Revisiting the Effect of Country Size on Taxation in Developing Countries

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Abstract

In developing countries, taxation makes up a significant part of government's current total revenue. Tax efficiency is important in order to maximize revenue that can be used in the redistribution of wealth and public expenditure. Larger economies, however, experience difficulties in remaining efficient. This study, therefore, seeks to investigate the effect country size has on tax revenues for developing countries and to discuss whether the findings of Codrington (1989) in the 1980s still hold in the twenty-first century. Analytical and empirical methodologies were conducted using a total of thirty-four countries. Conflicting results were found. Analytically, size played a discriminating role with respect to utilization of the tax systems as 72.6percent were employed by maxi-states while 59.7percent were adopted by small economies. Micro economies were heavily reliant on international trade and transaction taxes. Empirically, population positively influenced tax-to-GDP ratios while openness was statistically insignificant.

Introduction

Since the great debate on European economic integration in the mid-1950s, economists have been captivated by the study of economics of size. Researchers have initially attempted to determine the relationship between size and development. However, over the years, studies have shifted towards investigating the impact of size on key macroeconomic variables. In this era of globalization it is important to understand the relationship between size and the economy as small economies and increasingly, very large nations are progressively becoming susceptible to the demands from the economic powerhouses of the world. Very few studies, however, have focused on taxation. Though taxation can be seen as a disincentive to work, it is an essential part of the economy as it helps in the redistribution of income and to finance public expenditures that are necessary for further development.

Researchers have long emphasized that small economies rely heavily on taxation because of the many disadvantages that plaque their structural economies such as diseconomies of scale, lack of diversification due to limited natural resources and macroeconomic policy autonomy. Therefore, ensuring prudent fiscal management is of utmost importance for maintaining a stable economy. Nonetheless,

many economists believe that microstates are capable of withstanding these negative characteristics as their social and political environment allows for efficiency in taxation. Though small size has been seen to dismiss many fallacies in relation to development, for example, Switzerland and Luxembourg, developing countries are still fighting a continuous battle to remain competitive in this industrializing world.

Consequently, like Codrington (1989), this paper seeks to examine the effect of country size on tax revenues for developing countries and to discuss whether his findings for the 1980s are still applicable in the twenty-first century. Also addressed in the study are the policy implications and necessary recommendations. To this purpose, analytical and empirical investigations are carried out for a total of 34 countries. The analytical analysis looks at different ratios, in particular, tax-to-GDP and tax concentration as in Codrington (1989). However, since most of the data appear non-stationary in nature an unbalanced non-stationary panel data methodology is adopted for the empirical approach. This is an advancement on Codrington (1989) who assumed the data were stationary, leading to the possibility of biased estimates and unreliable inference. The findings from this paper are important for policy makers when reforming the tax

systems. Additionally, the results can be used as a further basis to explain variations in the macroeconomics among countries.

The remainder of this paper is organized as follows. Immediately following this section is a description of the literature for measuring country size. Section 3 presents the literature review for the effect of size on taxation while section 3 discusses the data and methodology employed. Section 4 provides an analysis of the analytical and empirical results for the study. Section 5 concludes.

2. Measurement of Size

Over the years, there has been much debate by researchers to establish a criterion that can group countries into different sizes. One accepted methodology is to adopt a continuous rather than a discrete concept [Commonwealth Secretariat (2007)]. Two methods have been predominantly identified in the literature: behavioral and quantitative.

Demas (1965), Selwyn (1980), Coulson (1982), Diggines (1985) and recently Briguglio (1995, 2002) are examples of studies that undertook theoretical analyses to classify countries based on common characteristics observed. Selwyn (1980) identified that microstates are heavily dependent on foreign trade, one large foreign company and have a specialized economy due to a narrow range of resources.

Briguglio (1995, 2002) added that smallness is associated with a "price taker" economy that results from the inability to influence international prices. However, the Commonwealth Secretariat (2007) noted that this characteristic is not a sufficient tool since it can also be applied to large countries. Nonetheless, one feature that wholly captivates researchers is that small states are predominantly vulnerable whether politically, economically, technically, socially and culturally [Commonwealth Secretariat (2007), Liou and Ding (2002), Armstrong et al. (1998), Briguglio (1995)]. However, it should be noted that studies have found that larger countries have also developed this characteristic (see www.fundforpeace.org). Therefore, since there is no accepted behavioral basis to categorize countries, researchers have placed greater emphasis on quantitative methodologies.

