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## **GROWTH, INCOME INEQUALITY AND AID GIVING: LOOKING FOR AN AID-KUZNETS CURVE**

*Sanjeev K. Sobhee\* & Shyam Nath\*\**

*This paper contributes to the literature on foreign aid by exclusively explaining a donor's motivation for foreign external assistance. The underlying framework focuses on recipients' needs for foreign aid to address income inequality as and when growth occurs. A tax-subsidy policy is hypothesised in the manner advocated by optimal tax theory to effectively deal with inequity by minimizing the distortionary effects of income taxes. This framework is ultimately endogenized in the recipient's budget constraint, from which the donor derives the demand for foreign assistance. The outcome supports an inverted-U relationship between foreign aid and per capita income in the way postulated by the conventional Kuznets curve. Our postulate is empirically tested using a panel of 29 developing countries across a time span of 27 years; and from which the hypothesis of an 'Aid-Kuznets' curve could not be rejected.*

**JEL Classifications:** F35, H21, E62

**Keywords:** Foreign Aid, Optimal Taxation, Fiscal Policy

### **INTRODUCTION**

The motivation of foreign aid has generally been modelled in terms of donor self-interest and recipient need, on the one hand; and improving growth and international income distribution, on the other hand [Edelman and Chenery (1977); McKinlay and Little (1979); Maizels and Nissanke (1984); Trumbull and Wall (1994); Gounder (1999) and Llavador and Roamer (2001). In a recent paper, Alesina and Dollar (2000) found considerable evidence that the direction of the bilateral foreign aid is dictated as much by political and strategic considerations, as by the economic needs and policy performance of the recipients. In this literature, however, there is no attempt to ascertain whether there is any consideration for income inequality within the recipient country as a basis for aid allocation. Hence, in this paper we extend the recipient need channel and argue that the recipient-country's income inequality could be a significant argument in justifying the demand for foreign aid and its trend. In fact, improved income distribution and growth may reinforce each other.<sup>1</sup>

Countries which receive foreign aid use it to increase economic growth (either through direct investment or through reductions in tax rates, for instance, Franco-Rodriguez *et al.* (1998)

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and Feyzioglu *et al.* (1998) and at some stage in their development this economic growth leads to more equal income distribution in the country. Countries that provide foreign aid are, other things being equal, more willing to provide it to those countries that seem to experience slower or sluggish growth rates and less willing to provide it to countries that are experiencing 'reasonable' rates of growth. The empirical observation that would be consistent with our theory would be that foreign aid and per capita income follow a U path (along the lines proposed in the context of a single-economy case by Kuznets (1955)) but this is simply because of the dual relationship between aid and growth of per capita output *and* growth of per capita output and income inequality and not necessarily because the aid is used specifically to improve equality. Nath and Sobhee (2007) have explained that per capita income and its growth rate could determine granting behaviour of donors. In their empirical analysis on 'Aid Motivation and Donor Behavior', they found that high income countries such as Botswana and Mauritius would not benefit from external assistance as would low income countries such as Mozambique and Bangladesh. There exists a threshold income level beyond which donors may be unwilling to provide further assistance. Indeed, data on foreign aid confirm this hypothesis, as will be explained later, if one considers Figure 1 in section III, which depicts clearly that external assistance is much lower for countries with high per capita income.

It remains altogether a fact that donors may as well be exclusively concerned with better redistribution of income within recipient economies in allocating foreign aid. In the empirical literature, for instance, Feyzioglu *et al.* (1998) have argued and found empirical support of how foreign aid could be used to provide tax reliefs and to promote the salaries on civil servants in developing countries. It is instructive to note that this paper goes further in mentioning that foreign aid could be one factor aimed at reducing poverty since the authors have traced out the disaggregated uses and applications of grants or foreign aid for specific public sector commitments, for instance, in reducing 'Infant Mortality Rates' and raising 'Enrolment Ratios'. These indicators invariably affect the poor and track poverty alleviation strategies of governments in the LDCs. In addition, there are rich insights that could be derived in terms of promoting private sector activity and investment. Current empiricism from Feyzioglu *et al.* (1998) indicates that there is lack of fungibility in some sectors such as 'Transport and Communication' which directly complement private investment. Financial resources obtained have been spent as they were designated clearly indicating that governments in these countries do not wish to harm private capital formation. Thus, donors continue to maintain their concern for the growth performance of recipient countries but, at the same time, do take into account the corresponding evolution of income inequality. Using this inequality setting, we postulate a framework in which the cost of a transfer-to-labour programme is designed, with a view to improving income distribution, which will be partly financed by foreign aid. As such, this fiscal action would ensure lower taxes on capital thereby suppressing any distortionary effect on the macroeconomy. Gunning (2001) has argued that taxes in LDCs may entail higher distortionary effects than usually observed and would therefore favour the use of aid as a means to provide tax relief.<sup>2</sup> To argue further about recipient's income distribution, the case of Pakistan may be considered, in which Franco-Rodriguez *et al.* (1998) found that foreign aid is found to displace taxes and public borrowings (future tax liabilities) differently there by affecting disproportionately generational equity.

