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**Explaining Jamaica's Growth Puzzle: A Comparative Growth
Accounting Exercise**

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Abstract

Jamaica's economic growth averaged 0.7 per cent over the last 10 years in spite of investment as a proportion of gross domestic product (GDP) averaging 28.8 per cent over the period. This investment to GDP ratio is high when compared to other Caribbean and Latin American economies, yet real growth has remained below that of the region. The objective of the paper is to explain this growth puzzle by analysing the contribution of key factors using growth accounting and regression analysis. The result highlights the importance of the quality of political and institutional climate in driving economic growth within the Caribbean region. Capital investment and FDI are found to be significant and positive contributors to economic growth, while labour and terms of trade growth are found to be insignificant.

¹ The views expressed are those of the author and does not necessarily reflect those of the Bank of Jamaica. The paper was supervised by Dr. Wayne Robinson and Ms. Prudence Serju.

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Table of Contents

1. Introduction	3
2. Stylized Facts	5
3. Methodology	9
3.1 The Growth Accounting Model	9
3.2 Panel Regression Model	11
4. Empirical Results	14
4.1 Growth Accounting	14
4.2 Panel Regression	15
4.3 Jamaica vis-à-vis the Rest of the Region	20
5. Summary Conclusion	21

.....

.....24

Appendix

.....

.....25

1.0 Introduction

The past decade has seen high levels of investment in the Jamaican economy, averaging 28.9 per cent of Gross Domestic Product (GDP)². Although, investment as a proportion of GDP in Jamaica is relatively high when compared to selected countries within the Caribbean, there continues to be significant divergence between Jamaica’s economic performance and that of the region (see Figure1, Appendix).³ Between 1990 and 2005, the Jamaican economy on average registered marginal growth of 1.3 per cent in contrast to an average growth rate of 3.1 per cent for the rest of the Caribbean⁴. Further, the Jamaican

² Investment includes public, private domestic and foreign direct investment.

³ The average investment to GDP ratio for the other 14 sample countries is 26.7 per cent.

⁴ Trinidad & Tobago, Antigua and St. Vincent, for example had average growth rates of 5.3 per cent, 3.4 per cent and 4.6 per cent, respectively, for the period.

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economy consistently lagged behind the region throughout the sample period.

Against this background, this paper seeks to explain Jamaica's economic growth puzzle by employing a growth accounting framework and panel regressions to identify the causes for the low growth. Bosworth and Collins (2003) show that when implemented and interpreted properly, growth accounting and growth regressions are valuable tools that can and have improved our understanding of growth experiences across countries. By dissecting the puzzle into its component parts, this research seeks to uncover the necessary factors that the Jamaican economy is lacking; i.e. those factors that are necessary to stimulate the level of growth that is commensurate to the country's high investment to GDP ratio. The paper also examines empirically the factors that account for the difference in the economic performance between Jamaica and the rest of the Caribbean.

Initial growth theory postulated that long-term economic growth could only be achieved through exogenous technological change, as changes in labour and capital only had temporary growth effects.⁵ Olsen (1996) however finds that differences in technology, capital and labour do not sufficiently account for the differences in growth rates across countries but that institutional quality and economic policies were the major factors in determining economic performance. Sala-I-Martin (2002) review of the theoretical and empirical literature found that the most important and robust factor that determines economic growth was the initial level of income. Furthermore, he showed that the quality of existing institutions was also important in determining growth performance, where institutional quality refers to factors such

⁵ Solow, Swan, Cass and Koopmans developed neoclassical growth theory in the 1950s and 1960s.

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as free markets, property rights, democracy, political stability, a good health system, efficient banking system, economic policies etc.

Subsequent research, using growth accounting and regression based analysis, has shown that there is no simple determinant of economic growth. Bosworth and Collins (2003) applied a growth accounting framework and channel decomposition to 84 countries, which account for 95 per cent of the world's GDP and 85 per cent of the world's population, over a 40-year period from 1960 to identify the major contributor to growth. They found that for the 84 countries, output per worker on average grew by 2.3 per cent for the period in question, with improvements in total factor productivity (TFP) and increases in physical capital per worker contributing approximately 1.0 per cent each. Human capital, on the other hand, contributed roughly 0.3 per cent. Bosworth and Collins (2003) also showed a significant positive relationship between growth and factors such as quality of governing institutions, geographical location and an indicator of a country's predisposition to trade. On the other hand, the paper showed evidence of convergence, as there was a negative relationship between growth and measures of initial conditions. The channel decomposition showed that factors such as budget balance and trade openness operated mainly through capital accumulation while life expectancy and institutional quality operated through TFP growth. However, geography and initial conditions were related to growth through both channels.

Similar factors have been identified by Ramkissoon (2002) and Dacosta (2007) in explaining economic growth in the Caribbean. These studies showed that differences in institutions and policies employed by countries within the region were the main reasons for the divergence in economic performance. Ramkissoon (2002) further

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showed that service oriented economies and societal cohesion were closely associated with better economic performance, while Dacosta (2007) showed that initial conditions also played a determining role.

Staritz, Atoyan and Gold (2007) employed a growth accounting exercise and regression analysis to Guyana to identify the reasons for the country's growth stagnation from 1998 to 2004 after a period of exceptionally strong economic performance during 1991 to 1997. They found that adverse terms of trade, weak infrastructure and exogenous shocks led to Guyana's growth slowdown. However, the persistent weak growth performance was a result of a continual decline in factor accumulation, deterioration in political and institutional environment, massive labour migration and declines in private and foreign direct investment.

This paper follows closely Staritz, Atoyan and Gold (2007) in explaining Jamaica's growth experience. However, a broader set of explanatory variables, which includes a measure of macroeconomic stability and the type of investment, is used. Further, we account for the type of exchange rate regime and country size.

The rest of the paper is organized as follows. Section 2 gives a brief discussion on Jamaica's growth performance. Section 3 explains the growth accounting and regression based methodology employed, while the penultimate section summarizes the findings of the estimations. The summary and conclusions are presented in the final section.

2.0 Stylized Facts

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The Jamaican economy registered marginal growth of 1.3 per cent between 1990 and 2005, despite significant investment averaging 28.9 per cent of GDP. There was a notable increase in gross fixed capital formation, over the review period, with the ratio as a percentage of GDP increasing from 25.2 per cent in 1990 to 34.8 per cent in 2005. Investment as a proportion of GDP in Jamaica is relatively high when compared to selected countries in the Caribbean. Barbados and Trinidad & Tobago, for example, recorded average investment to GDP ratios of 16.6 per cent and 18.8 per cent, respectively, over the sample period.

