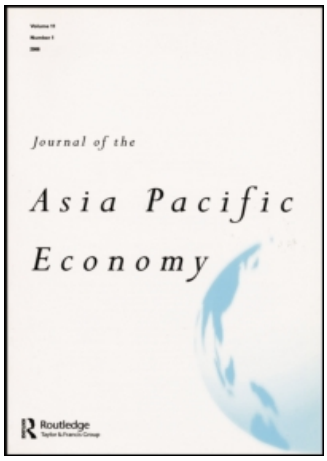

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Poverty Reduction through Fiscal Restructuring: An Application to Thailand

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Poverty Reduction through Fiscal Restructuring: An Application to Thailand

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ABSTRACT *A method is developed to simulate the impact that changes in the composition of taxes and public expenditures may have on poverty incidence and inequality. The paper then applies this framework to Thailand. We find that significant effects on poverty can be achieved though moderate, once-only redistributions of the total tax burden towards taxes that fall predominantly on the rich, including personal and corporate income taxes, and comparable reallocations of public expenditures towards those that most benefit the poor, including health and agricultural expenditures. Moreover, combining pro-poor reallocations of taxes and expenditures can increase the poverty-reducing capacity of economic growth.*

KEY WORDS: Thailand, growth, poverty, fiscal policy, income distribution

JEL CLASSIFICATIONS: O23, H22, I38

Introduction

Poverty reduction has become a central objective of development policy. Attention has thus focused on how a poverty reduction strategy should balance policies aimed at promoting growth with policies aimed at redistributing incomes. The proposition that growth is normally good for the poor is well grounded in empirical evidence. For instance, Dollar & Kraay (2002) have recently provided cross-sectional evidence that, on average, the incomes of the poor rise roughly one-for-one in absolute terms with the overall growth of the economy. 'On average', measures of inequality tend to remain stable over time. While there is considerable variation around this average relationship, it is difficult to find cases where the incomes of the poor decline over significant periods as the economy expands. It follows that policies aimed at reducing market distortions and promoting competition – through, for example, trade liberalization, improved corporate governance, good rule of law and fiscal discipline – are poverty-reducing because they are growth-promoting. They are thus rightly at the centre of

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the development agenda (see Alesina & Rodrick, 1994; Temple & Johnson, 1998; Sachs & Warner, 1995; and Barro, 1997, for empirical evidence on the impact of these policies on economic growth).[1]

The fact remains that the marginal effect that economic growth has on poverty reduction is particular to each country, confirming that the structural characteristics of economic, social and political systems influence the extent to which increases in national income are distributed to the poor. Thus, in principle, policies that provide education and health services to the poor, or protect them from fluctuations in their incomes, are likely to increase their capacity to derive benefits from economic growth as well as to mitigate the losses suffered during cyclical downturns. These policies indirectly affect the dynamics of the distribution of income by enhancing opportunities and minimizing risks for the poor.

There is surprisingly little evidence of a linkage between redistributive policies and the observed dynamics of the distribution of income (Cox & Jimenez, 1992; Hammer *et al*., 1992; and van de Walle, 1992). The distribution of income in a given country appears to be relatively stable over periods of 10 years or more (Rodrick, 2000). Dollar & Kraay (2002) found no evidence that public spending on health and education have systematic effects on the incomes of the poor. One possible explanation is that poverty programs and redistributive policies operating through public expenditures and taxes often do not effectively reach the poor (see Ravallion & Datt, 1992 and Squire, 1993 for assessments of this issue).

It is obvious that both poverty and inequality could be reduced by moving from regressive or neutral taxes, such as most indirect taxes, to more progressive taxes, such as personal and corporate income taxes. What is not at all obvious is the *magnitude* of the poverty and inequality reductions that can potentially be achieved in this way. Similarly, it is obvious on reflection that moving towards a more progressive tax structure can raise the capacity of economic growth to reduce poverty. But again, the likely size of this effect is not obvious. A similar point applies to reallocations of expenditures, away from those that benefit mainly the rich towards those that more heavily benefit the poor.

In this paper, we ask *how much* the distribution of income and poverty incidence in Thailand could be affected by moderate reallocations of public taxes and expenditures, both through their direct (static) redistributive impacts and through their indirect (dynamic) effects by influencing the contribution that economic growth makes to poverty reduction. Our analysis is based on recent micro-level research on the distributional effects of government taxes and expenditures in Thailand (Chalongphob & Direk, 1999). The Chalongphob and Direk (subsequently CD) study examines the way in which both the burden of taxation and the benefits received from public expenditures are related to household incomes.

Both the burden of taxes and the benefits from government expenditures are estimated in the CD study for different income groups, classified by income decile. The results are presented in the CD study for overall taxes and expenditures and for several

Table 1. Government revenue and expenditure composition (%)

	1980–84	1985–89	1990–94	1995–99	2000–03
Revenue Composition (% total government revenue)					
Personal*	9.6	10.3	10.1	13.4	12.0
Corporate*	10.4	10.0	17.0	17.0	19.1
Petroleum*	0.0	0.0	0.5	0.7	2.0
Business/Value added tax*	19.2	18.6	19.4	21.8	18.3
Excise tax*	22.8	25.0	20.2	21.5	24.2
Customs*	21.5	20.8	18.7	12.1	11.3
Local†	11.9	8.1	7.1	9.9	9.7*
Other	4.6	7.2	7.0	3.6	3.4
Total	100	100	100	100	100
Expenditure Composition (% total government expenditure)					
Education	21.4	21.0	21.6	23.8	24.5
Health care	5.1	6.6	7.9	7.8	8.1
Agriculture	10.8	10.9	10.8	8.9	7.8
Transportation	8.9	6.7	11.6	11.3	7.8
Other	53.8	54.8	51.9	48.2	51.8
Total	100	100	100	100	100

