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An Integrated Macro-Model for the Caribbean Sub-Region.

SUMMARY

The objective of this paper is to calculate a simple integrated macro-model for the Caribbean Subregion. Using a homogeneous data set that runs from 1980 to 1991 for a sample of 12 countries in the sub-region, and a fairly simple model with non-controversial specifications for the structural relationships, we generate a representative and consistent group of estimates for a given set of parameters in a pooled and in individual countries' estimations.

INTRODUCTION

The research area of macroeconomic modeling[1] for developing countries, in spite of all recent developments, still lacks harmony and consistency, both in a methodological and in an empirical level. On the methodological side, the assumptions used vary widely, regarding even some basic elements like the determination of both aggregate supply and demand, the features of the trade and exchange rate regimes, the degree of capital and labor mobility, of real wage flexibility, plus some of the more traditional controversies in macro modeling, like the adequate modeling of the agents' expectations. On the empirical side, dissent rages about the general specification of models and the parameters' representative values.

In the Caribbean sub-region, this general problems are compounded by the scarcity both of available data and of modeling attempts, not just for the sub-region as a whole, but even for its individual countries. Only some of the major countries have made any meaningful efforts in the area of macro modeling[2]. The objective of this paper is to begin to fill this gap.

Using a homogeneous data set for a sample of countries in the sub-region, and a fairly simple model with non-controversial specifications for the structural relationships[3], we will try to generate a representative and consistent group of simultaneous estimates for a given set of joint parameters for the sample of countries as a whole and forecast the short term value of these parameters. A fairly simple model can supply both national governments and national and regional agencies with a powerful tool to reliably forecast the short term value of some key macro economic variables, therefore providing an essential information set that facilitates basic policy decisions, like the choice of adequate economic policies in the short run.

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[1] A comprehensive description of the state-of-art at the economic growth modeling area is at Barro, R. & Sala-I-Martin (1995) and a very good discussion of the most recent controversies can be found at Clements, M. & Hendry, D. (1995).

[2] See Hilaire, A. at alli, 1990; Ganga, G., (1990); Worrel, D. & Holder, C. (1987); Boamah, D. (1982); ECLAC(a), (1991); Joefield-Napier, W. (1979). A special mention should be made about some recent attempts by the World Bank (See World Bank, 1994, (a) and (c)), due to it's scope and dimension and about the book by Nicholls, S., Leon, G. and Watson, P. (Nicholls, S., Leon, G. and Watson, P., 1996), published after the completion of this work, and which provides a very updated and comprehensive description of the subject.

[3] Haque, N., Kajal, L. & Montiel, P. (1990).

THE DATA SET AND THE MODEL

-The Data Set

The 12 countries selected for the pooled model (for a pooled model application, see Vinhas de Souza, 1997 an 1996(a)) were: Bahamas, Barbados*, Belize*, Dominica**, Dominican Republic, Grenada**, Guyana*, Jamaica*, Saint Kitts & Nevis**, Saint Vincent and the Grenadines**, Suriname* and Trinidad & Tobago*[4]. The period covered by our data goes from 1980 to 1991. The basic criterion used in this selection was data availability, and the main source of data used was the 1995 edition of the IMF's "International Financial Indicators Yearbook", complemented by data from several national institutions and international organizations, including the Central Bank Reports and Statistical Digests from the Bahamas, Barbados, Jamaica, the Netherlands Antilles, Trinidad and Tobago, plus data from the ECCB and ECLAC.

-The Model[5]

The model used is a variant of a classical Mundell-Fleming formulation, with one domestically produced good consumed both at home and abroad and one exported commodity[6]. Home country is price-taker in terms of its demand for imports, which takes place under external constraints, but it holds a degree of monopoly power on its exports output. Investment, domestic interest rate and the current account are set endogenously in the model. Dynamics are generated by partial adjustment processes and by forward-looking expectations. The set of reduced behavioral log-linear equations used in our estimations were:

$$(1)\ \log C_t = \alpha_0 + \alpha_1 r_t + \alpha_2 \log C_{t-1} + \alpha_3 \log Y_t^{\,d} + \alpha_4 \log Y_{t-1}^{\,d}$$

$$(2)\ \log (Y/L) = \beta_0 + \beta_1 (K_t^{\,I} - \log L_t) + gt + \beta_3 (Y/L)_{t-1}$$

$$(3)\ I_t = \gamma_1 (r_t - r_{t-1}) + \gamma_2 (Y_t - Y_{t-1}) + \gamma_3 I_{t-1}$$

$$(4)\ \log X_t = \delta_0 + \delta_1 \log \delta_t P_t^{*}/P_t + \delta_2 \log Y_t^{*} + \delta_3 \log X_{t-1}$$

$$(5)\ \log Z_t = \varepsilon_0 + \varepsilon_1 \log \varepsilon_t P_t^{*}/P_t + \varepsilon_2 \log Y_t + \varepsilon_3 \log R_{t-1}/P_{t-1}^{\,*} Z_{t-1} + \varepsilon_4 \log Z_{t-1}$$

$$(6)\ \log (M_t/P_t) = \theta_0 + \theta_1 i_t + \theta_2 \log Y_t + \theta_3 \log Y_{t-1} + \theta_4 \log (M_{t-1}/P_{t-1})$$

