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**APPROACHES AND METHODOLOGIES USED
IN THE PREPARATION OF ECONOMIC PROJECTIONS
IN CARIBBEAN COUNTRIES:
DIFFICULTIES AND SUGGESTIONS FOR IMPROVEMENT**

PREFACE

The intent of this paper is to present an insight into the approaches and broad techniques used in forecasting and the difficulties faced in achieving robust and credible forecasts. The paper seeks to bring to the attention of those who can make a difference the major constraints to econometric forecasting. There is no lack of awareness of techniques. A lack of appropriate data that is born of a lack of understanding of the importance of data collection is at the heart of the problem. Copious data sets are needed for the modelers to gain important insights to the mechanism of the economy, so that they can at least achieve a closer fit between their estimates and actuality. The paper observes the unpredictability of a number of exogenous variables that are outside the control of the local economy but which impact significantly on small open economies such as the Caribbean economies. The paper underscores the need for governments to rectify their data collection, processing and integration regimes to provide the type of information that would be useful to a wide variety of studies.

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OUTLINE OF PAPER

This paper begins by presenting an insight into data quality and availability in the English-speaking Caribbean. It observes the need to utilize a tool to forecast the impact of government policy. Such ability would indicate to the planners the effect of their policies. The debate touches on data availability, quality, timeliness, periodicity of production and the development of relevant series to measure new phenomena. The data discussion deals with the prerequisites to the ability to forecast systematically. The paper presents suggestions for improving and modernizing the national information system.

Much of the source material derives from a publication of the Caribbean Centre for Monetary Studies (CCMS) of the University of the West Indies (UWI) at its St. Augustine, Trinidad, Campus¹. The paper has also benefited from the work of Dr. Patrick Watson².

The paper visits the work of Craigwell, Christopher-Nicholls, Leon, Nicholls, Walker and Watson³. The authors believe that there is much work to be done in macroeconomic forecasting in the Caribbean and discuss a structured approach to macroeconomic forecasting. A review of the macroeconomic models as built by Caribbean econometricians is made. The paper comments on the use being made of those models by Ministries of Finance, Planning and by Central Banks in the Caribbean today. The shortcomings of the models reviewed derive from an insufficiency of good data and a lack of data of periodicity less than one year.

¹ Problems and Challenges in Modelling and Forecasting Caribbean Economies, Caribbean Centre for Monetary Studies (1996), edited by Shelton Nicholls, Hyginus Leon and Patrick Watson.

² Forecasting the Trinidad and Tobago macroeconomy using a medium-size structural econometric model, P.K. Watson, 1998.

³ Reflections on Macroeconometric Modelling and Forecasting in the English-speaking Caribbean.

PART 1. HISTORY AND DESCRIPTION OF MODELS

1.1 Modelling – A short history

Macroeconomic modelling can be traced back to the work of Tinbergen (1939), Haavelmo (1944) and the Cowles Commission (1952). In the Caribbean, model building appeared on the scene much later. Persad, Gafar and Worrell presented early works on this theme in the 1970s. In 1990, the Central Bank of Trinidad and Tobago benefited from the work of Henry, Hilaire and Nicholls when it produced the Bank's first macroeconomic model of the Trinidad and Tobago economy.

In Trinidad and Tobago, the International Monetary Fund's (IMF) concern about data availability and quality led to the appointment of Kari Levitt to review the national accounts in the 1970s and put in place a more comprehensive system that would be the focus of all data-gathering exercises. An integrated approach to data collection was put in train but did not find a match in the availability of the data to fuel the system. In the 1970s Jamaica was at about the same level as Trinidad and Tobago in terms of the development of its statistical system although its National Accounts might have been in relative terms somewhat advanced.

In the Eastern Caribbean, the national accounts work of Carleen O'Loughlin and Eric Armstrong was maintained in the face of the increasing need to bring more data to bear on the national accounts and the need to forecast the impact of government policy. A project of the Organisation of Eastern Caribbean States (OECS) produced an improvement in the national accounts of that group of countries and created technical leadership at the Secretariat and some national capability by way of transfer of knowledge. The initiative in statistics has since been picked up by the Eastern Caribbean Central Bank (ECCB) with its assumption of responsibility for the National Accounts and other economic statistics. The Bank has, in addition, taken leadership in the promotion of the General Data Dissemination System (GDDS) of the IMF. To date, not much has been done at national level to develop economic forecasting models in the OECS countries. The CCMS is resolved to initiate macroeconomic forecasting for the CARICOM region. This comes at a time when efforts are being made in the international community to ensure closer monitoring of the national economies to avoid the surprises of the Mexican and Asian financial crises. The GDDS of the IMF, with support from the World Bank, is intended to increase the quality and transparency in the production of statistics and, by so doing, enable the monitoring of the economy on a continuous basis.

