

The Nexus between Tax Structure and Economic Growth in Jamaica

Taxation Policy Division, Ministry of Finance and the Public Service, Jamaica
March 31, 2008

Abstract: This study examines the impact of the tax burden and the general tax structure on economic growth in Jamaica for the period 1989- 2006. After controlling for various determinants of growth, our results indicate that the CIT and PAYE had no impact on economic growth, while the effect of the GCT was positive albeit fragile. Our Findings show also that there is no evidence to support the argument that the average tax burden was growth retarding. Nevertheless, the research lends support to the calls for a rebalancing of the Jamaican tax system towards more indirect forms of taxation.

Keywords: economic growth; tax structure; tax mix; tax burden

Remark: The authors gratefully acknowledge helpful comments on previous drafts. The usual disclaimer applies. Please address correspondence to Kamara Gibson and Oronde Small, Research and Analysis Unit, Taxation Policy Division, Ministry of Finance and the Public Service, Jamaica; email: kamara@mof.gov.jm or oronde@mof.gov.jm.

Table of Contents

	Page
Introduction.....	2
Literature Review: Tax Structure and Economic Growth	4
Data	6
Methodology	10
Regression Results	13
Conclusion	188
Appendix I	20
References.....	26

1. Introduction

Jamaica's economic performance during fiscal year 2006/07 has been mixed. Real economic growth of about 2.5 percent was the best in over a decade, and annual inflation fell to 6.5 per cent, three percentage points below the target of 9.5 per cent. Notwithstanding these positives, the Jamaican government is still confronted with the challenges of realigning its fiscal accounts with regards to the budget deficit (which stood at some 5.3 per cent of GDP at the end of FY 2006/07) and reducing the debt to GDP ratio. The conditions within the macro economy underscore the urgent need for the government to secure enhanced revenue flows. In its 2007 *Article 24* Consultation with Jamaica, the IMF reiterated this point by emphasizing Jamaica's need to ensure increased revenue that could be used to correct the fiscal imbalances which will lend some stability to the macro economy and yield greater prospects for economic growth. In this setting, tax policy was identified as an obvious medium through which the government could accomplish such objectives. Higher levels of taxation realized via higher tax rates or broader tax bases could provide possible solutions. However, one has to straddle carefully with the idea of securing increases in tax revenue as a higher tax burden could have a retarding effect on economic growth.

An alternative approach that indebted countries like Jamaica could adopt is simply to grow out of the problem. But how can this materialize within the context of a macro economic environment that is seemingly discouraging to the very prospect of growth? Again, tax policy is an avenue that could provide the impetus that is needed. Analysts have characterized Jamaica as a country with a high rate of investment (*FDI*) but low rates of productivity and economic growth (World Bank, 2000; Artana and Naranjo, 2003). One possible explanation for the anomaly is that the tax system may have directed resources away from more productive investment choices toward areas of activity that offer benefits in terms of lower tax obligations, but which do not necessarily bode well for the overall growth of the economy. Within this context, there is a possible need to reform the existing tax structure to achieve a more efficient allocation of resources that will translate into higher rates of economic growth.

Bahl and Wallace (2004) in their “Comprehensive Tax Reform” study on Jamaica have highlighted several areas of concern which Jamaica might address through tax reform. A notable issue of importance that was highlighted speaks to an over reliance on direct taxes (income based) vis-à-vis indirect taxes (consumption based); a feature which is widely viewed in the public finance sphere as growth retarding.

In sculpting a tax regime that encourages economic growth, one at least has to first develop a clear understanding of how the various tax components within the economy affect the rate of growth of economic output. The majority of previous empirical work done with regards to the nexus between structure and growth within the developing country context has focused on ascertaining the effect of economic growth on tax revenues. In this research we attempt to fill this gap by departing from these studies and investigate instead the impact of the aggregate tax burden and the general tax structure on economic growth in Jamaica. Not only do we examine the relationship between the aggregate tax rate and economic growth but our research goes further to explore the links between growth and the other major tax types within the Jamaican context. Another point of departure of our study vis-à-vis previous empirical work is that we utilize time series analysis rather than a cross sectional approach to study the impact of the tax structure on growth.

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature on the determinants of economic growth especially as it relates to a country’s tax structure. Section 3 formally develops the methodology employed and the model to be estimated while section 4 gives a detailed description of the dataset. Section 5 presents an analysis of our findings. Finally, section 6 concludes the research and suggests areas for future work.

2. Literature Review: Economic Growth and the Tax Structure

Much of the empirical work in public finance has been devoted to investigating and documenting ways in which taxes distort the allocation of resources, but relatively few have gone further to examine the overall effect of the tax structure on economic growth. Among the research that has been undertaken, few have examined the link between economic growth and tax structure for developing countries¹. Here, we seek to examine this particular relationship in the case of Jamaica.

The determinants of economic growth were first highlighted in an accounting framework first developed by Solow (1956) in which economic output (y) (typically measured by GDP), is determined by the economy's resources. In particular, the size and skill of the labor force (l) and the size and technological productivity of the capital stock (k) are the chief determinants of the level of output in an economy. Economic growth therefore will depend on the growth rate of these resources – physical and human capital along with changes in the underlying productivity of these general inputs in the economy. The growth rate of the economy can be expressed as follows:

$$Y_i = \alpha_i k_i + \beta_i l_i + \mu_i \quad (1)$$

where the real GDP growth rate in country i is denoted by Y , the change over time of the capital stock is given by (k) , the percentage growth rate of the effective labor force over time is given by (l) and (μ) measures the economy's overall productivity growth. The coefficients α and β represent the marginal productivity of capital and the output elasticity of labor, respectively².

In principle a country's tax structure can influence each of the determinants of the rate of economic growth and therefore can indirectly impact the rate of growth of real GDP in several ways (Solow 1956). Firstly, taxes can discourage capital accumulation or growth in the capital stock through relatively high corporate tax rates. Secondly, taxes can hinder

¹ "Taxation and Economic Growth: The case of Taiwan" (Wang and Yip, 1992) is a notable exception

² Each coefficient provides information on the expected change in economic growth that will result from a one per cent change in the respective factor inputs.

growth in labor supply by discouraging labor force participation or hours of work or by distorting occupational choice or the acquisition of education skills and training through relatively high personal income taxes. Thirdly, tax policy can discourage productivity growth where it does not stimulate research and development (R&D) and the development of venture capital for “high tech” industries; activities whose spillover effects can potentially enhance the productivity of existing labor and capital. Fourthly, tax policy can influence the marginal productivity of capital by distorting investment from heavily taxed sectors into more lightly taxed sectors with lower overall productivity. Finally, heavy taxation on labor supply can distort the efficient use of human capital by discouraging workers from seeking employment in sectors with high social productivity but with a heavy tax burden (Engen and Skinner, 1996).