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[4] Countries marked * are CARICOM (Caribbean Common Market) member countries, and the ones marked ** are OECS (Organization of Eastern Caribbean Countries) member countries.

[5] This section follows closely Haque, N., Kajal, L. & Montiel, P., ibid.

[6] Data limitations prevent the use of a more desaggregated specification.

The first equation represents the aggregate consumption function[7], where C_t is real private consumption expenditure, r_t represents the real domestic interest rates[8], Y_t^d is the real disposable income (defined as GDP plus earnings on net assets held abroad, minus interest paid on domestic debt and taxes). Coefficient α_1 is a test for the short-run interest elasticity of consumption, coefficient α_2 for the permanent income hypotheses with no liquidity constraints, coefficient α_3 for the hypotheses of liquidity constraints among some households in a developing sub-region like the Caribbean and coefficient α_4 is a test for the length of the time horizons of non-liquidity constrained households.

The second equation represents the aggregated supply function, and is based on a classical Cobb-Douglas specification with complete wage-price flexibility[9]. Data on capital stock is extremely scarce in the Caribbean -virtually non-existing for most countries- so the capital stock series -K_t^I- is actually a proxy based on gross investment flows -gross fixed capital formation- according to the following equation

$$K_t^I = \log 2 + 1/2 \sum_{i=0}^{t-1} (1-\delta)^I I_t^I + t/2 \log (1-\delta)$$

δ, which represents the rate of depreciation, was set at 0.1 (10%). Imposing constant returns to scale, we get

$$\log (Y/L) = \alpha_0 + \alpha_1 (K_t^I - \log L_t)$$

The two other additional terms in this equation represent technological progress -expressed by the time trend gt- and a lagged adjustment process.

The third function is a standard investment equation, first differentiated to eliminate the capital stock variable. The remaining terms are the real interest rate and the real output.

The fourth function is the exports equation, with an also standard specification[10]: the first term represents the real exchange rate, the second the external demand -an index of world output- and the last one a lagged adjustment process.

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[7] This specification was based in Blinder, A. & Deaton, A. (1985).

[8] Forecasts had to be made for Suriname and the Dominican Republic for part of this series, based in the following specification: $i_t = \alpha_1 + \alpha_2 Y_t + \alpha_3 P_t + \alpha_4 i_{t-1}$, where Y is the GDP, P is the consumers price index and I is the lagged domestic interest rate.

[9] See Solow, R. (1957).

[10] See Goldstein, M. & Khan, M. (1985).

Similarly, the fifth function is the imports equation[11], also with an standard specification: the first term represents the real exchange rate, the second the real domestic demand, the third represents the external constraint faced by many developing economies -via a reserve/imports ratio- and the last one a lagged adjustment process.

The sixth and last one represents the real money demand equation, with a variable for real domestic demand and a lagged adjustment processes and with i_t -the domestic interest rate- set exogenously to the model[12].

[11] Goldstein, M. & Khan, M., ibid.

[12] This formulation deliberately avoids the modeling of the essential question concerning degree and role of capital mobility in the Caribbean economies. This decision was taken due to data difficulties -the absence of series on future values of exchange rates- and theoretical questions -the lack of consensus on the adequate assumptions about the parameters- and aims to simplify the structure of the model.

MODEL ESTIMATION

-Method of Estimation

The use of a pooled estimation model always implies the question of country heterogeneity. The approach used to deal with this question was to estimate three different types of pooled estimations:

-a pooled one, which assumes that the sample has single intercept and a single set of slopes, given by $\square_{it} = \square_{it}\ \square + \square + \square_{it}$;

-a fixed effects one, which assumes that the sample has a single set of slopes but that each data unit has its own intercept, i.e., the intercept captures the country heterogeneity, given by $\square_{it} = \square_{it}\ \square + \square_i + \square_{it}$. This is the usual approach in most estimations of this kind, either through the use of the intercept or through the use of a country dummy;

-a random effects one, which assumes that the sample has a single set of slopes and that each data unit has its intercept draw from a common distribution with a mean $\square$ and a variance $\square^2_{\square}$. In this estimation, the intercept captures part of the country heterogeneity, and the remaining is expressed in the error term, which has the specification $\square_{it} = \square_i + \square_t + \boldsymbol{n}_{it}$, where $\square_i$ is the individual effect, $\square_t$ is the time effect and $\boldsymbol{n}_{it}$ is the purely random effect. The estimates for this GLS (Generalized Least Squares) model are consistent and asymptotically efficient, *if the individual intercept of each data unit is not correlated with its independent variables*.

