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MONTHLY GDP: PROGRESS AND PROSPECTS

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Derek Blades and Ronny Nilsson*

Introduction

In 1979 the OECD published a report on the methods used by OECD countries to estimate national accounts on a quarterly basis[1]. This was the first step in a long term effort by the OECD Secretariat to persuade all Member countries to publish quarterly national accounts. In 1979 only seven OECD countries published quarterly national accounts – Canada, France, Italy, Japan, Sweden, the United Kingdom and the United States. Many of the other seventeen Member countries viewed quarterly national accounts with suspicion, believing them to be either impractical or unnecessary. At the present time only two of the thirty OECD Member countries do not publish quarterly national accounts– Iceland and Luxembourg. European Union regulations require its member states to provide quarterly national accounts (Luxembourg has a temporary prorogation) and the International Monetary Fund's *General* and *Special Data Dissemination Standards* (*GDDS* and *SDDS*) both call for countries to publish national accounts on a quarterly basis.

Ever since statistical offices started to compile quarterly national accounts they have been under pressure to reduce publication delays. For most OECD countries, these are between one and three months. Eurostat has set its member states a target of 45 days to produce "flash" estimates of quarterly GDP. Monthly GDP looks like an idea whose time has come.

Monthly national accounts are currently in a worse position than were quarterly national accounts twenty-five years ago. Only five countries – Canada, Chile, Finland, Peru and Sweden - publish official national accounts data on a monthly basis. However, there are signs of progress; the UK Office of National Statistics has described its recently published monthly *Index of Services* as "a step closer to the publication of a monthly GDP indicator" and Israel is planning to estimate GDP on a monthly basis as soon as resources allow. The Statistics Division of the UN Economic Commission for Europe has the promotion of short-term national accounts in its work programme and organises regular workshops to exchange information on, among other things, progress with monthly national accounts. As noted, Eurostat is pressing EU member states to produce "flash estimates" of quarterly GDP and one way of doing this is to compile the quarterly accounts on a cumulative monthly basis. More important, however, is the upsurge in private sector interest in monthly national accounts. It is clear that there is a growing market for these data, with analysts in the financial sector ready to pay high prices for monthly GDP estimates.

All the monthly GDP estimates reviewed in this paper refer to total GDP or to the total with a breakdown by kind of activity. No attempts have been uncovered to estimate the more interesting breakdown of GDP by type of final expenditure. This may become the focus of research in the future.

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* Respectively, former and present members of the OECD Statistics Directorate. The aurthors thank Kokkinen Arto for his helpful comments although the authors remain responsible for any factual errors.

[1] *Quarterly National Accounts. A report on the sources and methods used by OECD Member Countries*. OECD, Paris 1979.

This paper first reviews the work on monthly national accounts in five national statistical agencies. A second section looks at some private sector forecasts. A final section describes an innovative approach developed by the OECD Statistics Division and the central bank of Lebanon to estimate monthly GDP for a country which, at the time of writing, has neither quarterly nor annual estimate of GDP.

Official estimates of monthly GDP.

The methods used can be broadly classified into *indicator* and *econometric* methods.

The *indicator* method is a monthly adaptation of the procedures used by many countries to estimate quarterly GDP. In summary:

- The starting point is a reasonably firm estimate from the annual or quarterly national accounts of GDP by kind of activity.
- Monthly indicators, usually relating to the value or volume of output or to employment, are then used to project forward the starting estimate for each kind of activity.
- Standard techniques such as X-11 or TRAMO-SEATS are used to adjust for seasonality and different numbers of working days in each month.
- Each time a new firm estimate becomes available the monthly estimates are recalibrated using mechanical techniques that minimises the squares of the differences between the two series, subject to the need to avoid discontinuities in the monthly series when new bench-marks are introduced[2].

Statistics Canada's monthly GDP estimates were first published in 1971. They are good example of the indicator approach[3]. The starting point is value added by kind of activity from the latest annual input output tables which become available about thirty months after the end of the reference year. Value added at constant prices is then extrapolated forward using three types of monthly indicators: those that refer to the value of output or turnover (e.g. the deflated value of retail sales is used to project forward value added in retail trade); employment indicators (e.g. numbers employed are used to project forward value added in government and in legal and accounting services); and indicators related to the volume of output (e.g. passenger-kilometers and goods tons-kilometers are used for air transport). No directly relevant indicators are available for some activities and in such cases value added is usually assumed to move in line with output in a related sector (e.g. value added in road transport is assumed to move in line with the output of industries using these services). Each time a new input-output table becomes available, the monthly estimates are re-benchmarked.

Canada's monthly GDP is estimated at a very detailed level. Eighty-one activities are distinguished in the worksheets for services alone, although these are reduced to thirteen for publication purposes. The monthly estimates are published 60 days after the end of the month. Other countries that publish monthly GDP indicators derive their quarterly or annual value added estimates by a different, more accurate method and users can judge the accuracy of the

[2] These discontinuities are generally referred to as the *step problem*. Techniques to deal with this are described in *Quarterly National Accounts Manual: Concepts, Data Sources, and Compilation,* IMF, Washington D.C. 2001, and in *Eurostat Handbook on Quarterly National Accounts,* Eurostat, Luxembourg 2000.

