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# Is tourism-based development good for the poor? A general equilibrium analysis for Thailand

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## Abstract

The popularity of tourism as a component of development strategy in low-income countries is founded in part upon the belief that expansion of this industry will improve income distribution by greatly expanding demand for relatively low-skilled labor. We examine this belief for the case of Thailand, a highly tourism-intensive economy, using a new and specifically-designed applied general equilibrium model. A boom in inbound tourism demand generates foreign exchange and raises household incomes across the board, but worsens their distribution. Tourism sectors are not especially labor-intensive, and the expansion of foreign tourism demand brings about a real appreciation that undermines profitability and reduces employment in tradable sectors, notably agriculture, from which the poor derive a substantial fraction of their income. We examine the robustness of these results with respect to alternative factor market assumptions relevant to the Thai economy.

JEL: D58, L83, O15, O53,

Key words: tourism, Thailand, general equilibrium, income distribution

## 1. Introduction

Tourism is increasingly popular as a component of development strategy in low-income countries. This popularity appears to be founded upon three beliefs. First, that tourism can serve as a substantial source of foreign exchange earnings, thereby contributing to economic growth. Second, that tourism services are labor-intensive, so expansion of this industry will improve income distribution. Third, that tourism is a "clean" industry, i.e. its growth can be good for the environment. The promotion of tourism thus appears to be a policy that generates private gains and also advances broader societal goals; in particular, policies that promote tourism are seen as 'pro-poor' in that they are supposed to create disproportionately more jobs for less-skilled (and thus poorer) workers.

The first of these beliefs is well-founded in many cases. In many developing countries travel and tourism (T&T) contribute a larger share to total GDP than the world average and also generate a larger than average share of jobs and exports (WTTC 2006; see Appendix Table A-1). However, we shall see in this paper that the other two beliefs are less robust—at least in the case of Thailand, a major tourist destination and a country in which tourism is large in relation to national aggregates. Tourism expansion in Thailand certainly creates jobs for unskilled workers, and this has a direct poverty alleviation impact. But much of the gain from tourism growth accrues to factors other than unskilled labor, so income distribution may actually worsen. In addition, low-skill jobs in other sectors may be destroyed, and returns to agricultural land, from which the poor derive a considerable share of their income, may fall as tourism expands.

When tourism is relatively large in relation to GDP and employment, internal or external changes affecting the industry can have economy-wide impacts on resource allocation, sectoral outputs, wages and other factor prices, income distribution, and macroeconomic aggregates. Poverty and distributional outcomes of tourism growth cannot easily be predicted except in a numerical model capturing some of the complexity of interdependent sectors and markets as well as the effects of economic policies and other distortions. Subject to availability and quality of data, applied general equilibrium (AGE) models can be used to examine such complex economic systems. In this paper we present a SAM-based AGE model and databases for Thailand, and simulate the effects of a tourism boom and those of policies intended to promote tourism growth. In this paper we focus instead on the question: is tourism promotion a "pro-poor" strategy?[1]

*Previous studies*

Current economic impact analyses of tourism range from simple comparisons of data on tourism activities with key economic indicators to more complicated methods such as cost-benefit analyses (CBA), proportional multiplier methods, input-output (I-O) models and applied general equilibrium (AGE) models. Among these methods, AGE models alone are able to distinguish the gross effects of an activity on outputs, incomes and employment from the net effects after accounting for economy-wide linkages. They are flexible enough to allow for general specifications of the behavior of consumers, producers, and investors. Specifically, they can represent the behavior of those agents to be sensitive to changes in relative prices as well as in quantity variables. AGE models can also make explicit assumptions about government policy settings and can incorporate a more realistic set of economy-wide constraints on the supply side of the economy.

Zhou et al. (1997) analyze the impacts of a reduction in visitor expenditures on Hawaii's economy, using both I-O and AGE models. They conclude that the I-O results are similar in magnitude to the AGE results but generally higher, and that sectors closely associated with tourism exhibit the largest effects. Mabugu (2002) uses the AGE approach to find the appropriate macroeconomic policy reforms that can restore and sustain tourism growth in Zimbabwe. Mabugu simulates various combinations of policies, e.g., trade liberalization (a reduction in tariff rates and quantitative trade restrictions), nominal currency devaluation and a fiscal deficit reduction. He finds that the benefits of tourism on the economy's performance are enhanced under a liberalized foreign exchange regime.

Adams and Parmenter (1991, 1992, 1995) use ORANI-F and ORES (ORANI Regional Equation System) for Australia to simulate an economy-wide expansion of tourism. They implement two distinct simulations. The base case assumes the average annual growth rate of tourist arrivals at 7%. The other case is identical to the base case but with the growth rate of 17%. The effects of this increase in the tourism growth rate are measured in terms of key macroeconomic variables, sectoral outputs and regional output growth rates. They find that the winners are those tourism-related sectors that are directly and indirectly stimulated by a tourism expansion. The losers are the sectors whose activities are crowded out by tourism expansion. At a regional level, even the most tourism-oriented Australian state (Queensland) is among the net

losers. The reason is that the positive effects of tourism expansion are roughly proportional to the extent to which tourism expands within the state. The negative effects, on the other hand, are essentially spillovers, roughly proportional to the economy-wide tourism expansion.

Using a general equilibrium international trade framework, Copeland (1991) finds that a tourist boom benefits the host country through its effects on the price of non-tradables. An increase in the price of non-tradables is analogous to a terms-of-trade improvement in the presence of tourism. The presence of domestic commodity taxes will typically increase the benefits of tourism since they allow some extraction of rents from unpriced natural amenities which are consumed jointly with priced goods and services. Under the assumptions of sector-specific factors and internationally mobile capital, tourism can lead to a contraction of manufacturing output. The social benefits of tourism are mostly captured by the factors specific to non-tradable sectors. However, real returns to all other factors fall as a result of a tourism boom.

Nowak et al. (2004) use a hybrid of the Ricardo-Viner-Jones (RVJ) and Heckscher-Ohlin (HO) models under full employment. A key assumption is that the manufacturing sector produces with increasing returns to scale while other sectors produce with constant returns. They find that welfare effects on residents depend on the relative magnitudes of a favorable effect and a negative effect. Analogous to Copeland, the former is a terms-of-trade effect due to an increase in the relative prices of non-traded goods. The latter is an efficiency loss that occurs as manufacturing, the increasing-returns sector, contracts.

The above models, despite their general equilibrium structure, do not pay explicit attention to the effects of tourism on factor incomes or household income distribution. These are important measures in the development of low-income countries. There is invariably a need to know whether the expansion of a given industry or industries is likely to advance or retard the broader development goal of poverty alleviation. In the particular case of Thailand, a country where economic growth has been associated with increasing inequality in the household income distribution, there is a need to know how aggregate inequality will be affected, and through what mechanisms. The goal of this paper is to help answer that question.

The rest of the paper proceeds as follows. Section 2 outlines the basic structure of the AGE model and introduces extensions capturing tourism-specific phenomena. Section 3 explains the data base, parameters and sectoral aggregates. Section 4 presents simulations and sensitivity

analyses relating to tourism growth. Section 5 draws conclusions and offers some policy recommendations.