To quantitatively measure country size, three variables are commonly used: population, land area, and economic performance, usually proxied by gross domestic product (GDP). Studies have utilized cluster analysis and principal components techniques to compute an index that involves all three of the above variables [see Crowards (2002) and Downes (1988, 1990)]. So far, population has been the most favored amongst studies [see Kuznets (1960), Chenery and Syrquin (1975), Armstrong et al. (1998), Liou and Ding (2002) and

Rose (2006)]. Read (2001) argued that population is the best method to measure size because of information content and ease of conceptualization while the Commonwealth Secretariat (2007, p.22) conveyed that population size is 'intuitively appealing from an economic point of view as it reflects the size of the labor force and therefore the constraints associated with human resources and the potential number of consumers.' Furthermore, population is based on the suppliers and the buyers of goods and services produced, thus, it is most appropriate as a measure of size. To this note, in the empirical investigation below, population is employed as a measure of country size.

Some economists believe that the sole use of geographical area [Jalan (1982), and Lloyd and Sundrum (1982)] or economic performance or GDP [Read (2001)] provides misleading measures of economic size. Srinivasan (1986) also noted that GDP is more dependent on the level of development than size. It is therefore common to see two or more of these variables being utilized together [Demas (1965), Downes (1988, 1990), Codrington (1989), Crowards (2002)]. Downes (1988) noted that the three measures are interrelated by way of population density, per capita income and spatial per capita income, which is a proxy for the regional dispersion of per capita income. Thus, using all variables would provide a better indication of size.

Besides recognizing the variables to determine country size, further analysis is needed to establish a cut-off limit that would distinguish a small country from a medium or large one. Armstrong et al. (1998), after searching for a natural break in the population size continuum, identified an upper limit of 3 million persons for a microstate. The paper defined microstate as those entities with an unusual degree of autonomy within a larger country. Taylor (1969) used a mean population level of 18 million to differentiate between large and small countries while Jalan (1982) suggested an upper limit of 5 million people for a small state. Demas (1965) also agreed that a small country should have a population of less than 5 million in addition to usable land area of at most 20 thousand square miles.

Crowards (2002) categorized 190 countries according to population, land area and total income. Two methodologies were adopted: observation of continuum to identify significant breaks and cluster analysis. From the observational analysis the study found that there are five groups for country size – micro, small, medium-small, medium-large and large. A micro country was observed to have a population below 0.5 million, a land area of 7, 000 km^2 and income at no more than US$0.7 billion while for a large nation the continuum breaks indicated that there should be no less than 12 million people,

250,000 km^2 in land area and have at least US$12 billion.[3] The cut-off levels for the study were consistent with other research such as Armstrong et al. (1998) and Kuznets (1960). The findings obtained by Crowards were employed as the basis for ranking countries in this paper. From the continuums, cut-off levels were identified for maxi-states; the lower limits were 19 billion people, 300 km^2, and US$25 billion. However, it should be taken into account that there is no clear-cut method of determining the number of clusters in hierarchical classifications procedure or cut-off levels since they are based on subjective analysis (Downes, 1990). As such, there is no absolute hard and fast rule to distinguish between a big and small country.

3. Literature Review

Bray (1987) noted that the study of country size and its impact on the economy gained popularity, following the Second World War, due to the growth in the number of independent, small states. Researchers have been studying the effect of size on the taxable capacity of an economy since the 1970s. More recently, related studies have investigated the influence size has on tax competition, tax harmonization, and on macroeconomic variables such as economic

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[3] Since micro-states and maxi-states are of interest in this study only these results are provided, see Crowards (2002) for a wider discussion.

growth, trade, and economic volatility. Three approaches have been utilized to analyze these relationships: theoretical, empirical and analytical. Because very few papers have significantly addressed the issue of size and taxation for developing countries, the literature review will comprise mainly of an evaluation of the methodology and results of Tait et al (1979) and Codrington (1989). Brief discussions of associated papers are given.

Country Size and Taxation

Tait et al. (1979) sought to examine the relationship between taxable capacity and the ratio of exports plus imports to GDP, the share of mining in GDP, the share of agriculture in GDP, export ratio, export ratio excluding mining, per capita non-export income and per capita GDP, and compared the extent of the variation among countries with dissimilar economic characteristics. The study considered 63 developing countries with per capita gross national product (GNP)) less than US$1000. Regressions were run for subsamples of countries based on population, national income, and per capita GNP; and then compared to that of the larger sample. The paper found that national income affects taxable capacity in small countries, but is irrelevant for larger countries. The results supported the hypothesis that mining and foreign trade matter relatively more for the countries with lower per capita GNP (between US$0 and US$500). Additionally, the

estimates showed no significant relationship between population and countries with high and low densities. The researchers also tested for the effect of geography on taxable capacity. In Africa, agriculture was found to influence capacity, while in Asia and Latin America external trade was a more significant determinant. Moreover, the study posits that regrouping international tax comparison indices by subgroups for size of country, per capita income, population, and geographical area did not add significantly to an understanding of the relationship.