Despite the steady increase in investment, Jamaica's economic growth over the review period has generally been weak. For the first five years of the sample period the economy expanded on average by 2.4 per cent with the investment averaging 28.7 per cent of GDP. Over the remaining years, the economy grew marginally by 0.7 per cent while investment flows remained buoyant at 29.0 per cent of GDP. However, Serju (2006) showed that most of the investment did not involve an expansion of the "productive" capital stock but was concentrated in building construction, security and replacement of existing capital.

Jamaica's growth rate over the review period was affected by several factors. Serju (2006) highlighted factors such as quality of labour inputs, capital efficiency, adverse shocks, low capacity utilization and debt. In regards to the quality of labour inputs, over 70.0 per cent of the labour force had no training experience, while approximately 7.0 per cent, 7.5 per cent and 6.0 per cent had vocational training, on the job experience and attained professional status, respectively. Approximately 70 per cent of the labour force never passed any forms of formal examination. Furthermore, 86.0 per cent of the Jamaican

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labour force is literate, which is significantly low when compared to some of our Caribbean counterparts⁶.

Concerning capital efficiency, Jamaica's incremental capital output ratio (ICOR) averaged 1.9. There was a deterioration between 1996 and 1998 which reflected the effects of the financial sector crisis, which cost the economy approximately 40 per cent of GDP. Furthermore, a comparison between Jamaica's ICOR and that of Barbados and the Dominican Republic showed that the additional investment needed to generate an extra unit of output was higher in Jamaica, which signals that the country was not an efficient user of capital.

The low average rate of growth over the sample period also reflects the impact of adverse domestic and external shocks (e.g. financial sector crisis, hurricanes, oil prices etc). Notably, the main recipients of investment, namely mining, construction, and tourism exhibited volatile growth over the sample period, attributed primarily to external shocks. The mining industry is driven largely by external factors, mainly the global business cycle, as well as the position of the parent companies. Expansion and renovation activities in the sector in 1992 affected production, while an industry wide labour dispute dampened output in 1995. The explosion at the Gramercy Refinery in Louisiana significantly affected mining output between 1999 and 2000. Growth was further hampered in 2003 by the decisions by the Kaiser Aluminium Chemical Corporation to purchase its first quarter bauxite needs from American stockpile instead of its subsidiary in Jamaica. The sector's output was also significantly affected by labour disputes throughout the sample period.

⁶ Barbados and Trinidad & Tobago

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Even though the tourism industry has proven to be resilient over the years, various circumstances, both internal and external have served to erode its contribution to GDP. Tourism growth was affected by the Persian Gulf War in 1991, and was further dampened in 1998 and 1999 by, *inter alia*, the problem of visitor harassment⁷ and the negative impact of the media publicity following the April 1999 gas riot. In 2001, civil disturbances in Kingston in July along with the terrorist attacks on the USA on September 11, served to raise both domestic and international security concerns among potential visitors. Coupled with the recession in the USA and other source markets, travel not only to Jamaica but also worldwide was reduced.

Another shock to the economy was the financial sector crisis in the mid 1990's. As already discussed, this episode imposed a cost of approximately 40 per cent of GDP on the economy and was one of the major factors that inhibited growth in the late 1990's. The decline in this sector accounted for 58.0 per cent of the decline in GDP over the period 1997 to 1998.

Given the unpredictable nature of shocks, periods of high investment in production capacity were at times followed by periods of extremely low capacity utilization. In this regard, investments that were made during the economic and building boom of the 1980's and 1990's were underutilized. With regard to the utilization of capacity, the electricity industry operated on average at 43.2 per cent, while that of mining was 85.4 per cent⁸. While no hard data is currently available, the IMF estimates that the manufacturing sector is utilizing between 50 – 60 per cent of its capacity. During this period the tourism industry operated on the average at 54.7 per cent of its capacity.

⁷ There has been a noticeable improvement in this area.

⁸ Between 1996 and 2004

The country's high debt level has also served to limit economic growth. Over the review period the country's debt on average stood at 117.6 per cent of GDP, which placed Jamaica among the most indebted countries in the world. Domestic and external debt averaged 49.0 per cent and 68.8 per cent, respectively, over the sample period. The high debt level led to low productivity levels by causing macroeconomic uncertainty and crowding out investment in productive sectors. This high debt placed an upward pressure on interest rates. The average interest rate throughout the review period was approximately 24.8 per cent.⁹ The limited access to credit has constrained private investment, which has led to concerns about the type of investments in the economy.

Additional factors, such as crime, migration, exchange rates and relatively high inflation also affected Jamaica's growth experience¹⁰. In 2001, Jamaica had the third highest rate of intentional homicides (44 per 100,000 inhabitants) in the world. Crime has diverted valuable resources into security expenditure instead of into productive industries. A World Bank (2004) study estimated that the annual cost of crime to Jamaica was approximately 5 per cent of GDP. Furthermore, it has reduced productive work hours in the island due to early closure of businesses in volatile areas. In addition, crime has inhibited private investment in those sections of the country where the incidence is high.

Another important factor is that data have suggested that 80 per cent of tertiary graduates migrated from Jamaica during the 1990's. Against this background, there has been a declining trend in the

⁹ Interest rate refers treasury bill rate

¹⁰ See Blavy (2007)

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country's labour productivity and total factor productivity. Compounding the problem is the prevalence of high real wages despite Jamaica's weak productivity level. The Jamaican economy also suffered from a high average inflation rate of 21.4 per cent throughout the review period. Real exchange rate appreciation and high wage increases in the 1990's continue to keep costs high compared to Asia or regional competitors. Garment manufacturing shifted to lower cost producers such as Haiti, Honduras, Dominican Republic, amongst others, and to Mexico after the formation of NAFTA.¹¹ The loss of international competitiveness was further illustrated by the fact that there was a 50 per cent decline in Jamaica's market share of world merchandise exports from 1994 to 2001.

3.0 Methodology

3.1 The Growth Accounting Model

Growth accounting provides a breakdown of observed economic growth into its components associated with changes in factor inputs and a residual (Barro, 1998). This residual, also referred to as the Solow residual, is generally a measure of technological progress or TFP growth. TFP also captures the influence of a myriad of determinants such as external shocks, changes in government policies, institutional factors and measurement errors.