[3] A full description of Canada's monthly GDP estimates is given in *Gross Domestic Product by Industry. Sources and Methods.* Catalogue no. 15-547-XIE, Statistics Canada, Ottawa 2002.

monthly estimates by comparing them with these more reliable quarterly or annual figures. In Canada, however, the quarterly and annual estimates are derived from the monthly series so this test is not possible. Canada does however estimate final expenditure on GDP by an independent method. Differences in growth rates and levels between the value added estimates based on the monthly series and the independently derived expenditure estimates are generally insignificant.

Statistics Finland has published monthly GDP since 1986 and was the first European country to do so. Finland's estimates follow a similar approach to that used in Canada although the estimation is done at a less detailed level[4]. Six kinds of activity are distinguished and the following indicators are used:

Agriculture and forestry: Milk received by dairies; meat production; crop production; timber fellings.

Manufacturing: Volume index of industrial output.

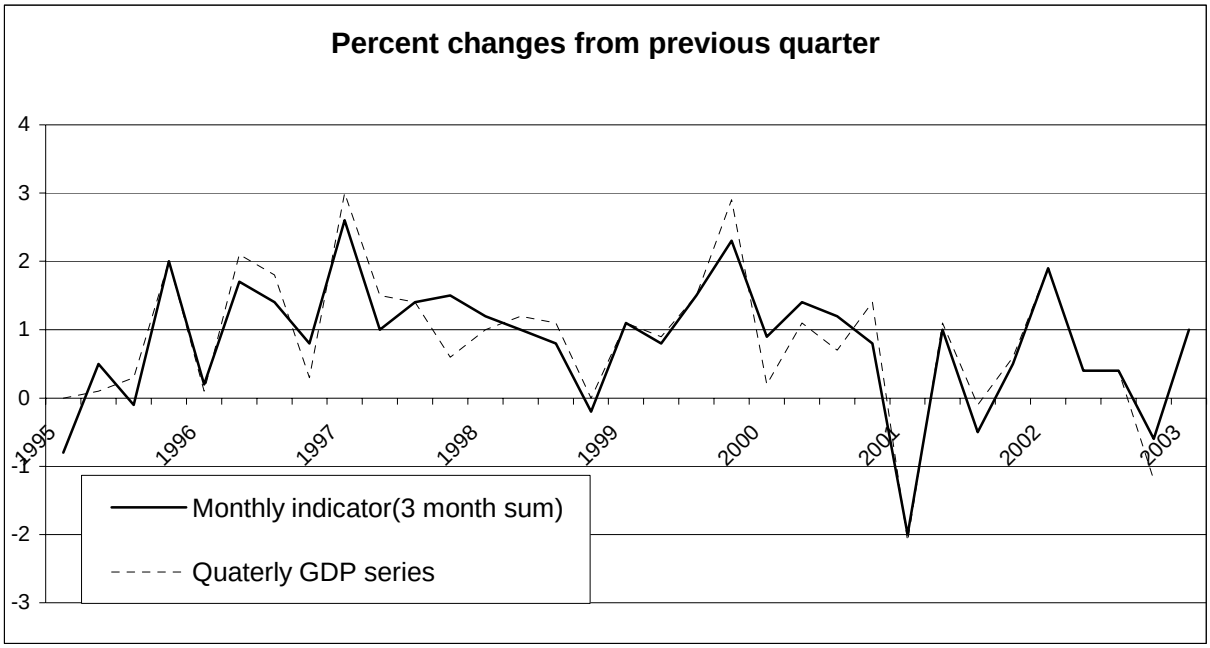
*Construction***:** Index of construction materials; employment .

Trade: Volume indices of sales of motor vehicles, wholesale trade and retail trade.

*Transport***:** Tonne-kilometres of rail freight transport; sales of diesel oil.

Other services (including government services): Trend estimate based on the most recent quarterly national accounts.

Chart 1. Finland. Comparisons of quarterly changes estimated by the quarterly accounts and the monthly indicator



[4] For details see Arto Kokkinen, *Monthly indicator of gdp*, Statistics Finland, Helsinki 2002

The monthly estimates are published 60 days after the end of the month. Chart 1 shows that the monthly estimates (aggregated to quarters) have generally tracked the quarterly estimates rather well. With the exception of three quarters in 1997 and one quarter each in 1998 and 2000 the monthly figures correctly predicted the direction of change in the quarterly data and also tracked the magnitude of these changes quite closely.

It is interesting to see that the rather simple approach used by Finland provides quite a good indicator of monthly GDP. One reason is that the index of industrial production which is used to extrapolate value-added in manufacturing covers around 80% of industrial turnover. On the other hand, the estimates for *other services* seem rather weak, being based on a simple extrapolation of recent trends. However, although *other services* account for around 40% of GDP, more than half consist of government services – health, education and community and social services - which may be expected to change only gradually in the short to medium term since they will not be much affected by changes in the business cycle.