Codrington (1989) investigated the relationship between size and taxation in developing countries for the period 1980 to 1984. Adopting Thomas (1974) methodology, three indicators – population, land area and national output - were used in order to determine the criteria for size. The developing economies were categorized into very small (mini-states) and very large (maxi-states) countries. Based on a theoretical examination, Codrington made comparisons between the two groups using three core fiscal indicators: the choice of tax instruments, the distribution of tax revenues, and the ratio of tax to GDP. His findings illustrated significant differences between the two country size groups. Large countries employed a greater percentage of available taxes than very small countries (44percent as compared to 41percent). The weight of taxes placed on functional categories also displayed notable disparity as large states focused more on

income, social security, property and employment taxes, while mini-states placed greater emphasis on foreign trade taxation. The latter result was consistent with Tait et al. (1979). Evidence suggested that nearly 84percent of tax revenue in large countries was derived from three tax groups, but only two was utilized for very small countries, implying that mini-states are more efficient in the collection of taxes. Small countries were also found to have a larger tax-GDP ratio. Size was the only variable identified that explained this difference, for it has implications on tax effort as economic structures, social organization, administration and government activities are affected.

Ohsawa (1999) demonstrated the important role that country size and location play in tax competition using Nash games. Although tax competition is globally inefficient, owing to the imbalance in the burden of tax competition, the study found that small countries could still benefit, as tax rates are higher in larger countries. Therefore, the small country achieves higher per capita revenue in the Nash equilibrium relative to the large country. Similar results were also found in Ohsawa (2003), Trandel (1994), Kanbur and Keen (1993), Wilson (1991) and Bucovetsky (1991). In contrast, Haufler and Wooton (1999) noted that imperfect competition with trade barriers could reverse the benefit for small countries. Considering two countries competing for a monopolist to invest in their economy, they

showed that even if the larger country ends up imposing higher taxes, it, nonetheless, wins due to better market access, since trade costs provides a location advantage. Such findings can have implications for increased tax revenues as governments may receive greater corporation tax.

Size and Country Performance Indicators

The literature on the analysis of size on macroeconomic indicators is important to this study because the effect of country size on macro-variables can give an indication of the performance level of a nation, in addition to the necessary implications on the collection of tax revenue.

Keesing (1968) tested for the size effect, using a cross-section analysis of 31 countries, in regard to 40 commodity categories. Evidence supported the hypotheses that the size effect gives rise to a positive correlation between per capita exports and population, but a negative correlation between per capita imports and population. Small countries were therefore at a disadvantage in the international trade of manufactured goods because their limited national markets restricted the possibilities of exploiting internal and external economies.

Balassa (1969) criticized Keesing's methodology and findings. He suggested reasons, other than country size, for the hypotheses given in the paper. Specializing, in a few export products, was identified as one reason to explain the first hypothesis since some of these countries will export only one commodity. The reason given for the second hypothesis was that specialization requires high importation that contributes to the negative correlation. He indicated that the use of individual product categories for the dependent variable (per capita exports and imports) is not sufficient to determine "size effect" and "income effect". Instead, he recommends the consideration of all manufactured goods. Balassa reformulated the regressions by taking the share of the exports (imports) of manufactured goods in total exports (imports) as the dependent variable. The results indicated the presence of size effect with regard to exports and imports in both country groups. Small countries were found to be at a disadvantage in the international trade of manufactured goods. He added, however, that small countries would gain more from trade liberalization and regional integration. After taking into consideration the heterogeneity in the manufacturing sector, Balassa separated the sector into semi-manufactures and finished manufactures. He found that small countries had a comparative advantage in exporting semi-manufactures but were disadvantaged in exporting finished goods.

Khalaf (1979), using a multiple correlation analysis, examined the effect of country size on both economic growth and economic development. The study found no evidence of country size being associated with either growth or development. There was also an unclear impact of dependence on trade, commodity export concentration, and geographic export concentration on growth and development.

Amiti (1998) assessed the relationship between the size of a country and the characteristics of the goods it produces and trades. A general equilibrium model was adopted to test the hypotheses that the 'market access' effect attracts firms to the large country to save on transportation costs; and the 'production cost' effect attracts firms to the small country due to lower wages. The study was conducted with the assumption that countries are the same in every respect besides size, but the industries were allowed to differ in factor intensities, transport costs and demand elasticities. Amiti (1998) found that capital easily flowed to the large country when industries are allowed to vary their factor intensities. When a variation in transport costs was allowed the large country traded its high transport cost goods for the small country low transport cost goods. Both countries benefited from increased economic activity that may result in higher tax ratios.