1.2 Models, their purpose and design

A model is an attempt to explain the mechanism of an economy through the use of equations and identities. It seeks to build a "maquette" of the economy. Since no one model can produce an excellent tracking of all aspects of the economy, it must be configured in response to the objectives as delineated by those who seek answers from it.

In a real world situation, the model builder must obtain a clear indication of objectives from policy makers who wish to use the power of the model to forecast the consequences of certain policies that are being contemplated. The model builder must ensure that he or she has a stock of equations that can be used at a moment's notice to configure a fine-tuned model that would suit the objective criteria of the policy maker. For instance, a model may be required to provide answers on the effect of (say) devaluation on government expenditure. The model builder must be just as prepared to reconfigure the set of equations in the model to throw light on debt management or other variables that influence the final effects of a devaluation or a variation in government expenditure.

Craigwell et al. identify **four considerations** that arise in the formulation of a macroeconomic model. The **first** is elaborating the theoretical and a priori notions that inform the linkages in the model. This sets the boundaries within which the model is expected to perform. The **second** consideration is to establish a mapping from possible theoretical latent variables to observable counterparts. At every step along the way there is the act of reducing to concrete and "explainable" terms variables that may not be capable of direct measurement, but which exert some influence on human behaviour. This step identifies indicators that may prove useful in the exercise. The **third** consideration is that of choosing appropriate functional forms. The determination of the functional relationships between the variables is what determines how the model will represent the effect of changes in any of the major variables in the real world. The essence of this step is to maintain a balance between the main variables, their individual orbits of influence and the more general and less quantifiable influences on behaviour. The **fourth** consideration refers to the size and composition of the model. This refers to the decision on the number and type of equations to be used. This is by and large dependent on the size and degree of elaboration of the data set(s) that are available to inform the understanding of the economy and which may be incorporated into the modelling of the behaviour of the economy.

One thing that is common to the constructors of models is the need to understand the mechanism of the economy through the examination of endogenous as well as exogenous variables. The extent to which a small open economy can dictate the movement of major determinants of economic and social behaviour impacts its ability to be proactive in its development. Small size and openness usually place the economy in a response posture in that it has to react to external stimuli, whether those be the rate of inflation in a major first world trading partner country or to new rules governing the conduct of foreign trade.

1.3 Forecasting the Trinidad and Tobago macroeconomy using a medium-size structural econometric model – by P.K. Watson

Watson sets out to forecast the key macroeconomic variables of Trinidad and Tobago. He believes that the model will be relevant to similar small, open economies. He constructs a medium-size structural econometric model of the Trinidad and Tobago

economy and evaluates it in terms of accuracy of prediction and the difficulties involved in using it to obtain forecasts. The structural econometric model (SEM) used by Watson is not small, neither is it linear. It cannot be criticized as being simplistic. It is, more accurately described, a medium-sized model with 138 equations of which 24 are behavioural and 66 are exogenous. Watson observes that the forecasting exercise involves four elements:

- (a) The econometric methodology to be employed;
- (b) The specification of the SEM, given the methodology being used;
- (c) Estimation and evaluation of the SEM;
- (d) The forecasting process.

The econometric methodology employed

After a discussion of several methodologies and the observation of their strengths and weaknesses, Watson opts for the application of Ordinary Least Squares (OLS) to the structural equations of his model, fully aware of the limitations of that approach. He outlines 5 steps that he follows in his methodology. These are:

- (a) The behavioural equations are specified on a priori economic grounds;
- (b) Each variable appearing in an equation was subjected to unit root testing;
- (c) Each equation was then subjected to the Johansen co-integration test to ensure that at least the variables appearing in the equation were co-integrated with economically meaningful parameter values;
- (d) Each behavioural equation in the model was then estimated by OLS and restrictions on the lags were imposed and tested;
- (e) After the model was estimated, it was solved and standard checks were made on its overall fit.