The ***Banco Central de Chile*** publishes a monthly indicator of economic activity referred to as *Imacec* (*Indicador Mensual de Actividad Economica*). As in the case of Canada the starting point is the latest input output table and a variety of volume and deflated value indicators are used to extrapolate value added for 12 kinds of activity. Also like Canada, the quarterly and annual estimates of GDP by kind of activity are obtained by summing the monthly estimates. The Bank's website[5] gives the values of the monthly indicator for total GDP in index form but does not give much information on the methodology.

The ***Instituto Nacional de Estadistica e Informacion del Peru*** publishes a monthly index of total GDP. The starting point is the 1979 estimate of GDP by kind of activity. The approach used is similar to that used by Finland; volume indicators are used to extrapolate monthly value added in agriculture, fishing and mining – all relatively important in Peru – and value added in manufacturing is extrapolated using an index of industrial production. Construction and all service activities are estimated in a "forma indirecta" but no information is given on exactly what this means[6].

Statistics Sweden uses what is here termed the econometric approach to estimate a monthly *Activity Index*, the purpose of which is to predict quarterly GDP[7]. Ordinary least squares is used to estimate a multiple linear regression between real quarterly GDP, as the dependent variable, and four independent variables: the index of industrial production; the deflated value of retail sales; numbers of hours worked by employees in the public sector; and electricity production. (The monthly variables are aggregated to quarters for the regression.) The estimated regression coefficients are then used to weight the monthly values of the independent variables to calculate the *Activity Index.*

The regression equation is estimated using non-seasonally adjusted data and a standard seasonal adjustment programme is used to produce the published *Activity Index.* The regression coefficients are periodically re-estimated as new quarterly data become available. As can be seen from Chart 2, the *Activity Index* tracks the quarterly estimates reasonably well

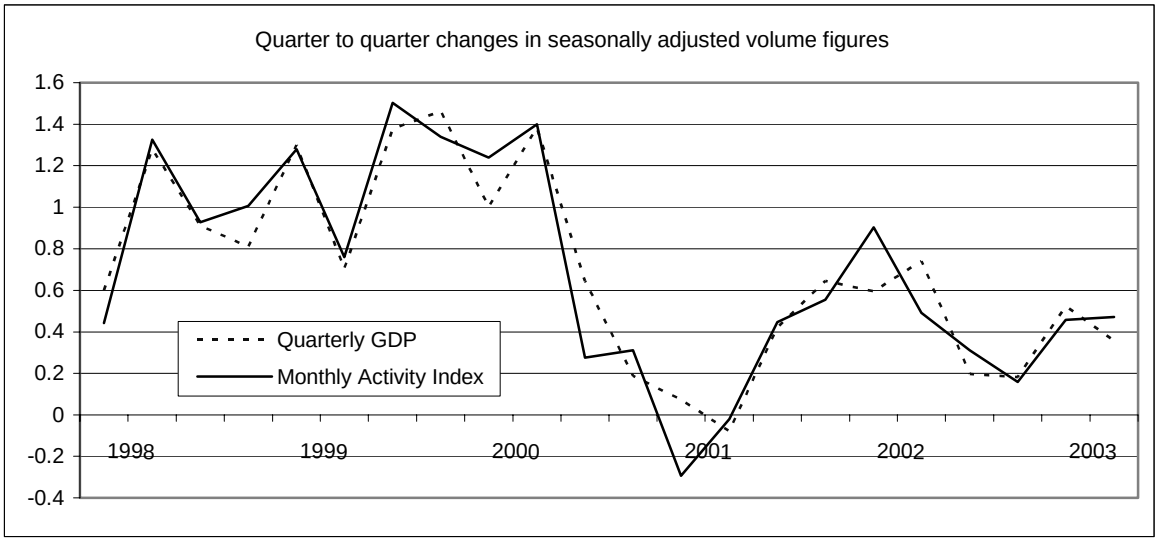
[5] See www.bcentral.cl

[6] See www.inei.gob.pe

[7] For details see Sven Ohlen, *An Activity Index for the Swedish Economy*, Statistics Sweden, Stockholm 1998.

although over the 21 quarters covered in the chart, the *Activity Index* missed the direction of change six times.

Chart 2. Sweden. Comparison of quarterly changes estimated by the quarterly accounts and the monthly activity index



Commercial estimates of monthly GDP

The Swedish *Activity Index* was originally developed by Sweden's *National Institute for Economic Research*. Since the beginning of 1998, a similar-sounding organisation - the *National Institute of Economic and Social Research* (NIESR) - has been publishing estimates of monthly GDP for the United Kingdom. The NIESR estimates are released to the general public through monthly press notices but, as their advertising points out *"…..…advance notice of these data is provided to subscriber*s. This allows subscribers to anticipate the impact that the press release can have on major financial markets (their emphasis)". Pricing this service presents an interesting problem since the value of advance notice to any individual subscriber is inversely proportional to the number of other people with access to the same information. The NIESR charges £1000 for twelve monthly GDP estimates delivered by simultaneous fax transmission (a level playing field for all subscribers) and guaranteed to arrive at least 90 minutes before public release.