Down (2007) tested the economic theory that smaller countries should experience greater levels of volatility than larger economies, on account of higher levels of insecurity. Evidence suggests that the level of domestic economic volatility in the developed economies during the latter half of the twentieth century may indeed have been driven by the size and depth of markets. Therefore, international trade integration may have eased rather than accentuated domestic economic volatility.

In general, the literature for size on taxation provides inconclusive evidence to support either large or small countries completely benefiting from higher tax revenues and tax ratios. Lotz and Morss (1967), Chelliah et al. (1975), and Tanzi and Shome (1993) identified other factors that might be responsible for a country's taxable capacity: the level of openness, per capita income, social attitudes, and political factors.

4. Methodology, Model Specification and Data

Methodology and Model Specification

To conduct an analysis of the effect of country size on taxation, the study adopted three criteria to determine the magnitude of a country: land area, population, and GDP. The economies were separated into five different categories: micro, small, medium, large, and very large.

Despite findings and recommendations from earlier studies, the cut-off values for each group were taken from Crowards (2002). These values were used because they provided the most recent analysis of the three criterions, as over the years, due to globalization and shocks to the economy, the population and gross domestic product figures for the countries would have been significantly altered. The study focuses mainly on microstates and very large nations.

To rank countries into different groups, all three criterions were given the same weighting. A nation was identified as a microstate (or mini-state) if at least two categories satisfied the microstate characteristics and the third category is at most small. For example, Antigua and Barbuda was a microstate with respect to land area and population but was considered a small country in terms of GDP; however, overall the country was labeled micro. Analogously, to determine a very large country, at least two of the criteria must be very large while the other falls under large. Cameroon provides an ideal example. The results are presented in Table 1.

After categorizing the data, the study first investigated the relationship between country size and taxation using an analytical approach. Similar to Codrington (1989), the indicators used were: the choice of tax instruments, the distribution of tax revenue, and the

ratio of tax-to-GDP. The results are presented in Tables 2A, 2B and 2C.

The final procedure embarked upon in this paper was to empirically test for the effect of size on taxation. A panel data model as specified below was adopted.

$$TAX_{it} = \alpha_1 + \Sigma\beta_i \; x'_{it} + v_{it}$$

where $x'_{it} = [POP, CS, IS, Y_{pc}, OP]$ with $i = 1,...,N$ countries over $t = 1,...,T$ time periods and $v_{it} = \varepsilon_{it} + \mu_{it,}$ where v_{it} is the composite error term, ε_{it} is the combined time-series and cross-section error component and μ_{it} is the cross-section or individual-specific error component.

In this study, the a priori for GDP per capita (Y_{pc}) on taxation is positive. An increase in per capita income pushes individuals into a higher tax bracket and also stimulates more consumption. These are two important avenues where governments receive tax revenues. Positive-signed coefficients are also expected for CS and IS since they are directly related to GDP through the National Income Identity. Population (POP), however, has an ambiguous relationship with tax-to-GDP ratio. An indirect relationship may exist as the management of tax systems becomes easier with fewer taxpayers thus, increasing efficiency [Shenfield (1968), and Tanzi and Shome (1993)] while a

positive-signed coefficient is possible as the greater the number of taxpayers the more tax-revenues collected. The impact of openness, OP, on tax revenue is also ambiguous. Trade liberalization, through a reduction in import duties, could encourage more imports that compensate the decline in the tax rate if the price elasticity is greater than one thus, resulting in an increase in trade taxes [Tanzi (1989) and Bovenberg (1987)]. On the other hand, an inverse relationship is possible if the price elasticity is equal to one or less. Calvo (1988) findings lent support to a negative-signed coefficient. Therefore, price elasticity is an important factor in determining the impact of openness on taxation.

To estimate the coefficients, the study used recent developments in panel unit root and co-integration analysis. Five major unit root tests were employed: Levin, Lin and Chu (LLC) (2002), and Breitung (2002) [which have a common unit root process as their null hypothesis], Im, Pesaran and Shin (IPS) (2002), the Augmented Dickey Fuller - Fisher Chi-square (ADFF) [which have individual unit root processes] and the Hadri z-statistic which has a null hypothesis of no unit root. The results are shown in Table 3A.