Watson observes that “few formal tests are available for large-scale non-linear dynamic models and evaluation should therefore proceed in a more informal manner than might be desirable in other cases”.

The specification of the Structural Econometric Model (SEM)

The author provides a profile of the economy and society, describing the size of its population, its main resources, the relationship between its main resource and its foreign exchange earnings and its dependence on the outside world. He describes the

role of the government in terms of its fiscal and monetary policies and its commitment to the maintenance of a stable exchange rate and moderate price levels. Watson describes his model as being “demand driven”. This characteristic does not derive from a lack of appreciation of the importance of the supply side of the economy. It is, rather, a reflection of the lack of data available for the construction of such a model.⁴

Watson explains the main purpose for which he constructed his model of the Trinidad and Tobago economy. The aim was to allow policy makers and planners to project future values of key endogenous variables in the system, on the basis of assumptions about the future path of the exogenous variables in the system. He targets as the main variables the following:

- ◆ GDP at constant prices;
- ◆ The unemployment rate;
- ◆ The retail price index;
- ◆ The nominal exchange rate.

In addition to the “real sector” variables listed above, he includes five main instruments of fiscal policy. These are:

- ◆ The Corporation Tax rate in the oil sector;
- ◆ The Sales Tax rate;
- ◆ Corporation Tax rate in the non-oil sector;
- ◆ Income Tax rate on individuals; and
- ◆ Tax rate on foreign trading activity.

He considers only one monetary policy instrument, that being the Treasury Bill Rate.

In the group of exogenous variables are some over which the government has some control, but there are others, such as the price of oil, over which no actor in the local economy has control. The chosen policy package and estimate of revenue are predicated on an assumption of the behaviour of this exogenous variable whose behaviour is subject to (sudden) change.

⁴ The author notes that even for the construction of the relatively aggregated model as presented in his document, the data available were only barely adequate.

Watson's model contains five interrelated blocs. They are represented and explained in the following table:

Table 1 - The five interrelated blocs of the model

Bloc	Description of bloc
Aggregate expenditure	Contains the identities and equations that elaborate the elements of the expenditure items on the production account. Includes a private investment function.
Balance of Payments on current account	The identities and stochastic equations explaining both import and export items provide us with the current balance. This feeds into both the aggregate expenditure and financial system blocs.
Public Sector	Includes the overall revenue-raising and expenditure activities of Public Authorities. Feeds directly into other blocs in the system, in particular the aggregate expenditure and financial system blocs.
Financial system	Categorizes revenue by sector of origin, eg. Oil or non-oil sectors.
Prices, Income, Output and employment	A collection of sub-blocs to explain prices entering the system. In addition, it explains the formation of income, output and employment in the oil, manufacturing, government and "other" sectors of the economy. Most important price determined in this bloc is the "exchange rate".

Estimation and evaluation of the model

The goodness of fit between the actual data and the simulated data was examined. On the basis of the Thiel inequality coefficient, U, the model performed well when one examines the following variables:

- ◆ GDP at market prices;
- ◆ The unemployment rate;
- ◆ The average exchange rate; and
- ◆ The Retail Price Index.

The model seems to have performed well and to have lent credence to the econometric methodology employed. Its internal consistency commends its use.

Having made this statement, one must hasten to bring to mind the admonition of Klein and Young (1980)⁵ that there is no correlation between goodness of fit of the individual equations and good simulation and forecast performance. They warn that emphasis on single-equation simulation criteria may be misplaced.

⁵ Klein, L.R. and Young, R.M. (1980) An introduction to econometric forecasting and forecasting models, Lexington Books.

The forecasting process

The author makes the point of the importance and unpredictability of important exogenous variables, such as the price of oil. He states, however, that the problem of projecting the exogenous variables does not invalidate the forecasting exercise. The great appeal of the model is the internal consistency that it brings to the forecasts⁶. The unpredictable (uncontrollable) nature of the exogenous variables can be taken care of by scenario planning in which forecasts are made on the basis of different scenarios, for example, by using differing projected prices of oil. The need for scenario planning underscores the importance of a full understanding of the mechanism of the economy and its sensitivity to different stimuli.