Sources: *Bank of Thailand, *Quarterly Bulletin*, various issues.
†International Monetary Fund, *Government Financial Statistics Yearbook*, various issues.
Note:* = data for 2000-02.

major tax categories, including personal and corporate income taxes, excise taxes, customs duties and value-added taxes, as well as for four major categories of expenditures – education, health care, agriculture and transportation. Strong assumptions were necessarily required to achieve these estimates, and the results must be considered provisional and subject to future refinement. The CD study is nevertheless highly unusual in the comprehensiveness of its coverage and the fact that the distributional incidence of both taxes and expenditures are analysed within a consistent framework.

The most recent year analysed in the CD study was 1994. An updating of the CD study to a more recent year would be desirable but is not yet available. Our analysis in this paper therefore rests on the CD results obtained for 1994, but defence of our use of data a decade old is clearly required. Table 1 shows that the composition of Thailand's taxes and revenues has changed only marginally since the mid-1990s. The Asian crisis of 1997–98 intervened between the period of these data and the present, and the Thai economy was significantly affected by the crisis and its aftermath, including the rate of poverty incidence (Warr, 2005). Nevertheless, the crisis was a macroeconomic event with very little effect on the structure of Thailand's taxes or expenditures. More to the point, there seems little likelihood of significant change in the distributional impacts of individual taxes and expenditures.[2] The distributional implications of an analysis based on the CD results for 1994 therefore remain relevant for Thailand today. For countries other than Thailand the interest of the results lies partly in the methods used for the analysis, but also in the broad qualitative implications of the results.

While the CD study was not developed within an explicit general equilibrium model,[3] its methods can be thought of as an attempt to approximate the general equilibrium distributional effects of all major taxes and most major expenditures. The general equilibrium perspective provides a good reference point for understanding the CD analysis. We are interested in the way changes in taxes and expenditures affect poverty and inequality. There are two channels through which this can occur – through *redistributions* of national income among households and through changes in the *level* of national income. The level of national income can be affected through changes in economic efficiency and through changes in the level of aggregate demand. In this study, we ignore changes in poverty or inequality arising from changes in economic efficiency, arising from changes in composition of taxes or expenditures, on the assumption that any such effects are small relative to redistributive effects. The trade-off between distribution and productivity, or between equity and efficiency is therefore not covered by the analysis and this must be acknowledged as a limitation.

Changes in aggregate demand arising from changes in the level of public sector demand are excluded by the methods used in our analysis. This is done by ensuring that in all simulations the level of the public sector deficit is held constant. The reason for this treatment is that if the size of the budget deficit changed, this could affect national income via the level of aggregate demand if the economy was not fully employed. Furthermore, whether national income changed through this means or not, a change in the deficit would affect the size of the government's debt. Future changes in taxes and/or expenditures would then be required to finance this change in government debt, in turn implying future changes in output and the distribution of income, with consequent implications for poverty and inequality in the future, which would not be counted within the analysis.

Given that neither CD nor the present study model the effect that changes in the overall level or the composition of taxes and expenditures may have on the level of national income, we limit ourselves to study the *redistributive* effects of reallocations of expenditures and taxes without affecting the overall level of taxation, total expenditures or (thus) the level of the fiscal deficit. To achieve this, the level of the fiscal deficit is held constant in our analysis by construction. The level of national income is thus treated as exogenous. The strength of the analysis is that the relatively simple methods used in this paper could be applied to other countries, given the existence of a database like that provided, for Thailand, by the CD study.

The remainder of the paper is organized in six sections. The next section is an overview of the dynamics of poverty incidence in Thailand and the potential linkages to economic growth. The section after discusses the methods we use to estimate the effects that reallocation of taxes and public expenditures have on poverty incidence and income inequality. We then discuss the results of our simulations and the impact of alternative tax and expenditure reallocations on the elasticity of poverty incidence with respect to economic growth. The subsequent section discusses the limitations of the simulation methods used in the paper and the final section concludes.

Economic Growth and Poverty Reduction in Thailand

In Thailand, the linkage between economic growth and poverty reduction is empirically well grounded. Between 1988 and 1996 the Thai economy was expanding at over 8 percent per year, while the average developing country was growing at only 2 percent. Over the same period, income per capita almost doubled and the headcount incidence of absolute poverty incidence dropped from 32.6 percent to 11.4 percent, implying that each year an average of around 1 million additional people were lifted out of poverty.[4] In eight years, the absolute number of poor people declined by 60 percent, falling from 17.9 million in 1988 to close to 7 million in 1996. The elasticity of poverty incidence with respect to real per capita GDP is estimated at –2.12, indicating that a 1 percent increase in real GDP per capita reduces the headcount incidence of poverty by 2.12 percent.[5]

Inequality is a very different story. From 1988 to 1994 income inequality increased significantly, but the expansion of average incomes was so large that the absolute incomes of the poor still increased rapidly. Between 1994 and 1996, income inequality apparently declined, but this process was interrupted by the financial crisis commencing in 1997. Today, Thailand continues to experience one of the most unequal income distributions in East Asia, with the poorest 20 percent of the population accounting for merely 3.8 percent of aggregate national income and the richest 20 percent accounting for 58.5 percent. The 1997 crisis brought over 3 million individuals back into poverty. Although high levels of social capital (especially strong family ties), contained the social impacts of the crisis, the sharp contraction of the economy (-2 percent in 1997 and -11 percent in 1998) increased the share of the poor in the total population from 11.4 percent in 1996 to close to 16 percent in 1999. With subsequent growth, poverty incidence returned to below pre-crisis levels by 2002 (Figure 1 and Warr, 2005).