With a substantial income at stake the NIESR gives only a general description of its methodology: "Using monthly data that are published, the latest statistical techniques allow the National Institute to use modelling methods to assess the behaviour of those sectors of the economy not covered by the Index of Industrial Production. Combining both of these output estimates on a monthly basis gives a picture of the output of the economy as a whole. Our statistical techniques ensure that the monthly estimates are always consistent with the ONS quarterly data as they are published."[8] From this brief description it seems likely that the NIESR uses the *indicator* approach for activities covered by the Index of Industrial Production combined with an *econometric* approach for other parts of the economy.

[8] Quoted from the National Institute of Economic and Social Research (NIESR) home-page, www.niesr.ac.uk

Another UK based company – NTC Research - has a more extensive programme of monthly GDP estimates, covering the larger European countries, Hong Kong and Russia[9]. They are based on surveys in which a sample of manufacturing, construction and service companies are asked to give "up/same/down" or "better/no change/worse" comparisons between the present and previous periods for indicators such as output, order-books and employment. NTC carries out thirty such surveys in fourteen countries to construct what they call "PMI", or *Purchasing Managers Indices*.

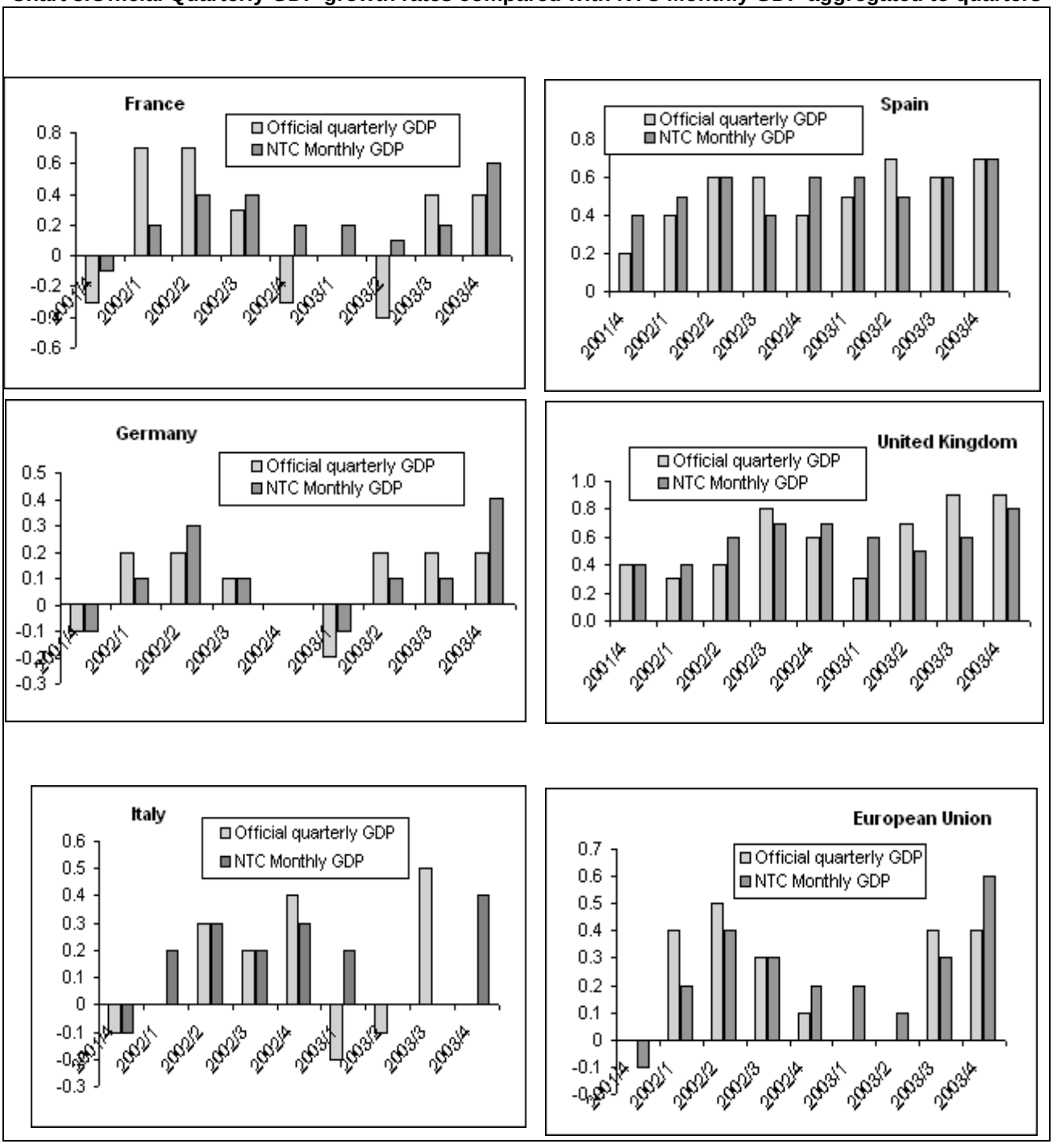
According to the NTC-Research website: "In order to combine manufacturing, service sector and construction industry PMI output data together to form a seasonally adjusted indicator of GDP, weights are applied according to each sector's contribution to total GDP. Statistical analysis is then used to determine the precise relationship between the composite indicator and quarterly and annual rates of change of GDP. Regression analysis has then been used to compare the resulting composite PMI output indexes against the quarterly and annual rates of change of GDP and produce constants and coefficients that can then be applied to the GDP Indicator value to produce estimates of GDP growth rates." In terms of the classification used earlier, the NTC appears to be using an econometric approach with the composite PMI as the independent variable. The interesting question is how the composite index is put together. It is not clear what information NTC uses from the PMI surveys nor whether the GDP sector weights are applied to *balances* or to some kind of *diffusion index*.