In answer to the question if it is worth the effort to construct and use a SEM, Watson points out that one major advantage deriving from its use is that the forecasting will be done in an internally consistent accounting framework. He cautions that even in the best situations of the use of well-chosen exogenous assumptions, the predictions made by the model will not be perfect. Large-scale macroeconomic models assume strongly that the future can be replicated from adequate knowledge of the past. This assumes structural constancy and long-run equilibrium in the economy and society that results in stability of behaviour that in turn produces foreseeable results. The situation in the Caribbean economies can hardly qualify for the large-scale model paradigm in view of their state of developmental fluidity, inadequate knowledge of the past and a perpetuation of the inadequacy of knowledge into present times.

1.4 Other macroeconomic models of other Caribbean countries: A review

Craigwell and others observe that there are few macroeconomic models for policy use or policy evaluation in the Caribbean. This no doubt derives from our fairly recently attained status of independent countries in charge of our own economic management.

The three categories of model are:

- ◆ Planning models;
- ◆ Estimated statistical models; and
- ◆ Judgmental models, such as those used by the IMF and Barbados.

The planning models are based on input-output relationships and use linear programming techniques. They require much detailed sectoral information. The estimated statistical models place emphasis on the sector composition and size. The

⁶ Watson points out that one major advantage deriving from the use of the SEM is that forecasting will be done in an internally consistent accounting framework. He cautions that even in the best situations of the use of well-chosen exogenous assumptions, the predictions made by the model will not be perfect.

judgmental forecasts are based on the forecaster's judgement. These latter have been experimented with in Barbados.

What follows below is a discussion of some of the macroeconomic models as built in the Caribbean. The presentation is on a country basis.

1.4.1 Jamaica

Several early efforts at macroeconomic model building range from Harris (1970) and Carter (1970) through Worrell and Holder (1984) to the United Nations Development Programme (1991). Whereas the purpose and type of the models varied⁷, the systems were Keynesian and annual data constituted the input into the model in each case. The estimating method was invariably either OLS or Two Stage Least Squares (2SLS). The models all had shortcomings as they failed to estimate at least one major determinant. For example, Carter's model did not estimate for the labour or financial markets. Worrell did not give consideration to the government and labour markets. The models all recognized the structural openness of the Caribbean economies and much emphasis was placed on the examination of international trade flows.

1.4.2 Trinidad and Tobago

Similar approaches to the models built for Jamaica are observed in the body of work pertaining to Trinidad and Tobago. The Trinidad and Tobago models are smaller than the Jamaican models as they possess a higher degree of aggregation of the data for Trinidad and Tobago. The Charles-St.Cyr (1992) and the Hilaire-Nicholls-Henry (1990) models surpassed the Jamaican performance through the generation of ex-post simulation and forecasting results. Joefield-Napier (1979) constructed the only model for a Caribbean country that was based on quarterly data. That model purported to explain aggregate demand. Its estimation method was OLS. With its emphasis on demand, the model omits the supply side. It does not make use of simultaneous equation techniques. One of the most interesting models on the Trinidad and Tobago economy was the one built by Charles and St.Cyr. This model attempted to analyze the responsiveness of policy variables on key macroeconomic variables using a modified Latin American Economic and Social Planning Institute (ILPES) model and an export-propelled model. One shortcoming of the export-propelled model was that it failed to consider the financial market.

1.4.3 Barbados

Model building began in Barbados after the efforts in Jamaica and Trinidad and Tobago. Craigwell et al believe that the relatively late start in that country led to better thought out approaches as the experience of the predecessor builders was taken on board. The Holder and Worrell model of 1979 attempted to describe the Barbadian economy

⁷ For a comprehensive overview of the models tried in the Caribbean, see Craigwell, Christopher-Nicholls, Leon, Nicholls, Walker and Watson, Problems and Challenges in Modelling and Forecasting Caribbean Economies.

using a monetary model and to explore Central Bank policy and its effects. Whereas the estimates were acceptable, some of the simulations did not track very well. A major observation of the model was that it was more or less static. The Galawish and Worrell (1988) and the Craigwell, Haynes, Walker and Worrell (1993) efforts combined econometric, accounting and judgmental frameworks to produce models that yielded medium-term forecasts and ex post simulations of some respectability.

1.4.4 Other models

The later efforts in Guyana and in the OECS follow the same vein as the models commented on above. The purpose for which the models were built reflects some appreciation of the perceived local economic problems.