## 2. The model

*2.1 A basic model*

The structure of the basic AGE model is taken from the "standard" computable general equilibrium model described in Löfgren, Harris and Robinson (2001). This standard model is based on a social accounting matrix (SAM) data base and has the following key structural elements:

a. *Production*: Industry demands for primary factors and intermediate inputs are described as a nested constant elasticity of substitution (CES) production. Value added taxes (VAT) on primary factor composites are also imposed in the production.

b. *Households*: Household demands for consumption of composite goods and services are described as a linear expenditure system (LES) or the Stone-Geary demand system. Changes in household utility, in the form of Klein-Rubin utility function, are also measured.

c. *Exports*: Foreign demands for exported commodities are downward-sloping with respect to export prices in foreign currency. The allocation of final outputs between exports and local markets is described as a constant elasticity of transformation (CET) technology. Export taxes are also imposed.

d. *Imports*: Local producers combine imported commodities with their own outputs according to the Armington assumption to form composite commodities for other production and final demands. An import prices system, i.e. a conversion of world import prices to local CIF prices to post-tariffs prices, are also measured.

e. *Government*: There is a group of equations describing government expenditures (on consumption and transfers) and government incomes (from tax revenues and transfers).

f. *Other final demands*: There is a group of equations describing investment and inventory demands for composite commodities.

g. *Market clearing*: There is a group of market clearing equations for composite commodities and primary factors.

h. *Trade and international capital flows*: There is a group of equations describing net transfers, incomes, expenditures and savings of the rest of the world.

i. *Distribution of factor incomes*: There is a group of equations describing distribution of net factor incomes and net incomes of non-government institutions.

j. *Other equations*: There is a group of miscellaneous equations defining GDP at factor costs, GDP from income sides, GDP from expenditure sides, savings pool, the absorption, the trade balance, the current account deficit, the consumer price index (CPI), other price indices (i.e. the government, investment, export, import and absorption price indices), terms of trade and real devaluation.

The "standard" model is thus a neoclassical representation of a generic economy, and as such provides a stylized representation of economic structure and the mechanisms, such as factor and product markets, consumer demand, and trade, from which general equilibrium inferences can be drawn. This generic model must then be modified to capture country-specific and sector-specific detail, both of structure and of parameter values. In the remainder of this section we offer structural modifications to represent tourism in the Thai economy. The country-specific data set is introduced in Section 3.

*2.2 Introducing tourism to the model*

Tourism is "the act of travel for the purpose of recreation, and the provision of services for this act" (Wikipedia), and as such has both demand and supply aspects.

Tourists purchase a bundle of domestic goods and services. Although there are many distinct categories (or niches) of tourism (Wikipedia identifies 26 of these), lack of data on these in the Thai context requires us to assume that all tourists have identical preferences. This assumption permits the definition of "tourism supply" as a specific bundle of goods and services. The literature typically treats these as combined in fixed proportions, reflecting the assumption that tourists cannot substitute transportation for food, food for hotels, and so on. We follow this convention. Hence, tourism demands for composite commodities are described by the Leontief function

$$X = Min[\frac{X_1}{A_1},...,\frac{X_i}{A_i}] \quad (1)$$

where $X$ is the quantity of tourism, $X_i$ is the level quantity of each commodity $i$ in the tourism composite, and $A_i$ is a productivity parameter associated with $i$. The corresponding percentage change forms of composite tourism quantity and prices are described below:

$$\hat{x} = \sum S_i(\hat{x}_i - \hat{a}_i) \tag{2}$$

$$\hat{p} = \sum S_i(\hat{p}_i + \hat{a}_i) \tag{3}$$

where $\hat{x}_i = 100dX_i / X_i$, $\hat{p}_i = 100dP_i / P_i$ and $\hat{a}_i = 100dA_i / A_i$ are percentage changes in quantities, prices and technical progress of composite commodities $i$, respectively, while $\hat{x} = 100dX / X$ and $\hat{p} = 100dP / P$ are percentage changes in quantity and price index of tourism composites, respectively. Lastly, each $S_i$ is the value share of commodity $i$ in the total value of the tourism composite.

Total tourism demand is made up of internal tourism by residents (INT), outbound tourism by residents (OBD), and inbound tourism by non-residents (INB). Inbound tourism is an additional final demand in the economy and can be thought of as an invisible export since foreign tourists have to exchange foreign currency in order to buy goods and services in the local economy. In this model, internal tourism consumed by households is simply included as another composite commodity in a Klein-Rubin utility function, while outbound tourism is modeled as a function of disposable incomes. That is,

$$INT \in \{\text{Composite Commodities}\} \tag{4}$$

$$OBD = R \cdot Y \tag{5}$$

where $INT$ and $OBD$ are internal tourism and outbound tourism, respectively, and $R$ is the ratio of outbound tourism expenditure to disposable income ($Y$). The corresponding ordinary change form of outbound tourism expenditure is

$$100delOBD = OBD \cdot (\hat{r} + \hat{y}) \tag{6}$$

where $delOBD$ is the ordinary (level) change in outbound tourism expenditures, while $\hat{r} = 100dR / R$ and $\hat{y} = 100dY / Y$ are percentage changes in the ratio and disposable incomes, respectively.

Finally, inbound tourism, the focus of our study, is a function of tourism prices and the exchange rate, i.e.

$$INB = H \cdot (P / E)^{\varepsilon} \tag{7}$$

where $INB$ is inbound tourism demand, $H$ is a shift parameter for an exogenous change in inbound tourism demand, $P$ is the composite price, $E$ is the exchange rate, and $\varepsilon$ is the price elasticity of foreign tourist demand. In percentage change form, inbound tourism expenditures are described by:

$$\hat{inb} = \hat{h} + \varepsilon \cdot (\hat{p} - \hat{e}) \tag{9}$$

where $\hat{inb} = 100dINB/INB$, $\hat{h} = 100dH/H$, $\hat{p} = 100dP/P$ and $\hat{e} = 100dE/E$ are percentage changes in inbound tourism, a shift parameter, tourism composite price and the exchange rate, respectively.

*2.3 Tourism, trade and the real exchange rate*

In the model, inbound tourism takes the form of an invisible export. Tourists exchange foreign for domestic currency, then use the latter to make purchases within the domestic economy. This process induces adjustment on both supply and demand sides of GDP. For a given shock, relative prices in the model will adjust to clear product and factor markets. From the demand side, with direct income tax rates given, the level of GDP determines disposable incomes and household consumption. With GDP from the expenditure side, household consumption, government consumption and investment, the trade balance is then determined as a residual from the expenditure side of GDP. If a shock such as increased tourist arrivals causes domestic demand for tourism-related goods and services to grow, their prices will be driven up; this is the real appreciation component of the shock (in simple models with the Law of One Price in markets for tradables, prices of nontradables will rise relative to tradables). The real appreciation will in turn will tend to raise returns to factors used intensively in nontradables production. The economy will thus accommodate higher tourism demands through the transfer of resources from other sectors whose prices have fallen relative to nontradables and endogenously-priced tourism sectors. The nature of this resource reallocation, and the consequent changes in overall production, trade, and factor incomes, will depend on the extent of any relative price movement, and of relative factor intensity across sectors. factor supply elasticities, and sector-specific propensities for input substitution. The economy will also import more intermediate goods for use by tourism-related sectors.

If resources are withdrawn mainly from export-oriented industries (EOI), total export volumes will decrease. On the other hand, if resources are removed mainly from import-

substituting industries (ISI), import volumes will rise, over and above any increase due to intermediate input demand from tourism-related sectors. Either way, the trade balance will deteriorate. In equilibrium, the net effects of this contribution to the current account deficit will be offset by the capital inflow associated with increased inbound tourism arrivals.

## 3. Tourism and the Thai economy

### *3.1 The role of tourism in Thailand*

Foreign tourism is Thailand's largest export industry, by a wide margin. "Visitor exports," or sales of tourism goods and services foreign visitors, averaged $US10.2 bn (12% of total exports) in 1998-2005 on more than 10 million annual visitor arrivals. The next largest category of exports, computers and parts, averaged $US 8.5 bn in the same period.[2] On average during 1998-2005, Thai tourism directly and indirectly accounted for 13% of GDP, 10% of employment (3 million jobs), and 12% of investment. Using the industry's GDP share as a measure, Thailand is ranked #60 of 174 countries in the World Tourism and Travel Council's global tourism satellite accounts (TSA). If we exclude very small countries like Bahrain, Brunei, and the Caribbean nations, Thailand's rank rises to 26; excluding countries on the European mainland or the Mediterranean coast, Thailand is ranked 9, and shares a single-digit ranking with two adjacent Southeast Asian countries, Cambodia and Malaysia. The industry's revealed comparative advantage index (Balassa 1965), computed as the ratio of its tourism exports (as a fraction of total exports) to global tourism exports (as a fraction of global total exports), is about 2. This indicates significant comparative advantage relative to world markets, and also among Thai tradable industries.