Having highlighted at least five plausible mechanisms through which taxes can impact economic growth, it is evident that tax policy is critical to the long term growth of the economy. Empirical studies have generally confirmed the existence of an inverse relationship between taxation and economic growth (see Koch et al (2005, pp 190). Nonetheless, there is an ongoing debate in the economic growth literature with regards to the suggested impact of taxes on economic growth. Models of endogenous growth including, Romer (1986) and Lucas (1990), for example, posit that taxes and tax policy can impact long term economic growth rates, whilst neoclassical growth models including Cass (1965), Koopman (1965) and Solow (1970) argue the contrary.

Endogenous growth models typically emphasize “spillover” and “learning by doing” effects as well as other positive externalities that can have long term, persistent effects on output growth. On the other hand, the conventional neoclassical growth models posit that long term output growth is inextricably tied solely to the exogenous rate of change in technology, and that output growth caused by any other factor is purely transitional. Within the context of the neoclassical framework, the length of the transition period and hence the importance of the ‘policy’ for growth varies widely. Thus a longer transition period, during which the output growth rate is higher relative to the steady state growth

rate, could suggest that tax policy does in fact impact significantly on the rate of economic growth within the economy.

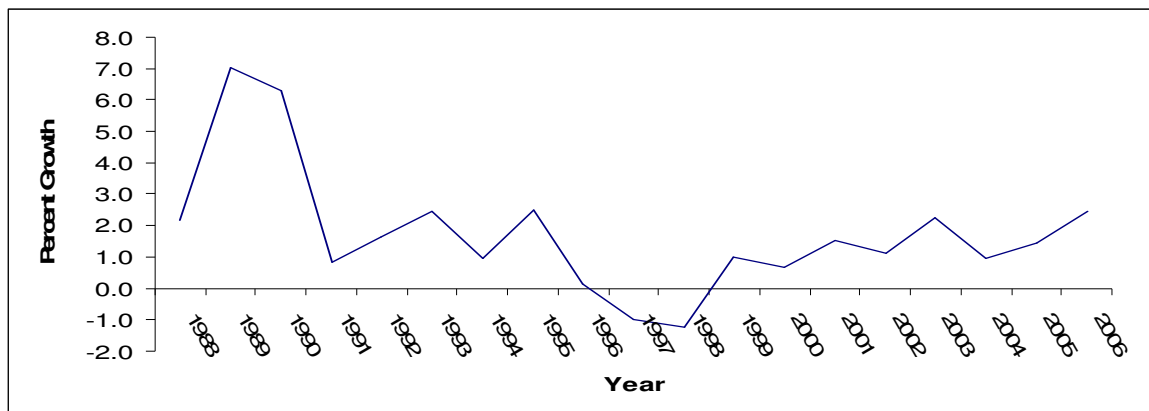
Much of the empirical research on this particular question of the relationship between tax burden and economic growth (of real per capita GDP) has lent support to existence of an inverse relationship between the two (see Widmalm (2001) and Wang and Yip (1992)). Moreover, a less pronounced but nonetheless inverse relationship between the observed tax mix (of indirect to direct taxes) and rates of economic growth has also been posited. Others however have found no evidence to support the argument that either the tax burden or the overall tax structure has a significant impact on economic growth, (see for example Engen and Skinner (1996)³ and Padovano and Galli (2001)). Nevertheless, most of the early empirical contributions have been criticized for not adequately controlling for the non-tax determinants of economic growth and as such, there are some doubts on the validity of their findings.

4. Data

Real GDP growth rate which, was used as the dependent variable in the analysis, was calculated using GDP data from the Statistical Institute of Jamaica's (STATIN) National Income and Product 2006 publication. Figure 1 illustrates real GDP growth performance for the period 1988 - 2006, which averaged approximately 1.8 per cent per year.

³ Engen and Skinner (1996) is an excellent survey paper on the literature on taxation and economic growth.

Figure 1: Jamaica's Real GDP Growth, 1988-2006



Source: Compiled using data from the Ministry of Finance and the Public Service

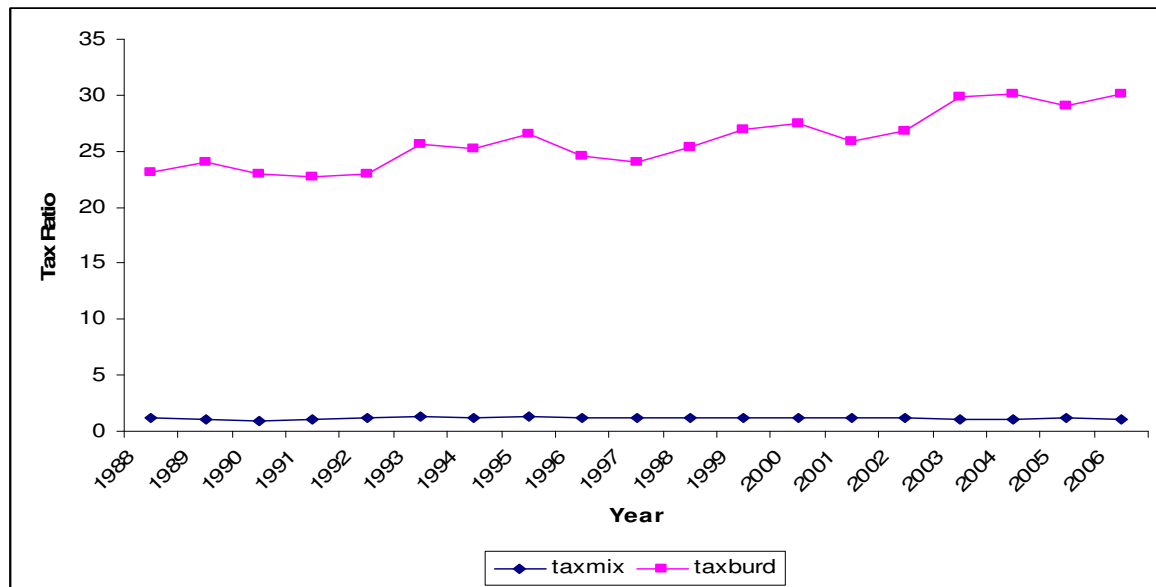
The Jamaican economy grew at phenomenal rates between 1989 and 1990 relative to the sample period as the country recovered from the effects of Hurricane Gilbert. In 1991 amidst a government policy that sought to liberalize the country's foreign exchange regime the rate of economic growth dropped dramatically from 6.3 per cent in the previous year to less than one per cent. The economy actually declined in 1997 and 1998, the two years immediately following the financial sector crisis which to this day still acts as an impediment to growth. The growth dynamics exhibited over the period is absolutely critical to the analysis going forward and requires that we fully incorporate the impact of the non tax growth effects. As mentioned previously, this is accomplished with the inclusion of structural dummies in our regression model.