NTC uses a different marketing strategy from the NIESR. Subscribers buy the monthly GDP estimates together with the underlying PMI survey data but they do not get information ahead of the general public. Chart 3 shows the differences between their monthly estimates, aggregated to a quarterly basis, and the official quarterly GDP estimates for five countries and for the European Union. The NTC monthly data have been good predictors of quarterly GDP for Germany, Spain and the United Kingdom, and rather less good for France and Italy where directions of change have been missed and sizes of changes have been less well estimated.

Because the financial sector and perhaps other users, will pay high prices for early information on movements in GDP, it is probable that there a number of other private sector initiatives that the authors have not discovered.

[9] Information from the NTC RESEARCH website, website: www.ntc-research.com

Chart 3.Official Quarterly GDP growth rates compared with NTC Monthly GDP aggregated to quarters



A Coincident Indicator for Lebanon

There have been no official GDP estimates for Lebanon for many years. Wars and civil unrest halted most statistical activities for nearly 20 years starting in the early 1970s. Although the country has experienced more than a decade of peace and economic progress since the 1991 *Ta'if Accord*, the Lebanese statistical institute has been reluctant to start work on national accounts until better basic statistics are in place. In the absence of official GDP figures, the

Lebanese central bank - Banque du Liban (BDL) - has published a *composite coincident indicator* for Lebanon since 1994 as a measure of overall economic development[10].
In 2002 the OECD was asked to advise the BDL on how this indicator could be improved as a measure of monthly GDP.

For several years the OECD Statistics Directorate has been constructing composite *leading* indicators (CLI) for its member countries[11]. These are designed to predict turning points in the growth rate of a target variable – the index of industrial production in this case - with a lead of about 6 months. The same techniques can be used to construct a composite *coincident* indicator (CCI) – i.e. one whose movements coincide with those of the target variable. Below we describe the various stages in the construction of a coincident indicator for Lebanon as recommended by the OECD Statistics Directorate. The Banque du Liban has recently revised its system and publishes what it now describes as its *New Composite Indicator*. The authors do not know in detail how far this new indicator is based on the OECD recommendations and so the description that follows should not be taken as the methodology of BDL's new coincident indicator.

1. Candidate variables
To select variables for a coincident indicator, the usual starting point would be to examine the relationship between the growth patterns of available monthly series and GDP. This was not possible in Lebanon and a candidate list of indicator series was drawn up by considering what kinds of monthly statistics usually coincide with the growth rates of GDP in other countries. Table 1 below lists the 11 statistics that were selected for possible use in the composite coincident indicator. Eight are quantitative statistics and three are described as "qualitative", that is they came from a business tendency survey conducted by BDL.

2. Data preparation
Cyclical indicators are normally used to monitor fluctuations in real output and to do this it is essential to use statistics expressed in volume terms or nominal value series adjusted for inflation.

A prerequisite for cyclical analysis is seasonal adjustment, which identifies and removes the regular pattern within a year to highlight the underlying short-term movements in the series. The candidate series were seasonally adjusted using X-12 ARIMA.

If the irregular pattern in the series is strong, the seasonally adjusted series may not be smooth enough to be easily interpreted. The seasonally adjusted series were adjusted for irregular movements using the *Months for Cyclical Dominance* (MCD)[12] moving average method. This method ensures approximately equal smoothness between series, and also ensures that month-to-month changes in each series are more likely to be due to cyclical than irregular movements.

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[10] The coincident indicator is published in the Monthly *Bulletin* of the Banque du Liban. The *Bulletin* is on the BDL web-site, www.bdl.gov.lb

[11] Composite leading indicators for OECD Member countriesd are published in *Main Economic Indicators*. See www.oecd.org/std/cli for a description of the methodology.