In the event of non-stationarity, Pedroni Panel Co-integration test (1999, 2000) was implemented (See Table 3B). Due to different orders of integration found in the series, the Panel Dynamic Ordinary

Least Squares (DOLS) procedure proposed by Kao and Chiang (2000) and Mark and Sul (2003) was adopted. Therefore, the following model was regressed:

$$LTAX_{it} = \alpha_1 + \Sigma\beta_i \, x'_{it} + \Sigma\gamma_i \, \Delta x^\circ_{it} + v_{it}$$

where Δx° denotes lags and leads of the changes in *LPOP, LIS, and LY_{pc}*. In this method, lags and leads were included in each equation for the first difference of I(1) variables to correct for possible autocorrelation and endogeneity. Two lags and leads were employed as annual data was used. A general-to-specific reduction process was undertaken where only significant variables were retained. White cross-section is included in the estimation to account for cross-equation correlation. It should be noted that similar results were found for longer lags and leads. The findings of the significant variables are reported in Table 3C. To save space the leads and lags are omitted from the table.

Data

The listing of the developing countries was based on the International Monetary Fund (IMF)'s definition and was obtained from the World Economic Outlook Report for April 2008. In order to measure country size, 2007 figures for GDP, population and land area were used. These data were procured from the IMF, the Central Intelligence Agency (CIA) World Factbook, and the United Nations' World Population Prospects, respectively.

To conduct the empirical investigations, the following variables, were considered: tax revenue (TAX), gross domestic product (Y), population (POP), consumption share of current GDP (CS), investment share of current GDP (IS) and openness in current prices (OP). All variables were expressed in logarithm form and reported in nominal values. Thirty-four cross-sections, representing all five country-sizes, were included. The time period considered ranged between 1962 and 2007. A total of 3,420 observations were therefore used in the study.

Due to the lack or unavailability of statistics, annual data were obtained from various sources and were unbalanced among the countries. Taxation data for the six Caribbean countries were retrieved from the Eastern Caribbean Central Bank while data for the other countries were obtained from various sources of the Government Finance Statistics Yearbook of the IMF. All other variables were sourced from the Penn World Tables 6.2. Robustness checks were carried out to ensure consistency in the data.

5. Results

Analytical Results

After examining the choice of tax instruments by the two groups, the results shown in Tables 2A, 2B and 2C indicate similar findings to Codrington (1989), with both country groups utilizing more of the tax systems. The available statistics showed that on average 72.6 percent of maxi-states employed the tax system while 59.7 percent were adopted by very small economies. Each tax classification under the Government Finance Statistic (GFS) system were implemented by the very large countries, small economies, however, did not employ taxes on payroll and workforce, profits of fiscal monopolies, profits of export or import monopolies and exchange profits.

There was no significant difference for taxes on income, profit and capital gains (IPC) as the tax seemed popular between both country groups (91.7 percent for mini-states and 100 percent for maxi-states). However, compared to the 1980s, very large countries have implemented more of the specific taxes than the microstates while micro economies significantly reduced the use of unallocated taxes. The results also suggested that microstates reduced miscellaneous taxes and focused more on taxing areas that generated more revenue such as company profits, thus, moving towards more effective taxes.

The usage of property taxes was generally the same for maxi-states but surged for mini-states. Additionally, micro economies intensified the implementation of general taxes on goods and services by almost two fold. Large countries fully employed excise taxes while taxes on specific services and taxes on use of or permission to use goods were more popular with very small economies. There was positive utilization of miscellaneous taxes for very small countries compared to the non-use found in the 1980s. This increase may have offset the fall-off in taxes on specific services.

All countries in the sample exploited international taxes. Larger countries were found to use more of the sub-categories than smaller economies. Profits of export or import monopolies and exchange

profits, however, are still unfavorable with microstates. This is expected as mini-states have small domestic markets that make it difficult to extract revenue from these sources. Instead, governments provide incentives through tax concessions to large firms in order to encourage them to invest locally. An example is Grenada's Fiscal Incentives Act 1974.

The results indicated that both country groups utilized more of the tax systems that indicated an attempt to generate higher tax revenues. However, maxi-states tended to employ more taxes than mini-states. This is likely because large countries have more complicated economies that allows for greater flexibility for developing and implementing other taxes. Therefore, overall maxi-states can be seen as having a more buoyant tax system.

Table 2B shows the results of the tax-to-GDP ratios. On average, tax revenues for microstates made up 24.1 percent of their GDP, which was significantly higher than the 10.6 percent average for maxi-states. Mini-states was also found to have a higher tax-to-GDP ratio interval for individual countries than very large economies. Comoros had the lowest ratio of 11.6 percent among the sampled microstates. For maxi-states, the tax-GDP ratio ranged between 6 and 30 percent with the lowest ratio being that of Iran. This shows that despite the

level of development, small economies still performed better in collecting tax revenues than large nations. Generally, the tax-GDP ratios performed better for the microstates indicating that tax revenues made up a significant portion of their gross domestic product. Consequently, mini-states are more efficient in the collection of tax revenues. Therefore, governments should place greater emphasis on taxation since it is necessary for the growth and development of the economy through public expenditure.