All tax revenue data were sourced from within the Ministry of Finance and the Public Service. Figure 2 below highlights the overall performance of Jamaica's tax revenue in relation to GDP for the period under study. The tax burden (total tax revenue divided by GDP) has been on an upward trajectory over the period. In FY 2006/07, the Jamaica's tax burden stood at approximately 30 per cent up from 23 per cent in 1988⁴. The tax mix (ratio of direct to indirect taxes) has remained fairly stable over the period. Indirect or

⁴ Bahl and Wallace (2004) have suggested that in comparison with similar sized economies in the Caribbean and Latina America, Jamaica's tax burden is about average. A more detailed regression analysis to derive Jamaica's tax effort relative to regional economies supported the result that Jamaica's tax effort is about average.

consumption based taxes have always outstripped income based taxes except in 1990. Nonetheless, there is a concern that there is an over reliance on direct taxes in Jamaica which might in part explain the economy's poor performance with growth rates averaging about 1.8 per cent over the period.

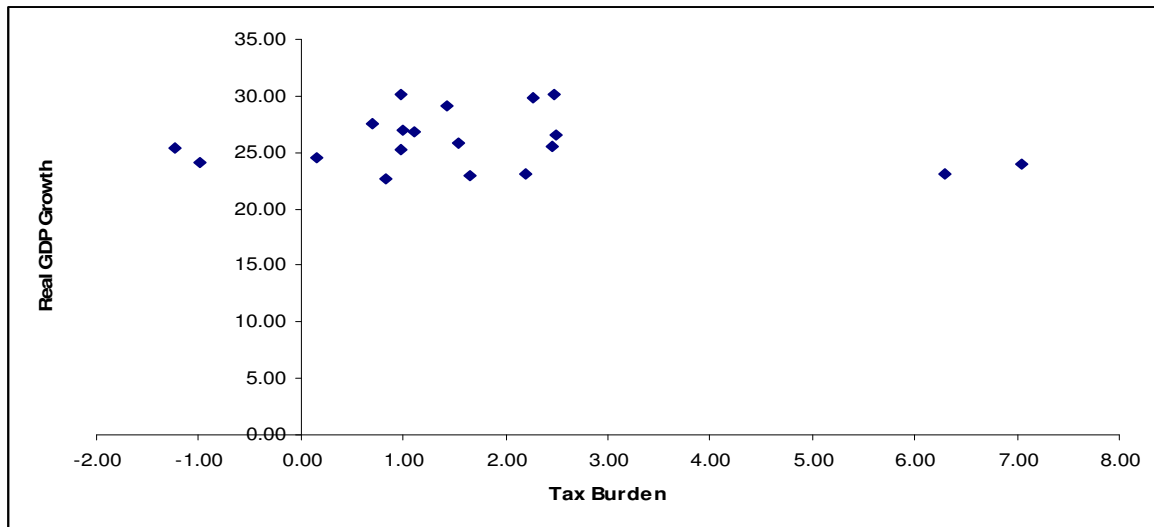
Figure 2: The tax mix and the tax burden in the Jamaican economy 1988-2006



Source: Compiled using data from the Ministry of Finance and the Public Service

Figure 3 illustrates the relationship between real GDP growth rates and the tax burden. The Pearson correlation coefficient showed a slightly negative relationship between the two variables, but however was not significant at the 5 per cent level. In general however Engen and Skinner (1996) noted that correlation between marginal tax rates and growth rates yield a decidedly mixed picture and that by itself cannot test satisfactorily the relationship between tax structure and growth. Regression analysis is also needed to adequately investigate this relationship. This is even more necessary since the overall pattern exhibited by figure 3 is ambiguous.

Figure 3: Correlation between Real GDP Growth Rate and the Tax Burden



Source: Compiled using data from the Ministry of Finance and the Public Service

Data for other independent variables, such as population growth rate, unemployment rate, primary and secondary school enrollment were all obtained from the Planning Institute from Jamaica's publication "Economic and Social Survey of Jamaica". The Ministry of Labour and Social Security supplied information on man-days-lost and data on government consumption as a percentage of GDP was sourced from the Economist Intelligence Unit (EIU). The fiscal year rate of inflation was calculated using data from the Statistical Institute of Jamaica (STATIN). Data on gross fixed capital formation, (used as a proxy for investments), as well as trade data on imports and exports (used to create a measure of trade openness) were retrieved from STATIN's National Income and Product publication for the respective years. The descriptive statistics of the variables used in our analysis as well as the sources of the data are presented in Table A1 in the Appendices.

3. Methodology

A number of studies have examined the effect of the average tax rate (measured as total tax revenue's share of GDP) on economic growth. Katz Mahler and Franz (1983), Koester and Kormendi (1989) and Agell, Lindh and Ohlsson (1996) for example, presented evidence showing the average tax rate as having no impact on economic growth. Engen and Skinner (1992) on the other hand, found a large negative relationship between the two. In our research, we utilized time series data on the average tax rate (as defined above) to examine the impact of the tax burden on Jamaica's economic growth.

Unfortunately, the average tax rate however does not explain the impact that the underlying tax structure has on economic growth. A more insightful approach to investigating this particular relationship requires examining the impact that specific tax types have on economic growth over a particular period. The analysis can be extended further to include an examination of the impact of the relative tax mix (defined as the ratio of indirect taxes to direct taxes) on the growth rate of economic output. In our research, we examine the relationships between these tax structure components and economic growth in the case of Jamaica using time series data for the period 1991-2006⁵.

It is important to mention from the outset that a caveat in this research (as in the majority of the empirical studies examining the relationship between taxation and economic growth) has to do with the issue of reverse causation. This is where it is possible that one variable causes the other or vice versa. In other words, do changes in the tax base (or the overall tax structure) explain observed changes in the rate of economic growth, or is it the rate of economic growth that has influenced the observed changes in the tax structure? Richer economies for example, typically have higher average tax rates relative to poorer economies. However, it is ambiguous as to whether it is the tax regime that has primarily caused countries to become richer or whether the higher average tax rates are as a result of the country being richer.

⁵ Cross country analysis would provide a good test of the relationship between taxation and growth. However, a country specific enquiry would best be conducted using time series analysis. Also a problem that is generally associated with cross country studies is that the estimated regression may be spurious if country specific characteristics are not included in the model.