The Effects of Fiscal Policy on Poverty and Inequality

Our analysis is based on the discrete distribution of income, taxes, and public expenditures computed by CD for the year 1994. For direct comparability with CD, the present discussion is based on a division of the population into decile groups – each containing one tenth of the population – arranged by incomes. Obviously, the theoretical discussion applies equally to any other level of disaggregation, such as percentiles, quintiles and so forth. The share of total income Y received by population decile i is denoted y_i, the share of total expenditures E (including only those expenditures that can be allocated to households) received by decile i is denoted e_i and the share of total taxes T paid by decile i is denoted t_i.

In the CD study, the distributions y_i, e_i and t_i were each estimated and compared. Expenditures were allocated across households given data on the use of public services by different income groups. Direct taxes, such as personal and corporate income taxes, were allocated across households from data on tax schedules and

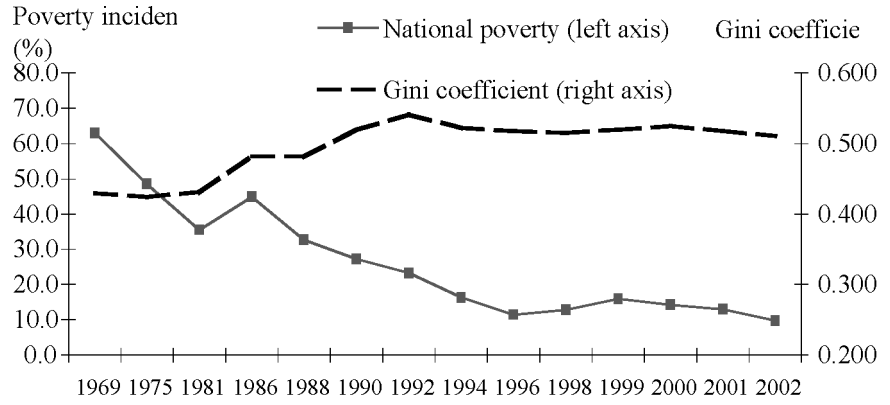

Figure 1. Thailand: evolution of poverty incidence and inequality. *Source*: National Economic and Social Development Board, Bangkok, based on household income data collected in the Socio-economic Survey.

estimated compliance rates. Indirect taxes were allocated from assumptions about supply and demand functions for different economic sectors. Indirect taxes first affect the consumer prices of goods and services. This effect was allocated on the basis of survey data about household consumption patterns. Second, indirect taxes also affect the producer prices of goods and services and therefore the remuneration of factors of production. In the CD study this effect was allocated among households using data on their sources of incomes.

Using these distributions, the share of total net income received by decile i is given by:

$$x_i = \left(\frac{y_i Y + e_i E - t_i T}{Y + E - T}\right) = \left(\frac{y_i Y + e_i (E^N + T) - t_i T}{Y^N}\right) \tag{1}$$

where Y is total household income, E represents total pubic expenditures, T represents total taxes, $E^N = E - T$ is net expenditures, and $Y^N = Y + E - T = Y + E^N$ is net income. We are interested in understanding how changes in the *composition* of taxes and expenditures affect the distribution of income and the level of poverty incidence. The analysis of the changes in the composition of taxes requires us to look in greater detail at the distributions t_i and e_i.

We consider a vector $\mathbf{X}$ of expenditures and a vector $\mathbf{Q}$ of taxes. We have:

$$\begin{aligned} E_j &= s_j E; \quad \sum_j s_j = 1; \quad j \in \mathbf{X} \\ T_j &= m_j T; \quad \sum_j m_j = 1; \quad j \in \mathbf{Q} \end{aligned} \tag{2}$$

where s_j and m_j are respectively the share of expenditure $j$in total expenditures E, and the share of tax j in total tax revenues T. The variables s_j and m_j can be considered policy instruments. The benefits of each of these expenditure categories and the burden of each of the tax categories are distributed differently across the population. Therefore, if we write $r(i,j)$ and $v(i,j)$ for the functions that characterize these distributions of benefits and burdens respectively, we have:

$$e_i = \sum_j r(i,\, j)s_j; \quad j \in \mathbf{X}$$
$$t_i = \sum_j v(i,\, j)m_j; \quad j \in \mathbf{Q} \tag{3}$$

To simulate changes in the composition of expenditures and taxes, holding total expenditures or taxes constant, we require a methodology to distribute changes in s_j and m_j. We shall assume that when the share of a given expenditure or tax category j is adjusted, the share of all other expenditures or taxes adjust uniformly, so that their relative shares remain constant. The intuition behind this assumption is that all 'other' expenditures or taxes are effectively merged into one category and that a change in their joint share is distributionally neutral among them. If we call **S** the vector of expenditure categories that are adjusted by the analyst and **S**′ the vector of the remaining categories (similarly **M, M**′ the vectors for tax categories), it can be shown that, writing δ and λ for the changes in the share of expenditures and taxes respectively,

$$e_i = \sum_k r(i,k)(s_k + \delta_k) + \sum_j \frac{s_j\left(1 - \sum_k (s_k + \delta_k)\right)}{1 - \sum_j s_j}; \qquad k \in \mathbf{S}, \quad j \in \mathbf{S}'$$
$$t_i = \sum_k v(i,k)(m_k + \lambda_k) + \sum_j \frac{m_j\left(1 - \sum_k (m_k + \lambda_k)\right)}{1 - \sum_j m_j}; \quad k \in \mathbf{M}, \quad j \in \mathbf{M}' \tag{4}$$