Therefore, our plan of the paper is as follows: in the next section, the relationship between aid, income inequality and growth is conceptualized; and from which emanates an Aid-Kuznets

curve that links foreign aid and income in a quadratic manner. Data, estimation and empirical issues are addressed in the third section, while we conclude in the last section.

### AN INTERACTIVE FRAMEWORK OF AID AND TAX-SUBSIDY

Three components of the proposed model require focus; growth of income as described by a production function, a tax-subsidy framework and the recipient's government budget constraint.

#### The Production Function

We assume a Cobb- Douglas production function for the recipient economy in the following manner:

$$Y = aL^{\theta_1} K^{\theta_2} \quad (1)$$

where Y is income, L is labour force and K is capital stock.  $\theta_1$  and  $\theta_2$  are output elasticities. Without loss of generality, we assume that returns to capital exceed those of labour and that constant returns to scale typify our production function. Therefore,  $\theta_1 < \theta_2$  and  $\theta_1 + \theta_2 = 1$ . Here, 'a' is a parameter representing scale efficiency.

Further, for the sake of convenience and tractability, we express our measure of income inequality, g, as follows<sup>3</sup>:

$$g = \frac{K(MP_K) - L(MP_L)}{K(MP_K) + L(MP_L)} \quad (2)$$

where MP is marginal product, a conventional way to measure the reward of factor inputs (in real terms). Given our specification of the production function, the product of MP and units of the factor employed would constitute the income of that factor. Using partial differentials, we can show that indeed g simply represents the difference in returns to scale between capital and labour:

$$\begin{aligned} g &= \frac{\theta_2 Y - \theta_1 Y}{\theta_2 Y + \theta_1 Y} \\ &= \theta_2 - \theta_1 \quad (\text{Since } \theta_1 + \theta_2 = 1, \text{ as assumed above}). \end{aligned}$$

Now, to improve income distribution, a tax-transfer policy is advocated. As a result, the inequality coefficient is modified as (g') and is read as follows, after the tax-transfer policy (where t = tax rate and s = subsidy rate) is implemented simultaneously:

$$g' = \frac{K[MP_K(1-t)] - L[MP_L(1+s)]}{K[MP_K(1-t)] + L[MP_L(1+s)]} < g \quad (3)$$

#### Interactive Tax-Transfer Policy

To satisfy the above, we need a progressive tax on capital to finance the transfer policy. However, a progressive taxation of capital may entail disincentives to domestic as well as foreign capital

mobility resulting in lower investment and growth rates in the recipient country. On the other hand, a proportional tax on capital would necessitate additional resources to finance transfer policy. However, additional domestic resource mobilization may prove counter-productive. At this stage, the role of foreign assistance is envisaged to finance the transfer policy, while reducing the dead-weight loss impacts of taxes on capital. Thus, given the binding budget constraint of the recipient government, the latter has to rely on foreign aid to make up any deficiency between domestic resources, particularly taxes, and overall expenditures. This point has also been emphasised by Gunning (2001).