[12] MCD (Months for Cyclical Dominance) is defined as the shortest span of months for which the I/C ratio is less than unity. I and C are the average month-to-month changes without regard to sign of the irregular and trend-cycle component of the series, respectively. There is a convention that the maximum value of MCD should be six. MCD determines the number of months to be used for the moving average.

Table 1 gives the results of the seasonal adjustment and MCD tests on the 11 variables. The results show that seasonality was not detected in the series for petroleum products and cleared cheques, that the irregular component is very strong in the petroleum series, and that moving seasonality is present in the cheques series. Both of these series are rejected by the combined quality statistics. The export series is also rejected on the combined quality measure mainly due to disturbance from the irregular component. All other indicators show identifiable seasonality and pass the quality statistics. However, both the series on passenger flows and imports are rather irregular with MCD values of 8 and 7 respectively. For the time being, however, all the 11 series were retained for possible use in the CCI.

Table 1 Seasonal adjustment results (X-12 ARIMA)

	Time span	Pre-adjustment		ARIMA Model	Disturbance from irregular component	Identifiable seasonality		Combined quality statistics
		TRD	EAST	ID	MCD	Mov	Comb	Q value
Quantitative Indicators								
(1) Petroleum products	1993-August 2001	No	**Yes**	Fixed	**12**	No	**No**	**1.74**
(2) Electricity production	1993- August 2001	No	No	Fixed	4	No	Yes	0.61
(3) Cheques cleared	1993-August 2001	No	**Yes**	Fixed	1	**Yes**	**No**	**1.51**
(4) Cement deliveries	1993-August 2001	No	No	Fixed	5	No	Yes	0.45
(5) Passengers flows	1993-August 2001	No	**Yes**	Fixed	**8**	**Yes**	Yes	0.61
(6) Imports	1993-August 2001	No	No	Fixed	**7**	No	Yes	0.98
(7) Exports	1993-August 2001	No	No	Fixed	**12**	No	Yes	**1.32**
(8) MoneyM3	1993-August 2001	No	No	Fixed	1	No	Yes	0.36
Qualitative Survey Indicators								
(9) Production tendency in industry	1995-Quaretr 4 2000	No	No	Fixed	1	No	Yes	0.39
(10 Order situation in industry	1995-Quarter 4 2000	No	No	Fixed	1	No	Yes	0.27
(11) Sales volume tendency in commerce	1995-Quarter 4 2000	No	No	Fixed	1	No	Yes	0.28

TRD = Trading day regression
EAST = Easter adjustment
ID = ARIMA model selected from fixed set of 5 models
MCD = The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular component
Mov = Moving seasonality
Comb = Combined test for the presence of identifiable seasonality
Q value = Overall monitoring and quality statistics. The Q value is in the range 0 to 3 with an acceptance region from 0 to 1.

combined quality measure mainly due to disturbance from the irregular component. All other indicators show identifiable seasonality and pass the quality statistics. However, both the series on passenger flows and imports are rather irregular with MCD values of 8 and 7 respectively. For the time being, however, all eleven series were retained for possible use in the CCI.

3. Data transformation

In general, the aim of a coincident indicator in the context of cyclical analysis is to measure fluctuations in aggregate economic activity, with particular focus on turning points in economic activity. If the aim is to measure business cycles, then turning points in the *level* of the indicator is studied and if the focus is on measuring growth cycles, then turning points in the *deviations from the trend* of the indicator is of interest. For the BDL CCI, the focus is on measuring growth cycles and the candidate series were therefore transformed into deviations from trend. The trend was estimated by the *Phase-Average Trend (PAT)* method which consists essentially in connecting up the separate trends observed over past growth cycles[13].

[13] For a description of the PAT method, see Victor Zarnowitz and Ataman Ozyildirim, *Time Series Decomposition and Measurement of Business Cycles, Trends and Growth Cycles*, NBER Working Paper No; w8736, January 2002

The PAT-estimated trend was then removed from the seasonally adjusted series to give de-trended, or "ratio to trend" series.

4. Evaluation of indicators

The indicators to be included in a composite coincident indicator can be selected in at least two ways. One method is to select a set of indicators that represents aggregate output or the general cycle in a country without focus on the cyclical relationship between the selected indicators. A second method also starts from a set of indicators representing the general cycle but only the ones that show coincident behaviour among themselves are selected. This second approach was used here.

Cross correlations were calculated for the 11 indicators and the results are set out in Table 2. The table also gives the lead or lag at the peak-correlation values between the indicators in ratio to trend form.