Additionally, a researcher must be cautious when picking the control variables (independent variables) used in calibrating the regression model that is typically employed to examine the relationship between taxation and economic growth⁶. Some studies have reported a simple correlation between taxation and growth; while others however have rightfully extended the analysis to control for other (*non tax*) factors that help to determine taxation's impact on economic growth. Depending on the control variables that are employed, the results of these studies may be interpreted differently. The use of varying control variables is one possible explanation for the conflicting results that have resulted from previous empirical works that examined the nexus between tax structure and economic growth.

The estimation approach that we adopt in this research is similar to the extreme bounds analysis (EBA) utilized by Widmalm (2001). EBA essentially involves estimating a basic regression model, before extending the model by including additional covariates (one at a time), re-estimating the new models and noting any change in the coefficient of interest⁷. If the estimated coefficient on the variable of interest remains significant, then the relationship is said to be robust (or stable). However, if the coefficient estimate changes as covariates are introduced into the model, the relationship may be deemed 'fragile'⁸. Our regression model to be estimated had the following general structure:

$$\text{RGDP} = \alpha + \beta_t T + \beta_g G + \beta_z Z + \varepsilon \quad (2)$$

We ran a series of base regressions with the growth rate of real RGDP as the dependent variable for the period 1990 to 2007. The independent variables or regressors were

⁶ The regression model should be aptly specified such that the independent utilized do not introduce multicollinearity problem within the model. Also the structural breaks associated with non tax variables should be accounted for in the model.

⁷ The covariates that were used in the regression comprise a set of variables that are widely considered as alternative determinants of economic growth found in the empirical literature.

⁸ The EBA approach is a useful method to test for the robustness of the regression results.

grouped into three distinct categories⁹. The first group of regressors (**T**) comprises proxies of the tax structure which is our variable of interest. These components include the tax burden (calculated as the ratio of tax revenue to GDP), revenues from the specific tax types (PAYE, CIT and GCT) as a share of GDP and the tax mix (defined as the ratio of indirect to direct taxes).

Overall, it is expected that the tax burden should have a negative impact on economic growth since as tax revenue increases due to a rise in tax rates, economic activity is shifted from the formal to the underground economy. If an increase in tax revenue is not returned to the public in the provision of public goods for example, then this might retard growth. Moreover, a corrupt or untrustworthy government might squander a country's resources. Finally, government agents have an incentive to widen the tax base of taxed activities. In the case of developing countries, which often rely on corporate taxes imposed on large (often state-owned) companies, the tax structure provides an incentive to increase the profits of these companies often to the detriment of competitors, which could have significant economic growth effects (Koch et al. (2005, pp193)).

The general expectation is that personal and corporate income taxes will adversely affect growth since they distort incentives to accumulate human and physical capital, which are deemed critical determinants of economic growth in endogenous growth models. This has informed policy thinking in many jurisdictions which focuses more heavily on indirect forms of taxation vis-à-vis direct taxes (such as the GCT in the case of Jamaica), as it is expected that the impact on the economy will be much less severe, or even positive. The tax mix measures the structure of taxes, which relative to the level of taxes, might play a more important role in explaining economic growth. It is expected that a high indirect/direct tax mix ratio should be growth enhancing, since indirect taxes are supposedly relatively less distortionary.

⁹ To mitigate the problems associated with multicollinearity, it is desirable that no pair of regressors in the respective groupings measure the same underlying phenomenon. In our estimation multicollinearity was not a serious problem as the variance inflation factor was below 20 in all cases.

The second group of regressors (**G**) incorporates our basic growth determinants as suggested by the empirical growth literature and are included in all regressions. These variables include the growth rate of gross fixed capital formation (GCF); a proxy for investment which is one of the most widely used determinants of growth in empirical growth studies. Secondly, the population growth rate (POP), which is regarded as a biological depreciator of capital and hence a direct growth determinant in endogenous growth models. Thirdly, a measure of trade openness (OPEN), measured by export plus imports divided by GDP was used to capture the growth effects associated with trade. Also included in the base regressions were structural dummies to account for the economic effects of hurricane Gilbert in 1988 (D1), the liberalization of the country's foreign exchange regime in 1991 (D2) and the financial sector crisis of 1996 (D3). The inclusion of these dummies improved the results significantly (resulting in higher R^2 squares and lower Mean Squared Errors (MSE's)).

The third group of regressors (**Z**) includes our conditioning variables or our alternative information set, which included a mix of fiscal, monetary and other growth determinants. The conditioning variables were excluded from the base regressions which sought to establish a relationship between our target variables and economic growth. Nonetheless, the conditioning variables were subsequently incorporated to test the 'robustness' of the results from the initial regressions for each of the respective tax components. These variables included inflation (INF), government consumption (GOVTCON) as a share of GDP, total man days lost (MANDAYS), total unemployment rate (UNEMP) and primary (PRIMARY) and secondary (SECONDARY) school enrollment rates. A description of the variables used in the analysis as well as some descriptive statistics for each of the variables is presented in Appendices.

5. Regression Results

Our base model appeared robust in all regressions except in the case of the tax burden, as the regression coefficients do not change significantly when subjected to the extreme bounds analysis (EBA). Tables A2 through A6 in the Appendices display the estimation

results from the EBA (including the results from our base regression model). Table 1 below depicts the results from our base regression examining the impact of the tax burden and tax structure components on economic growth.

Table1: Results from the Base Regression on the Respective Tax Structure Components

BURDEN	0.571 (4.34)***	CIT	-0.32 (-0.36)	PAYE	-0.283 (-0.59)	GCT	0.26 (0.87)	TAXMIX	9.32 (3.81)**
GCF	0.035 (3.88)**	GCF	0.002 (0.16)	GCF	0.001 (0.07)	GCF	0.01 (0.75)	GCF	0.003 (0.28)
OPEN	-0.058 (-2.33)**	OPEN	0.08 (1.58)	OPEN	0.081 (1.92)*	OPEN	0.04 (0.61)	OPEN	0.090 (2.82)**
POP	0.082 (-0.13)	POP	-1.67 (-1.28)	POP	-1.870 (-1.13)	POP	-2.96 (2.63)**	POP	-3.659 (-5.05)***
D1	4.58 (6.65)***	D1	5.79 (3.93)***	D1	5.910 (3.21)***	D1		D1	9.107 (9.62)***
D2	-5.31 (-9.88)***	D2	-6.68 (-6.25)***	D2	-6.671 (-5.95)***	D2		D2	-8.733 (-9.88)***
D3	-1.68 (-2.63)**	D3	-0.74 (-1.31)	D3	-0.188 (-0.26)	D3	-1.29 (-1.16)	D3	-0.671 (-1.18)
Constant	-6.902 (-2.20)*	Constant	-4.14 (-1.31)	Constant	-3.854 (-1.25)	Constant	-2.65 (-0.46)	Constant	-16.677 (-4.21)***
Obs	18	Obs	18	Obs	18	Obs	15	Obs	18
R-squared	0.933	R-squared	0.865	R-squared	0.866	R-squared	0.555	R-squared	0.920