To measure the impact that changes in the shares of particular taxes and expenditures have on poverty incidence, starting from the discrete distribution of net income given by equations (1) and (4), we estimate the continuous distribution of income. Following a general practice in the literature on income distribution (see Lambert, 1993, for a review), we use a Gamma distribution function with parameters α and β. This function provides more flexibility when fitting the data than functions such as the log normal distribution. Given the income shares of a set $\boldsymbol{I}$ of population percentiles the parameters α and β can be estimated by solving

$$\hat{\alpha}, \hat{\beta} \in \left\{ Min_{\alpha,\beta} : \sum_i \left(\sum_{l=1}^{i} x_l - \frac{1}{\beta^\alpha \Gamma(\alpha)} \left(Y^N \sum_{l=1}^{i} x_l \right)^{\alpha-1} e^{\frac{-\alpha}{\beta}} \right)^2 \right\}; \quad i \in \mathbf{I} \tag{5}$$

where $\Gamma(\cdot)$ is the gamma function.

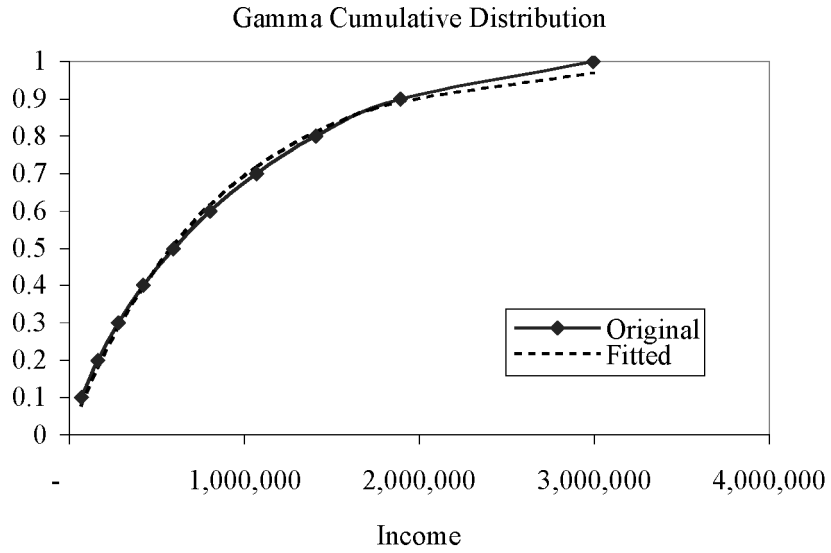

Figure 2. Estimation of a gamma cumulative income distribution function for 1994. *Note*: The parameters of the Gamma function are $\alpha = 0.8089$ (0.0678) and $\beta = 868, 224{,}000$ (9,006). Standard-errors in parentheses. Units of income are baht per year.

For each change in the composition of taxes and expenditures, we estimate these parameters by non-linear least squares using a Newton type algorithm. The continuous function provides a better representation of the distribution of income in the neighbourhood of the poverty line than, say, a simple linear extrapolation between percentile points. As shown in Figure 2, the Gamma distribution does a good job of fitting the discrete distribution of income, particularly for the first seven deciles, which includes all households potentially in the neighbourhood of the poverty line. In all cases, the parameters are statistically significant, displaying relative low standard errors.[6] In the case of the status-quo, for instance, the standard errors for β and α represent respectively, 8.5 percent and 1 percent of the mean. To test the sensitivity of the curvature of the income distribution in the neighbourhood of the poverty line, we simulated the impact of a three standard deviation increase (decrease) in β and α. On average, for each level of income, the share changed by only ± 0.5 percent. For income levels below Baht 160,000 per year, the average change was ± 0.4 percent. Hence, the method allows us to estimate very small changes in poverty incidence resulting from reallocations in taxes and subsidies.

Given estimates of the parameters α and β, it is straightforward to measure poverty incidence. For this purpose we use the headcount index given by:

$$p = \frac{1}{\hat{\beta}^{\hat{\alpha}}\Gamma(\hat{\alpha})} L^{\hat{\alpha}-1} e^{\frac{-\hat{\alpha}}{\hat{\beta}}} \tag{6}$$

where L is the poverty line. Similarly, we measure the distribution of income through the Gini coefficient given by

$$G = \int_{z=0}^{z=1} \left(z - \frac{1}{\hat{\beta}^{\hat{\alpha}} \Gamma(\hat{\alpha})} (Y^N \cdot z)^{\hat{\alpha}-1} e^{\frac{-z}{\hat{\beta}}} \right) \mathrm{d}z \tag{7}$$

where z represents income shares.

Changing the Composition of Taxes and Expenditures

To what extent could adjustments to fiscal policy potentially influence poverty incidence and income inequality? The analysis presented here simulates the degree to which the post-tax and post-expenditure distribution of incomes (given by equations (1) and (4)) would be affected by hypothetical reallocations of revenues among major tax categories and/or reallocations of expenditures among major expenditure categories. These reallocation are introduced through equation (4). We then use these simulated changes to the ex-post distribution of incomes to estimate the degree to which poverty (equation (6)) and income inequality (equation (7)) would be affected. We emphasize that the analysis takes the distributional effects of individual tax and expenditure categories, as estimated by CD, as given. That is, the effects that might be derived from better targeting of individual tax or expenditure items are not addressed by this analysis.