Table 2 Cross-Correlation Matrix

Indicator	Petrol-eum	Electric-ity	Cheques	Cement	Passen-gers	Imports	Exports	Money M3	Produc-tion	Orders	Sales
		Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef	Lag (-) Coef
Petroleum		6 0.21	-7 0.37	**0 0.57**	-7 0.19	**0 0.55**	-6 0.51	8 0.34	**3 0.45**	7 0.60	6 0.35
Electricity			-15 0.21	-6 0.34	-13 0.37	-8 0.21	20 0.30	-6 0.54	11 0.35	11 0.27	11 0.38
Cheques				7 0.54	7 0.51	7 0.67	20 0.43	4 0.56	**-1 0.79**	-13 0.71	**2 0.90**
Cement					-7 0.30	**0 0.82**	-4 0.49	6 0.50	**-2 0.76**	-8 0.72	**0 0.69**
Passengers						5 0.38	15 0.51	1 0.29	-4 0.41	-15 0.55	**-1 0.47**
Imports							-5 0.47	6 0.38	-7 0.90	-8 0.66	**-3 0.90**
Exports								20 0.54	11 0.47	11 0.59	-15 0.68
MoneyM3									-5 0.30	-15 0.57	20 0.48
Production										-4 0.91	**3 0.94**
Orders											14 0.84
Sales											

In order to count as a coincident indicator the lead or lag must be short. In this case it was decided to select only indicators with a lead or lag of 3 months or less. In addition, the cross correlations must be reasonably good. The figures in Table 2 printed in bold indicate both a lead/ lag of 3 months or less and a cross-correlation of 0.45 or better. The indicators concerned are set out below:

Indicator	*Coincident relationship with:*
Petroleum products	Cement deliveries, imports and production tendency in industry
Cheques cleared	Production tendency in industry and sales volume in commerce
Cement deliveries	Petroleum products, imports, production tendency in industry and sales volume in commerce
Passenger flows	Sales volume in commerce
Imports	Petroleum products, cement deliveries and sales volume in commerce
Production tendency in industry	Petroleum products, cheques cleared, cement deliveries and sales volume in commerce
Sales volume in commerce	Cheques cleared, cement deliveries, passenger flows, imports and production tendency in industry

Of the eight quantitative indicators only three show coincident relationships with more than one of the other quantitative indicators, namely, petroleum products, cement deliveries and imports. Of the qualitative indicators, production tendency in industry and sales volume in commerce turn out to be the indicators with coincident relationship with most other series. The most striking result is for electricity production which shows no coincident relationships with any other series and with very weak correlation with all other series[14]. The result for the exports series also indicates no coincident relationship with any other indicator but a leading relationship with several of the indicators.

A second analysis of the cyclical relationships between the indicators was performed by investigating the dating of turning points among the indicators. The turning points dates produced by the PAT method are set out in Table 3. The results show clusters of turning points for most indicators in late 1994 to early 1995, in late 1995 to early 1996 and in late 1997 to early 1998. The spread of the turning points within these periods is large however, and several indicators show turning points over other periods in addition to these periods. In particular the series on electricity production and exports show a strong cycle over the period mid 1996/late 1996 which is not indicated for any of the other indicators.

5. Weighting the indicators

There are basically two ways in which the component indicators can be weighted to calculate the composite indicator – *unit* weights for all indicators or weights determined by *principal component analysis* (PCA).

Table 4 shows the weights obtained by PCA for different selections of the 8 quantitative series. The three qualitative variables are not included because the time series are too short. The PCA is carried out on ratio to trend series estimated by the PAT method. These series are standardised by first subtracting the mean and then dividing by the mean of the absolute values of the difference from the mean.

[14] In almost all countries there is a good correlation between electricity production and GDP. Lebanon is a special case because, during its disputes with Israel power stations in Lebanon have sometimes been targets by the Israeli airforce. As a result producers, and some households, have installed their own generating capacity and production from this source is only partly covered in the figures on electricity production.

Table 3 Indicator Chronologies: Turning Point Dates

Indicator	Turning points, Peak (P) and Trough (T)										
	T	P	T	P	T	P	T	P	T	P	T
Petroleum	10/93	5/95					12/98	6/99	4/00	12/00	
Electricity		3/94	8/95	4/96	12/96	8/98	8/99				
Cheques		12/94	4/96			2/98			12/00		
Cement	8/93	4/95			1/98	10/98	8/99			01/01	
Passengers	8/93	5/95	4/96			4/97					
Imports	3/93	1/95	4/96	12/96			10/99			01/01	
Exports	7/93	7/94	1/95	7/96	1/97	3/98	9/98	2/00	12/00		
MoneyM3		1/94	6/96			10/97	11/98	2/00			
Production			4/96			2/98					
Orders					4/97	3/98					
Sales			3/96			4/97	3/99				

Weights are then estimated by principal component analysis (PCA) on the standardised ratio to trend series for the eight quantitative indicators. The results of three calculations are presented in Table 4. The first calculation includes all eight indicators and the first principal component (PC) explains 0.38 per cent of the total variance in the indicators. This first PC shows very low weights for electricity production and exports. This is not surprising because the cyclical characteristics of these two indicators do not show coincident relationships with the other indicators as was noted in the previous section. These two indicators and the money supply indicator are excluded in the second PCA calculation, which includes the indicators with the highest weights in the first PC in the first calculation. All of the five indicators included in the second calculation show significant weights and the first PC with all indicators included explains 0.56 per cent of the total variance in the indicators. The indicator with the lowest weight in the second calculation (passenger flows) is excluded in the third calculation which shows an improvement in the first PC with 67 per cent of the total variance in the indicators explained.