1.5 Evaluation of the Caribbean models

Holder and Worrell observe:

*“... all these models were abandoned by their authors before they had captured sufficient interest to suggest adoption by policy makers and/or their critics... the models in general did not yield sufficient insight into policy issues of most vital interest to decision makers: exchange rates, fiscal policy, interest rates, central bank reserve requirements and exchange controls”.*⁸

The neo-Keynesian nature of the models with the emphasis on the demand side of the economy may have been the result of insufficient discourse among the model builders of the Caribbean region. The easy abandonment of the models may have occurred as a result of problems of data availability and quality that beset their builders in their efforts. The problem of data availability and quality has been the subject of much commentary in the past⁹. The Craigwell et al paper makes the point that the economist is not involved in the collection, compiling or assessing of statistics and may be ignorant of the sources and consequences of most of its errors. The logical next statement should be that the economist should align him/herself more closely to the data. Poor data or no data gave researchers little choice but to omit several important relations, particular functions related to the financial and labour markets. Data inputs of low quality have adversely affected the performance of the models.

1.6 The need for data and information to feed into the forecasting model

Statistical data as well as information are necessary for the researchers to gain an appreciation of the mechanism of the economy as a prerequisite to model building. With

⁸ Quotation taken from Reflections on Macroeconometric Modelling and Forecasting in the English Speaking Caribbean, Craigwell, Christopher-Nicholls, Leon, Nicholls, Walker and Watson (1996).

⁹ ECLAC has for some time been raising the problem of data supply. As recently as 1996 it conducted a seminar with the ECCB in St. Kitts on the topic of improving the data supply modality.

few exceptions, the statistical capabilities of the Caribbean countries are weak and result in the capture of a data set that is inadequate to monitor the economy in a comprehensive manner. The Statistical Office in each of the countries collects statistics. Some Caribbean countries also have a Central Bank that monitors monetary statistics and is in a position to comment on production, prices, external trade, employment, unemployment, the balance of payments and other such issues. In addition, several Ministries need data to monitor their work programmes that flow out of the Government's perspective plans and annual budgets. Many government agencies collect statistics for various purposes. The determination of what is to be collected, the periodicity of collection and other issues that impinge on quality and reliability are in most cases not in place. This leads to a situation in which there are multiple standards or no standards of data treatment. Quality of data and reliability suffer as a consequence.

The model builders should be regarded as critical users of statistics and should be included in the set of experts who meet to advise on the statistical mapping of the economy and society. In such a manner, their requirements can be made known and at best, catered for. The need for a panel with functions as suggested here is obvious and overdue. ECLAC is prepared to assist in furthering discussions as to what these panels should do and how their recommendations can be put into operation.

PART 2. DIFFICULTIES

2.1 Some common data problems

Most model builders do not themselves collect the data that they use. They usually come upon data that seem acceptable because of what they purport to be and use them in the model as if they were what they would like them to be. The result is an immediate loss of control over quality. It is more than likely that if the same exercise were replicated over time or space, the data collected would vary widely. Statisticians and model builders throughout the Caribbean are becoming increasingly aware of the need to monitor data quality as important inputs into their work. Increasingly one recognizes the need to standardize the data inputs not only over time within a country, but also over space, i.e. from country to country to maintain comparability. The recent additions to the expressed need for the creation of structured relational databases speak of the benefits of clearly defined data elements that can be grouped up to fit the concept or definition being employed in any given exercise. In the Caribbean, the challenge is therefore to arrive at a situation where completeness in data collection, adequate periodicity in recorded data and the evaluation of data for guidance to the public at large and to the model builder in particular are achieved. The Worrell and Holder comment on insufficiency of information on exchange rates, fiscal policy and other critical variables is valid. The mediocre performance of the models reflects the effect of a poor statistical and information base on the attempts to provide predictive instruments to the decision-makers. Quarterly data, for example, would form a significant input into forecasting

models in preference to annual data. The Subregional Headquarters of the Economic Commission for Latin America and the Caribbean (ECLAC) has devoted much energy to the discussion of the data problem and has been in the forefront of technical assistance to countries that wish to improve their data and information collection capabilities. ECLAC has convened two large meetings to discuss data quality and availability. In both meetings the planners were invited to gather first hand information on their data situations and to support the efforts of the statisticians who collected and treated the data.