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

Tax Burden

In our base regression the coefficient on the tax burden suggested that the tax burden had a positive and significant impact on growth during the period. This result however may be partly due to reverse causality. After being subject to an EBA, the coefficient on the tax burden turned out to be insignificant (see Table A2 in the Appendices). This suggests that our results are fragile and that there is no conclusive evidence to support arguments that the tax burden had been a stifling influence on economic output in Jamaica. This result is roughly in line with that presented by Widmalm (2001), who found the relationship between the average tax rate and growth amongst 23 OECD countries to be

insignificant. Wang and Yip (1992) also reported that there was no significant relationship between the average tax rate and economic growth in the case of Taiwan. However Koch et al found that decreased tax burdens are strongly associated with increased economic growth potential in South Africa.

CIT

As shown in Table1 above, the coefficient on corporate income tax in our base regression was negative and insignificant at the 10 per cent level. Note also that the as additional covariates were introduced in the EBA; the coefficient became positive but remained insignificant (see Table A3 in the Appendices). This compares with Widmalm (2001) who found a positive though fragile relationship between the corporate tax rate and the rate of economic growth in some 23 OECD countries. Wang and Yip (1992) and Lee and Gordon (2005) on the other hand found that the corporate tax rate had a significant negative impact on the rate of growth in Taiwan and a cross section of countries respectively.

The insignificance of the capital or corporate income tax within the Jamaican context might be due to the relatively poor level of tax administration as it relates to collections as well as the benefits that accrue to companies with regards to tax credits and other forms of tax incentives. Additionally, the ratio of CIT revenue to GDP used in the analysis might not have accurately reflected the level of corporate taxation in Jamaica, as tax on dividends and interest were excluded from our calculations, both of which are mainly paid by business corporations.

PAYE

With regards to the PAYE, our results suggest that personal income taxes had no real impact on the growth of the Jamaican economy over the period of study. The coefficient on the PAYE remained insignificant throughout the EBA (see Table A4 in the Appendices). This result is not surprising as it is more or less in line with predictions from growth models based on relatively wage – inelastic labor supply. The rationale is that to the extent that labor is less responsive to changes in the tax rate then higher

relative tax rates will not result in major dislocations of the labor supply and this mitigates any expected fall off in the rate of growth of economic output. Wang and Yip (1992) also found that the labor tax rate and the rate of change of the labor tax had essentially no effect on the growth of the Taiwanese economy during the period 1954-1986. These findings contrast with Skinner (1987) and Widmalm (2001) who both found that labor taxes significantly impinged on the rates of growth of several African economies and a cross section of OECD countries, respectively.

Alleyne et al (2004) showed that there is a mild progressivity of Jamaica's tax system, including all major taxes. Koester and Kormendi (1989) demonstrated that because of this progressivity, a high tax rate on high income earners reduces the return to human capital which in turn distorts educational decisions and result in lower economic growth. One caveat of our research is that the average PIT rate used in our regression analysis might not have adequately captured the real progressivity of the personal income taxes and as a result we may have discounted the real impact on economic growth to some extent.

GCT

Based on the results from our base regression model the coefficient on the GCT is positive but insignificant at the 10 per cent level. Notwithstanding as our base model is extended in the EBA, the coefficient becomes significant (see Table A5 in the Appendix) suggesting that the GCT does in fact determine the rate of economic growth. However, the impact of the GCT on economic growth is inconclusive owing to the fragility of or estimation results. Widmalm (2001) found taxes on goods on service to have a positive and significant impact on growth in the OECD countries she studied. This she explained with the argument that indirect (consumption) taxes create less of a disincentive to work since employees retain more of what they earn. Workers respond to lower marginal tax rates by expanding the hours they work and raising productivity which in turn raises the output potential of the economy.

Tax Mix

The results from our base regression showed the tax mix as having a positive and significant effect at the on economic growth. The results appeared relatively robust as the coefficients remained significant and the 5 per cent level subsequent to the addition of the conditioning variables in the EBA (see Table A6 in the Appendix). This concurs with the anecdotal stance that direct taxes vis-à-vis indirect taxes impact negatively on the rate of economic growth, suggesting that policies geared at rebalancing the tax system toward more indirect forms of taxation should pay huge dividends in terms of higher rates of economic growth¹⁰. Our finding is supported by Koch et al. (2005) who found that a lower tax mix is good for economic growth in the case South Africa.

¹⁰ Bahl and Wallace (2004) estimated Jamaica's ratio of indirect to direct taxes to be 42 per cent (using data for 2000). This was above the mean of 32 per cent derived from the 57 countries in the sample. Bahl and Wallace also suggested that the tax structure was overly dependent of direct taxes and this could have a deleterious effect on growth.

6. Conclusion

This paper presented a comprehensive examination of the nexus between the rate of economic growth of the Jamaican economy and the tax structure using data for the period 1989-2006. Our analysis borrows from the approach used in Widmalm (2001) who utilized extreme bounds analysis to test the relationship between the tax structure and economic growth. The results of our study are inconclusive with regards to the impact of the average tax burden on the rate of economic growth of the Jamaican economy. A more comprehensive analysis of this particular relationship using EBA suggests that the tax burden has no impact on economic growth. This finding possibly arises from the opposing effects of two major taxes: consumption taxes versus factor income taxes. However, the investigation of the aggregate tax effect without further study of the underlying tax structure may not help us to better understand the real impacts of tax policy.

Our results also confirmed that as a share of total tax revenue the PAYE and CIT do not have a significant impact on the rate of economic growth in Jamaica. One possible explanation for this finding is that the Jamaican labour market likely displays characteristics of a relative wage inelastic labor supply which mitigates the expected negative impact on the economy as posited by the public finance literature. That the CIT regime has been tweaked over the years to encourage capital investments through incentives etc, coupled with concerns about low levels of compliance, has resulted in low effective corporate tax rates relative to the statutory rate of 33.3 per cent. This militates against the negative impact on growth expected to accompany these taxes.

Consistent with expectations from the empirical literature, the GCT had a positive, though fragile impact on the rate of growth of the Jamaican economy. Consumption taxes are heralded as being the way forward and as such many governments have shifted their focus away from more direct forms of taxation. This argument finds support in the results gleaned from our analysis of the relationship between growth and the tax mix. The coefficient on the tax mix was positive and statistically significant in all regressions

(EBA) and supports a policy approach geared at rebalancing the tax system towards more indirect forms of taxation.