Bosworth and Collins (2003) show that growth accounts can be constructed to produce TFP estimates that are independent of functional form, as long as factor earnings are proportionate to factor

¹¹ See World Bank Report released in 2004 titled "Jamaica: The Road to Sustained Growth"

productivities and that data is available on factor shares of income. However, given data limitations it is reasonable to assume fixed income shares. As such, the growth accounting model assumes a production function with constant returns to scale and a Hicks neutral technology, yielding a discrete time estimate of the growth rate of the Solow residual. The production function is as follows:

$$Y_t = A_t K_t^\alpha (L_t)^{1-\alpha} \quad (1)$$

where Y_t is GDP in real terms, A_t is TFP and L_t is labour force. Based on the previous assumption of constant returns to scale; the weights are given by the shares of capital and labour in aggregate output. The capital share of output (α) is assumed to be 0.67, which is consistent with Murray (2006). Taking logs and differentiating both sides of equation (1) decomposes the growth rate of output into the growth rate of TFP and the weighted average of the growth rates of physical capital and labour, which leads to:

$$\delta y_t = \delta a_t + \alpha \delta k_t + (1 - \alpha) \delta l_t \quad (2)$$

where the lower case are the logs of the variables¹². The growth in capital services is assumed to be proportional to the capital stock, which was estimated using the perpetual inventory method:

$$K_{t+1} = I_t + (1 - d) K_t$$

where (d) is the rate of depreciation, I the gross fixed capital formation and K is the capital stock. Gross fixed capital formation is

¹² GDP growth rates at constant 1990 prices, labour force data and gross capital formation are obtained from the Statistical Institute of Jamaica (STATIN).

Draft

obtained from STATIN. The depreciation is assumed at 10.0 per cent which is consistent with general accounting standards.

Notably, this framework does not take into account changes in the quality of the labour force and capital because of data constraints. The contribution from the labour force may be underestimated because explicit consideration is not taken of the impact of the level of education or skills. As such, this may lead to an overestimation of the Solow residual. In this regard, the results should be interpreted accordingly.

Growth accounting was applied to the entire sample period from 1990 to 2005. Furthermore, averages for the three sub periods from 1990–1995, 1996–2000 and 2001–2005 were examined to identify the roles the factors of production played in the varied growth rates across each sub period. The growth accounting exercise was further repeated with different assumed values of the capital share of output (α) to identify if the qualitative results varied significantly. This robustness procedure was employed as growth accounting results are potentially sensitive to the assumed value of the capital share of output.

3.2 The Regression Model

Given the lack of sufficient data on Jamaica, a panel regression framework, which includes other Caribbean countries was employed¹³. The analysis is conducted with a view to determine the factors that are stimulating growth within the Caribbean region with an attempt to explain deviations in each country's growth performance. Panel data allows for variability of individual countries while still preserving

¹³ See A1 in the Appendix. for the list of selected Caribbean countries.

Draft

the dynamic adjustment within countries. The results of the panel estimation are then extrapolated to explain the determinants of growth in Jamaica.

The data used in the estimations are annual observations of real GDP growth rates, domestic investment, foreign direct investment, terms of trade, a measure of political and institutional development, inflation and world growth, from 1990 to 2005. Tests for panel unit roots, based on Augmented Dickey Fuller (1979), do not reject the null of a unit root process at the 5 per cent confidence level for all the variables used in the estimations (see Table 1, Appendix).

Regression analysis is conducted over the entire sample of Caribbean countries to examine regional factors which have influenced the Caribbean's growth experience. The sample of Caribbean countries are heterogeneous in terms of macroeconomic policies and initial conditions, however, their geographic proximity would take into account region specific factors. The sample is also divided based on the size of each economy and the type of exchange rate regime. This is done to ascertain whether there are any differences in the drivers of growth across exchange rate regimes and large or small economies.¹⁴

The model is as follows:

$$\begin{aligned} d\log gdp_{it} = & b_0 d\log gdp_{it-1} + b_1 cfratio_{it} + b_2 fdiratio_{it} + b_3 d\log tot_{it} + \\ & b_4 dpolrisk_{it} + \\ & b_5 dinflation_{it} + b_6 worldgrowth_t + \varepsilon_{it} \end{aligned}$$

(3)

¹⁴ The large economies consist of 8 countries, averaging growth of 2.7 per cent over the review period, while the small economies include 7 Islands, with average growth of 3.2 per cent.

The model seeks to explain the growth ($dloggdp_{it}$) in country (i) using the autoregressive structure of growth rates ($dloggdp_{it-1}$), domestic investment to GDP ratio ($cfratio_{it}$), foreign direct investment to GDP ratio ($fdiratio_{it}$), percentage change in terms of trade ($dlogtot_{it}$), changes in political and institutional climate ($dpolrisk_{it}$), percentage change in domestic prices ($inflation_{it}$) and growth of the world economy ($worldgrowth_t$). The terms of trade variable is used as a measure of openness of the economies while inflation is used as a measure of macroeconomic stability. The distinction is made between domestic and foreign investment to identify the relative significance of each type of investment to growth in the Caribbean.

The variables used in the model represent some of the conventional factors identified by researchers as the main catalysts behind economic growth. The model assumes that growth in previous years act as an important factor in driving economic performance in subsequent years. Other factors such as the quality of education and the health system are likely to be major contributors to growth, however, due to limited data these variables are omitted from the analysis.

The model is estimated using both the fixed and random effects specification. The likelihood ratio to test for redundant fixed effects is used to test for the presence of fixed effects.¹⁵ The results show that fixed effects are statistically significant. As previously mentioned the parameter estimates are subject to potential endogeneity issues. This endogeneity bias is partially due to the inclusion of the lagged dependent variable ($dloggdp_{it-1}$) in the regression. Simultaneity between regressors and dependent variables also causes an

¹⁵ Null hypotheses are judged at the 5 per cent confidence level.

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endogeneity bias. However, an examination of the cross correlations of the variables, show that simultaneity bias is weak as evidenced by the low correlation statistics (see Table 2, Appendix). To account for the possible endogeneity bias arising from lagged dependent variables, the model is re-estimated with the use of a robust GMM estimator, Arellano and Bond (1991). Pooled OLS estimates are also presented for comparative purposes.