Tourism spending accounts for about 3% of total Thai government budget outlays. The importance of this industry to the Thai government can be seen from this spending and the corresponding official predictions of tourism receipts. These expenditures supported a range of programs, some of which originated in a conscious effort to assist recovery from the 1997-98 economic crisis. These campaigns have included 1997's "Visit Thailand Year" to "Thailand: the Gateway to Indochina", "Amazing Thailand" and the ongoing "Unseen Thailand".

Despite the obvious prominence of tourism in the economy, there are no empirical studies that rigorously evaluate the welfare and distributional effects of this industry, or of publicly-

funded promotional campaigns. Although the recently-adopted Thai TSA framework (Wongnopadondecha and Roongruangchaiboon 2003) takes interindustry and economy-wide effects into account, it does not consider general equilibrium feedback effects. Inter-industry effects computed in the TSA framework focus only on tourism-related industries; changes in other industries and in economy-wide aggregates such as wages and prices are not taken into consideration. Other empirical studies focus on partial analyses, especially the environmental valuation of ecological places, recreational areas and tourist destinations. At least 20 environmental valuation studies applying a range of partial-equilibrium methods were conducted in Thailand between 1981 and 1999 (Israngkura 1999).

The perception of tourism's economic merits, and thus of the benefits of tourism promotion policies, may be modified once indirect interactions with unrelated sectors and institutions are taken into account. A sector as prominent as tourism in the Thai economy is bound to have relatively rich links to other sectors, both through intermediate demand and trade (the purchase of goods and services by the tourism industry) and through competition in factor markets, especially those factors used intensively in the tourism sector. Given the magnitude of the tourism industry in relation to the total economy, any internal or external changes affecting inbound tourism could have positive or negative economy-wide effects on resource allocation, industry outputs, income distribution, key macroeconomic variables and the environment.

One of the biggest controversies is whether a tourism boom is pro-poor, as generally believed by policy makers. If not, why not? In this section we develop a model for the Thai case; subsequently, we use the model to assess the effects of tourism growth on factor incomes, income distribution and social welfare.

*3.2 Data*

The basic data for any AGE model is a social accounting matrix (SAM). The SAM database used in this research was developed by TDRI (2004); we refer to it below as the TDRI SAM. However, it has been necessary to make substantial modifications to this data set in order to achieve our goals. Our focus on income distribution requires a more detailed accounting for the incomes of the poor and for labor-intensive sectors, the better to identify poverty and distributional impacts. As the majority of the poor derive income from agriculture, the agricultural operating surplus in the original SAM has been disaggregated into two separate

primary factors, namely agricultural land and capital. Labor has been disaggregated into nine broad categories by occupation. Internal tourism expenditures have been separated from general consumption expenditures.[3]

More than half the sectors in the TDRI SAM are interdependent with tourism, confirming the *ex ante* importance of a general equilibrium approach. However, a number of revisions to the basic SAM have been necessary in order to match the requirements of this research. The SAM reports tourism expenditures on inbound tourism demands by foreigners (ROW) and outbound tourism demands by domestic residents, but internal tourism expenditures are not separated from the general consumption expenditures of households. To separate these accounts, we first assume that households' entire expenditures on hotels are expenditures on internal tourism. Expenditures on other tourism-related commodities are then set proportionally to hotel expenditures so that internal tourism expenditures across commodities are in the same proportion as inbound tourism expenditures.

Four final results are obtained from this disaggregation. First, one more sector, namely "internal tourism" is added to the SAM. Second, the internal tourism sector employs only tourism-related composite commodities as intermediate inputs for its production. Third, the output of the internal tourism sector is considered as a single good consumed by households. Finally, internal tourism expenditures of households are now separated out from general consumption expenditures.

### *3.3 Parameter values: shares and elasticities*

A variety of parameters are required in order to implement the AGE model. Share parameters (for example sectoral shares in employment and capital use, import shares, export shares, budget shares, etc) can be computed directly from the SAM. Elasticities related to production and consumption functions— for example, elasticities of substitution between primary and intermediate inputs, household expenditure elasticities, export demand elasticities, and Armington elasticities of substitution between imports and domestically produced goods— are obtained from other studies using Thai data. Sources of these estimates include Sarntisart (1993), Warr et al. (1993), Sussangkarn and Kumar (1997), TDRI (2004) and Horridge (2005). Where there is uncertainty about elasticity values, structural sensitivity analyses can be

conducted to check the robustness of simulation results with respect specific parameter values or the associated standard errors of their estimates (see Wattanakuljarus 2005).[4]

## 4. Simulations and results

### *4.1. Methodology*

The model is implemented using GEMPACK software (Harrison and Pearson 1996; Horridge 2005). In general, models in GEMPACK are written as a system of linear equations in which most variables enter in percentage change form (some appear in levels or level changes). We conduct three basic simulations, followed by several variants intended to test the robustness of the basic results.

According to statistics from the Tourism Authority of Thailand (TAT), the average annual growth rate of inbound tourism is around 10%. Thus, in the base simulation we assume a 10% inbound tourism expansion, with fixed supplies of all primary factors.

### *4.2. Macroeconomic closure*

Macroeconomic closures specify exogenous and endogenous variables to reflect our stylization of the functioning of a real-world economy. In Figure 1, exogenous variables are depicted in rectangles and endogenous variables in ovals. The arrows indicate a plausible direction of causation between variables. The upper part of the figure is the supply side or income side of GDP, while the lower part is the demand side or expenditure side. For given values of exogenous variables, the model simultaneously determines equilibrium values of endogenous variables.

On the supply side, employment, technology, supplies of land, forest and capital are exogenous variables, while real wages and real rates of return on other factors are endogenous. The reasons are as follows. Firstly, the Thai labor market can be allocated across sectors. The average unemployment rate (3% of the labor force) is so low that labor can be considered as being fully utilized. Secondly, technical change can be exogenously set according to the actual rate of technical progress in the economy at that time. Thirdly, in the short to medium run, supplies of land, forest and capital are fixed in aggregate, but can be allocated to different activities. Thus, the model allows for land to be reallocated between crops, forestry and water systems, and for the movement of capital across sectors.

On the demand side, household consumption is assumed to be endogenous so that the model can directly determine social welfare effects. Direct income tax rates are exogenously given. Government consumption and investment are fixed. In the base SAM (2001), investment already contains capital stocks or inventories. Tourism consumption can be exogenously set according to tourism growth rates. However, tourism consumption can be switched to an endogenous variable if the effects of a given policy shock on tourism is the primary focus. The trade balance, the current account deficit (or foreign savings), terms of trade, and real devaluation are endogenously determined within the model.

In a static model, government and household savings are considered as leakages from the economy. Allowing for endogenous changes in these variables renders any assessment of welfare change impossible. To capture the full welfare effects of an exogenous shock, these savings variables have to be held constant; this has the effect of ensuring that all changes in aggregate income are expressed through changes in current household incomes and expenditures. Of course, this closure requires that the government budget deficit also remain unchanged. There are many ways to achieve this: (i) net transfers from government to households can be adjusted, (ii) tax revenues can be changed by adjusting direct tax rates or indirect tax rates, and (iii) subsidies can be changed by adjusting subsidy rates. At the same time, the marginal propensity to save by households has to be adjusted so that household savings are kept constant, Any changes in household income are therefore measured as changes in consumption.