The hypothetical changes to taxes and expenditures used in our simulations are adjusted to ensure that the size of the government's budget deficit does not change (this is guaranteed by equations (1) and (4)). The reasons for this treatment are outlined in the introductory section, above. Table 2 presents the results of this analysis. The simulations reported are of two kinds.

(i) changes in the composition of taxes

The first set of simulations given in the table shows the simulated effect of increasing one tax at a time and reducing all other taxes in the manner described above, keeping both total tax revenues and total expenditures constant. In each case, the share of the tax concerned within total revenue is increased by 10 percentage points. For example, for a tax that has an initial share of 12 percent of total revenue, its share of total revenue is increased to 22 percent. When each tax is raised, say tax 1, other taxes are reduced sufficiently to keep total tax revenues unchanged and so as to keep their respective shares of revenues from taxes other than tax 1 unchanged as well. Individual expenditure items do not change at all.

Table 2. Simulated effects of reallocations of public expenditures and taxes on the distribution of income and poverty incidence

	Gini coefficient		Level of poverty incidence (%)			% Change in poverty incidence (%)			People Lifted Out of Poverty (thousands)		
Scenario	Level of Gini coefficient	% Change in Gini	Poverty line 1	Poverty line 2	Poverty line 3	Poverty line 1	Poverty line 2	Poverty line 3	Poverty line 1	Poverty line 2	Poverty line 3
Actual tax and expenditures Taxes:	0.459		7.0	16.3	36.4						
10 percentage points increase in the share of:											
Personal	0.451	−1.61	6.2	15.4	35.8	−11.43	−5.52	−1.65	493.6	555.2	370.2
Corporate	0.458	−0.23	6.8	16.1	36.3	−2.86	−1.23	−0.27	123.4	123.4	61.7
Petroleum	0.460	0.18	7.1	16.4	36.5	1.43	0.61	0.27	−61.7	−61.7	−61.7
Value Added	0.463	0.83	7.5	16.9	36.8	7.14	3.68	1.10	−308.5	−370.2	−246.8
Specific Business	0.458	−0.27	6.9	16.2	36.3	−1.43	−0.61	−0.27	61.7	61.7	61.7
Excise	0.458	−0.15	6.9	16.2	36.3	−1.43	−0.61	−0.27	61.7	61.7	61.7
Customs	0.460	0.30	7.2	16.5	36.6	2.86	1.23	0.55	−123.4	−123.4	−123.4
Local	0.458	−0.20	6.9	16.2	36.3	−1.43	−0.61	−0.27	61.7	61.7	61.7
Expenditures: 10 percentage points increase in the share of:											
Education	0.458	−0.22	6.9	16.2	36.3	−1.43	−0.61	−0.27	61.7	61.7	61.7
Health care	0.456	−0.68	6.6	15.8	36.1	−5.71	−3.07	−0.82	246.8	308.5	185.1
Agriculture	0.455	−0.84	6.5	15.7	36.0	−7.14	−3.68	−1.10	308.5	370.2	246.8
Transportation	0.465	1.36	7.9	17.4	37.1	12.86	6.75	1.92	−555.2	−678.6	−431.9
Comprehensive reallocation: 10 percentage point changes[a]	0.440	−4.20	4.2	13.4	33.3	−40.00	−17.79	−8.52	1727.4	1789.1	1912.5

Note: *Poverty Line 1*: Based on US$1 per person per day, equivalent to Baht 9,125 per person per year at 1994 prices, which implies a level of poverty incidence in 1994 of 7% of the total population.
Poverty Line 2: The Thai government's official poverty line, produced by the National Economic and Social Development Board, of Baht 12,286 per person per year at 1994 prices, equivalent to US$1.35 per day which produced a level of poverty incidence in 1994 of 16.3% of the total population.
Poverty Line 3: Based on US$2 per person per day, equivalent to Baht 18,250 per person per year at 1994 prices, which implies a level of poverty incidence in 1994 of 36.4% of the total population.
Poverty incidence under actual taxes and expenditures. Computed on the basis of the Gamma distribution.
[a]Comprehensive reallocation means a 10 percent change in the share of personal income tax (increase), VAT (decrease), health expenditures (increase), agricultural expenditures (increase), holding total taxes and total expenditures const.

(ii) changes in the composition of expenditures

This is the exact counterpart for expenditures of the tax changes described above. The share of each expenditure item within total expenditure is increased, one at a time, by 10 percentage points.

The results show the estimated effects that these hypothetical tax and expenditure changes have on inequality and poverty incidence. Inequality is measured by the Gini coefficient (values are between 0 and 1, higher values indicate greater inequality). The initial (1994) level of this coefficient was 0.459. The effects on poverty incidence are calculated using three poverty lines:

Poverty line 1. Based on US$1 per person per day, equivalent to Baht 9,125 per person per year at 1994 prices, which implies a level of poverty incidence in 1994 of 7 percent of the total population.

Poverty line 2. The Thai government's official poverty line, produced by the National Economic and Social Development Board, of Baht 12,286 per person per year at 1994 prices, equivalent to US$1.35 per person pre day and which produced a level of poverty incidence in 1994 of 16.3 percent of the total population.

Poverty line 3. Based on US$2 per person per day, equivalent to Baht 18,250 per person per year at 1994 prices, which implies a level of poverty incidence in 1994 of 36.4 percent of the total population.