The results from the functional classifications illustrated no major differences from earlier studies. They lend support to the stylized fact that small vulnerable states have high dependence on international trade for most of their tax revenues. On the other hand, very large states were seen to depend mainly on taxes from IPC, and goods and services that comprised 7.3 percent and 8.1 percent, respectively. Regardless of size, property taxes, payroll and workforce taxes, and miscellaneous taxes continues to insignificantly contribute to developing countries GDP.

The results for tax concentration ratios also showed that the sampled countries focused tax revenues on three main areas: IPC, goods and services and international trade and transactions. The Gini-Hirschman coefficient indicated that small countries concentrated

mainly on international trade as nearly 60 percent of tax revenue was obtained from this source whereas maxi-states needed to implement two or more tax groups to obtain the same revenue. Therefore, the findings by Codrington are still applicable in the twenty-first century. This may be due to the diverse sectors found mainly in large economies.

Consequently, although maxi-states utilized international trade and transaction taxes more than mini-states, the results showed that micro economies have a higher percentage of trade taxes to GDP and, thus, a higher concentration ratio. Overall, mini-states are more tax efficient than large countries with regards to collecting taxes.

Empirical Results

Overall, the unit root tests indicated mixed orders of integration for the variables. *LTAX*, *LCS and LOP* were stationary in levels while *LPOP*, *LIS, and LY$_{pc}$* were non-stationary [I(1)]. The Pedroni co-integration test conveyed the presence of at least one co-integrating vector. Therefore, the results for the Panel DOLS estimation are presented next.

As shown in Table 3C, *LPOP, LCS, LIS,* and *LY$_{pc}$,* were statistically significant in determining tax capacity for developing countries. The

findings and analyses for size on taxation are presented first. A positive coefficient of 0.538 was found for *LPOP*. This indicates that when population increases by 1000 persons, the tax-to-GDP ratio rises by US$538 million. Though this result is inconsistent with Codrington (1989), and Tait et al (1979), it is plausible as a larger population results in a greater workforce that brings about more personal incomes and additional consumption on goods and services. Furthermore, an expansion in the population size can benefit very large nations because of foreign direct investments (FDI) as firms have greater incentives to invest due to the large market size that may guarantee more sales. These are all areas in which governments can accumulate extra tax revenues. This result is consistent with the developed countries as bigger states have higher tax capacities than small nations.

Per capita income, another measure for country size, has a negative effect on tax-revenue-to-GDP ratio (-1.003). The result was unexpected as one anticipated a rise in GDP or economic activity to bring about higher tax revenues. To account for the overall negative relationship, one can attribute the recent trends in taxation, that is, the shift away from personal income taxes towards consumption taxes [Atkinson (1981)]. By this change, the effect of per capita income is reduced as more taxes are collected from goods and services.

As noted in Lotz and Morss (1967), sectoral compositions of an economy are positively correlated with tax-to-GDP ratios. Therefore, as anticipated, *LCS* and *LIS* had significant coefficients of 0.531 and 0.287, respectively. The move towards indirect taxation could explain why the effect of *LCS* on tax capacity was greater than the impact of *LIS*.

The findings for openness were found to be statistically insignificant thus, suggesting that international trade does not assist in the collection of tax revenues. This result was unexpected as earlier studies showed the importance of international trade for micro economies to achieve acceptable levels of taxable capacity. To explain why microstates still had higher tax-to-GDP ratios, one can point at other factors such as political conditions and low levels of corruption since most of the small, sampled-countries have a history of political and economic stability [Imam and Jacobs (2007)].

Consequently, both the analytical and the empirical results were more or less consistent with earlier findings. The paper found that size does indeed play a significant role in determining taxation. However, despite the fact that small states had higher tax ratios and concentrated on taxes from international trade, the result of the empirical analysis showed that international trade was not

responsible for these ratios. This, therefore, leads one to conclude that a more efficient tax system is responsible for micro-economies' performance over maxi-states.

Conclusion and Policy Implications

In developing countries, taxation makes up a significant part of government's current total revenue. It is of paramount importance for the redistribution of wealth and for public expenditure. Therefore, economists advocate maximizing tax revenues through tax efficiency. Larger economies, however, may experience difficulties in remaining efficient as they have various sectors to control as well as monitor the many taxpayers. This study, therefore, sought to investigate the effect country size has on tax revenues for developing countries and to discuss whether the findings of Codrington (1989) in the 1980s still hold in the twenty-first century. Analytical and empirical methodologies were conducted using a total of thirty-four countries. When compared with findings from previous authors similar results were found in the analytical section while the empirical approach showed inconsistencies. The main findings and implications for these nations are summarized below.