Estimations for the large and small country samples are carried out using a restricted model, where the political risk variable is omitted. This is also the case for the fixed exchange rate and floating exchange rate samples. This is due to the limited availability of political risk data. The data is available for only seven countries and, as such, there are insufficient data points to run meaningful estimations. This restricted model is therefore estimated primarily for comparative purposes.

To identify the main reasons for the differences between the growth rates in Jamaica and other Caribbean countries, a GMM regression model in differences of the following form was used:

$$\begin{aligned} (dloggdp_{jt} - dloggdp_{mt}) = & b_0(dloggdp_{jt-1} - dloggdp_{mt-1}) + b_1(cfratio_{jt} - \\ & cfratio_{mt}) + \\ & b_2(fdiratio_{jt} - fdiratio_{mt}) + b_3(dlogtot_{jt} - \\ & dlogtot_{mt}) + \\ & b_4(dpolarisk_{jt} - dpolarisk_{mt}) + b_5(dinflation_{jt} - \\ & dinflation_{mt}) + \varepsilon_{jmt} \end{aligned} \tag{4}$$

where all variables are as defined earlier. In equation (4), subscripts j and m refer to corresponding variable for Jamaica and a specific country of comparison, respectively. This differencing is performed for all the countries in the sample. Controlling for systematic differences in factors that are important determinants of economic growth allows for greater intuition into the problem and provides a partial explanation of Jamaica's growth stagnation over the review period.

4.0 Empirical Results

4.1 Growth Accounting

The result of the growth accounting exercise shows that Jamaica's economic growth, over the review period, is explained exclusively by improvements in gross capital formation as labour and TFP or technological advancement made negative contributions (see Table 1)¹⁶. The contribution from labour would have been affected by large scale migration of tertiary graduates during the 1990's.

In regard to the sub-samples, all factors contributed positively to growth during the liberalization period of 1990 to 1995, with capital being the dominant component. Of note, the economy registered the highest growth in this period. Characterized by the financial sector crisis, the economy contracted by 0.07 per cent during 1996 - 2000. During this sub-period, while the contribution from capital

¹⁶ The possibility exists that total factor productivity may have been overestimated due mainly to the fact that the quality of labour force and capital are not explicitly taken into consideration. Therefore, the contributions from total factor productivity may be lower than estimated.

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significantly increased relative to the first sub period there was a considerable decline in the contribution from TFP. The contribution from labour remained marginal and negative.

The period 2001 - 2005, or the post crisis recovery period was characterized by an average growth of 1.46 per cent. The contribution from capital, although positive, was lower than its contribution in the liberalization sub-period, while the contributions from labour and TFP, although negative, improved.

The results show that despite a strong and positive contribution from capital, the inefficiency by which technology is utilized dampened the country's growth potential. Further, the contribution from labour is generally negative, which may be reflective of the low skill levels. The robustness procedure yielded qualitatively similar results for the different values for the capital share of output (see Figure 2, Appendix).

Table 1. Growth Accounting Exercise

4.2 Panel Regression

The fixed effects estimation results for the entire Caribbean sample show that GDP growth is explained by some amount of inertia as well as domestic investment, FDI, changes in institutional & political climate, world growth and changes in inflation rates (see Table 2). Terms of trade growth is found to be insignificant in explaining economic growth. The model explains approximately 50 per cent of

Period	GDP Growth	Contribution from Capital	Contribution from Labour	Contribution from TFP
1990	5.24	-0.61	0.00	5.85
1991	0.54	-20.63	0.43	20.73
1992	2.71	6.69	0.07	-4.05
1993	2.46	9.12	0.21	-6.86
1994	0.98	7.13	0.28	-6.42
1995	2.61	6.42	0.28	-4.09
1996	0.16	8.83	-0.21	-8.46
1997	-0.98	8.99	-0.26	-9.72
1998	-1.23	5.18	-0.15	-6.25
1999	0.99	3.81	-0.28	-2.54
2000	0.69	5.44	-0.41	-4.34
2001	1.54	4.40	0.00	-2.87
2002	1.10	5.76	-0.01	-4.65
2003	2.26	0.48	-0.17	1.95
2004	0.97	1.06	0.08	-0.18
2005	1.43	1.63	-0.07	-0.14
1990 - 2005	1.34	3.36	-0.01	-2.00
1990 - 1995	2.42	1.35	0.21	0.86
1996 - 2000	-0.07	6.45	-0.26	-6.26
2001 - 2005	1.46	2.67	-0.03	-1.17

the variation in economic growth rates. By contrast, the random effects model explains approximately 39 per cent of economic growth variations and predicts that economic growth exhibits a strong autoregressive pattern, however, the coefficient for domestic investment is now insignificant. The results of the GMM estimation also shows that growth is explained by some amount of inertia, as well

as by domestic investment, changes in institutional environment and world growth. FDI and changes in inflation rates are found to be insignificant. The model has a good predictive ability as its adjusted r-squared value is approximately 51 per cent. Pooled OLS results shows all variables to be significant contributors to growth and the model is able to explain approximately 45 per cent of the variations in economic growth in the Caribbean

Table 2. Cross-Country Panel Regressions

	Fixed Effects	Random Effects	GMM	Pooled
<i>constant</i>	-0.0601*** (0.0192)	-0.0279 (0.0210)	-0.0464** (0.0186)	-0.0157*** (0.0178)
<i>dloggdp(-1)</i>	0.1442** (0.0713)	0.2399*** (0.0530)	0.2120*** (0.0599)	0.3587*** (0.0657)
<i>cfratio</i>	0.2183*** (0.0507)	0.0747 (0.0569)	0.2071*** (0.0492)	0.0223*** (0.0392)
<i>fdiratio</i>	0.5541*** (0.1350)	0.5712*** (0.1242)	0.3326 (0.3148)	0.4925*** (0.1048)
<i>dlogtot</i>	0.0192 (0.0367)	0.0215 (0.0320)	-0.0020 (0.0302)	0.0163** (0.0495)
<i>dpolrisk</i>	0.0022*** (0.0007)	0.0026*** (0.0007)	0.0021*** (0.0007)	0.0028*** (0.0009)
<i>worldgrowth</i>	0.0074** (0.0031)	0.0065** (0.0031)	0.0048** (0.0020)	0.0059*** (0.0037)
<i>dinflation</i>	-0.0001* (0.0001)	-0.0001** (0.0001)	-0.0001 (0.0001)	-0.0001*** (0.0001)
r-squared	0.57	0.39	0.58	0.45
adjusted r- squared	0.50	0.34	0.51	0.45
# of observations	96	96	89	96

*, **, *** - Statistically significant at the 10, 5 and 1 per cent level respectively.
Standard errors in parentheses

The fixed effects model shows that economic growth has a significant autoregressive component in large Caribbean economies but this dynamics is not a feature of the small economies (see Table 3). Variations in growth in the large economies are explained by domestic investment, FDI, world growth and changes in inflation rates while growth in small economies is explained by only domestic investment. The results are somewhat similar for the random effects model, except that FDI becomes a significant contributor to small economies growth. The GMM estimation shows only domestic investment, world growth and changes in inflation to be significant to large economies growth, while only domestic investment is significant to growth in small economies. The pooled results on the other hand, show that apart from world growth and changes in inflation rates, FDI is also a significant contributor to growth in the large economies. Domestic investment and FDI are the significant contributors to the small economies growth.