#### ***A Constant Marginal Tax Rate Policy***

In this way, a constant marginal rate of tax policy is proposed and denoted by:

$$T_K = t MP_K \quad 0 < t < 1$$

where  $T_K$  = total tax revenue from capital and  $t$  is a proportional tax rate on the returns of capital.

$$\begin{aligned} \text{Since, from partial derivatives, } \quad \frac{\partial Y}{\partial K} &= MP_K = \theta_2 \left( \frac{Y}{K} \right) \\ \therefore T &= t \left\{ \theta_2 \frac{Y}{K} \right\} \\ &= \left\{ \frac{t\theta_2}{K} \right\} Y_K \end{aligned} \quad (4)$$

$$\text{Hence } T = \lambda Y_K \quad (5)$$

Equation (5) constitutes a tax policy for owners of capital, where  $\lambda = t\theta_2$  and the average income of capital;  $Y_K = (Y/K)$ .

#### ***A Policy of Decreasing Marginal Rate of Transfers***

On the other hand, we have a transfer policy, which varies according to the returns of labour. It is further assumed that such returns will vary according to production and income growth. Thus, marginal rate of transfer to labour,  $s$ , will depend on a given threshold level of income as follows:

$$\begin{aligned} s &= -\beta(MP_L - MP^*) \\ s &= -\beta(Y_L - Y^*) \\ s &> 0 \quad \text{if } Y_L < Y^* \\ s &< 0 \quad \text{if } Y_L > Y^* \end{aligned} \quad (6)$$

where  $MP^* = Y^*$  is that hypothetical level of income at which 'g' peaks.

Hence, from equations (5) and (6), the total tax revenue in this economy will be given by

$$\begin{aligned}
 T &= \text{tax on Capital} + \text{tax on Labour (negative transfers)} \\
 T &= \lambda Y_K + \beta(Y_L - Y^*) \\
 &= \lambda \rho Y_t + \beta[(1-\rho)Y_t] - \beta Y^* \\
 &= -\varphi_0 + \varphi_1 Y_t
 \end{aligned}$$

Here, it is rather obvious to show that  $Y_K + Y_L = Y_t$ , the overall income per capita, with  $\rho$  as the proportion of overall income accruing to capital and its complement to labour. Note here that  $\varphi_0 = \beta Y^*$  and  $\varphi_1 = [\lambda \rho + \beta(1 - \rho)]$ . When the threshold level of income  $Y^*$  has not been crossed, the government provides a positive rate of transfer to labour (basically in the form of a negative tax rate) to offset, to some extent, the significant income inequality existing between both factor inputs. As soon as the threshold is crossed, the government chooses to revert back and instead a negative transfer rate comes into effect, which acts as a positive income tax rate on the reward of labour. From equation (6), we can write down the following Total Transfer Function to labour (S) that the government has to administer as income increases:

$$\begin{aligned}
 S_t &= \int s \, dY_t \\
 &= \int -\beta(Y_L - Y^*) \, dY_t \\
 &= \frac{-\beta Y_L^2}{2} + (\beta Y^*) Y_t + c \quad (\text{c is a constant term}) \\
 &= -a_1 Y_t^2 + a_2 Y_t + a_0 \quad (7)
 \end{aligned}$$

where  $a_1 = \frac{\beta^2}{2}$ ,  $a_2 = \beta Y^*$  and  $a_0 = c$

From the above, it is evident that transfer to labour will follow a Kuznets path (see Kuznets, 1955); that is, as income increases, it rises initially to reach a given threshold level of income before starting to decline.

### ***Recipient Government's Budget Constraint and Need for External Assistance***

We now consider the recipient government budget constraint as follows:

$$G_t + S_t = T_t + B_t + GR_t \quad (8)$$

Where  $G$  = Total government consumption excluding transfers,  $S$  = Total transfers,  $T$  = Total tax revenue,  $B$  = Bonds issued (if any) and  $GR$  = Foreign Grants.

Now, by rewriting (8) and substituting  $T$  and  $S$ , the donor can derive the demand for foreign assistance by the recipient government to tackle inequality of income as growth sets in. Thus,

$$\begin{aligned}
 GR_t &= G_t + S_t - T_t - B_t \\
 &= G_t + (a_2 Y_t - a_1 Y_t^2 + a_0) - \lambda Y_t - B_t
 \end{aligned}$$

(Assuming G and B to be exogenously given)

$$\begin{aligned}
 &= (G - B)_t + (\alpha_2 - \lambda)Y_t - \alpha_1 Y_t^2 + \alpha_0 \\
 &= (G - B + \alpha_0) + (\alpha_2 - 1)Y_t - \alpha_1 Y_t^2 \\
 &= b_0 + b_1 Y_t - b_2 Y_t^2
 \end{aligned} \tag{9}$$

where  $b_0 = G - B + \alpha_0$ ,  $b_1 = \alpha_2 - 1$  and  $b_2 = \alpha_1$ .

