Maximum Percent Differences across spans

Differences   Frequency
  0.21  +##########
        |##############################
  1.03  +######################
        |################
  1.86  +########
        |###########
  2.69  +####
        |####
  3.51  +#
        |#
  3.93  +#

Outlier [#

One '#'= 1 observation[s]

Maximum Percent Differences across spans considered to be outliers
Time  Maximum Percent Differences across spans
-----------------------------------------------
1:1987  4.62

Breakdown of the maximum percentage differences of the
Seasonal Factors for flagged months.

         Greater than or equal to 3.0% but less than 4.0% :  3
         Greater than or equal to 4.0% but less than 5.0% :  1
         Greater than or equal to 5.0% but less than 6.0% :  0
         Greater than or equal to 6.0%                    :  0
```

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 30,
SERIES ITRANSF

S 3.b Breakdowns of unstable Trading Day Factors
and Average Maximum Percent Differences across spans for
Trading Day Factors of ITRANSF.

January	:	9	(AMPD = 13.8)
February	:	9	(AMPD = 57.3)
March	:	9	(AMPD = 13.8)
April	:	9	(AMPD = 13.5)
May	:	9	(AMPD = 13.9)
June	:	9	(AMPD = 13.4)
July	:	9	(AMPD = 13.9)
August	:	9	(AMPD = 14.1)
September	:	9	(AMPD = 13.3)
October	:	9	(AMPD = 14.1)
November	:	9	(AMPD = 13.4)
December	:	9	(AMPD = 13.9)

1987	:	12	(AMPD = 10.0)
1988	:	12	(AMPD = 16.8)
1989	:	12	(AMPD = 18.2)
1990	:	12	(AMPD = 18.3)
1991	:	12	(AMPD = 18.3)
1992	:	12	(AMPD = 16.8)
1993	:	12	(AMPD = 18.2)
1994	:	12	(AMPD = 7.6)
1995	:	12	(AMPD = 7.0)

Summary Statistics for the Maximum Percent Differences across spans

Minimum	:	5.88
25th Percentile	:	9.00
Median	:	16.33
75th Percentile	:	16.89
->85th Percentile	:	17.29<-
Maximum	:	17.85
Standard Deviation	:	24.21

```
Histogram of the Maximum Percent Differences across spans

Differences   Frequency
    3.03  +#
          |#################
   15.13  +####################################
          |
   27.24  +
          |
   39.35  +
          |
   51.45  +
          |
   57.51  +

One '#'= 2 observation[s]

Breakdown of the maximum percentage differences of the
Trading Day Factors for flagged months.

     Greater than or equal to 2.0% but less than 3.0%  :   0
     Greater than or equal to 3.0% but less than 4.0%  :   0
     Greater than or equal to 4.0% but less than 5.0%  :   0
     Greater than or equal to 5.0%                     : 108
```

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 31,
SERIES ITRANSF

S 3.c Breakdowns of unstable Final Seasonally Adjusted Series
and Average Maximum Percent Differences across spans for
Final Seasonally Adjusted Series of ITRANSF.

January	:	9	(AMPD = 12.8)
February	:	9	(AMPD = 12.6)
March	:	9	(AMPD = 14.8)
April	:	9	(AMPD = 13.5)
May	:	9	(AMPD = 13.1)
June	:	9	(AMPD = 13.6)
July	:	9	(AMPD = 13.4)
August	:	9	(AMPD = 14.3)
September	:	9	(AMPD = 13.1)
October	:	9	(AMPD = 13.1)
November	:	9	(AMPD = 13.1)
December	:	9	(AMPD = 16.2)

1987	:	12	(AMPD = 9.1)
1988	:	12	(AMPD = 16.6)
1989	:	12	(AMPD = 16.5)
1990	:	12	(AMPD = 16.6)
1991	:	12	(AMPD = 16.7)
1992	:	12	(AMPD = 16.8)
1993	:	12	(AMPD = 16.7)
1994	:	12	(AMPD = 7.3)
1995	:	12	(AMPD = 6.4)

Summary Statistics for the Maximum Percent Differences across spans

Minimum	:	4.98
25th Percentile	:	9.17
Median	:	15.79
75th Percentile	:	16.92
->85th Percentile	:	18.02<-
Maximum	:	21.04
Standard Deviation	:	23.41

```
Histogram of the Maximum Percent Differences across spans

Differences   Frequency
     2.93  +#######
           |##############################
    14.63  +##################################################
           |####################
    26.33  +
           |
    38.04  +
           |
    49.74  +
           |
    55.59  +

One '#'= 1 observation[s]
```

Breakdown of the maximum percentage differences of the
Final Seasonally Adjusted Series for flagged months.

Greater than or equal to 3.0% but less than 4.0%	0
Greater than or equal to 4.0% but less than 5.0%	1
Greater than or equal to 5.0% but less than 6.0%	6
Greater than or equal to 6.0%	101

Indústria de Transformação - Brasil (IBGE) - (1991=100) PAGE 32,
SERIES ITRANSF

S 3.d Breakdowns of unstable Month-to-Month Changes in SA Series and Average Maximum Percent Differences across spans for Month-to-Month Changes in SA Series of ITRANSF.

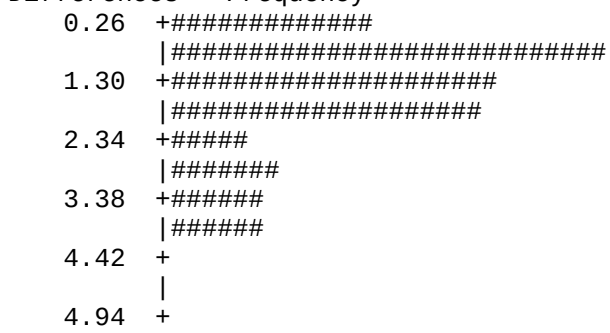
January	:	3	(AMPD = 2.7)
February	:	0	(AMPD = 0.9)
March	:	3	(AMPD = 1.9)
April	:	0	(AMPD = 1.2)
May	:	0	(AMPD = 1.8)
June	:	1	(AMPD = 2.2)
July	:	0	(AMPD = 1.1)
August	:	0	(AMPD = 1.1)
September	:	0	(AMPD = 1.4)
October	:	0	(AMPD = 0.9)
November	:	0	(AMPD = 0.8)
December	:	7	(AMPD = 3.0)

1987	:	1	(AMPD = 1.1)
1988	:	2	(AMPD = 2.1)
1989	:	3	(AMPD = 2.1)
1990	:	2	(AMPD = 1.7)
1991	:	2	(AMPD = 1.3)
1992	:	1	(AMPD = 1.6)
1993	:	2	(AMPD = 1.6)
1994	:	1	(AMPD = 1.6)
1995	:	0	(AMPD = 1.0)

Summary Statistics for the Maximum Percent Differences across spans

Minimum	:	0.09
25th Percentile	:	0.76
Median	:	1.40
->60th Percentile	:	1.61<-
75th Percentile	:	1.94
Maximum	:	5.41
Standard Deviation	:	2.08

Histogram of the Maximum Percent Differences across spans



Outlier [#

One '#'= 1 observation[s]

Maximum Percent Differences across spans considered to be outliers

Time	Maximum Percent Differences across spans
12:1987	5.41

Breakdown of the maximum percentage differences of the
Month-to-Month Changes in SA Series for flagged months.

Greater than or equal to 3.0% but less than 5.0%	13
Greater than or equal to 5.0% but less than 7.0%	1
Greater than or equal to 7.0% but less than 10.0%	0
Greater than or equal to 10.0%	0