*4.3. Experiments and results*

We simulate the effects of tourism growth by imposing an exogenous, one-time increase in inbound tourist arrivals on the model. Being static, the model provides results that show the effects of this shock on the economy once adjustment is complete, i.e. once a new equilibrium has been attained. We make the structural assumptions of fixed factor quantities, both in total and between agriculture and the rest of the economy, so it is reasonable to think of this as a short-medium run result, i.e. one taking about one year to emerge. In section 5 we perform some structural sensitivity analyses in which assumptions on factor supplies are relaxed; these provide for longer-run outcomes.

Simulation results will be analyzed in this section in three groups: macroeconomic, institutional and sectoral results. To condense and organize the discussion, we define several sets of sectoral aggregates as follows (Table 1 lists sectors and defines aggregates):

(1) Agriculture, manufacturing and services sectors (AMS)
- Agriculture sectors (A) are industries numbered (1) to (27) and (36)
- Manufacturing sectors (M) are those numbered (28) to (35) and (37) to (59)
- Services sectors (S) are those industries numbered (60) to (80).

(2) Tourism-related sectors (DT, IT, NT)
- Direct tourism (DT) is the group of sectors attracting two per cent or more of total tourism expenditures..
- Indirect tourism (IT) is the group of sectors with tourism expenditure shares that are positive, but less than 2%.
- Non-tourism (NT) is the group of sectors without tourism expenditures.

(3) Trade patterns (EOI, ISI, DOI)
- Export-oriented industries (EOI) are those with shares of export receipts in total sales greater than 30%.
- Import-substituting industries (ISI) are those with shares of imports in total domestic demands greater than 60%. In other words, shares of domestic products in total domestic demands are less than 40%.
- Domestic-oriented industries (DOI) are the rest, regarded mainly as non-tradable.

Macroeconomic results

Key macroeconomic results are shown in Table 2. Consider the expenditure side or demand side of GDP: a 10% growth in inbound tourism (line 5) induces 0.11% growth of real GDP (line 1). Given government consumption (line 3) and investment (line 4) constant by the choice of closure, higher incomes enable households to increase consumption by 3.51% (line 2). Due to increased household and tourism consumption, total domestic absorption increases by 2.55% (line 6). Since total domestic absorption grows at a higher rate than the does real GDP, the trade balance (exports – imports) has to fall in order to balance the real GDP growth rate. Thus, the trade surplus falls by 36 billion baht (line 9). A 2.39% decrease in export volume (line 7) and a 1.73% increase in import volume (line 8) are responsible for this reduction.

A 3.53% rise in the GDP price index (line 11) causes an appreciation in the real exchange rate by 3.41% (line 19). This real exchange rate appreciation indicates a loss in international competitiveness for exports, as can be seen from a 1.91% increase in the export price index (line 17), because world demand for Thai exports is less than perfectly elastic. Growth in domestic demands over domestic supplies raises all domestic price indices, as can be seen from a 2.53% increase in the consumer price index (CPI) (line 13), a 3.27% increase in the government price index (line 14), a 2% increase in the investment price index (line 15), and a 2.62% increase in the tourism price index (line 16). Therefore, the absorption price index increases by 2.48% (line 12). A rise in domestic price indices gives an incentive for the allocation of resources from export-oriented industries (EOI) to domestic-oriented industries (DOI).

Although the trade balance deteriorates, the current account deficit declines by 28 billion baht (line 10), mainly due to the receipt of an additional 24 billion baht from net inbound tourism and net transfers from rest of the world. The savings pool of domestic institutions (line 23), which can be thought of as a leakage, is fixed. Hence, the model captures only the pure effects of an inbound tourism expansion without the effects of an increase in domestic savings. This assumption shifts the burden of adjustment to a shock onto household expenditures, which then provides an approximate money-metric welfare change measure. Specifically, to keep government savings constant when there is a 10% inbound tourism expansion, direct income tax rates on households are reduced by 0.27%. To keep household and corporate savings constant when there is a 10% inbound tourism expansion, their marginal propensity to save has to be varied.

Now, consider the income side or supply side of GDP with fixed primary factor supplies (line 32-39). The economy-wide weighted-average real wage increases by 1.05% (line 24). However, only the real wage in non-agriculture increases (1.16%, line 26), while that in agriculture decreases slightly (0.0014%, line 25). Similarly, the weighted-average real rate of return on capital rises by 1.24% (line 29), but only the real rate of return on non-agricultural capital rises (1.31%, line 31), while that on agricultural capital declines (0.04%, line 30). The real rates of return on land and forest increase by 0.25% (line 27) and 0.85% (line 28), respectively.

Thus, tourism growth improves the productivity of factors used in non-agriculture rather than in agriculture, especially non-agricultural labor and capital. This widens the wage

differential and the differential rate of return on capital between agriculture and non-agriculture. The next results will examine how the benefits and costs of an inbound tourism expansion are distributed across institutions.

Distributional results

Key distributional results of the base simulation are presented in Table 3. In analyzing these we use the following abbreviations for subsets of the household income distribution:

*LowAg* The poorest 80% of households in agriculture or "low income in agriculture"

*HighAg* The richest 20% of households in agriculture or "high income in agriculture"

*LowNag* The poorest 80% of households in non-agriculture or "low income in non-agriculture"

*HighNag* The richest 20% of households in non-agriculture or "high income in non-agriculture"

From Table 3, a 10% inbound tourism expansion raises overall consumption, utility and income for all household classes. An increase in income induces all household classes to consume more of many kinds of goods and services. This is because the non-homothetic Klein-Rubin utility function allows households to change consumption patterns as income changes.

Within the same income classes, however, households in non-agriculture gain by more than those in agriculture. Within the same sector, high-income households gain more than low-income ones. As a result, low-income agricultural households gain the least, while high-income non-agricultural households gain the most. This implies that inbound tourism expansion is not a pro-agriculture or, in relative terms, a pro-poor change.

These distributional results are directly linked to changes in factor incomes. Capital and labor in non-agriculture are the factors that gain the most. From Figure 2, agricultural wage income rises by 2.53%, non-agricultural wage income by 3.72%, land income by 2.79%, agricultural capital income by 2.50%, non-agricultural capital income by 3.88%, and forest income by 3.40%. Tables 4 and 5 show how these factor price changes affect households. Table 4 shows the sources of factor income for each household, while Table 5 shows the distribution of ownership of each factor. The distribution of factor income changes across institutions can be calculated from these tables. The major owner of the factor that gains most from a given shock will get the most benefits from inbound tourism expansion. Since corporations are the major

owners of capital in non-agriculture, corporate incomes rise the most. Similarly, since high-income non-agricultural households are the major owners of labor in non-agriculture, they are the next biggest beneficiaries.

The above expectations are borne out by the simulation results in Table 6. A 10% tourism expansion generates an extra 5,374 MB of agricultural labor income. Of this, 4,229 MB goes to LowAg, 240 MB goes to HighAg, 717 MB goes to LowNag, and 188 MB goes to HighNag. Other factor income distributions can be read in the same way. As expected, corporations earn the highest extra income (68,491 MB), while HighNag earn the second highest income gain (59,946 MB). In conclusion, capital and labor in non-agriculture are the first and second ranked beneficiaries, while other factors gain only slightly. As a result, corporations and HighNag are the first and second ranked winners, while other institutions get only small increases in income. The inbound tourism expansion raises incomes across the board, but the lion's share of the gains accrue to the non-poor.

Sectoral results: AMS aggregates

It was noted earlier in the paper that the growth of one sector has direct and indirect effects on other sectors. These changes are summarized in a series of figures (tables of complete results are available on request). Increased factor demand in tourism-related sectors tends to raise the value marginal products of factors used intensively in those sectors, and this reduces profits in other sectors using the same factors intensively. Broad trends in factor reallocation across sectors are shown in Figures 3(a), 3(b) and 3(c). It is clear from Figure 3(b) that tourism growth induces a reallocation of capital and labor from manufacturing to services. As seen in Figure 3(b), the net change in capital use and labor employment in agriculture is zero. This is because these factors are assumed immobile between agriculture and non-agriculture. However, this does not imply that there is no change in capital use and labor employment within agriculture (see Wattanakuljarus and Coxhead 2006).