Equation (9) suggests that foreign aid must follow a quadratic path as postulated by the conventional Kuznets's inverted 'U' hypothesis. A country is expected to receive relatively more foreign assistance in the initial stage of its development and subsequently less after having attained a given income threshold. It is important to note that it is the relationship between transfer and income given in equation (7) that guides the behaviour of foreign aid vis-à-vis growth. As per capita income grows, income distribution would tend to improve (Kuznets hypothesis), and the need for foreign aid to meet the cost of transfer to labour would gradually cease. Therefore, foreign aid is not merely provided to assist a poor country in improving its growth performance, but as well as, helping it to redistribute income (see for instance Feyzioğlu *et al.* (1998) and Llavador and Roamer (2001)).

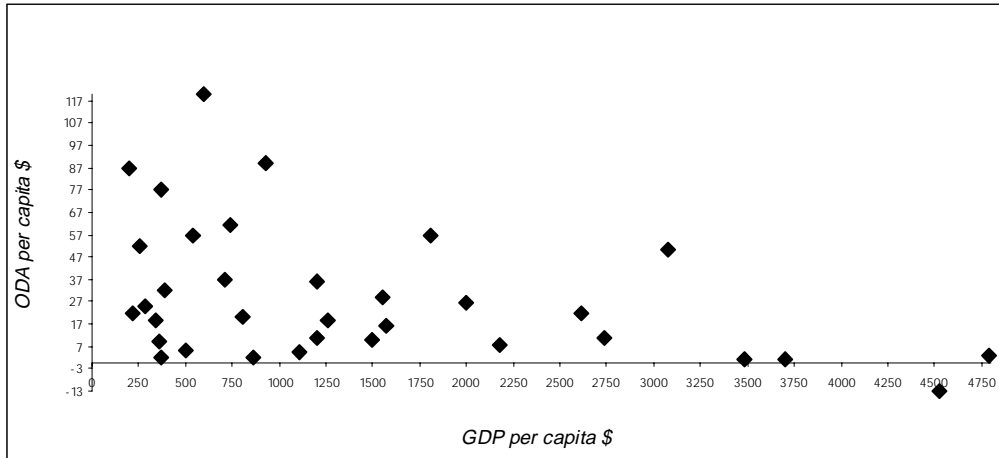
#### DATA PROFILE OF OVERSEAS DEVELOPMENT ASSISTANCE (ODA)

The purpose of this section is to provide some quantitative evidence on the patterns of grants, the non-refundable component of foreign aid or overseas development assistance (ODA). The use of this data set is intentional as the multilateral foreign aid would capture the general motivation underlying donor behaviour. Data on GDP in billion dollars and population are taken from International Financial Statistics. Data on foreign aid (ODA) in million dollars are from Organisation for Economic Cooperation and Development (OECD): Geographical distribution of financial flows to aid recipients, and values of Gini are taken from World Bank Development Report, 2000-2001. It would be instructive to analyse the trends in per capita ODA grants, per capita GDP and income Gini coefficients. Annual observations have been pooled for the period: 1971-96 for aid-receiving countries.

From Figure 1, it is clear that ODA per capita has declined over income scale for the sample under consideration. Thus, donors have shown less inclination to allocate grants to recipient countries, which have grown in terms of per capita income. For the purpose of representation, in Figure 2, Gini coefficients are plotted against ODA per capita to ascertain whether aid allocations are guided by income inequality in recipient countries. However, no definite pattern could be spotted since econometrically a chart is limited in simply showing correlation. More profound tests (econometrically specified models) are required to obtain a seemingly unobserved theoretical relationship and this is done in the next section.