From the analytical results, size played a discriminating role with respect to utilization of the tax systems as 72.6 percent were employed by maxi-states while 59.7 percent were adopted by small economies. Nonetheless, the study found that taxes on income, profit and capital gains (IPC), and international trade taxes were popular between both groups with no significant differences in their utilization. On average, microstates had significantly higher tax-to-GDP ratios than maxi-states, 24.1 percent compared to 10.6 percent. Evidence supported the conclusion that large states were dependent on taxes from IPC, and goods and services and, international trade and transactions while small states had high dependence on the latter. Therefore, these three taxes remained popular among developing countries. Overall, the analytical results indicated a more buoyant tax system for very large nations. These findings were consistent with earlier studies.

The results from the Panel DOLS procedure indicated statistical significance for population, consumption-share of current GDP, investment-share of current GDP, and per capita income in determining tax capacity for developing countries. The coefficient on the variable of interest, population, suggested that largeness is associated with higher tax-to-GDP ratios. Evidence showed that an

increase in per capita income lead to a decline in tax capability. Though the coefficient on openness was positive, it was statistically insignificant. This was unexpected since it was observed that small economies concentrated on international trade. Therefore, the questions asked were: why no relationship existed between openness and tax capacity, given that microstates had higher tax-to-GDP ratios and high concentration on international trade, and if so, how can they still be able to raise higher tax revenues with respect to income than large nations? The only relatable answer was efficient tax administration that can be attributable to better political conditions and less corruption. In this study, the findings for the empirical investigation were given more weight thus being the preferred method.

The findings presented above naturally lead to several implications and recommendations to assist countries with effective policy making. The results fortified the vulnerable state of micro countries in a globalized world as their size puts them in a disadvantaged position in the generation of additional tax revenues. Therefore, microstates are more susceptible to fall-offs in tax revenues as a result of shocks to the economy. This may encourage external borrowing by the government in order to meet public expenditure that in turn worsens

the budget deficit. Consequently, the government needs to lower tax concentration and diversify their tax structure.

Based on the results, maxi-states have more flexibility in adopting any public sector approach. Whenever faced with the problem of finding revenue to finance increased expenditures, the spend-tax hypothesis can be used without creating major adversities on their economies. On the other hand, it would be more prudent for a microstate government to practice the tax-spend hypothesis, that is, raise revenue first and then allocate to expenditure. This approach will alleviate any potential budget deficits that may become detrimental to the growth of the economy. Therefore, policy makers are provided with information that could assist them in fiscal decision-making.

To help improve tax-to-GDP ratios in maxi-states, the study recommends that very large nations should educate the taxpayers on the benefits that both society and the taxpayer may receive. If individuals are aware of the purposes of taxation, this may abate the possibility of evading or avoiding taxes. To address the inefficiencies due to internal conflicts and corruption, the government can assign tax administrators to different constituencies instead of having one large body being responsible for collecting tax revenues. Further

research can be undertaken to weigh the costs and benefits of such a

decision.

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Appendix

Table 1: List of Micro and Very Large Countries

Country	
Microstate	**Maxi-state**
Antigua and Barbuda	Algeria
Comoros	Angola
Dominica	Cameroon
Grenada	Chile
Kiribati	Cote d'Ivoire
Kuwait	Ecuador
Maldives	Iran
Samao	Iraq
Sao Tome & Principe	Kazakhstan
Seychelles	Kenya
St. Kitts and Nevis	Morocco
St. Lucia	Nigeria
St. Vincent Grenadines	Pakistan
Tonga	Peru
Vanuatu	Saudi Arabia
	Sudan
	Ukraine
	Uzbekistan
	Venezuela
	Vietnam
	Yemen

Table 2A: Percentage of Countries using Individual Tax Groups (Averages)

Tax Category	Ministates (percent)	Maxistates (percent)
Taxes on income, profit and capital gains	91.7	100
Individual	75	94.1
Corporate	91.7	100
Unallocated	8.3	70.6
Taxes on Payroll and workforce	0	35.3
Taxes on Property	83.3	58.8
Recurrent taxes on immovable property		
Recurrent taxes on net wealth		
Estate, inheritance, and gift taxes		
Taxes on financial and capital transaction		
Other non-recurrent taxes on property		
Other recurrent taxes on property		
Taxes on goods and services	91.7	100
General taxes on goods and services	83.3	82.3
Excises	58.3	100
Profits of fiscal monopolies	0	23.5
Taxes on specific services	66.7	35.3
Taxes on use of goods or permission to use goods	75	47.1
Other taxes on goods and services	33.3	41.2
Taxes on international trade and transactions	100	100
Customs and other import duties	91.7	100
Taxes on exports	41.7	64.7
Profits of export or import monopolies	0	11.8
Exchange profits	0	17.6
Exchange taxes	41.7	5.9
Other taxes	33.3	35.3