Despite the importance of our results, there were some limitations in our research. Our research paper utilized time series data to assess the impact of the tax structure on growth and as such did not explore the impact on other countries apart from Jamaica. Future research could examine this area using panel data to include other Caribbean countries which were excluded due to data unavailability.

The use of average and not marginal tax rates in our research is another cause of concern. In a progressive tax system, average tax rates understate marginal tax rates and as such the real impact of the progressivism on growth is ignored in our estimation results. In addition, our study was limited by aggregation problems which may have resulted in an understatement of the tax incidence on factor inputs, particularly labour and capital through our reliance on the PAYE and CIT. By focusing on the PAYE and CIT which are essentially taxes on wages and capital, we inadvertently ignored other forms of comprehensive personal and corporate income and in so doing may have introduced some amount of bias in the results.

In sum, the idea that the tax burden influences economic growth has theoretical underpinning, but the empirical evidence available thus far is rather weak. The results of this study however lends support to the view that tax structure does matter, in particular that greater focus on indirect taxes does have a positive impact on growth as suggested by our analysis of the impact of the tax mix on the performance of the Jamaican economy. However, tax progressivity which is a key element of the theoretical construct with regards to the nexus between taxation and growth was not incorporated in our study and suggests undoubtedly the need for future work.

Appendix

Table A1: Summary statistics for the time series variables

Variable Description	Variable name	Source	No. of obs.	Mean	SD	Min.	Max.
Growth rate of real GDP	rgdp	STATIN's National Income and Product (2006)	19	1.75	2.03	-1.23	7.04
<i>Tax Variables</i>							
Corporate income tax revenue	cit	Ministry of Finance and Public Service (MoFPS)	19	2.81	0.60	1.91	3.81
PAYE income tax revenue	paye	MoFPS	19	5.24	0.85	4.11	7.08
GCT income tax revenue	gct	MoFPS	16	7.21	1.55	2.71	9.21
Tax mix	mix	MoFPS	19	1.14	0.09	0.89	1.30
Tax burden	taxburd	MoFPS and STATIN's National Income and Product (2006)	19	25.96	2.48	22.72	30.13
<i>Other Variables</i>							
Annual growth rate of population	pop	Economic and Social Survey Jamaica	19	0.73	0.32	0.01	1.28
Unemployment rate	unemp	Economic and Social Survey Jamaica	19	14.96	2.28	10.30	18.90
Inflation	infl	Compiled using data from Statistical Institute of Jamaica	19	19.31	17.79	5.76	80.19
Government consumption as a percentage of GDP	govt	Economist Intelligence Unit (EIU)	19	13.76	2.24	8.80	16.70
Growth rate of gross capital formation	gcf	National Income and Product 2005	18	26.13	22.53	-5.33	99.25
Openness	open1	Compiled using data from National Income and Product 2005	18	104.63	9.31	89.83	122.74
Man days lost	mandays	Ministry of Labour	19	57527.26	54724.54	1340	181020
Primary school enrollment	primary	Economic and Social Survey Jamaica	19	328370.11	10758.32	306205	348682
Secondary school enrollment	secon	Economic and Social Survey Jamaica	19	250985.05	58170.59	219336	488803

Table A2: Results from an EBA of the impact of the tax burden on Economic Growth, 1988 to 2006

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BURDEN	0.571 (4.34)***	0.568 (4.00)**	0.599 (3.65)*	0.61 (3.41)**	0.651 (3.93)**	0.576 (1.79)	0.596 (1.63)
GCF	0.035 (3.88)**	0.036 (3.78)**	0.03 (2.63)**	0.027 (2.23)*	0.037 (2.38)**	0.032 (1.45)	0.032 (1.25)
OPEN	-0.058 (-2.33)**	-0.06 (-1.97)*	-0.301 (-0.45)	-0.065 (-0.69)	-0.110 (-1.38)	-0.090 (-0.85)	-0.104 (-0.84)
POP	0.082 (-0.13)	-0.012 (-0.01)	-0.701 (-0.54)	-0.829 (0.65)	-1.193 (-1.40)	-0.552 (-0.30)	-0.766 (-0.35)
D1	4.58 (6.65)***	4.74 (3.72)***	5.52 (3.46)***	5.54 (3.65)***	6.25 (5.42)***	5.80 (3.42)***	6.26 (2.92)**
D2	-5.31 (-9.88)***	-5.24 (-6.15)***	-5.71 (-4.54)***	-5.49 (-4.37)***	-5.37 (-5.35)***	-5.01 (-3.37)***	-4.91 (-2.88)**
D3	-1.68 (-2.63)**	-1.79 (-1.65)	-1.45 (-1.14)	-1.19 (-0.91)	-1.71 (-1.30)	-1.68 (-1.22)	-1.72 (-1.20)
INFL		-0.003 (-0.18)	0.005 (-0.21)	-0.051 (-0.19)	-0.011 (-0.48)	-0.018 (-0.54)	-0.020 (-0.54)
UNEMP			0.181 (0.55)	0.141 (.42)	0.038 (0.14)	0.019 (0.06)	0.073 (0.20)
GOVTCON				-0.258 (-0.62)	-0.19 (-0.14)	-0.110 (-0.18)	-0.149 (-0.23)
MANDAYS					0 (-0.83)	0 (0.7)	0 (0.76)
PRIMARY						0 (0.42)	0 (0.37)
SECONDARY							0 (0.83)
Constant	-6.902 (-2.20)*	-6.651 (-1.57)	-13.405 (-0.99)	-5.842 (0.31)	-2.41 (-0.16)	-12.571 (-0.43)	-13.269 (-0.4)
Observations	18	18	18	18	18	18	18
R-squared	0.933	0.933	0.936	0.948	.0946	0.950	0.954