We also estimated a model in which both intercepts and slopes vary among data units, what amounts to a single individual estimation for every country, given by $\square_{it} = \square_{it}\ \square_i + \square_i + \square_{it}$, and the used the results of this estimation in a F-test of restriction of equality of coefficients (slopes and intercepts) of this model against the pooled and the fixed effects models' coefficients. We also estimated the same F-test between the fixed and random effects models[13].

[13] This amounted to the testing of a set of J linear restrictions upon the coefficients, given by $g\hat{} = (R\square\hat{}\hat{} - r)' (RCR')^{-1} (R\square\hat{}\hat{} - r)^d \rightarrow \square^2_{(J)}$, that has as null and alternative hypothesis, respectively, $\square_0$: $R\square = r$; $\square_1$: $R\square \neq 0$ and being the null hypotheses rejected for values of g greater than the critical value of the distribution $\square^2_{(J)}$ for a pre-chosen significance level (0.05%).

List of Variables

Aggregate Demand Equation	
C	Constant
IR	Real Domestic Interest rate
LTCL	Real Private Consumption Expenditure
LYD	Real Disposable Income
LYDL	Real Disposable Income Lagged
Aggregate Supply Equation	
KS	Capital Stock
TIME	Time Trend
LYLL	Aggregate Supply Lagged
Investment Equation	
IRD	Real Domestic Interest Rate
GDPD	Real Output Lagged
IL	Investment Lagged
Exports Equation	
LXR	Real Exchange Rate
LYX	External Demand
LXL	Exports Lagged
Imports Equation	
LXR	Real Exchange Rate
LGDP	Real Domestic Demand
LRL	Reserves Level
LML	Imports Lagged
Money Demand	
IR	Domestic Interest rate
LGDP	Real Domestic Demand
LGDPL	Real Domestic Demand Lagged
LMOL	Money Supply Lagged

-Results of Estimations

The results of our estimations are given by the table below:

Aggregate Demand Equation				
Variable	Expected Sign	Pooled Estimation	Fixed Effects	Random Effects
R^2		0.99	0.9	0.99
C		.005 0.09		-.07 -.93
IR	-	.002 2.2*	.24 2*	.003 2.9*
LTCL	+	.96 102*	.85 14.7*	.95 65.4*
LYD	+	.36 5.9*	.43 7*	.37 6.5*
LYDL	+	-.31 -4.9	-.12 -1.6	-.31 -5.1
Aggregate Supply Equation				
R^2		0.99	0.86	0.98
C		.064 .9		-.02 -.17
KS	+	.3 1.8*	.07 .75	.04 1.14
TIME	+	-.0003 -.69	.015 2.95*	.0001 .1
LYLL	+	.98 167.9*	1.13 21.2*	.99 86.7*
Investment Equation				
R^2		0.99	0.98	0.99
C		-.9 -.05		-6.1 -.27
IRD	-	3.78 2.54*	4.3 2.82*	3.9 2.8*
GDPD	+	.32 34.7*	.29 18*	.32 30.9*
IL	+	1 41.9*	1.1 20*	1 35*

Exports Equation				
Variable	Expected Sign	Pooled Estimation	Fixed Effects	Random Effects
R^2		0.98	0.79	0.97
C		1.21 1.3		1.25 1.4
LXR	+	.23 6.72*	.3 5.8*	.23 6.2*
LYX	+	-.26 -1.3	-.35 -1.7	-.26 -1.3
LXL	+	.96 80.8*	.79 13.7*	1 64.6*
Im ports Equation				
R^2		0.98	0.86	0.94
C		-.11 -1.3		-.08 -.5
LXR	-	.2 5.7*	.12 2.5*	.19 5.5*
LGDP	+	.01 .28	1 5.7*	.13 2.1*
LRL	+	-.02 -1	.004 .17	-.01 -.3
LML	+	1 57.2*	.7 12*	.9 -.5
Money Demand				
R^2		0.99	0.88	0.99
C		.06 1		.08 .8
IR	-	-.003 -2.4	.00001 .07	.002 -1.3
LGDP	+	1.9 7.5*	1.9 4.6*	1.7 6*
LGDPL	+	-1.9 -7.3	-1.6 -3.4	-1.7 -5.8
LMOL	+	1 119.2*	.8 14.3*	1 84.8*

*=significant at the 5% level.