Several commentators have written about the data deficiencies that present challenges to planners in the Caribbean subregion. Forde¹⁰ writes of the Trinidad and Tobago situation but her observations are valid for the other English-speaking Caribbean countries. Generally, to use the observation of Forde, the data situation in the Caribbean countries shows the following weaknesses:

- ◆ Lack of timeliness of data;
- ◆ Lack of new series to reflect new phenomena;
- ◆ Inadequate periodicity of recorded data;
- ◆ Insufficient data transformations;
- ◆ Short data sets; and
- ◆ Absence of forward-looking indicators.

2.1.1 Lack of timeliness of data

Time lags between data collection and the appearance of statistics are too long for any meaningful use as early warning systems. Model building must be facilitated by timely supply of data from all sources so that the model can benefit from matching and time relevant input data. Whereas it is possible for data from the banking sector to be made available with short periodicity, a similar possibility does not exist in the case of data on the real sector. The Central Statistical Office, the organization entrusted with the maintenance of this series, computes a key statistic –the GDP figure - annually. In some countries recent attempts to produce quarterly GDP estimates have led to an exercise that moves the (firm) annual GDP estimate by a series of quarterly indicators. The expectation is that these quarterly estimates (which are for the most part not published) will assist in the monitoring of the effects of government policies. In many countries the international trade statistics experience a time lag in appearance that robs any model of a vital bit of information whose unavailability at the time needed would introduce errors into any model being considered.

¹⁰ See Challenges and Problems in Forecasting Caribbean Economies: Some data issues, Dr. Penelope Forde in Problems and Challenges in Modelling and Forecasting Caribbean Economies, Caribbean Centre for Monetary Studies, 1996.

2.1.2 Lack of new data series

At issue here are two concerns:

(a) The maintenance and updating of present series. This would refer to the re-basing of index number series, the renovation of series, especially index numbers, to reflect more accurately a present day basket, and

(b) The introduction of new series to reflect the recognition and tracking of new developments in the economy and society

A number of series can be cited to bear out the assertions made above. As early as 1989 Forde identified a number of areas in which no data existed for Trinidad and Tobago. These were:

- (a) Concentration ratios,
- (b) Wealth;
- (c) Bankruptcy;
- (d) Rates of return;
- (e) Capacity utilization; and
- (f) Investment intentions.

The above-suggested series are important to the understanding of the dynamics of the contemporary business environment. They should be introduced as a matter of policy and be used to the benefit of planning.

2.1.3 Inadequate periodicity of recorded data

Most of the macroeconomic models of Caribbean economies are annual models. This is due to the inability of the major producers of statistics to produce quarterly, monthly or weekly statistics that would be more useful to the model builder. This inability is in large part reflective of the lack of resources or the inadequate management of resources to move on to shorter reporting periods. The networking that exists between the Central Bank of Trinidad and Tobago and the Central Statistical Office to produce quarterly GDP estimates serves as an example of what can be achieved when two or more organizations decide to pool resources for the national good. The same type of networking that has taken place between the Central Bank and the Central Statistical Office of Trinidad and Tobago is possible between the Central Statistical Office (CSO) and a number of key ministries, such as the Ministry of Agriculture, the Ministry of

Education, etc. For this to materialize, fundamental change in the data gathering and analysis paradigm must take place.

2.1.4 Insufficient data transformations

Apart from the transformation of nominal series to constant price series in the GDP figures on a sector basis, the other views of the GDP are not available in real terms. This leaves the field wide open for users of data to create their own series with methodologies that may not be as rigorous as they should be. Seasonal adjustments are not done in a large number of statistical offices, impairing proper analysis of production or some allied measures of production that are sensitive to, for example, the number of working days in a month.

2.1.5 Short data sets

For many of the economic data sets the start of the series is around the mid-1960s. Most of the series are annual. This means that for the majority of series there are only a bit more than thirty data observations. The fact of short time series may not be negative. It may reflect the emergence of new areas of activity or a break in series because of substantial revamping of the methodology.

2.1.6 Absence of forward-looking indicators

The rapidity and fundamental nature of change, usually explained by drastic changes in the rules of the game, has rendered historical data less valid as a guide to the future than had been the case in the past. Leading indicators have been linked to knowledge of the business cycle to predict behaviour in the economy on the basis of observed lagged relationships. There is need for more research to identify lags and leads in the behaviour of economic indicators. This will improve the monitoring and early prediction of events in the economy. Data collection agencies should work with the research units to identify and collect data on such early warning systems.