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

**Table A3: Results from an EBA of the impact of the Corporate Income Tax on
Economic Growth, 1988 to 2006**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CIT	-0.32 (-0.36)	-0.28 (-0.28)	-0.30 (-0.27)	-0.32 (-0.27)	-0.42 (-0.33)	0.33 (0.33)	0.17 (0.09)
GCF	0.002 (0.16)	0.004 (0.12)	0.004 (0.12)	0.001 (0.04)	0.003 (0.09)	0.01 (0.26)	0.01 (0.13)
OPEN	0.08 (1.58)	0.08 (0.55)	0.08 (0.55)	0.06 (0.34)	0.05 (0.28)	0.01 (0.08)	0.02 (0.09)
POP	-1.67 (-1.28)	-1.79 (-1.14)	-1.87 (-0.76)	-1.97 (-0.72)	-2.28 (-0.96)	0.75 (0.2)	0.42 (0.07)
D1	5.79 (3.93)***	6.03 (2.89)**	6.10 (2.14)*	6.13 (2.02)*	6.61 (2.48)**	4.34 (1.26)	4.76 (0.76)
D2	-6.68 (-6.25)***	-6.55 (-4.37)***	-6.60 (-2.73)**	-6.51 (-2.48)**	-6.58 (-2.39)*	-4.37 (-1.60)	-4.56 (-1.15)
D3	-0.74 (-1.31)	-0.88 (-0.50)	-0.86 (-0.41)	-0.70 (-0.30)	-0.97 (-0.40)	-0.92 (-0.60)	-0.98 (-0.60)
INFL		-0.01 (-0.22)	-0.004 (-0.12)	-0.01 (-0.22)	-0.12 (-0.25)	-0.04 (-0.76)	-0.03 (-0.60)
UNEMP			0.02 (0.03)	-0.01 (-0.01)	-0.04 (-0.08)	-0.18 (-0.32)	-0.13 (-0.14)
GOVTCON				-0.15 (-0.23)	-0.12 (-0.15)	0.12 (0.11)	0.09 (0.08)
MANDAYS					0 (0.26)	0 (0.19)	0 (0.19)
PRIMARY						0 (1.53)	0 (1.18)
SECONDARY							0 (0.14)
Constant	-4.14 (-1.31)	-3.77 (-0.84)	-4.35 (-0.23)	-0.03 (0.00)	1.24 (0.04)	-27.99 (-0.78)	-28.16 (-0.72)
Observations	18	18	18	18	18	18	18
R-squared	0.865	0.866	0.866	0.867	0.869	0.903	0.904

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

**Table A4: Results from an EBA of the impact of the Personal Income Tax on
Economic Growth, 1988 to 2006**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PAYE	-0.283 (-0.59)	-0.257 (-0.74)	-0.522 (-0.74)	-0.507 (-0.72)	-0.509 (-0.58)	-0.588 (-0.70)	-0.632 (-0.42)
GCF	0.001 (0.07)	0.003 (0.14)	0.008 (0.30)	0.008 (0.27)	0.008 (0.23)	0.002 (0.04)	0.001 (0.04)
OPEN	0.081 (1.92)*	0.076 (1.33)	0.034 (0.29)	0.029 (0.18)	0.029 (0.19)	0.043 (0.28)	0.045 (0.27)
POP	-1.870 (-1.13)	-1.978 (-1.12)	-1.018 (-0.40)	-1.060 (-0.39)	-1.055 (-0.36)	1.135 (0.38)	1.233 (0.28)
D1	5.910 (3.21)***	6.126 (2.85)**	4.973 (1.65)	5.001 (1.55)	4.994 (1.39)	3.559 (1.09)	3.396 (0.58)
D2	-6.671 (-5.95)***	-6.553 (-4.65)***	-5.931 (-2.94)**	-5.903 (-2.62)**	-5.903 (-2.39)*	-4.565 (-2.26)*	-4.559 (-1.97)
D3	-0.188 (-0.26)	-0.386 (-0.88)	-0.669 (-0.39)	-0.623 (-0.33)	-0.621 (-0.28)	-0.819 (-0.54)	-0.802 (-0.48)
INFL		-0.005 (-0.88)	-0.014 (-0.46)	-0.157 (-0.35)	-0.016 (-0.37)	-0.335 (-0.75)	-0.032 (-0.69)
UNEMP			-0.262 (-0.48)	-0.264 (-0.44)	-0.264 (-0.41)	-0.291 (-0.47)	-0.312 (-0.33)
GOVTCON				-0.449 (-0.07)	-0.045 (-0.06)	0.170 (0.17)	0.181 (0.17)
MANDAYS					0 0	0 (0.02)	0 (0.01)
PRIMARY						0 (1.82)	0 (1.63)
SECONDARY							0 (-0.48)
Constant	-3.854 (-1.25)	-3.522 (-0.88)	6.193 (0.29)	7.316 (0.23)	-23.760 (-0.59)	-23.760 (-0.59)	-23.299 (-0.02)
Observations	18	18	18	18	18	18	18
R-squared	0.866	0.867	0.871	0.871	0.871	0.908	0.908

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

Table A5: Results from an EBA of the impact of the General Consumption Tax on Economic Growth, 1988 to 2006

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GCT	0.26 (0.87)	0.62 (1.26)	0.87 (1.79)	0.94 (1.69)	1.01 (1.57)	1.16 (2.27)	1.16 (1.90)
GCF	0.01 (0.75)	0.03 (1.41)	0.02 (1.14)	0.18 (1.01)	0.03 (1.12)	0.03 (1.16)	0.03 (1.00)
OPEN	0.04 (0.61)	0.01 (0.10)	0.06 (0.76)	0.03 (0.27)	-0.01 (-0.11)	-0.06 (-0.46)	-0.06 (-0.41)
POP	-2.96 (2.63)**	-2.47 (-1.71)	-4.34 (-1.90)	-4.42 (-1.75)	-5.32 (-3.14)	-2.26 (-0.41)	-2.24 (-0.35)
D1							
D2							
D3	-1.29 (-1.16)	-0.85 (-0.67)	0.001 (0.00)	0.29 (0.20)	-0.21 (-0.15)	-0.10 (-0.07)	-0.10 (-0.06)
INFL		0.03 (0.77)	0.06 (1.35)	0.05 (1.13)	0.05 (1.12)	0.035 (0.66)	0.03 (0.53)
UNEMP			0.40 (0.88)	0.37 (0.78)	0.29 (0.68)	0.19 (0.38)	0.19 (0.32)
GOVTCON				-0.22 (-0.55)	-0.12 (-0.23)	-0.08 (-0.11)	-0.08 (-0.10)
MANDAYS					0 (-0.33)	0 (0.52)	0 (0.45)
PRIMARY						0 (0.79)	0 (0.67)
SECONDARY							0 (0.03)
Constant	-2.65 (-0.46)	-2.73 (-0.50)	-16.00 (-1.04)	-9.33 (-0.50)	-5.77 (-0.33)	-24.21 (-0.77)	-24.31 (-0.65)
Observations	15	15	15	15	15	15	15
R-squared	0.555	0.580	0.623	0.636	0.681	0.738	0.738