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The predictive values, for all estimation methods, were higher for the large economies than for the small economies. This suggests that the variables used in the estimations are better able to explain or predict variations in economic growth for large economies than for small economies. Thus, the variables accounting for small economies higher average growth rate have not been fully accounted for in these estimations. This may be partially due to the omission of the political risk variable, as better political environments and institutional arrangements may in fact be the major driving force for the growth in the small economies.

Table 3. Cross-Country Panel Regressions - Size

Size	Large	Small	Large	Small	Large	Small	Large	Small
	Fixed Effects		Random Effects		GMM		Pooled	
<i>constant</i>	-0.0300*** (0.0106)	-0.0118 (0.0092)	-0.0147 (0.0101)	-0.0085 (0.0070)	-0.0299** (0.0120)	-0.0162 (0.0118)	-0.0064 (0.0063)	-0.0077 (0.0096)
<i>dloggdp(-1)</i>	-0.0086*** (0.0024)	-0.2189 (0.1828)	-0.0080*** (0.0023)	-0.1805 (0.2005)	0.1313 (0.0995)	-0.0070 (0.1282)	-0.0062 (0.0071)	-0.1610 (0.1729)
<i>cfratio</i>	0.0014*** (0.0003)	0.0009*** (0.0003)	0.0007** (0.0003)	0.0007*** (0.0002)	0.0014*** (0.0004)	0.0007** (0.0003)	0.0002 (0.0002)	0.0006* (0.0002)
<i>fdiratio</i>	0.0011** (0.0005)	0.0003 (0.0004)	0.0015*** (0.0004)	0.0004* (0.0002)	0.0003 (0.0004)	0.0004 (0.0004)	0.0025* (0.0006)	0.0005* (0.0002)
<i>dlogtot</i>	0.0141 (0.0164)	-0.0192 (0.0242)	0.0157 (0.0184)	-0.0181 (0.0250)	0.0138 (0.0153)	-0.0238 (0.0230)	0.0156 (0.0203)	-0.0173 (0.0199)
<i>worldgrowth</i>	0.0033** (0.0014)	0.0012 (0.0028)	0.0032** (0.0015)	0.0012 (0.0027)	0.0034* (0.0018)	0.0026 (0.0026)	0.0030* (0.0014)	0.0012 (0.0023)
<i>dinflation</i>	-0.0003* (0.0001)	-0.0001 (0.0000)	-0.0003** (0.0001)	0.0000 (0.0000)	-0.0005*** (0.0001)	0.0000 (0.0000)	-0.0003 (0.0001)	0.0000 (0.0000)
r-squared	0.51	0.21	0.24	0.11	0.59	0.20	0.28	0.12
adjusted r- squared	0.45	0.10	0.20	0.05	0.53	0.07	0.27	0.11
# of observations	117	95	117	95	109	88	117	95

*, **, *** - Statistically significant at the 10, 5 and 1 per cent level respectively.
Standard errors in parentheses

The fixed effects model shows that variations in the growth rate for countries with either fixed or floating exchange rate regime does not have a significant autoregressive structure (see Table 4). Domestic investment and FDI are the significant contributors to growth in fixed regime countries, while domestic investment and world growth are the drivers of growth in floating regime countries. The random effects model also does not find growth to have an autoregressive structure. Domestic investment is a significant contributor to growth in fixed regime countries, while there were no significant variables for floating exchange rate countries. The GMM results are the same as the random effects model for fixed regime countries; however growth

in floating rate countries is explained by some amount of inertia as well as domestic investment and world growth. For the pooled OLS results, there were no significant variables for the fixed regime countries, however, domestic investment, FDI and changes in inflation rates explain growth in floating regime countries. The r-squared values in all estimations were higher for the floating exchange regime countries. The variables used in the estimation are better able to explain growth variations in floating exchange rate regime countries. Therefore the major drivers of growth in fixed regime countries have not been identified, a fact which may be partially due to the omission of the political risk variable.

Table 4. Cross-Country Panel Regressions - ER Regime

ER Regime	Floating		Floating		Floating		Floating	
	Fixed	g	Fixed	g	Fixed	g	Fixed	g
	Fixed Effects		Random Effects		GMM		Pooled	
<i>constant</i>	-0.0168 (0.0085)	-0.0369* *	-0.0064 (0.0060)	-0.0106 (0.0137)	-0.0141 (0.0095)	-0.0248* (0.0124)	-0.0046 (0.0074)	0.0033 (0.0092)
<i>dloggdp(-1)</i>	0.0389 (0.1323)	-0.1781 (0.2393)	0.1169 (0.1460)	-0.0555 (0.2384)	0.0157 (0.1408)	0.1566** *	0.1519 (0.1370)	0.1719 (0.2025)
<i>cfratio</i>	0.0009* **	0.0019**	0.0004* **	0.0009	0.0008* **	0.0012**	0.0003 (0.0002)	0.0002** (0.0002)
<i>fdiratio</i>	0.0006* (0.0003)	0.0005 (0.0004)	0.0003 (0.0002)	0.0002 (0.0003)	0.0005 (0.0003)	0.0006 (0.0004)	0.0003 (0.0002)	0.0006* (0.0003)
<i>dlogtot</i>	-0.0121 (0.0272)	0.0087 (0.0182)	-0.0111 (0.0271)	0.0108 (0.0198)	-0.0212 (0.0254)	-0.0065 (0.0155)	-0.0110 (0.0212)	0.0142 (0.0260)
<i>worldgrowth</i>	0.0022 (0.0022)	0.0019* (0.0011)	0.0022 (0.0020)	0.0012 (0.0010)	0.0022 (0.0026)	0.0023** (0.0010)	0.0022 (0.0020)	0.0005 (0.0022)
<i>dinflation</i>	-0.0003 (0.0006)	-0.0001 (0.0000)	-0.0002 (0.0007)	-0.0001 (0.0000)	-0.0003 (0.0006)	0.0000 (0.0000)	-0.0002 (0.0005)	-0.0001* (0.0000)
r-squared	0.21	0.46	0.10	0.12	0.20	0.54	0.11	0.14
adjusted r- squared	0.11	0.38	0.05	0.05	0.09	0.46	0.10	0.14
# of observations	121	84	121	84	112	78	121	84