Unless otherwise indicated, our discussion below will be related to Poverty Line 2 – the Thai government's official poverty line. According to the simulation results, if the share of personal income taxes within total revenues was increased by 10 percentage points and all other taxes were reduced uniformly, as described above, the Gini coefficient of inequality would decline from its initial value of 0.459 to 0.451. The incidence of absolute poverty would decline from 16.3 percent of the total population to 15.4 percent, implying that 540,000 persons, or roughly 1 per cent of the population, would move above the official poverty line as a result of this tax reallocation. This number of people represents a reduction of the total number of people in poverty in 1994, based on this poverty line, from around 9 million to around 8.5 million.

The basis for this result is that the personal income tax is more progressive than the combination of all other taxes, falling disproportionately on the rich. Increasing its share of total revenues – and simultaneously reducing other, less progressive taxes – would benefit the poor, reducing inequality and reducing absolute poverty incidence. Alternatively, increasing the share of regressive taxes within total tax revenue would increase both inequality and poverty incidence. For example, a 10 percentage point increase in the share of the value-added tax within total tax revenues (with a simultaneous reduction in other taxes) would increase poverty incidence by 360,000 persons, or roughly two-thirds of one percent of the total population.

Turning to expenditures, the results are contained in rows B.1 to B.4 of Table 2. Increasing the expenditure shares of either education, health care or agriculture by

10 percentage points within total expenditures would reduce total poverty incidence whereas increasing the share of transportation expenditures would increase it. The reason is that, according to the CD estimates, the benefits of transportation expenditures accrue disproportionately to the rich, compared with the combination of all other expenditures.

The above analysis indicates that even moderate, once-only redistributions of the total tax burden, towards taxes that fall more predominantly on the rich, and redistributions of government expenditures towards those that benefit mainly the poor, may have significant effects on poverty incidence. Better compliance with personal income tax obligations through improved collection and monitoring mechanisms, could add to these poverty alleviation effects. Similarly, better targeting of poverty-related expenditure categories such as education, health and social services, could also add to the poverty-reducing power of fiscal policy.

The above estimates refer to once-only reallocations of taxes and/or expenditures. The point must be emphasized that reform to the tax and expenditure structure would affect the benefits from growth as well. The more equitable the tax and expenditure system, the more equitably distributed would be the new incomes deriving from economic growth. This issue is analysed in the next section.

Changes in the Quality of Growth

In this section we estimate the impact that a reallocation of taxes and expenditures would have on the growth elasticity of poverty – the elasticity of poverty incidence with respect to the level of real GDP. Within a general equilibrium framework, a fiscal reallocation could potentially change the steady-state growth rate of the economy as well as the distribution across population groups of the benefits from future growth. Here we adopt the simplifying shortcut of taking the growth rate of the economy as given. To distribute changes in aggregate income across population percentiles, we compute the elasticity of household income of each income decile with respect to GDP. These elasticities are computed on the basis of observed shares of total household income for each decile (s_i), the observed share of total household income in GDP (h_i), and the observed growth rate of GDP ($\dot{Y}$). Hence, the elasticities are given by:

$$\varepsilon_i = \frac{\dot{s}_i(1+\dot{h}+\dot{Y}+\dot{h}\dot{Y})+\dot{h}+\dot{Y}+\dot{h}\dot{Y}}{\dot{h}+\dot{Y}+\dot{h}\dot{Y}} = 1+\dot{s}_i+\frac{\dot{s}_i}{\dot{h}+\dot{Y}+\dot{h}\dot{Y}} \tag{8}$$

where a dot over a variable represents a growth rate.

To compute the elasticities ε_{it} we used the results of the Socio Economic Survey (SES) conducted by the National Statistics Office in Thailand during the period 1981 to 1999. Table 2 presents these elasticities for each quintile of the income distribution for four time intervals. Up to 1992, the elasticities of the 1st and 2nd quintiles (poorest)

Table 3. Growth of real GDP and household incomes and elasticities of household incomes with respect to GDP

	GDP	Quintile 1 (poorest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (richest)
			Growth of real income (percentage change)			
1981–1988	59.77	42.95	48.67	51.47	57.93	66.39
1988–1992	46.34	28.82	31.31	34.92	39.46	65.40
1992–1996	35.59	47.92	47.17	46.02	43.86	32.00
1996–1999	−8.10	−16.85	−13.00	−11.99	−10.87	−5.18
			Elasticities with respect to GDP			
1981–1988		0.719	0.814	0.861	0.969	1.111
1988–1992		0.622	0.676	0.754	0.852	1.411
1992–1996		1.346	1.325	1.293	1.232	0.899
1996–1999		2.081	1.605	1.481	1.342	0.640
1990–1996		0.998	1.024	1.037	1.059	1.150

Note: The growth rate of real income by quintile is computed on the basis of the share, h, of household income in total GDP, and the share s_i of total household income allocated to quintile i (see equation (8) in the main text).

were lower than 1, while the elasticity of the 5th quintile (richest) was greater than one. Economic growth during this sub-period was therefore associated with an increase in income inequality. Between 1992 and 1996, the elasticities of the 1st and 2nd quintiles became equal to or greater than one while those of the richest quintile group became smaller than one, and because GDP was growing rapidly, income inequality declined. Between 1996 and 1999 the incomes of poorer households to changes in GDP became even more sensitive to changes in GDP and the incomes of the richest households became less so, but because this was a period of *negative* growth of GDP, income inequality again increased.