Although there is a 0.36% reduction in capital use and a 0.22% reduction in labor employment in manufacturing (Figure 3(b)), there is a 1.46% increase in imports of intermediate goods (Figure 3(c)). This increase is large enough to compensate for a reduction in domestic manufacturing output. Therefore, as depicted in Figure 3(a), average manufacturing supplies (domestic production plus imports) are 0.58% higher. This is consistent with the fact that tourism

expansion induces an appreciation in the real exchange rate, which causes imports of intermediate goods to become relatively cheaper than domestic products. Manufacturing then increasingly substitutes imports of intermediate goods for domestic counterparts. On the contrary, a 0.41% increase in services output (Figure 3(a)) is essentially associated with an increase in factor use, not an increase in imports. From Figure 3(c), there is only a 0.17% increase in imports in services since the majority of services are non-tradable.

Sectoral results: tourism aggregates

Consider Figures 4(a), 4(b) and 4(c). With the same investigation as above, a 0.49% expansion in direct tourism outputs (Figure 4(a)) is mainly due to a 0.14% increase in capital use and a 0.12% increase in labor employment (Figure 4(b)) and partly due to a 0.32% increase in imports (Figure 4(c)). As shown in Figure 4(b), capital and labor are released from indirect tourism and non-tourism to direct tourism, while land is reallocated from non-tourism to indirect tourism. Generally, land is reallocated to domestic-oriented industries (DOI) especially those that supply goods and services for tourism demands, such as vegetable, fruit, poultry products, and fresh water fisheries. Other agricultural sectors show declining output and factor use; paddy, maize, rubber, coffee, sugarcane and other major field crops all experience output changes far less than the median change (0.93 across all sectors), while hotels, restaurants, and domestic transportation sectors grow almost three times faster than the median.

Although there is a 0.04% reduction in capital use and a 0.09% reduction in labor employment in indirect tourism (Figure 4(b)), outputs of indirect tourism increase by 0.40% (Figure 4(a)) due to a considerable increase in imports of intermediate inputs. As shown in Figure 4(c), there is a 1.06% increase in imports in indirect tourism. Likewise, although there is a reduction in all factor uses in non-tourism (Figure 4(b)), non-tourism outputs slightly increase due to a 0.35% increase in their imports.

Sectoral results: trade aggregates

Consider Figures 5(a), 5(b) and 5(c). As expected from Figure 5(a), a 10% tourism expansion stimulates an expansion in domestic-oriented industries (DOI). There is a 0.55% increase in DOI outputs, a 0.30% increase in EOI outputs and a 0.23% increase in ISI outputs. These results are parallel to the macroeconomic results such that the economy-wide production is in the direction

of DOI rather than EOI and ISI. That is, a 10% inbound tourism expansion induces higher demands for domestic goods and services. Primary factors are released from EOI and ISI to DOI. In particular, a 0.50% land use is reallocated from EOI to DOI.

In conclusion, a 10% inbound tourism expansion shifts production toward manufacturing and services, direct and indirect tourism, and domestic-oriented industries (DOI). Primary factors are mainly allocated toward services, direct tourism, and DOI. Finally, an increase in imports of intermediate inputs is mainly for manufacturing, indirect tourism industries, and import-substituting industries (ISI).

### *4.4 Analysis and discussion*

Dutch disease

Traditional Dutch Disease models (Corden and Neary (1982), Corden (1984); Benjamin et al. (1989)) examine the effects of an export boom in a tradable sector on resource allocation, production in other sectors, prices, and income distribution. In these models, a boom unambiguously raises the relative prices of nontradables, first by reducing their supply through competition in factor markets, and second through increasing final demand as a result of spending out of increased total income from the boom. In this scenario the prices of non-tradables are unambiguously raised relative to those of tradables, under the law of one price assumption. If the resource movement effect dominates the spending effect, output and employment in non-tradable sectors will to contract, along with that in non-booming tradables sectors. Total income in the economy will rise, but the distribution of gains will be unequal: owners of factors used intensively in booming sectors will gain in real terms, while the real incomes of owners of other factors may rise or fall, depending on the fortunes of the sectors in which those factors are most intensively used.

The nature of tourism is such that most of the direct increase in demand takes place in sectors–such as hotels, resorts, restaurants, and domestic transportation services–that are non-tradable. To the extent that tourism growth also raises aggregate income, there is a further stimulus to non-tradable demand through the spending effect. Thus, in our analysis, tourism growth is analogous to a demand shock in non-tradable sectors. Their prices are driven up; and resources are attracted from other sectors into tourism-related industries. The subsequent spending of new income in the domestic economy may provide a further stimulus to tourism

sectors, along with other sectors producing non-tradables. Tradable sectors, under the law of one price assumption, will contract; exports will fall, and imports will rise.

We can see the general pattern of this result in the simulations summarized above, even though the AGE model incorporates much greater complexity than in the heuristic Dutch Disease analyses (in particular, we do not impose the law of one price; hence the prices of some tradable goods are driven up by the contraction of domestic supply). A decomposition of results into resource movement and spending effect components (available on request) shows that the former effect dominates the latter in absolute value terms. This implies that the total intersectoral and distributional impact of tourism expansion is substantially due to resource reallocation, a phenomenon not captured in partial equilibrium or input-output models.

Effects of a tourism collapse

Although export receipts from tourism are no more volatile than for other industries, the industry is vulnerable to exogenous shocks unrelated to national macroeconomic or policy trends. These include natural disasters, disease outbreaks, global terrorist incidents, and perceptions of regional or global instability. The Thai tourism industry has been buffeted in the past half-decade by SARS (2003), the Indian Ocean tsunami (2004-05), avian flu (since 2004), resurgent civil unrest and acts of terror in southern provinces (since 2004), and more. It makes sense to ask not only about the effects of growth in this industry, but also of unexpected setbacks.

Our model provides a first approximation of the effects of a negative shock. It is approximately linear in percentage changes of its variables, so the effects of an exogenous 'collapse' in tourism demand are similar to the negatives of those resulting from a growth shock of equivalent magnitude, under the assumption of symmetric responses (which implies, for example, risk-neutrality, savings behavior that responds identically to positive and negative shocks, and nominal prices that are not sticky downwards). Under this assumption, we can use the simulation results already obtained as guides to the effects of a hypothetical collapse.[5] Thai tourism arrivals in 2003, the year of the SARS outbreak, were 7.3% below those for the preceding year, so given anticipated growth of about 5% per year based on 1998-2002 averages, a simulated 10% drop in tourism receipts is a conservative approximation.

Reversing the values shown in Table 2, a sudden drop in tourist arrivals slightly reduces GDP growth and household consumption. Lower demand for "invisible" exports such as tourism

brings about real exchange rate depreciation, which boosts output, jobs, and net foreign exchange earnings in tradable sectors. Table 3 provides a guide as the to distribution of losses; when tourism slumps, the largest proportional losses are borne by households whose incomes are relatively more dependent on assets that are less mobile across sectors, and in particular capital (see Table 4). In contrast, low-income households, whose incomes are derived from labor that is more readily allocated to different sectoral occupations, lose the least, in percentage terms. In proportional terms, the model suggests, a drop in tourist arrivals has a much more severe effect on the owners of hotels, resorts and other tourist-related fixed assets than on laid-off staff, taxi drivers, boatmen, vendors and others who depend primarily on their labor and who are then "free" to seek alternative of employment. Of course, the model abstracts from transactions costs, risk aversion and other factors that can be expected to affect the welfare of low-income individuals and their dependents much more than the wealthy; in addition, its use of representative agents in each class of households glosses over a much wider range of outcomes and responses. More positively, however, this *ceteris paribus* simulation result underlines the point that tourism shocks are frequently unrelated to macroeconomic trends. A broader-based shock, such as a rise in the cost of capital, would be more likely to depress labor demand across the board, with very different outcomes for employment among unskilled workers.[6]

## 5. Sensitivity analysis

Simulation models of the kind used in this research have the advantage that they capture economy-wide relationships and general equilibrium constraints on the response of an economy to a given shock. However, the foundations on which they rest are only as robust as the underlying data and accumulated knowledge of institutional and economic conditions of the economy. A variety of forms of sensitivity analysis are thus merited, testing the robustness of simulation results with respect to parameter values as well as structural assumptions about the operation of markets and the macroeconomy. Among such assumptions, that of full factor employment with endogenous prices is especially risky. This is notably the case in Thailand in the early 2000s, as the country underwent a deep recession in 1997-98, followed by four years of fitful growth; GDP recovered its pre-crisis level only in 2002. In such circumstances, it may be reasonable to suppose not that capital and labor are fully employed, as in our simulations thus far, but rather that the economy is characterized by excess capacity and unemployed labor. In

this case, expansion in a sector such as tourism can take place by exploiting underutilized capital and labor, with much smaller cost implications for other industries.