As we may see from the results, all the equations have high R^2 and most of the variables are significant and from the expected signs.

In the case of the Aggregated Consumption Equation, the variable for the interest rate elasticity in consumption is significant but positive in all model, albeit with a small coefficient, except for the fixed effects model. This may be explained by an interest rate administratively set and negative in real terms, as was the rule in most of the Subregion during the period in question. The variable for the permanent income hypotheses is strongly significant and has the right sing for all models, as is the variable for disposable income. The variable for lagged disposable income is not significant and has the wrong sign in all models. This also supports the hypotheses that the average household in the Subregion is liquidity constrained and has a very short time horizon on financial terms.

In the aggregate supply function, the proxy for capital stock -KS- was significant only for the pooled estimation. The others -albeit the right sign- are non-significant and have very small coefficients. The proxy for technological progress is significant only in the fixed effects model, and with a relatively small coefficient, albeit the right sign in all of them. This indicates the lack of a clear, sustained trend of technological upgrading in the Subregion. The only variable systematically significant was the lagged investment variable. That indicates that this specific endogenous variable probably could be adequately forecasted in the short run by a simple ARIMA specification.

As reasons for these results, we may consider the fact that most of the countries in the Subregion rely heavily in foreign direct investment and official flows for their gross capital formation -in some cases, over 50% and that the majority have their productive structures dominated by sectors -the primary and tertiary- which are not particularly capital intensive.

In the case of the Investment Equation, the variable for interest rate is significant for all of the models, but has the wrong sign and its coefficient is suspiciously high. The investment lagged is also generally strongly significant and has the right sign. The variable representing real output is also strongly significant and has the right sign.

Some of the possible explanation for these have been already listed for the Aggregate Demand and Supply Equations. Investment in the Subregion is heavily dependent on external flows, both private and official, which are not affected by the domestic interest rate. We can add that most of the Caribbean economies were until recently almost textbook cases of financial repression[14]:

[14] For a definition of financial repression, see Gurley, J. & Shaw, E., 1983.

several of their domestic financial system allocated credit on an administrative basis and under heavily negative real interest rates, and that the ownership structure in the economy -specially in the primary and tertiary sectors- is a mix of "traditional" and "modern" firms, in which the access of the "traditional" set to market financing is limited, leading them to rely heavily on non-market forms of financing, what is another indication of financial repression.

In the case of the Exports Equation, the variable for exchange rate is significant and has the right sign in all the models, but estimated coefficient for the world demand proxy is not significant in all the models, and all have the wrong sign. The variable for lagged exports is significant in all the models and has the right sign. These results may be due to the facts that the Subregion exports are dominated by preferential trade schemes, like the Lome Agreement, the Caribbean Base Initiative, or the US Sugar Quotas, and specific quotas are actually administratively set for some major primary products (sugar, bananas).

The results for the Imports Equation show that the variable exchange rate is significant in all the models, but has the wrong sign in all of them, the variable for real domestic demand has the right sign in all the models but is not significant for the pooled estimator model, none of the models have a significant reserve constraints variable and two of them have the wrong sign, while the lagged imports variable is significant for two of the models, but has the right sign for all of them.

Some of the reasons for these results are the same as for the previous equation. The existence of preferential trade flows, which allows for a certain degree of stability on the hard currency flows generated by exports, specially with the help of the Lome Agreement stabilization funds -STABEX and STAMIN, plus the importance of foreign inflows, both private and official, have reduced the importance of the reserves constraints for these economies. Also, administratively set and differentiated exchange rates, which existed in some countries in the Subregion during the period, may partially explain the results for the exchange rate.

In the case of the Money Demand Equation, the previous results for the domestic real interest rate reappear, which indicates the need for complete financial liberalization: the variable for the domestic interest rate is not significant in all the models and has the wrong sign in two of them, and the coefficients are very small. The variable for current real domestic demand has the right sign in all of the models and is significant in all of them, but the variable for lagged real domestic demand is not significant and has the wrong sign in all the models, what a again lends support to the notion of liquidity constrained households. The lagged money demand variable is strongly significant and has the expected sign for the models.

Generally, the results were very satisfactory. The models generated a set of consistent,

asymptotically efficient and representative estimates. Most of the coefficients were significant, had the expected signs and the explanatory power of the regressions -the R^2- were very high.