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

**Table A6: Results from an EBA of the impact of the Tax Mix on Economic Growth,
1988 to 2006**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TAXMIX	9.32 (3.81)**	11.54 (6.06)***	12.009 (5.53)***	12.168 (5.12)***	12.141 (4.76)***	10.304 (2.87)**	11.463 (2.34)*
GCF	0.003 (0.28)	-0.004 (-0.39)	0.003 (0.20)	-0.001 (-0.05)	0.002 (0.08)	0.0002 (0.01)	0.0003 (0.01)
OPEN	0.090 (2.82)**	0.114 (3.36)***	0.071 (1.27)	0.046 (0.50)	0.034 (-0.28)	0.039 (0.32)	0.0489 (0.37)
POP	-3.659 (-5.05)***	-3.504 (-4.41)***	-2.711 (-1.62)	-2.854 (-1.52)	-2.975 (-2.13)*	-1.749 (-0.75)	-1.8056 (-0.73)
D1	9.107 (9.62)***	8.780 (8.44)***	7.959 (3.82)***	8.009 (3.54)	8.222 (5.31)**	7.259 (3.35)**	7.154 (2.85)**
D2	-8.733 (-9.88)***	-9.779 (-13.52)***	-9.329 (-8.78)***	-9.179 (-7.78)	-9.149 (-7.19)***	-8.030 (-4.07)**	-8.476 (-3.56)**
D3	-0.671 (-1.18)	0.137 (0.21)	-0.264 (-0.35)	-0.004 (-0.01)	-0.148 (-0.11)	-0.0362 (-0.25)	-0.277 (-0.15)
INFL		0.024 (2.29)**	0.016 (1.14)	0.007 (0.27)	0.005 (0.18)	-0.008 (-0.24)	-0.002 (-0.06)
UNEMP			-0.198 (-0.54)	-0.24 (-0.57)	-0.274 (-0.50)	-0.253 (-0.49)	-0.312 (-0.54)
GOVTCON				-8.140 (-0.687)	-0.209 (-0.37)	-0.089 (-0.12)	-0.081 (-0.10)
MANDAYS					0 (0.17)	0 (0.19)	0 (0.07)
PRIMARY						0 (1.04)	0 (0.75)
SECONDARY							0 (0.704)
Constant	-16.677 (-4.21)***	-21.442 (-6.46)***	-14.927 (-1.26)	-8.140 (-0.42)	-6.954 (-0.31)	-21.359 (-0.82)	-19.603 (-0.66)
Observations	18	18	18	18	18	18	18
R-squared	0.920	0.929	0.933	0.936	0.936	0.944	0.947

Dependent variable is the growth rate of real GDP

*significant at 10%; **significant at 5%; ***significant at 1%

Value of t statistics in parenthesis (formed using robust standard errors).

References

- Agell, J., Lindh, T. and Ohlsson, H. (1997). "Growth and the Public Sector: A Critical Review Essay." *European Journal of Political Economy*. Vol. 13, pp. 33-52.
- Alleyne, D., Alm, J., Bahl, R., & Wallace, S. (2004). "Tax Burden in Jamaica." Jamaica Tax Reform Project, Working Paper 9. Atlanta, GA: Andrew Young School of Policy Studies, Georgia State University.
- Artana, D. and Naranjo, F. (2003). "Fiscal Policy Issues in Jamaica: Budgetary Institutions, the Tax System, and Public Debt Management." Region 3. Inter-American Development Bank.
- Bahl, R. and Sally Wallace (2004). *Comprehensive Tax Reform: Final Report*. Atlanta, GA: Andrew Young Schools of Policy Studies, Georgia State University.
- Bahl, Roy and Sally Wallace (2007). *Tax Reform and Economic Development The Jamaican Case*. Planning Institute of Jamaica, Kingston.
- Branson, J. and Lovell, C. A. (2001). A Growth Maximising Tax Structure for New Zealand, *International Tax and Public Finance*, Vol. 8, No. 2, pp. 129-146.
- Cass, D. (1965). "Optimum growth in an Aggregative Model of Capital Accumulation" *Review of Economic Studies*. Vol.32, No.3, pp. 233-240.
- Easterly, W. and Rebelo, S. (1993). Fiscal Policy and Economic Growth: An Empirical Investigation, *Journal of Monetary Economics*, Vol. 32, Issue 3, pp. 417-458.
- Engen, E. and Jonathan Skinner (1996). "Taxation and Economic Growth." *National Tax Journal*. Vol. 49 No. 4, pp. 617-42.
- Engen, E.M. and Jonathan Skinner (1992). "Fiscal Policy and Economic Growth." *NBER Working Paper*. No. 4223.
- Katz, C.J., Mahler, Vincent A. and Michael G. Franz (1983). "The Impact of Taxes on Growth and Distribution in Developed Capitalist Countries: A Cross-National Study. *The American Political Science Review*. Vol. 77, No. 4, pp. 871-886.
- Koch, S., Schoeman, N. and Van Tonder, J. (2005). Economic Growth and the Structure of Taxes in South Africa: 1960-2002, *South African Journal of Economics*, Vol. 73, No. 2, pp. 190-210.

- Koester, R. and Roger C. Kormendi (1989). "Taxation, Aggregate Activity and Economic Growth: Cross Country Evidence on Some Supply-Side Hypotheses" *Economic Inquiry*. Vol. 27 pp.367-386.
- Koopmans, T. (1965). "On the Concept of Optimal Economic Growth." Cowles Foundation Paper 238.
- Lee, Y. and Gordon, R. (2005). Tax Structure and Economic Growth, *Journal of Public Economics*, Vol. 89, Issue 6, pp. 1027-1043.
- Lucas, R. (1990). "Supply side economics: An analytical review. *Oxford Economic Papers*. Vol. 42 no. 2, pp.293-316.
- Mendes, Margaret and Rachael McLean (2007). *Essentials of Jamaican Taxation*. CFM Publications, Kingston.
- Padovano, F. and Galli, E. (2001). Tax Rates and Economic Growth in the OECD Countries (1950-1990), *Economic Inquiry*, Vol. 39, No. 1, pp. 44-57.
- Romer, P. (1986). "Increasing returns and long run growth" *Journal of Political Economy*. Vol. 94, No. 5, pp.1002-1037.
- Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics*. Vol. 70 no. 1, pp 65-94.
- Solow, Robert M., (1970). *Growth Theory: An Exposition*. Oxford University Press, New York.
- Tosun, M. and Abizadeh, S. (2005). Economic Growth and Tax Components: An Analysis of Tax Changes in OECD, *Applied Economics*, Vol. 37, Issue 19, pp. 2251-2263.
- Wang, Ping and Chong K. Yip (1992). "Taxation and Economic Growth: The Case of Taiwan." *American Journal of Economics and Sociology*. Vol. 51, No. 3. pp. 317-331.
- Widmalm, Frida. (2001). "Tax Structure and Growth: Are Some Taxes Better than Others?" *Public Choice*. Vol. 107, pp.199-219.