*, **, *** - Statistically significant at the 10, 5 and 1 per cent level respectively.
Standard errors in parentheses

This paper relies on panel data to identify the factors that are important for economic growth within the Caribbean region. It extrapolates these findings to the Jamaican economy. The appropriateness of the extrapolation can be assessed by comparing the models' performance in predicting the evolution of growth rates in Jamaica with that of the other countries. The GMM estimation indicate that the model can characterize Jamaica's economy reasonably well, as the residuals computed from Jamaica's data appears to exhibit comparable variance with those of most of the other Caribbean countries (see Figure 3, Appendix)¹⁷. Reasonable inferences can therefore be drawn from the Caribbean results and extrapolated to Jamaica.

4.3 Jamaica vis-à-vis the Rest of the Region

Over the review period the average growth rate of the Jamaican economy is 0.77 per cent below the mean growth rate of the Caribbean region (see Table 5). Although Jamaica exceeds its Caribbean counterparts in terms of capital endowment and changes in inflation rates, the country lagged behind, in terms of FDI flows and terms of trade improvements as well as improvements in political & institutional environment.

To identify the different roles that the explanatory variables play in determining variances in economic growth between Jamaica and the rest of the Caribbean islands, a GMM regression is conducted. The results show that the significant differences in Jamaica's growth rate vis-à-vis the region is not attributed to differences in either domestic

¹⁷ There are, however, a few outliers in terms of residuals' distribution.

investment, terms of trade variations or changes in inflation rates, but to differences in foreign investment and political & institutional environment (see Table 6).

Table 5: Average Difference in Economic Growth Rates

Numeraire Country	Jamaica 1990 - 2005
$dloggdp_{jt} - dloggdp_{mt}$	-0.77
$cfratio_{jt} - cfratio_{mt}$	5.66
$fdiratio_{jt} - fdiratio_{mt}$	-4.81
$dlogtot_{jt} - dlogtot_{mt}$	-0.51
$dpolrisk_{jt} - dpolrisk_{mt}$	-0.65
$dinflation_{jt} - dinflation_{mt}$	-0.00089

Table 6: GMM estimation in Differences

$dloggdp$	
$dloggdp_{jt-1} - dloggdp_{mt-1}$	0.3255* ** (0.1043)
$cfratio_{jt} - cfratio_{mt}$	0.0004 (0.0003)
$fdiratio_{jt} - fdiratio_{mt}$	0.0022* * (0.0008)
$dlogtot_{jt} - dlogtot_{mt}$	0.0009 (0.0168)
$dpolrisk_{jt} - dpolrisk_{mt}$	0.0014* * (0.0005)
$dinflation_{jt} - dinflation_{mt}$	0.0000 (0.0000)
r-squared	0.3982
adjusted r- squared	0.3413

*, **, *** - Statistically significant at the 10, 5 and 1 per cent level respectively.
Standard errors in parentheses

5.0 Summary and Conclusion

In spite of Jamaica's consistently high investment rate relative to other islands within the Caribbean region, the country continues to record lower growth. This growth puzzle may be due in part to measurement problems in calculating GDP and an overestimation of productive investments within Jamaica. However, the rate of growth in the informal sector may not be significantly higher than the formal sector so the same inferences are applicable.

Low TFP and weak labour productivity serve to counterbalance investment spending in Jamaica. Other factors such as exogenous shocks, crime, high debt level, low capacity utilization and loss of international competitiveness have also hindered growth in the Jamaican economy over the review period. Jamaica also suffered from low total factor productivity over the review period, which may be possibly lower than was estimated due to potential overestimation of the Solow residual. Jamaica's low productivity or efficiency is due in part to lack of efficiency in the use of capital, low labour force quality, insufficient technological advancements, under-developed markets, lack of competition and weak institutional and policy arrangements.

This study shows that the political and institutional environment within a country is an important factor in explaining growth within the Caribbean region. Jamaica has lagged behind its regional counterparts in terms of both quality and improvements in its political and institutional framework. This largely explains the divergence in

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Jamaica's economic performance with that of the region. Jamaica also lagged behind regional counterparts in FDI. This difference in FDI also contributed significantly to the divergence in growth rates between Jamaica and the rest of the Caribbean. The study also shows that changes in inflation had a negative relationship with growth in large Caribbean economies like Jamaica. Therefore, worsening macroeconomic stability serves to reduce growth within a country. Jamaica was ahead of the rest of the region in terms of increases in the rate of inflation and this was also another reason for the growth divergence. However, labour and terms of trade growth are found to have little impact on growth.

Policies should be aimed at improving the quality of the country's political and institutional environment in an attempt to improve efficiency within the economy. Removing the level of bureaucracy, improving governance, reducing corruption and improving the regulatory framework will serve to achieve this goal. Measures to improve labour force quality such as reducing outward migration of the most educated workers by providing jobs should be employed as well as skills training to enhance the country's literacy level.

There is, however, a need for further exploration of Jamaica's growth puzzle. Further extensions to the paper include the use of channel decomposition techniques to identify the channels through which growth determinants affect Jamaica's economic growth. In other words, trying to identify whether for example, political and institutional environment affect growth through either, factor accumulation or total factor productivity. The data set should also be expanded to include other Caribbean and Latin American countries and estimations techniques employed to address possible non-linear effects. Additional explanatory variables such as the debt to GDP

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ratio, the real effective exchange rate and country specific natural endowment could be explored. Initial incomes should also be examined to test for the presence of convergence.