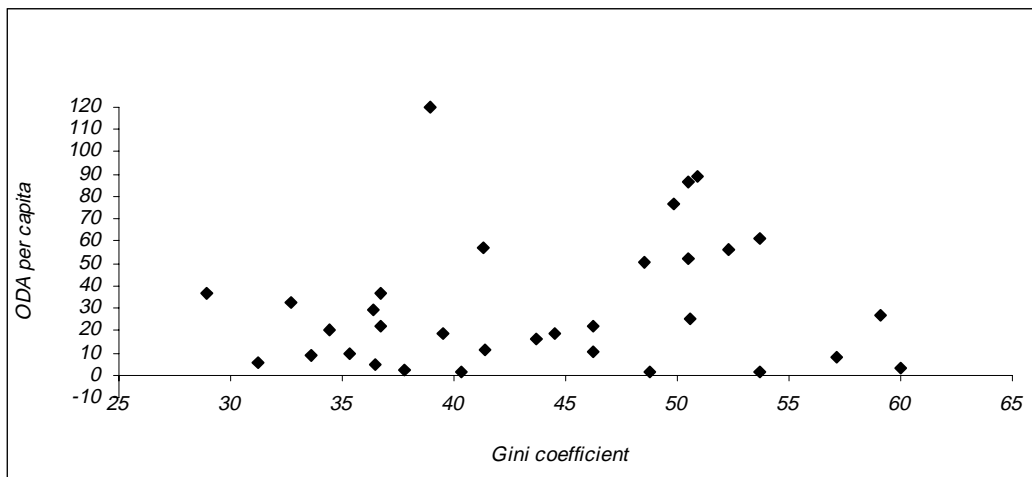
Foreign aid is expected to produce growth, which becomes the basis of future aid allocations. But the route we are discussing here is through improved income distribution, which helps donor community to support proportional corporate taxes in destinating countries. Thus, foreign aid will reduce income inequality in the recipient country and engender growth via higher investment rate. The latter will be occasioned by greater participation of FDI, besides domestic

Figure 1: ODA Per Capita and GDP Per Capita 1997



Source: Authors' Computation

Figure 2: ODA Per Capita and GINI



Source: Authors' Computation

investment, in producing higher levels of per capita income. We test the empirical model in the next section to capture the various processes involved and highlight the role of income inequality via growth as an argument in donors' portfolio of aid allocation.

### ESTIMATION AND FINDINGS

We follow the common practice of regressing foreign aid (GR) against a quadratic function of mean income (Y). The constant term is not suppressed because there may exist some positive value of grant, when mean income is zero<sup>3</sup>. While a test can be conducted to empirically examine the impact of income inequality on grant, the reduced form of the theoretical model renders



income as a powerful vehicle to accomplish this objective. This would imply that as income increases, the ability of aid receiving countries to improve income distribution increases, and the role of foreign aid would tend to decline.

The weakness of the usual Ordinary Least Squares (OLS) procedure is that it assumes that regression parameters do not change over time (temporal stability) and do not differ between each cross-section unit (cross-sectional stability). Typically, cross-section parameters may shift over time and individual units may vary in important ways, not reflected in the cross-section variables. We have used panel data estimation to quantify this relationship. Apart from its ability to separate time and cross-sectional effects, panel data can have a number of other advantages as well. First, panel data sets usually provide an increased number of data points that generate additional degrees of freedom. Second, incorporating both cross-section and time-series variables in the model can substantially diminish the problems that arise when there is an omitted-variables problem. The first technique of panel data estimates the underlying model by utilizing ordinary least squares. A second procedure recognizes that omitted variables may lead to changes in the cross-section and time-series intercepts, and adds dummy variables to cater for changing intercepts. A third technique improves the first technique by accounting for cross-section and time-series disturbances.

We estimate the Aid-Kuznets inverted-U hypothesis using a panel of 29 developing countries over the period 1971-1996. More precisely, the following equation is estimated:

$$GR_{it} = f(Y_{it}, Y_{it}^2) \quad (10)$$

Where,  $GR_{it}$  refers to per capita grants received by the  $i$ th country at time 't'.

$Y_{it}$  refers to per capita Gross Domestic Product at constant prices of the  $i$ th country at time  $t$  and  $Y^2$  refers to the square of per capita GDP of the  $i$ th country

The results of panel data estimation are presented in Table 1. To compare the random effects estimator with the fixed effects estimator, we use the Hausman test. The test warrants the fixed effects specification. The coefficients on both forms of income, that is,  $Y$  (per capita GDP) and  $Y^2$  are highly significant and bear the expected signs. Thus, our empirical results support our a priori contention that aid allocations follow the Kuznets path. This result lends support to the contention that income distribution within recipient country can be one of the arguments in the aid portfolio.