The objective of this section is to examine and contrast the simulated effects of tourism expansion in the full employment closure with those under two assumptions about idle capacity. The three closures are summarized as:

**BASE** Supply of each primary factor is fixed, and factor markets clear through endogenous price adjustments. This is the closure employed in the simulations reported in Tables 2 and 3. This economy is defined as an '*inelastic economy*'.

**ELAS_CAP** There is idle capacity in industry; that is, the supply of capital is elastic at a constant unit cost, but the supply of other primary factors is inelastic. This economy is defined as an '*elastic capital economy*'.

**ELAS** There is both idle capacity and unemployment, and the supply of each primary factor is elastic at a constant unit cost or daily wage. This economy is defined as an '*elastic economy*'. It is equivalent in this respect to an I-O model.

From the 'inelastic economy' (BASE), to the 'elastic capital economy' (ELAS_CAP), to the 'elastic economy' (ELAS), an economy becomes relatively more and more responsive to a shock, and factor prices less so. Therefore, the 'inelastic economy' experiences more severe tradeoffs when one sector expands, while in the 'elastic economy' factor market constraints play no role. To save space we focus only on the macroeconomic and distributional results.[7]

Key macroeconomic results of the BASE, ELAS_CAP and ELAS simulations are shown in Table 7. Generally, GDP growth is faster when tourism expands and the economy is less constrained by factor endowments than in the BASE simulation. When capital is available in elastic supply, tourism growth raises real GDP by 0.9%, as opposed to only 0.1% in the base closure. When both capital and labor are elastically supplied, the predicted rise in real GDP is 2.1%. Price changes are damped in the less constrained models; when capital is abundant, price indices rise by about two-thirds the amount in the base simulation; when all factors are abundant, prices rises are an order of magnitude smaller than the base.

As in the BASE result, direct income tax rates on households in the ELAS_CAP and ELAS simulations are reduced (by 0.40% and 0.70%, respectively) to keep government savings constant when there tourism demand increases. To keep household and corporate savings constant, their marginal propensity to save has to be varied.

A 10% inbound tourism expansion causes appreciation of the real exchange rate in each closure (Table 7, line 19). However, the degree of appreciation is lower in more elastic closures, and the loss in international competitiveness of tradable goods is correspondingly smaller. This can be seen in the terms of trade (line 20) and in real export volumes (line 7). The increase in real import volumes (line 8) is not much different in each closure. Thus, the trade balance (exports – imports) (line 9) and the current account deficit (line 10) are more favorable as the economy becomes more elastic.

Finally, consider factor returns (line 24-31). When capital supply is elastic the real wage rises (as it must) relative to capital returns, by about 1.4%; this is a reversal of the base case, in which capital returns rise faster than wages. Total capital income, however, need not fall behind as some previously unemployed capital is now brought into production (lines 36-39). Similarly, when both capital and labor are abundant, their real prices are unchanged but the quantity of each factor employed increases. It is notable in each case, however, that the employment of factor riss faster in non-agriculture than in agriculture. The structural effects of the tourism shock are similar, whether all factor supplies are fixed or all are elastic.

Key distributional results of the BASE, ELAS_CAP and ELAS simulations are shown in Table 8. A 10% inbound tourism expansion causes an increase in household consumption, utility and income in each closure. The increase in these indicators becomes greater as the economy becomes more elastic. No matter how elastic the economy is, an inbound tourism expansion tends to increase utility of non-agricultural and rich households, i.e. it is not pro-poor or pro-agriculture.

Gains from factor incomes of each factor in the BASE, ELAS_CAP and ELAS simulations are presented all together in Figure 6. As noticed, no matter how elastic the economy is, owners of labor and capital in non-agriculture gain more income than other factors (labor, capital, land and forest) in agriculture. Distribution of extra factor income across institutions in the ELAS_CAP and ELAS closures are shown in Tables 9(a) and 9(b) (the BASE results are in Table 6). No matter how elastic the economy is, corporations and HighNag are still the greatest beneficiaries since they are the major owners of capital and labor in non-agriculture, respectively. The elastic closures imply that owners of elastically-supplied capital or other factors receive no income from part of their endowment prior to the shock. Thus, their incomes rise after the shock as factor employment expands although nominal factor prices are unchanged.

This implies that, in general, an inbound tourism expansion is not distributionally neutral, and in fact favors the relatively wealthy, regardless of whether the economy was initially at full employment or had idle capacity.

## 6. Conclusions

The Thai economy depends heavily on the performance of the tourism industry. More than half of Thai industries are directly and indirectly interdependent with tourism; the industry accounts for millions of jobs and a substantial fraction of export earnings. Given this, any internal or external changes that affect Thai tourism can have economy-wide impacts on resource allocation, sectoral outputs, income distribution, and macroeconomic variables. This paper pays special attention to the effects of tourism expansion on income and income distribution.

In experiments with a general equilibrium model we find that although tourism growth benefits all household classes, the gains are concentrated in high income and non-agricultural households. Inbound tourism expansion is not a pro-poor policy as long as the owners of primary factors in agriculture and other labor-intensive tradables sectors do not participate in tourism-related activities. Growth of inbound tourism induces the reallocation of primary factors toward domestic-oriented production and away from tradables sectors, notably agriculture. As real wages and capital returns are greater in non-agriculture than in agriculture, the structural changes induced by tourism growth tend to further widen intersectoral differences in wages and capital returns. Owners of land, the income of which is tied directly to the fortunes of agriculture, also lose.

The general effects of tourism growth are the same no matter how elastic is factor supply. Its economic impacts are stronger as factor market constraints are relaxed. Importantly, however, no matter how elastic is the economy, corporations and high income households in non-agriculture are still the greatest beneficiaries.

Finally, the benefits of a tourism boom are spread across numerous sectors, in contrast with typical Dutch Disease models in which a boom is concentrated in one or a few sectors. The resource movement effect of tourism dominates its spending (or income) effect. This finding contrasts with those in traditional Dutch Disease models of natural resource booms, in which the spending effect is typically the major contributor to the total effect.

Our model enables the generation of new information on the role of tourism in a developing country, by breaking the sector out in a national accounting data set and incorporating those data in a model built specifically to accommodate structural features of a tourism-led economy. Importantly, our approach captures general equilibrium constraints imposed by factor endowments, and these, it appears, play an important role in shaping both changes in economic structure and shifts in income distribution following an exogenous increase in tourism demand.

As with most of its kind, however, the sectoral and structural richness of our model is a characteristic won at the expense of other features, notably dynamics and second-moment effects. Does tourism growth reduce the pace of long-term human capital accumulation by drawing skilled workers and entrepreneurs away from 'cutting-edge' manufacturing industries such as electronics? Does the volatility of the industry, and in particular its vulnerability to exogenous shocks due to weather, disease outbreaks, fears of terrorist attack, and perceptions of political and economic stability, give rise to transactions costs that reduce its measured contribution to welfare growth? What are the net environmental and poverty impacts of tourism, in an economy in which natural resource wealth remains the primary income source for the majority of the poor? These are questions for which the increasing availability of richer data sets should in the near future justify the development and application of more complex models.