Nevertheless, we must also note that the of *all* the F tests indicate the rejection of the null hypotheses, i.e., of coefficients equality between the individual estimation and the pooled and fixed models, and equality between the fixed and random effects model. These results may indicate that the random effects model is the one that most adequately represents the results from a individual country estimation, which is in accordance with the theory. To verify that, a Hausman test[15] of random versus fixed effects in panel data was realized. The results of this test indicate, once again, the random effects model as the probably most adequate aggregate modeling alternative for individual countries' regressions[16].

[15]A Hausman test verifies the equality of two set of estimations, $\beta_1\hat{}$ and $\beta_2\hat{}$, in which $\beta_1\hat{}$, the most efficient estimator is compared with the less efficient one $\beta_2\hat{}$. If the model specification is correct, $\beta_1\hat{}-\beta_2\hat{}$ will tend to zero.

[16]The single exception was the Investment Equation, also the single equation that failed to reject the null of equality between the pooled and fixed effects estimations. In this case, a specification with common slopes could be an adequate modeling alternative, may be due to the reliance of the Subregion on external capital flows and the eventual similar perceptions and constraints of the investors toward it.

CONCLUSIONS

The general results for our estimation were mostly satisfactory. We may assume the estimators generated as representative for the countries in our sample. The reliability of the model was tested by "forecasting backwards", which generated values for the endogenous variables within a +/-0.01 and +/-0.02 from the real variables, as would be expected from the R^2 from the equations. Nevertheless, some specificities of the Caribbean economies are not adequately represented in the standard specifications of growth models[17], which is compounded by the usual problem of lack of reliable and updated data. The modeling of the specific regulatory hurdles, specially financial, still present in most Caribbean economies and of the preferential trade and investment schemes prevalent among these countries is essential for an adequate representation of their economic structures.

On the other hand, some of the previous results may also indicate that -not surprisingly- due to the natural diversity of the countries in the Subregion -oil exporters and oil importers, relatively large continental countries and small island states, colonies and independent countries, mostly industrial economies together with primary and tertiary ones, different degrees of financial, trade and investment liberalization and different types of institutional relationships with different sets of developed countries- a joint modeling effort of the Caribbean as a single economic area not only has its limitations, but may even be an inadequate assumption. Specific country modeling, or the modeling of more homogeneous groupings -for example, OECS member countries, but not CARICOM member countries- would naturally provide a more precise picture[18]. Nevertheless, it must be noted that this fairly simple model supply both national and regional agencies with a powerful tool to reliably forecast the short term value of some key macro economic variables, therefore providing an essential information set that facilitates basic policy decisions.

[17] It must be noted that most of this "specifities" actually represent temporary deviations from market allocation -a regulated banking and exchange rate systems, preferential trade schemes, and are a measure of the amount of liberalization still needed.

[18] An initial attempt of country-specific modeling is presented at the Annex. Its results are actually much less satisfactory than the ones for the joint estimation, but they give a very interesting idea of the importance of country specificities. Also, we must note that in Watson, P. (Watson, P., 1995), even the use of a perceived homogeneous group as the OECS for its modeling attempts is rejected as not justifying a meaningful joint estimation, which also means its rejection as a true economic region.

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ANNEX

INDIVIDUAL COUNTRIES' ESTIMATION

Since the results of our pooled estimations revealed some doubts about the adequacy of a joint estimation for the countries in our sample, a individual country estimation was also attempted. Its results are quite different -and much less satisfactory, actually- them the ones for the joint estimation.. The results bellow were generated by AR1 estimations, due to the necessary corrections for first order serial correlation in the individual regressions.

RESULTS OF ESTIMATION

The actual coefficients are listed in tables after the text.

In the case of the Aggregated Consumption Equation, the variable for interest elasticity in consumption is significant for only three countries, 5 have the wrong sign but are non significant, what is in accordance with interest rate administratively set and negative in real terms, as was the rule in most of the region during the period in question. The variable for the permanent income hypotheses is significant for eight countries in the sample, and most have the expected sign. On the other hand, the variable for disposable income is significant for 6 countries in the sample, 3 of the non significant have the wrong sign. The variable for lagged disposable income is significant for an additional 4, but 7 of the non significant have the wrong sign. This lends some support to the hypotheses that the average household in the Subregion is liquidity constrained or has a very short time horizon on financial terms.

In the Aggregate Supply Function, the proxy for capital stock -KS- was significant only for 3 countries in our sample (other 8 had the wrong sign but were not significant). These three countries rely most in private capital investment and have a comparatively higher share of their GDP produced by the secondary sector. The proxy for technological progress was non significant in virtually all of the countries in our sample, and 10 had a sign contrary to the expected, indicating the lack of a clear, sustained trend of technological upgrading in the Subregion. The only variable mostly significant was the lagged investment variable, but even here three of the non significant had the wrong sign. That indicates that this specific endogenous variable probably could be adequately forecasted in the short run by a non structural formulation.