In Table 3, we present the results of similar simulations to those presented in Table 1. The difference is that, in this case, we analyse the final impact of the reallocation of taxes and expenditures after a period of 5 years, under the assumption that the economy has been growing at 5 percent per year.[7] We observe that with no reallocation, growth alone can have important effects on poverty incidence. The effect that growth has on poverty incidence is surprisingly sensitive to the poverty line that is used. It depends on the elasticity of household incomes with respect to GDP for those individuals with incomes close to the poverty line.

Table 4 summarizes these results in terms of the implied elasticity of poverty incidence with respect to the rate of growth of real GDP. Using the official poverty line, the elasticity of poverty incidence with respect to the rate of growth approximates 2.6.[8] This implies that a 10 percent increase in income is associated with a 26 percent reduction in poverty incidence. However, when we use $2 per day as the reference

Table 4. Simulated effects of reallocations of public expenditures and taxes after 5 years, assuming 5 percent growth

	Gini coefficient		Level of poverty incidence (%)			% Change in poverty incidence (%)			People Lifted Out of Poverty (thousands)		
Scenario	Level of Gini coefficient	% Change in Gini	Poverty line 1	Poverty line 2	Poverty line 3	Poverty line 1	Poverty line 2	Poverty line 3	Poverty line 1	Poverty line 2	Poverty line 3
Actual tax and expenditures	0.459		7.00	16.30	36.40						
Growth with no reallocation	0.472	2.80	0.00	4.40	28.50	<−95	−73.01	−21.70	4,200	7,065	4,257
10 percentage points increase in the share of:											
Personal	0.464	1.20	0.00	2.90	27.60	<−95	−82.21	−24.18	4,200	7,991	4,812
Corporate	0.471	2.57	0.00	4.00	28.30	<−95	−75.46	−22.25	4,200	7,312	4,381
Petroleum	0.472	2.98	0.00	4.50	28.70	<−95	−72.39	−21.15	4,200	7,004	4,134
Value Added	0.475	3.61	0.00	5.30	29.10	<−95	−67.48	−20.05	4,200	6,510	3,887
Specific Business	0.470	2.52	0.00	4.20	28.40	<−95	−74.23	−21.98	4,200	7,189	4,319
Excise	0.471	2.65	0.00	4.20	28.40	<−95	−74.23	−21.98	4,200	7,189	4,319
Customs	0.473	3.10	0.00	4.70	28.70	<−95	−71.17	−21.15	4,200	6,880	4,134
Local	0.471	2.60	0.00	4.20	28.40	<−95	−74.23	−21.98	4,200	7,189	4,319
10 percentage points increase in the share of:											
Education	0.471	2.58	0.00	4.10	28.30	<−95	−74.85	−22.25	4,200	7,251	4,381
Health care	0.469	2.14	0.00	3.60	28.00	<−95	−77.91	−23.08	4,200	7,559	4,566
Agriculture	0.468	1.97	0.00	3.40	27.90	<−95	−79.14	−23.35	4,200	7,682	4,627
Transportation	0.478	4.12	0.00	6.00	29.60	<−95	−63.19	−18.68	4,200	6,078	3,578
Comprehensive reallocation:											
10 percentage point changes[a]	0.453	−1.33	0.00	0.00	25.50	<−95	<−95	−29.95	4,200	9,780	6,108

Note: Definition of poverty lines and the meaning of 'Comprehensive reallocation', see Table 2.

Table 5. Growth elasticity of poverty with changes in the composition of taxes and expenditures

Scenario	Poverty line 2
With current tax and expenditures	−2.64
With 10 percentage points increase in the share of specific taxes:	
Personal	−2.98
Corporate	−2.73
Petroleum	−2.62
Value Added	−2.44
Specific Business	−2.69
Excise	−2.69
Customs	−2.58
Local	−2.69
With 10 percentage points increase in the share of specific expenditures	
Education	−2.71
Health care	−2.82
Agriculture	−2.86
Transportation	−2.29
With a comprehensive reallocation	−3.62

Note: The poverty line used is Poverty line 2. For the definition and the meaning of 'Comprehensive reallocation', see Table 2.

poverty line, the growth elasticity is less than one. The simulations show that reallocating taxes and expenditures can have meaningful impacts on the growth elasticity of poverty incidence.

To interpret the results in Tables 4 and 5 it is useful to notice that the number of people lifted out of poverty as a result of an expansion of the economy of size ($x \times 100$) percent is given by $P \times \varepsilon \times x$, where P is the initial number of poor and ε is the economic growth elasticity of poverty incidence. Therefore, the change in the number of poor resulting from a change in the elasticity is simply $P \times x$. In Thailand in 1994, using the official poverty line, the total number of poor was around 10.05 million. Using this stock as the initial condition, the number of people lifted out of poverty as a result of a 1 percent expansion of the economy would increase by $P \times 0.01 =$ 100,560 for each one unit increment in the growth elasticity of poverty incidence or by 10,560 for each 0.1 increment.

The results in Table 5 indicate that a 10 percentage point increase in the share of personal taxes increases the growth elasticity from 2.6 to close to 3, calculated at the official poverty line (Poverty Line 2). These results imply that an increase in the share of personal income taxes of this magnitude would mean that for each 1 percent increase in the growth rate of GDP, 40,225 additional individuals could be raised from poverty. It is obvious from these results that a more comprehensive fiscal reallocation could increase the growth elasticity even more. The illustration provided in Table 4 is a 10 percent increase in the share of personal income taxes, coupled with a revenue-neutral reduction in the share of the valued added tax, plus 10 percent increases in both

health and agricultural expenditures, coupled with an expenditure-neutral increase in transportation expenditures. This combination of fiscal reallocations raises the growth elasticity from 2.6 to 3.6, implying over 105,000 persons emerging from poverty for each 1 percent increase in the growth rate.