Other taxes	58.3	100

Table 2B: Tax Revenue/GDP Ratio

Tax category	Mini-state	Maxi-state
Income, profits and capital gains	5.2	7.24
Payroll and workforce	0	0.54
Property	0.3	0.4
Goods and services	4	8.1
International trade and transactions	11.9	5.6
Other	0.8	0.6
Total Tax Revenue	24.1	10.6

Table 2C: Tax Concentration Ratios

Tax Category	Sources of tax revenue	
	Mini-states	Maxi-states
Income, profits and capital gains	20.4	36.3
Payroll and workforce	0	2.2
Property	1.3	2.7
Goods and services	17.4	32.4
International trade and transactions	58.1	22.2
Other	2.3	3.5

Table 3A: Panel Unit Root Test Results

Variable	LLC	Breitung	IPS	ADFF	Hadri	Decision
LTAX	-0.315 (0.376)	-3.121 (0.001)***	-2.1097 (0.017)**	8.176 (0.0168)***	8.048 (0.000)***	I(0)
ΔLTAX	-46.967 (0.000)***				-1.116 (0.868)	
LPOP	0.0298 (0.512)	-1.442 (0.075)*	-0.047 (0.481)	1.464 (0.4808)	9.555 (0.000)***	I(1)
ΔLPOP	-46.976 (0.000)***	-24.125 (0.000)***	-28.628 (0.000)***	254.672 (0.000)***	-0.323 (0.627)	
LCS	-3.392 (0.0003)***	-1.159 (0.123)	-3.044 (0.0012)*	13.073 (0.0014)*	4.389 (0.000)***	I(0)
ΔLCS		-13.861 (0.000)***			-0.035 (0.514)	
LIS	-0.547 (0.292)	-0.920 (0.179)	-0.798 (0.212)	3.198 (0.202)	7.766 (0.000)***	I(1)
ΔLIS	-23.86 (0.000)***	-1.69 (0.046)**	-18.350 (0.000)***	174.82 (0.000)***	-0.905 (0.8171)	
LYpc	0.519 (0.698)	-0.422 (0.337)	0.3089 (0.621)	0.914 (0.633)	8.89 (0.000)***	I(1)
ΔLYpc	-42.058	-14.779	-27.483	241.43	0.7013	

	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.2415)	
LOP	-2.064 (0.0195)**	1.330 (0.908)	-2.355 (0.0093)***	9.440 (0.009)***	6.4415 (0.000)***	I(0)
ΔLOP	-28.134 (0.000)***	-7.927 (0.000)***			0.3063 (0.379)	

Notes: *** indicates significance at 1 percent; ** indicates significance at 5 percent; * indicates significance at 10 percent. Figures in parenthesis are the probability values.

Table 3B: Pedroni Panel Co-integration Test Results

	Within Dimension (Panel Statistics)			Between Dimension (Group Statistics)		
Statistics	**No Intercept No Trend**	**Intercept No Trend**	**Intercept Trend**	**No Intercept No Trend**	**Intercept No Trend**	**Intercept Trend**
V	24.904 (0.000)***	25.027 (0.000)***	-19.799 (0.000)***			
Rho	-20.821 (0.000)***	-19.011 (0.000)***	-16.316 (0.000)***	-21.978 (0.000)***	-18.755 (0.000)***	-15.084 (0.000)***
PP	-15.008 (0.000)***	-14.039 (0.000)***	-13.022 (0.000)***	-17.582 (0.000)***	-15.232 (0.000)***	-13.178 (0.000)***
ADF	-12.211	-12.013	-10.994	-13.978	-12.795	-10.888

	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***

Notes: *** indicates significance at 1 percent; ** indicates significance at 5 percent; * indicates significance at 10 percent. Figures in parenthesis are the probability values.

Table 3C: Panel Dynamic Ordinary Least Squares Estimation Results

Variables	Coefficient	t-statistic	Standard Error
LPOP	0.538	2.410	0.223
LCS	0.531	3.614	0.147
LIS	0.761	3.983	0.191
LY_{pc}	-1.003	-4.590	0.219
R^2 = 0.738			
Adj. R^2 = .0738			
Prob(F-statistic) = 0.000			