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## Notes

[1] Tourism, in a developing country, also has substantive environmental interactions, both direct and through its impacts on markets for other goods and services. These are of considerable importance in the Thai case. The model described in this paper also contains environmental and natural resource information. A companion paper (Wattanakuljarus and Coxhead 2006) reports on environmentally-focused aspects of this research.

[2] Data in this paragraph are compiled from the World Bank's *World Development Indicators Online* (exports of goods and services; www.worldbank.org, accessed 1/5/2007); Asian Development Bank's *Key Indicators* (merchandise exports; www.abd.org, accessed 1/5/2007); and the World Travel and Tourism Council's Tourism Satellite Accounts (visitor exports and employment; www.wttc.org, accessed 1/5/2007).

[3] In addition to these changes, and some additional work related to environmental outcomes (see Wattanakuljarus and Coxhead 2006), some other revisions were made to standardize the structure of the SAM: a set of 'intermediary' interindustry accounts with no economic meaning were removed. This does not affect the reporting of interindustry transactions or factor use. For complete details see Wattanakuljarus (2005).

[4] The elasticity values used are defined and documented in Appendix Tables A-2, A-3 and A-4.

[5] The exact results of a simulated decline in tourism are available from the authors on request. They do not differ sufficiently from the negatives of values shown in Tables 2-3 by enough to merit separate reporting.

[6] To return to the SARS example: in 2003, while Thai tourism collapsed, GDP grew at a rate of more than 7%.

[7] Complete simulation results for these closures are available on request.

**Table 1** Industry classifications with respect to sectoral aggregates

| Industry | | A | M | S | DT | IT | NT | EOI | ISI | DOI |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Paddy | • | | | | | • | | | • |
| 2 | Maize | • | | | | | • | | | • |
| 3 | Sorghum | • | | | | | • | | | • |
| 4 | Cassava | • | | | | | • | | | • |
| 5 | FlowerOth | • | | | | • | | | • | |
| 6 | BeanNut | • | | | | • | | | • | |
| 7 | Vegetable | • | | | | • | | | | • |
| 8 | Fruit | • | | | | • | | | | • |
| 9 | Sugarcane | • | | | | | • | | | • |
| 10 | Coconut | • | | | | • | | | | • |
| 11 | PalmBean | • | | | | | • | | | • |
| 12 | KenafJute | • | | | | | • | | | • |
| 13 | CottonKapok | • | | | | | • | | • | |
| 14 | TobaccoLeaf | • | | | | | • | | • | |
| 15 | CoffeeTea | • | | | | | • | • | | |
| 16 | Rubber | • | | | | | • | • | | |
| 17 | CattleBuff | • | | | | | • | | • | |
| 18 | Swine | • | | | | | • | | | • |
| 19 | OthLiveStoc | • | | | | • | | | • | |
| 20 | Poultry | • | | | | | • | • | | |
| 21 | PoultryProd | • | | | | • | | | | • |
| 22 | SilkFarm | • | | | | | • | | | • |
| 23 | AgService | • | | | | | • | | | • |
| 24 | LogCoalWood | • | | | | • | | | • | |
| 25 | OthForest | • | | | | • | | | | • |
| 26 | MarineFish | • | | | | • | | • | | |
| 27 | FreshFish | • | | | | • | | | | • |
| 28 | Lignite | | • | | | | • | | | • |
| 29 | CrudeOilGas | | • | | | | • | | | • |
| 30 | IronOre | | • | | | | • | | • | |
| 31 | TinMining | | • | | | | • | | • | |
| 32 | Tungsten | | • | | | | • | | • | |
| 33 | OthMining | | • | | | | • | • | | |
| 34 | Fluorite | | • | | | | • | | | • |
| 35 | SaltMfg | | • | | | | • | | | • |
| 36 | AgProcess | • | | | | | • | | | • |
| 37 | RiceMilling | | • | | | • | | • | | |
| 38 | TapiocaMfg | | • | | | | • | • | | |
| 39 | SugarMfg | | • | | | • | | • | | |

**Table 1** (continued)

| Industry | | A | M | S | DT | IT | NT | EOI | ISI | DOI |
|---|---|---|---|---|---|---|---|---|---|---|
| 40 | OthFoodMfg | | • | | • | | | • | | |
| 41 | Beverage | | • | | • | | | | | • |
| 42 | TobaccoMfg | | • | | | • | | | | • |
| 43 | Textile | | • | | • | | | • | | |
| 44 | Clothing | | • | | • | | | • | | |
| 45 | LeatherShoe | | • | | • | | | • | | |
| 46 | WoodProd | | • | | | • | | | • | |
| 47 | Furniture | | • | | | | • | • | | |
| 48 | PaperProd | | • | | | • | | | • | |
| 49 | PrintPublsh | | • | | • | | | | | • |
| 50 | ChemProd | | • | | | • | | | • | |
| 51 | PetroProd | | • | | | | • | | • | |
| 52 | RubberPlast | | • | | | • | | • | | |
| 53 | NonMetalPro | | • | | | • | | | • | |
| 54 | BasicMetal | | • | | | | • | • | | |
| 55 | FabMetalPro | | • | | | • | | | • | |
| 56 | Machinery | | • | | | | • | | • | |
| 57 | ElectricMac | | • | | | • | | | • | |
| 58 | TransprtEqp | | • | | | • | | • | | |
| 59 | OthMfg | | • | | • | | | • | | |
| 60 | Electricity | | | • | | • | | | | • |
| 61 | GasMfgDist | | | • | | | • | | | • |
| 62 | PipeWater | | | • | | • | | | | • |
| 63 | Construct | | | • | | | • | | | • |
| 64 | Trade | | | • | | | • | | | • |
| 65 | Restaurant | | | • | • | | | | | • |
| 66 | Hotel | | | • | • | | | | | • |
| 67 | Transport | | | • | • | | | | | • |
| 68 | Communicate | | | • | | • | | | | • |
| 69 | BankFinance | | | • | | • | | | | • |
| 70 | Insurance | | | • | | • | | | | • |
| 71 | OwnDwelling | | | • | | • | | | | • |
| 72 | BusinessSrv | | | • | | | • | | | • |
| 73 | PubAdmDef | | | • | | • | | | | • |
| 74 | Education | | | • | | | • | | | • |
| 75 | MedHealth | | | • | | • | | | | • |
| 76 | NonProfit | | | • | | • | | | | • |
| 77 | RecEntertan | | | • | | • | | | | • |
| 78 | Repairs | | | • | | • | | | | • |
| 79 | PersnHouSrv | | | • | | • | | | | • |
| 80 | Water | | | • | | | • | | | • |