As reasons for these results, we may consider the fact that most of the countries in the Subregion rely heavily in foreign direct investment for their gross capital formation, the majority have their productive structures dominated by sectors -the primary and tertiary- which are not particularly capital intensive and some of them strongly depend on official foreign capital flows for their investment efforts. This last situation is most common with the so-called OTC (Other Countries and Territories), overseas dependencies of European Union countries. These territories are entitled to transfers and grants from their colonial mother and to transfers and "soft loans" from European Union agencies, like the EIB (European Investment Bank). Also, former colonies are entitled to resources from the EDF funds (European Development Fund) under the provisions of the several "Lome Agreements". The modeling of these factors, and the availability of more detailed information that would enable the use of real variables instead of proxies for the capital stock could generate better results.

In the case of the Investment Equation, the investment lagged is the only systematically significant variable, and all have the expected sign. The variable representing real output is significant in two thirds of the sample, but all have the right sign, and only two countries have the variable for interest rate significant, and these two have the wrong sign.

As a major explanation, we may point out that most of the Caribbean economies were until recently almost textbook cases of financial repression: several of their domestic financial system allocated credit on an administrative basis and under heavily negative real interest rates. This is compounded by relatively low domestic savings. Some additional reasons for these results have been already listed for the Aggregate Supply Equation. Investment in the Subregion is heavily dependent on external flows, both private and official. Also, most of these investment flows are linked to preferential trade schemes that the Subregion has with the global main markets, the United States and the European Union.

In the case of the Exports Equation, a quarter of the sample had no significant variable at all, only three had the variable for exchange rate significant, three of the non significant had the wrong signs and some of the coefficients were suspiciously high. Likewise, only three countries reported significant estimates for the world demand proxy, and six of the non significant variables had the wrong sign. Less than half of the countries reported a significant variable for lagged exports, but all had the expected sign. Only one of the non significant variables had a wrong sign.

These results may be due to the facts that most of the Caribbean countries do not have market set exchange rates. Most of them still have fixed exchange rates or official pegging or a "dirty float",i.e., a managed pegging to the American dollar. Also, the Subregion exports are dominated by preferential trade schemes, like the Lome Agreement, the Caribbean Base Initiative, or the US Sugar Quotas. Specific quotas are actually administratively set for some major primary products (sugar, bananas). Only countries that successfully managed to diversify away from those sectors show a significant correlation in their export efforts with global demand.

The results for the Imports Equation are equally flawed. A quarter of the sample show no significant variable. Four countries have the variable for lagged imports significant, but most of them have the right sign. Only two have the variables for exchange rate significant, six have their signs contrary to the expected and some of the coefficients are suspiciously high. In only three cases the variables for real domestic demand and reserves' constraints are significant, but most of the variables have the expected sign.

Some of the reasons for these results are the same as for the previous equation: administratively set exchange rates. Also, the existence of preferential trade flows allows for a certain degree of stability on the hard currency flows generated by exports, specially with the help of the Lome Agreement's stabilization funds -STABEX and STAMIN, plus the relative importance of foreign inflows, both private and official, may have reduced the importance of the reserves constraints for these economies.

In the case of the Money Demand Equation, three quarters of the sample have a significant lagged money demand variable, and most have the expected sign, almost half have a significant variable for current real domestic demand, and again most have the expected sign, but only variable for lagged domestic demand is significant, and 9 have the wrong sign, which again lends support to the notion of liquidity constrained households. The usual disappoint results for the domestic real interest rate reappear: only two are significant, and both have the wrong sign. These results may indicate the need for financial liberalization.

In this case, a simple non structural ARIMA equation could generate a reliable short term forecast of the real money demand. Nevertheless, we must note that a possible explanation for the lack of a broader significance of the real domestic demand on the money demand may be the peculiar status of the money supply in the Subregion: the use of a second currency parallel to the national one is widespread in most of these economies, even legal in some of them, as they are exposed to large inflows of hard currency that are disseminated among the population by the tourists. An adjustment for the figures of money demand that includes hard currency holdings could reveal a higher correlation with the GDP.

CONCLUSIONS

The general results for our individual estimations were mostly disappointing. Specificities of the Caribbean economies, not adequately represented in the standard specifications of growth models and whose effects are reduced in a joint estimation, clearly showed up on the individual countries' modeling. This was compounded by the usual problem of lack of reliable and updated data. The modeling of the specific regulatory hurdles still present in most Caribbean economies, of the preferential trade and investment schemes prevalent among these countries is essential for an adequate representation of their individual economic structures.