PART 3. SUGGESTIONS FOR IMPROVEMENT

3.1 Confronting the data supply and quality problem

Craigwell and others were correct when they observed that there were few macroeconomic models for policy use or policy evaluation in the Caribbean. The reason that they proffered for this fact (...“deriving from our fairly recently attained status of independent countries in charge of our own economic management”) cannot continue to be made. The countries have gained their independence for some time and must now look forward and not back. The countries’ status of being in charge of their own destiny would suggest that they create the necessary infrastructure that would support activities that are necessary to ensure their future development. The lack of data is a direct result of insufficient investment in information for national development. The data deficiencies that hinder the success of the forecasters reflect a lack of appreciation of verifiable indicators of performance and forecasts.

Data cannot be produced by accident. Somewhere in the minds of the policy makers there must be an appreciation of the need for certain bits of information, either now or in the future, that will signal the need for that information to be collected. The obvious underutilization of macroeconomic models in the Caribbean has no doubt in turn hindered the planning process and probably the development process and path. The lack of meaningful information on the economy and society means that our planners are navigating in the dark and are subjected to the consequences of so doing. The lack of good data in the form and periodicity needed for modelling has resulted in the abandonment of the models by their constructors. This outcome has meant that the countries and the people of the Caribbean have lost an opportunity to develop because of the lack of a positive official stance on the collection of data. It also means that the people of the Caribbean have lost the opportunity to get to know their countries and themselves better through key databases and models that can be tested empirically.

It is the duty of the Ministry of Planning to put in place the data sets necessary to facilitate planning. In this context, the importance of data collection becomes immediately obvious. The Ministry of Planning must ensure that the human resources available to it either directly (within the Ministry) or indirectly (elsewhere in the Public Service) produce the required data with maximum efficiency. This would result in networking among government ministries to collect data. This would mean that first of all there must be a national policy on information and statistics and a will to collect data as economically and as efficiently as possible. It would appear advisable that the data collection initiative be led by an agency with acknowledged expertise in the collecting and handling of statistics. The author’s suggestion would be the national statistical office.

Any attempt to rectify the data supply problem must contemplate reengineering aspects of the public service. It should recognize the advantages of the process approach

to the present functional approach that tends to produce little ministerial kingdoms and islands of information to the detriment of the nation as a whole.

In the study entitled **Civil Service 2000 Revisited**, Cameron and others make the point that the civil service will have to follow the private sector and do the following things, among others:

- ◆ Re-engineer processes and redesign jobs;
- ◆ Change attitudes of managers and employees to make continued improvement of work processes a shared responsibility;
- ◆ Reduce the ranks of middle-level managers and place additional self-management responsibilities on employees;
- ◆ Expand the range of duties and multi-skilling;
- ◆ Maximise automation and IT to assist those whose work is primarily analytical in nature.

The World Bank in its discussion of Public Sector Modernization in the Caribbean¹¹ identifies the problem of the public sector in most countries as one of ineffectiveness and inefficiency in the performance of many of its tasks. This assessment is in accord with the conclusion of a survey on the CSO conducted among users and producers of statistics and which has formed the basis of a study conducted by this author¹². The Bank advises that a public service reform programme should be government-wide in its strategic conception. Any attempt to re-engineer processes in the CSO, and by extension the government sector, must also be wide enough to impact on its value chain and utilize the new processes that may have been put into place in other parts of the government service.

Both studies recognize the need for re-engineering in the Public Service to secure for the country an improved data set for the widest possible effective use. An acceptance of the need for re-engineering carries with it the commitment to view networking and sharing of information across ministerial divides as of prime importance.

¹¹ Public Sector Modernization In The Caribbean, World Bank, Caribbean Division, April 1996.