Bibliography

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Blavy, R., 2006, "Public Debt and Productivity: The Difficult Quest for Growth in Jamaica", IMF Working Paper 06/235 (Washington: International Monetary Fund)

Dacosta, M., 2007, "Colonial Origins, Institutions and Economic Performance in the Caribbean: The Case of Barbados and Guyana", IMF Working Paper 07/43 (Washington: International Monetary Fund)

Kwon, G., L. McFarlane, & W. Robinson, 2006, "Public Debt, Money Supply, and Inflation: A Cross-Country Study and Its Application to Jamaica", IMF Working Paper 06/121 (Washington: International Monetary Fund)

Murray, A., 2006, "Dynamic Computable General Equilibrium (CGE) Model for the Jamaican Economy", Research Department, Bank of Jamaica

Olsen, M., 1996, "Big Bills Left on the Sidewalk: Why Some Nations are Rich, and Others are Poor", *Journal of Economic Perspectives*, Vol. 10, No.2, 3-24

Ramkissoon, R., 2002, "Explaining Differences in Economic Performance in Caribbean Economies", paper presented to an International Conference on "Iceland and the World Economy: Small Island Economies in the Era of Globalization", Center for International Development (CID), Harvard University, Cambridge, MA

Rodrik, D., and A. Subramanian, 2004, "Why India Can Grow at 7 Percent a Year or More: Projections and Reflections", IMF Working Paper 04/118 (Washington: International Monetary Fund)

Sala-I-Martin, X., 2002, "15 Years of New Growth Economics: What Have We Learnt?" Columbia University, Department of Economics Discussion Paper Series, Discussion Paper No. 0102-47,

Serju, P., 2006, "An Explanation of the Paradox of High Growth and Low Growth in the

Draft

Jamaican Economy”, mimeo Bank of Jamaica

Staritz, C., R. Atoyan, & J. Gold, 2007, “Guyana: Why Has Growth Stopped? An

Empirical Study on the Stagnation of Economic Growth”, IMF Working Paper

07/86 (Washington: International Monetary Fund)

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Appendix

A1: Caribbean Country Sample

Antigua (S)

Bahamas (L)

Barbados (L)

Belize (L)

Dominica (S)

Dominican Republic (L)

Grenada (S)

Tobago (L)

Guyana (L)

Jamaica (L)

St. Kitts (S)

St. Lucia (S)

St. Vincent (S)

Haiti (L)

Suriname (S)

Trinidad and

Letters in parentheses indicate the size of the economy: L (large) and S (small).

Figure 1. Average Annual Economic Growth in Selected Caribbean Countries

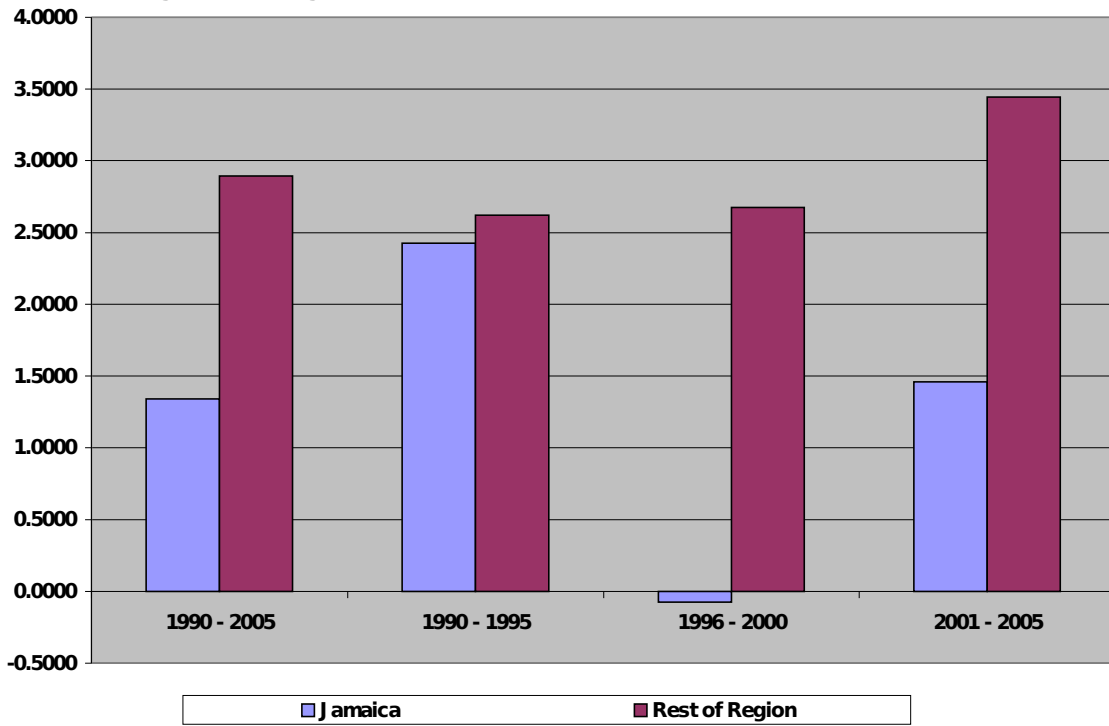
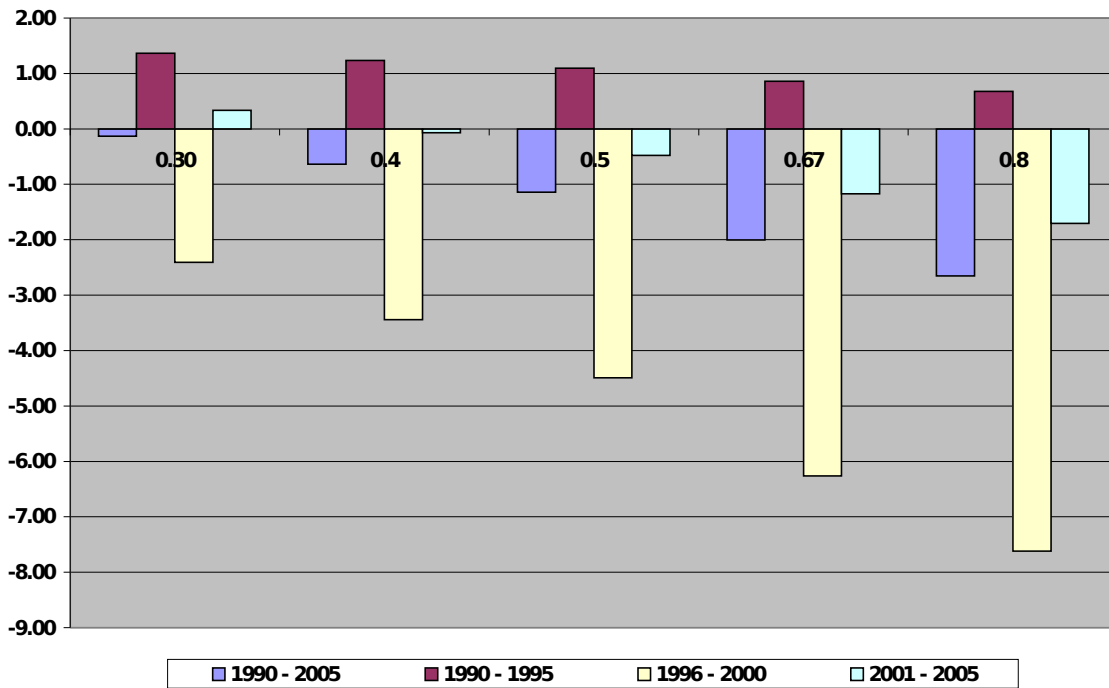