Limitations of the Approach

The approach used in the above analysis has the advantage that it makes use of available studies on the incidence of taxes and expenditures to explore the implications that hypothetical fiscal reallocations might have for poverty incidence and inequality. The simple approach used has important limitations, however, and these should be made explicit.

First, the data on which the analysis is based measures the benefit derived from, say, health expenditure in terms of the cost to the government of providing it. In the case where the households concerned would otherwise have been spending at least this amount of their own incomes on the form of health services concerned, this assumption will be exactly correct. The public provision will displace private provision one-for-one and will be equivalent to a grant of money. In many cases, this assumption will be overly restrictive in that the household would not otherwise have been able to purchase the service and the net effect will be an increase in the quantity and/or quality of the service that is consumed beyond the income effect of an equivalent grant of money. Moreover, in such cases, the long-term beneficiaries may not be identical to the short term recipients of the service, with correspondingly different distributional implications.

Second, the method takes the 'average' incidences of taxes and expenditures and uses them to estimate the effects of 'marginal' reallocations. In some instances, average and marginal incidence could be different. Third, existing data on the incidence of taxes and expenditures incorporate the behavioural responses of households at different levels to the existence of these taxes and expenditures. Again, in using these data to estimate the effects of marginal reallocations we are assuming that marginal reallocations would be subject to exactly the same behavioural responses as are reflected in the existing 'average' data. Fourth, there is no allowance for the possibility of altering the distributional effects of taxes or expenditures by improving compliance rates and eliminating corruption. Finally, and perhaps most important, by focusing on reallocations *between* tax and expenditures the method makes no allowance for the ways that reallocations *within* expenditure categories (such as shifts away from tertiary education and towards lower secondary) might alter the distributional implications of that form of expenditure.

Finally, the analysis ignores effects that changes in the composition of taxes and expenditures may have on poverty incidence and inequality via their effects on economic efficiency. The justification is that even though these fiscal reallocations will indeed affect economic efficiency, the changes in poverty incidence and inequality

that will result from the consequent changes in the level of national income are likely to be minor relative to their distributional effects. However, this is an assumption that could be tested with the assistance of a full general equilibrium model.

Conclusions

This paper develops a framework for simulating the impact that changes in the composition of taxes and public expenditures have on the distribution of income and then applies this framework to Thailand. We find that even moderate, once-only redistributions of the total tax burden towards taxes that fall predominantly on the rich, including personal and corporate income taxes, can have significant effects on poverty incidence.

For example, we estimate that a 10 percent increase in the share of the personal income tax in total tax revenues, combined with uniform reductions in the share of all other taxes, holding total tax revenues constant, would reduce poverty incidence from 16.3 percent of the total population to 15.4 percent. This result implies that 540,000 persons, or roughly 1 percent of the total population and 5.5 percent of the number of poor people, would move above the poverty line as a result of this tax reallocation.

Comparable reallocations of public expenditures towards those which most benefit the poor, including health and agricultural expenditures, would also reduce poverty incidence significantly. In addition, combining pro-poor reallocations of taxes and expenditures can substantially increase the poverty-reducing capacity of economic growth.

Stepping beyond the results of this paper, better compliance with personal income tax obligations through improved collection and monitoring mechanisms, could add to the poverty alleviation effect of tax reallocations that are suggested by our results. Similarly, better targeting of poverty-related expenditure categories such as education, health and social services, could also add to the poverty-reducing power of fiscal policy.

Notes

1. There is also evidence that some countries that have performed impressively in terms of growth in GDP and increasing the incomes of the poor are unable to point to comparable progress in other dimension of well-being (Dreze & Sen, 1990).
2. The CD study actually covers three years, 1986, 1990 and 1994. Only the 1994 results are used in the present study because the CD results indicate very little change in the distributional impacts of individual taxes and expenditures between these years.
3. Within most general equilibrium models, taxes directly and indirectly affect households through the prices of commodities they purchase and through the determinants of household incomes (see Warr, 2001, for an application to Thailand). Nevertheless, in most such models there are no clear linkages between the structure of public expenditures and household incomes.
4. The periodic Socio-Economic Surveys conducted by the Thai government's National Statistical Office provide virtually the sole source of reliable information on poverty incidence in Thailand that can be

compared over time. The survey was conducted periodically prior to the 1980s. Another round was conducted in 1981, and since 1986 surveys have been conducted every two years except for a special survey conducted in 1999. Poverty estimates in Thailand are based on comparing household incomes, rather than expenditures, with a poverty line held fixed over time in terms of real purchasing power.

5. This elasticity was computed as the mean percentage change in poverty relative to GDP per capita between consecutive surveys for the period 1988–1999.
6. Calling x the predicted share of income, y the level of income, and $h(\cdot)$ the gamma function, the asymptotic covariance matrix is estimated as: $\Omega = \hat{\sigma}^2(Z'Z)^{-1}$ where $\hat{\sigma}^2 = \frac{1}{n}\sum(x_i - h(y_i; \hat{\beta}, \hat{\alpha}))^2$ and $\mathbf{Z} = \{z_i^1, z_i^2\}$ with $z_i^1 = \frac{\partial h(\cdot)}{\partial \beta}(y_i)$; $z_i^2 = \frac{\partial h(\cdot)}{\partial \alpha}(y_i)$.
7. In these calculations we use the average household-income-elasticity by quintile for the period 1990–96 (see Table 3).
8. The 1994 official poverty line of 12,286 baht per year converts to $1.34 per day at the official exchange rate.

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