On the other hand, the previous conclusions indicate that, not surprisingly, those countries that managed to diversify away from the preferential trade and investment flows and that have liberalized their domestic financial system and exchange rate produced much more robust results in the model than the others. Thus, the results of the model do present a rough gauge of how far the Subregion still is from a market environment, and lend support to the notion that the region must try to adopt more liberalized trade, investment and financial regimes.

Individual Countries Results.

Variables	Expected Sign of The Variable	Bahamas	Barbados	Belize	Dominica	Dominican Republic	Grenada	Guyana	Jamaica	St. Kitts & Nevis	St. Vincent & The Grenadines	Suriname	Trinidad & Tobago
Aggregate Demand Equation													
R2		0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
DW		2.6	2.3	2	2.5	2.1	2.5	2.6	2.4	1.5	2.3	2.1	2.3
C		-3.4 -3.6	-6.6 -2.9	-3.8 -4.1	2.1 5.6*	-.2 -0.1	-1.2 -2.1	-3 -1.4	-13.6 -2.5	-.1 -1	-2.9 -2	6.4 2.4*	5.4 3*
IR	-	.01 3.7*	.04 1.7**	-.4 -2.4	.7 2.8*	-.01 -1.1	-.02 -3.3	.0 0.3	.01 2.8*	-.0 -0.5	.04 1.8*	-.02 -1.2	-.1 -4.3
LTCL	+	.4 1.6**	.4 1.5**	.6 3.2*	-.5 -2.2	1.1 2.1*	.2 0.8	-.2 -0.7	.9 4.9*	.7 2.6*	1 4.1*	.3 1.3	.7 2.7*
LYD	+	1.3 8.4*	.8 1.6**	.9 10.4*	1.1 4.2*	.1 1.1	-.5 -1.4	-.02 -0.1	.3 0.3	1 28.9*	.1 0.6	-.1 -0.5	1.7 4*
LYDL	+	-.3 -0.9	.6 0.9	-.2 -0.9	-.1 -0.4	-.1 -1.7	1.6 3.5*	1.6 2.7*	1.5 2.0*	-.6 -2.4	.3 2*	-.1 -0.6	-2.1 -5.3
Aggregate Supply Equation													
R2		0.99	0.99	0.99	0.76	.99	0.99	0.99	0.99	0.99	0.99	0.97	0.99
DW		2.6	1.3	2.3	1.1	2	1.4	1.8	1.8	2.1	1.8	1.8	1.3
C		1.5 1.4**	9.3 2.8*	.5 0.5	.3 0.3	8 3.3*	3.8 4.9*	6.3 2.3*	7.5 2.2*	.5 0.6	1.5 0.9	7.8 6.6*	6.1 3.4*
KS	+	0.5 -8.3	-.4 -1.9	-.5 -1.1	1.2 2.4*	.2 1.9*	-.3 -3.6	-.2 -0.9	-.3 -2	-.3 -2.5	-.1 -1.1	-.3 -4.1	.7 3*
TIME	+	-.05 -6	-.03 -2.4	.01 0.5	-.03 -0.7	-.04 -1.3	-.05 -0.3	-.05 -0.7	-.07 -2.7	-.06 -0.9	.5 1	-.1 -5.4	-.02 -1.1
LYLL	+	1 8.3*	.2 0.6	1.4 6.1*	-.5 -2	-.1 -0.4	.5 4.8*	.2 0.5	.4 1.1	1 7.7*	.8 3.7*	.2 1.6**	-.01 -0.1