**Table 1**  
**Panel Regression Results: 29 Countries using 1970–1996 Data**

<b>Dependent variable: ODA per capita</b>				
<i>Variable</i>	<i>Fixed Effect</i>	<i>t-ratio</i>	<i>Random Effect</i>	<i>t-ratio</i>
Constant	2.27E+08	12.508	2.12E+08	4.454
Y	1.58E-02	10.446	1.74E-02	12.974
Y <sup>2</sup>	-3.22E-14	-7.833	-3.60E-14	-9.288
R <sup>2</sup>	0.73		0.50	
$\overline{R^2}$	0.71		0.48	

Source: Authors' estimation

### CONCLUSION AND POLICY IMPLICATIONS

This paper revitalises the literature on foreign aid by exclusively explaining a donor's motivation for foreign external assistance. The underlying framework focuses on recipients' needs for foreign aid to address income inequality as and when growth occurs. A tax-subsidy policy is hypothesised in the manner advocated by optimal tax theory to effectively deal with inequity by minimizing the distortionary effects of income taxes. This framework is ultimately endogeneized in the recipient's budget constraint, from which the donor derives the demand for foreign assistance. The outcome supports an inverted-U relationship between foreign aid and per capita income in the way postulated by the conventional Kuznets curve. Our postulate is empirically tested using a panel of 29 developing countries across a time span of 27 years; and from which the hypothesis of an 'Aid-Kuznets' curve could not be rejected.

In the current context, such a relationship means that donors may provide more grants at early stages of economic development implying that grants will increase, attain a maximum at a given income threshold, and fall thereafter. This grant-subsidy mechanism would have implications for growth as well as income distribution. The objective of redistribution is very much built-in as donors are usually concerned with aid for designated projects aiming at improving quality of life and human development. Many countries do benefit from project-specific assistance on education, health or human capital formation when they start to develop. Eventually with high growth of income, greater taxable capacity and substantive public sector reforms, donors reduce their financial assistance by turning probably to other more needy countries. What is vital to note is that income inequality entering the aid portfolio is based on the premise that donor's major concern is recipient growth. It is also plausible that donors participating in transfer-to-labour policy may be embedded in some strategic considerations, such as lighter taxation of capital. There is a general tendency to levy proportional tax on capital coupled with other concessions as against progressive taxes on capital in the past. Donor countries with surplus capital would prefer lowering taxes on capital in recipient countries for their FDI.

### NOTES

1. Improved income distribution having a positive impact on growth has been modeled in the literature (see for instance Persson and Tabellini (1994) and Birdsall *et al.* (1995)).
2. For a more general discussion on the implications of optimal tax equity, see Atkinson and Stiglitz (1980).
3. The definition of inequality here is derived on the basis of Euler's marginal productivity theorem of income distribution, see for instance Henderson and Quandt (1980). Another inspiring source is the typical 'Irene and Janet' method, see for instance Cowell (2000) which illustrates a very simple way of measuring income inequality under specific assumptions.
4. For the debate on the importance of the intercept term in an empirical Kuznets equation, see Ravallion (1997) and Ram (1997).

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**APPENDIX 1**

**SAMPLE OF 34 COUNTRIES FOR SCATTER PLOT—GRAPH 1, GRAPH 2**

Algeria, Bangladesh, Brazil, China, Colombia, Côte d'Ivoire, Ecuador, Egypt, El Salvador, Ghana, Honduras, India, Indonesia, Jamaica, Kenya, Malaysia, Mali, Mauritania, Mexico, Morocco, Nepal, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Senegal, Sri Lanka, Thailand, Venezuela, Zambia.

**SAMPLE OF COUNTRIES FOR PANEL REGRESSIONS**

**( 29 countries)**

Bahrain, Botswana, Burkina Faso, Chad, Cyprus, Egypt, Ethiopia, Fiji, Gambia, Guyana, India, Jordan, Kenya, Lesotho, Malta, Mauritius, Myanmar, Nepal, Oman, Pakistan, Panama, Papua New Guinea, Philippines, Seychelles, Sierra Leone, Sri Lanka, Swaziland, Tanzania, and Tunisia.