¹² Leading issues in the modernisation of the statistical services in a small open economy in the throes of structural adjustment ... the case of the Central Statistical Office of Trinidad and Tobago, Lancelot A. Busby, unpublished MBA dissertation, June 1997

3.2 A process map for the government sector

Hammer and Champy¹³ discuss the process map in the hunt for re-engineering opportunities. Their example was the process map for the semiconductor business of Texas Instruments. The artifact of the process map is considered to be applicable to the Public Service. Hammer and Champy demonstrate that there are at base relatively few processes in any business. Whereas one has become accustomed to viewing organizations as agglomerations of (functional) sections, the process map demonstrates the flows that trace the product from the concept stage to the supply stage. Of interest is the graphical presentation of the point made by Davenport¹⁴ of the importance of information and IT in process innovation. The flow lines between Strategy Development, Information Processing Capability Development and order fulfilment demonstrate the importance of Information processing (and Technology) in the scheme of things. This process map in fact covers the work of the entire organization. To the extent that the processes depend on a resource market and a customer market, the work of the data-gathering ministries is seen to be a part of a larger public, private and household sector picture, which must be well coordinated to maximise outputs.

The process map is the invisible mechanism behind the familiar organizational chart that describes functions. The background mechanism is in fact cross-functional. This working across functions is precisely what the reengineering paradigm seeks to ensure.

3.2.1 Cross-functionalism – What does it mean?

Cross-functionalism is the approach to work that focuses on the national as opposed to narrow ministerial or departmental goal. It therefore brings together people from different organizations (ministries) to solve a particular problem and then disbands the problem-solving team at the end of the exercise.

3.2.2 User demand as a driver of change

One may conclude, thus far, that insensitivity to user demand is one of the shortcomings of the Government information apparatus. If all of the data-gathering entities in the government sector could come together to present their data requirements, it would be possible to streamline the following:

- ◆ The collection of the data;
- ◆ Clarification of the general thinking surrounding data collection;

¹³ Hammer and Champy, *Re-engineering the Corporation*, Harper Business Books, 1993

¹⁴ Davenport, Thomas, *Process Innovation: Re-engineering Work through Information Technology*, Harvard Business School Press, 1993

- ◆ Agreement on concepts, definitions and periodicity of data collection; and
- ◆ Encouragement of high standards of interpretation of the data.

The data plans of such a forum should be presented to a meeting of users and producers of statistics. The modellers will have the opportunity to present their data requirements. At that forum, the data challenges as outlined by Forde and presented earlier in this paper can be addressed. Table 2 below is a preliminary listing of some of the data sets that must be collected, and in greater detail, to meet the needs of the various interest groups in the society. Forde's list will find a place in the discussion that will amplify the table presented below as an example of the data demands that should emerge.

Table 2
Broad demand for statistics by major user group and nature of thrust

User group	Nature of thrust	What are the statistics demanded
Government	Planning thrust	National Accounts, estimates of GDP, Savings, Investment, Production, expenditure, income, prices, volume and value of external trade, competitiveness, business statistics, demographic statistics Note: All series above are macro. Of absolute importance are the supporting data that go into the production of the macro data. Government will also require good social statistics to monitor changes in quality of life as measured by a number of indicators.
Private Sector	Marketing thrust	Demographic statistics to assist in market analysis, national accounts, production, savings, investment, income and its distribution, small area data, external trade statistics at product level and at times at a level finer than that yielded by the HS or SITC classification (Item within Classification). Competitive analysis of exports and imports by country of origin, retail sales index. Statistics analyzing the health of the business sector.
Academia and Research Institutions	Analytical thrust	All of above for analyzing the economy in the light of government policy enactment. Coverage of all major variables in the economy and society for purposes of model building.
Household sector	Information thrust	Price statistics, demographic statistics, health statistics, crime and justice statistics, analysis of real progress at the local level, poverty statistics.

New strategies for the organization of work will emerge from discussion. Successful implementation of work redesign is a social process and will not take place overnight. The process involves the adjustment of concepts, definitions, classification and coding schemes, standards of data collection and periodicity of entry into the field to collect data. It is, however, most desirable that the process be embarked on and encouraged. Most initiatives of this nature need the active and open sponsorship of an appropriate leader in society. Coping mechanisms must be put in place to secure the support of functionaries at every level in the hierarchy and eliminate negativity in the approach to the new data cooperation paradigm.

PART 4. CONCLUSION

There is a very important role to be played by macroeconomic modellers who must be given every encouragement to continue their research. Data of vastly improved quality, shorter periodicity and regularity and timeliness in production will fuel a new drive on the part of the modellers. The benefit of this approach will be a keener knowledge of the mechanism of the economy and society and better forecasting tools that can be used in sensitivity analysis that may be used when major monetary, fiscal or exogenous policy decisions are being contemplated by the Administration.

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