Figure 2. TFP for Differential Capital Share of Output



Regression Analysis

Table 1. Panel Unit Root Tests*

	<i>dloggdp</i>	<i>cfratio</i>	<i>fdiratio</i>	<i>dlogtot</i>	<i>dpolri</i>	<i>worldgro</i>	<i>dinflat</i>	<i>oilprices</i>
	-2.26	-2.40	-2.11	-3.63	-2.78	-2.94	-6.93	-8.94

* Based on panel unit root test of Augmented Dickey Fuller (1979)
 Statistics in bold note the rejection of the null of a common unit root process at the 5 per cent confidence level

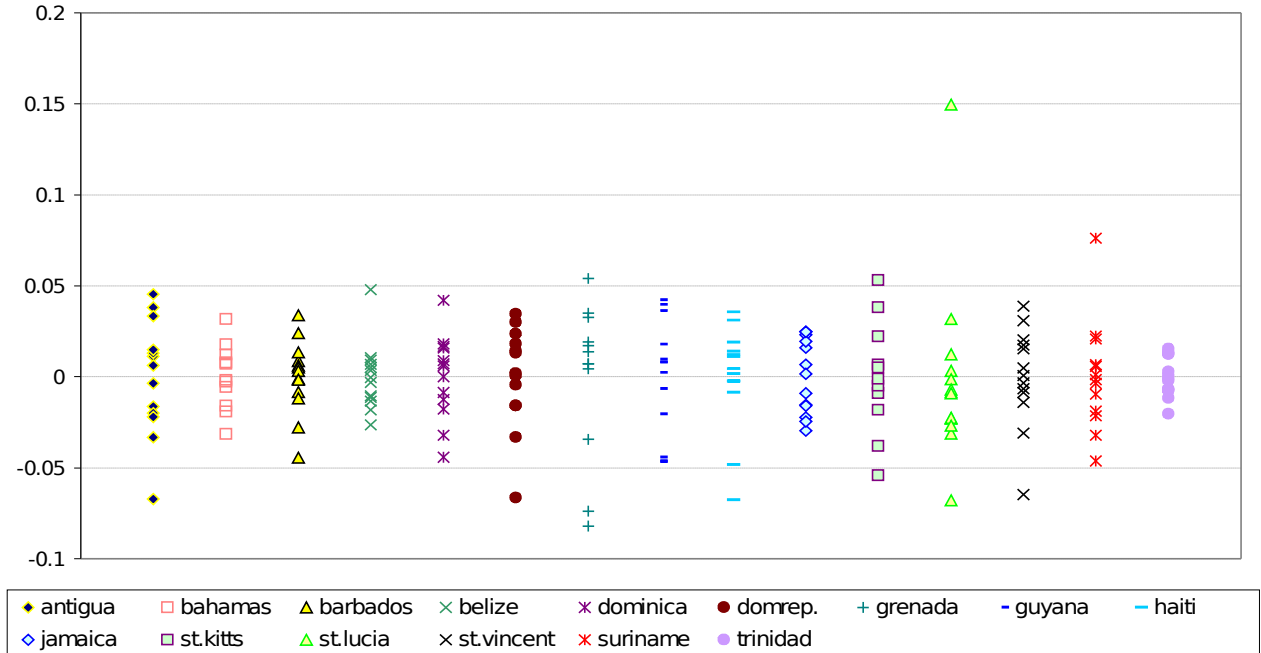
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Table 2.

Cross - Correlations in Caribbean Sample

	<i>dloggdp</i>	<i>dloggdp(-1)</i>	<i>cfratio</i>	<i>fdiratio</i>	<i>dlogtot</i>	<i>dpolrisk</i>	<i>worldgrowth</i>	<i>dinflation</i>
<i>dloggdp</i>	1.00							
<i>dloggdp(-1)</i>	0.53	1.00						
<i>cfratio</i>	0.14	0.16	1.00					
<i>fdiratio</i>	0.50	0.44	0.02	1.00				
<i>dlogtot</i>	-0.02	0.06	-0.02	-0.04	1.00			
<i>dpolrisk</i>	0.21	-0.09	0.07	0.06	-0.20	1.00		
<i>worldgrowth</i>	0.19	0.16	-0.03	0.04	0.09	-0.06	1.00	
<i>dinflation</i>	-0.17	-0.13	-0.09	0.03	0.25	-0.06	-0.03	1.00

Figure 3. Residuals from GMM Regression



Data

Real GDP and gross fixed capital formation at constant 1990 prices were obtained from the United Nations National Accounts Main Aggregates Database.¹⁸ The ICRG Political Risk Index measures the changes in political and institutional environment; however, the data was available for only 7 Caribbean countries.¹⁹ Foreign direct investment (FDI) data was retrieved from the IMF's International Financial Statistics Database. Terms of trade data are from the International Financial Statistics database. The terms of trade index (TOT) is defined as the price deflator for exports of goods and services over the price deflator of imports of goods and services with the base

¹⁸ See <http://unstats.un.org/unsd/snaama/downloads/GDPconstantNC-countries.xls>

¹⁹ Data was available for Jamaica, Suriname, Trinidad, Bahamas, Guyana, Haiti and Dominican Republic.

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year being 2000. Data on inflation and world growth is obtained from the World Economic Outlook database.