Table 4 Principal Component Analysis (PCA) results

Indicator	PCA with 8 indicators Weights on First principal component	PCA with 5 indicators Weights on First principal component	PCA with 4 indicators Weights on First principal component
Petroleum products	0.16	0,19	0.23
Electricity production	0.02		
Cheques cleared	0.17	0.18	0.19
Cement deliveries	0.19	0.24	0.28
Passenger flows	0.11	0.14	
Imports	0.20	0.25	0.30
Exports	0.02		
MoneyM3	0.13		
Explained total variance	0.38	0.56	0.67

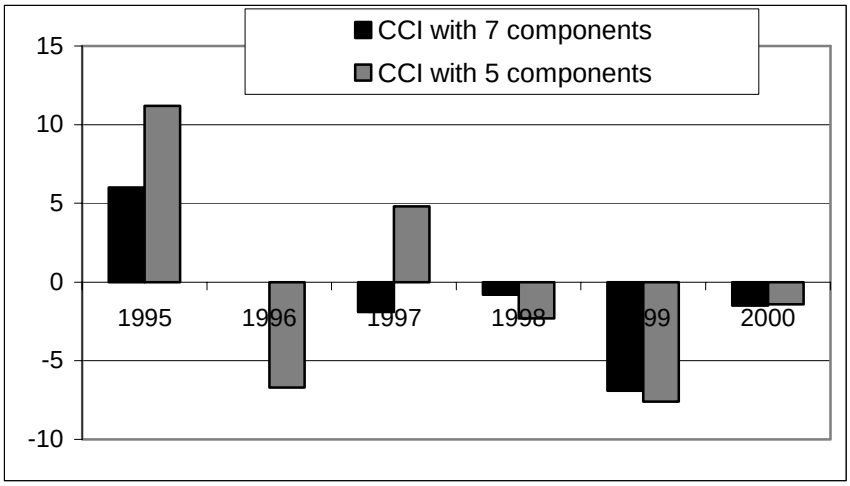
6. Alternative Composite Coincident Indicators

The evaluation methods and results presented above show that the indicators to be included in a CCI can be selected and weighted in different ways. A number of different CCIs were calculated using different combinations of the 11 variables and the alternative weighting patterns.

As regards weighting, it was found that there was little difference in the CCI whether unit weights were used or weights derived from principal component analysis. It was therefore decided to use unit weights. In other words the CCI was an un-weighted average of the deviations from trend of the component indicators.

As regards the choice of variables, the tests described above suggested that only five of the eight quantitative variables are reliable coincident indicators, namely: *petroleum products, cheques cleared, cement deliveries, passenger flows,* and *imports.* In addition, two qualitative variables, namely: *production tendency in industry* and *sales volume in commerce* could also be considered as good coincident indicators although they were only available for a part of the period. The OECD therefore recommended two CCIs – one based on the five quantitative indicators that passed the various quality test mentioned above and a second one which also included the two qualitative variables but which was only available for a shorter period. Chart 4 compares the two recommended CCIs. It is clear that the results are sensitive to the choice of components. In general the CCI with the larger number of components would be preferred but the real test is whether either CCI comes close to measuring fluctuations in GDP. This question will only be answered when and if Lebanon begins to estimate national accounts on a regular basis.

Chart 4. Year on year percentage growth rates of GDP based on alternative monthly Composite Coincident Indicators.



7. Growth Rates

Because the two recommended CCIs were constructed from de-trended data in order to isolate the cycle from the long-term trend. However, to monitor monthly GDP in terms of growth rates it is necessary to add back the trend. Cyclical indicator systems are normally constructed around a reference series or target series, where the trend is directly available, such as GDP or index of industrial production. As no target series is available, the trend has to be estimated from the series included in the composite coincident indicator.

Summary

- Efforts to estimate monthly GDP focus either on total GDP or GDP broken down by kind of activity. Although this may seem a rather limited objective, it is seen as a key indicator both by government policy makers and by economists and financial analysts in the private sector.
- Only five countries presently publish monthly GDP but there are some encouraging signs. The UN Economic Commission for Europe and Eurostat are both working with their member countries to reduce delays in the publication of national accounts. More important perhaps, private companies are entering what appears to be a profitable market for monthly GDP estimates.
- Official estimates are derived by what we have describes as either *indicator* or *econometric* methods. Commercial estimates use some innovative approaches such as combinations of both indicator and econometric methods and the use of results of business tendency surveys.
- Techniques developed for constructing composite *leading* indicators can be adapted to construct composite *coincident* indicators for tracking overall economic activity. Indicators of this kind have been developed by the OECD and the Banque du Liban and the methodology is described in the paper.