		Bahamas	Barbados	Belize	Dominica	Dominican Republic	Grenada	Guyana	Jamaica	St. Kitts & Nevis	St. Vincent & The Grenadines	Suriname	Trinidad & Tobago
Investment Equation													
R2		.97	0.98	0.99	0.43	0.87	0.94	0.87	0.48	0.3	0.9	0.57	0.78
DW		2.2	1.9	2.4	1.6	1.9	1.9	1.8	1.7	1.7	2.1	1.6	1.8
IRD	-	-8.4 -1	19.9 3.5*	21.2 3.0*	.4 0.5	-.5 -0.8	-1 -2.4	-2.5 -0.9	-.03 -1.4	-.5 -0.5	.3 0.2	-4.9 -1	-.03 -0.03
GDPD	+	.5 4.2*	.4 5.6*	.2 4.2*	.4 0.4	2.1 2.8*	.3 0.74	.7 5.9*	.4 1.7*	.7 0.8	.5 2*	.3 1.4**	.01 0.09
IL	+	1 38.9*	1 57.6*	1.3 8.3*	1 6.5*	.8 7.6*	1 9.7*	1 24.3*	.9 10.7*	.9 7*	1 23.3*	1 25.3*	1.1 15.3*
Exports Equation													
R2		0.99	0.99	0.98	0.88	0.98	0.98	0.99	0.51	0.48	0.95	0.85	0.99
DW		2.1	1.3	1.6	1.8	1.6	2.4	2.2	1.9	1.9	2	1.9	2
C		.1 0.03	2.9 1	10.3 1.5**	-13.9 -0.4	31.6 1.9*	-87 -1.9	-18.3 -3.2	5.4 0.15	-36 -0.8	1.6 0.4	-9.2 -0.5	-21.1 -1
LXR	+	.5 1.6**	-2.9 -1	1 6.1*	17.4 0.5	-36.1 -2.2	86.3 2*	-.9 -3.5	4.2 0.07	34.1 0.8	.1 0.7	40.3 1.3	27.4 1
LYX	+	-.1 -0.1	-4.3 -1.6	-1.3 -0.9	-.4 -0.9	1.7 3.3*	.9 1.2	4.3 3.5*	-.7 -1	1.3 1.6**	.3 0.4	-3 -2	.6 2*
LXL	+	1 9.2*	-.1 -0.1	.2 1	.6 1.6**	.1 0.5	.3 1.2	.8 3.6*	.4 1.2	.05 0.2	.5 1.9*	.2 0.6	.8 4.1*

		Bahamas	Barbados	Belize	Dominica	D. Republic	Grenada	Guyana	Jamaica	St. Kitts & Nevis	St. Vin.& Grenadines	Suriname	Trinidad & Tobago
Imports Equation													
R2		0.99	0.98	0.99	0.91	0.94	0.97	0.99	0.98	0.98	.98	0.94	0.99
DW		2.9	2.3	1.6	2	2.1	1.8	2.6	2.1	2.2	2	2	2
C		-27.8 -2.3	7.4 0.3	2.1 0.5	26.4 1.7**	-1 -0.06	-12.6 -0.8	-8.7 -1	31.8 0.8	-12.5 -0.3	-1 -0.2	12.5 0.8	20 2.2*
LXR	-	2 3.1*	-7.4 -0.3	.5 0.8	-24.6 -1.6	3 0.2	12.7 0.9	.5 2.1*	-51 -0.8	13.1 0.3	.1 1	-1.1 -0.1	-21.5 -1.8
LGDP	+	2.9 1.6**	.9 0.9	.6 0.7	.3 0.8	.1 0.2	.6 2.3*	1.2 1.2	.5 1	.2 0.5	.8 1.6**	-1 -0.9	-.5 -2.7
LRL	+	.05 0.3	.4 1	.3 1.7**	.1 0.7	.04 0.4	-.01 -0.2	.7 4.6*	.1 1.2	.1 1	-.1 -1.2	-.2 -0.8	.1 2*
LML	+	1 2.4*	1.8 4*	-.1 -0.6	.2 0.4	.4 1.4	.4 1.4	.1 0.5	.4 1	.6 2.3*	.2 0.6	.4 0.8	.5 4.6*
Money Demand													
R2		0.99	0.99	0.99	.99	0.91	0.93	0.8	0.99	.99	0.99	0.99	0.99
DW		2.3	2.3	2	2.7	2.2	2.2	1.7	1.9	2.3	1.5	2.8	2.1
C		1.3 0.6	4.2 3*	-1 -1.2	1.5 3.7*	1.7 1.1	3.1 2.1*	3.1 0.2	6.2 8*	2.2 3.6*	14.6 1.7**	13.3 3.4*	.1 0.1
IR	-	.04 0.7	.5 1.4	-.03 -0.8	.08 2.2*	-.02 -0.9	.01 1.3	-.04 -0.3	.03 1.7**	-.03 -0.7	.0 0.04	-.02 -2.8	.02 1
LGDP	+	.4 0.7	-.2 -2.2	.8 3*	3.8 2.5*	-1 -0.7	.3 0.1	5.2 2.2*	.4 0.9	2.8 6.8*	.4 0.3	-.8 -2.8	1 2.7*
LGDPL	+	.03 0.1	.3 3.7*	-.6 -1.8	-3 -2.3	1 0.7	-.4 -0.1	-3.4 -0.9	-2.2 -3.8	-2.7 -6.7	-2 -1.5	-.6 -2.7	-.7 -1.4
LMOL	+	.4 1.5*	.3 2*	.8 6.9*	-.1 -0.3	.6 2.3*	.2 0.6	-1.4 -2.3	1 18.3*	.4 3*	.8 3.1*	.5 4*	.5 4.6*