**Table 2** Key macroeconomic effects of tourism expansion
*Percentage changes (if not indicated as million baht changes, **MB**)*

| Line | Macroeconomic Variables | Change |
|---|---|---|
| 1 | Real GDP | 0.1149 |
| 2 | Real household consumption | 3.5135 |
| 3 | Real government consumption | 0 |
| 4 | Real investment | 0 |
| 5 | Real tourism consumption | 10 |
| 6 | Real domestic absorption | 2.5504 |
| 7 | Real export volume | -2.3860 |
| 8 | Real import volume, CIF | 1.7292 |
| 9 | Trade surplus (**MB**) | -36,213 |
| 10 | Current account deficit (**MB**) | -27,731 |
| 11 | GDP price index | 3.5312 |
| 12 | Absorption price index | 2.4762 |
| 13 | Consumer price index, CPI | 2.5340 |
| 14 | Government price index | 3.2721 |
| 15 | Investment price index | 1.9964 |
| 16 | Tourism price index | 2.6179 |
| 17 | Export price index | 1.9069 |
| 18 | Import price index | 0 |
| 19 | Real devaluation | -3.4107 |
| 20 | Terms of trade | 1.9069 |
| 21 | Inbound tourism (**MB**) | 32,107 |
| 22 | Outbound tourism (**MB**) | 8,335 |
| 23 | Domestic savings pool (**MB**) | 0 |
| 24 | Real wage, weighted average | 1.0500 |
| 25 | Real wage, agriculture | -0.0014 |
| 26 | Real wage, non-agriculture | 1.1601 |
| 27 | Real rate of return on land | 0.2459 |
| 28 | Real rate of return on forest benefits | 0.8451 |
| 29 | Real rate of return on capital, weighted average | 1.2391 |
| 30 | Real rate of return on capital, agriculture | -0.0379 |
| 31 | Real rate of return on capital, non-agriculture | 1.3136 |
| 32 | Employment, weighted average | 0 |
| 33 | Employment, agriculture | 0 |
| 34 | Employment, non-agriculture | 0 |
| 35 | Land use | 0 |
| 36 | Forest benefits use | 0 |
| 37 | Capital use, weighted average | 0 |
| 38 | Capital use, agriculture | 0 |
| 39 | Capital use, non-agriculture | 0 |

**Table 3** Key distributional and institutional effects of tourism expansion
*Percentage changes (if not indicated as million baht changes, **MB**)*

| Line | Institutional Variables | Change |
|---|---|---|
| 1 | Real household consumption | |
| | - LowAg | 2.1992 |
| | - HighAg | 4.1316 |
| | - LowNag | 2.8949 |
| | - HighNag | 4.4440 |
| 2 | Social welfare (utility) | |
| | - LowAg | 3.1750 |
| | - HighAg | 7.0617 |
| | - LowNag | 4.4447 |
| | - HighNag | 7.6019 |
| 3 | Household incomes | |
| | - LowAg | 5.0893 |
| | - HighAg | 5.1495 |
| | - LowNag | 5.5691 |
| | - HighNag | 5.7916 |
| 4 | Savings (**MB**) | |
| | - LowAg | 0 |
| | - HighAg | 0 |
| | - LowNag | 0 |
| | - HighNag | 0 |
| | - Corporation | 0 |
| | - Government | 0 |

**Table 4** Shares of factor incomes (percent)

| Institutions | LabAg | LabNag | Land | CapAg | CapNag | Forest | Total |
|---|---|---|---|---|---|---|---|
| Corporation | | | | | *100 | | 100 |
| The poorest 80% of households, agriculture | *35.08 | 10.83 | 12.20 | 18.51 | 22.90 | 0.49 | 100 |
| The richest 20% of households, agriculture | 5.74 | 18.15 | *34.83 | 21.92 | 18.79 | 0.58 | 100 |
| The poorest 80% of households, non-agriculture | 3.59 | *74.69 | 3.81 | 0.63 | 17.27 | 0.02 | 100 |
| The richest 20% of households, non-agriculture | 0.47 | *84.66 | 2.61 | 0.07 | 12.19 | | 100 |

* Indicate the major source of factor incomes for each institution

**Table 5** Distribution of factor incomes across institutions (percent)

| Institutions | LabAg | LabNag | Land | CapAg | CapNag | Forest |
|---|---|---|---|---|---|---|
| Corporation | | | | | *78.91 | |
| The poorest 80% of households, agriculture | *78.60 | 2.54 | *30.89 | *67.42 | 4.87 | *67.42 |
| The richest 20% of households, agriculture | 4.49 | 1.49 | *30.82 | 27.89 | 1.40 | 27.89 |
| The poorest 80% of households, non-agriculture | 13.40 | 29.23 | 16.08 | 3.84 | 6.12 | 3.84 |
| The richest 20% of households, non-agriculture | 3.51 | *66.74 | 22.21 | 0.85 | 8.70 | 0.85 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

* Indicate the major factor owners of each factor

**Table 6** Distribution of an extra factor income across institutions (**MB**)

| | **LabAg** | **LabNag** | **Land** | **CapAg** | **CapNag** | **Forest** | **Total (MB)** | **Percent (%)** |
|---|---|---|---|---|---|---|---|---|
| **Corporation** | | | | | *68,491 | | *68,491 | *38.87 |
| **LowAg** | 4,229 | 2,115 | 1,616 | 2,196 | 4,225 | 79 | 14,460 | 8.21 |
| **HighAg** | 240 | 1,087 | 1,612 | 908 | 1,211 | 33 | 5,092 | 2.89 |
| **LowNag** | 717 | 21,197 | 841 | 125 | 5,312 | 4 | 28,197 | 16.00 |
| **HighNag** | 188 | *51,014 | 1,162 | 28 | 7,553 | 1 | *59,946 | *34.02 |
| **Total (MB)** | 5,374 | *75,413 | 5,231 | 3,257 | *86,792 | 117 | 176,185 | 100 |
| **Percent (%)** | 3.05 | *42.80 | 2.97 | 1.85 | *49.26 | 0.07 | 100 | |

* Indicate the major gainers

**Table 7** Key macroeconomic results: BASE, ELAS_CAP and ELAS closures
*Percentage changes (if not indicated as million baht changes, **MB**)*

| Line | Macroeconomic Variables | BASE | ELAS_CAP | ELAS |
|---|---|---|---|---|
| 1 | Real GDP | 0.1149 | 0.8824 | 2.0584 |
| 2 | Real household consumption | 3.5135 | 3.8069 | 4.1133 |
| 3 | Real government consumption | 0 | 0 | 0 |
| 4 | Real investment | 0 | 0 | 0 |
| 5 | Real tourism consumption | 10 | 10 | 10 |
| 6 | Real domestic absorption | 2.5504 | 2.8978 | 3.2524 |
| 7 | Real export volume | -2.3860 | -1.5327 | -0.0318 |
| 8 | Real import volume, CIF | 1.7292 | 1.8431 | 1.9225 |
| 9 | Trade surplus (**MB**) | -36,213 | -35,889 | -33,550 |
| 10 | Current account deficit (**MB**) | -27,731 | -28,884 | -30,144 |
| 11 | GDP price index | 3.5312 | 2.3313 | 0.2654 |
| 12 | Absorption price index | 2.4762 | 1.6673 | 0.2510 |
| 13 | Consumer price index, CPI | 2.5340 | 1.7145 | 0.2747 |
| 14 | Government price index | 3.2721 | 2.3361 | 0.2507 |
| 15 | Investment price index | 1.9964 | 1.2829 | 0.1949 |
| 16 | Tourism price index | 2.6179 | 1.7172 | 0.2847 |
| 17 | Export price index | 1.9069 | 1.2098 | 0.0366 |
| 18 | Import price index | 0 | 0 | 0 |
| 19 | Real devaluation | -3.4107 | -2.2782 | -0.2647 |
| 20 | Terms of trade | 1.9069 | 1.2098 | 0.0366 |
| 21 | Inbound tourism (**MB**) | 32,107 | 31,356 | 30,338 |
| 22 | Outbound tourism (**MB**) | 8,335 | 7,557 | 5,939 |
| 23 | Domestic savings pool (**MB**) | 0 | 0 | 0 |
| 24 | Real wage, weighted average | 1.0500 | 1.3984 | 0 |
| 25 | Real wage, agriculture | -0.0014 | 0.9668 | 0 |
| 26 | Real wage, non-agriculture | 1.1601 | 1.4436 | 0 |
| 27 | Real rate of return on land | 0.2459 | 1.1570 | 0 |
| 28 | Real rate of return on forest benefits | 0.8451 | 1.8246 | 0 |
| 29 | Real rate of return on capital, weighted average | 1.2391 | 0 | 0 |
| 30 | Real rate of return on capital, agriculture | -0.0379 | 0 | 0 |
| 31 | Real rate of return on capital, non-agriculture | 1.3136 | 0 | 0 |
| 32 | Employment, weighted average | 0 | 0 | 1.8554 |
| 33 | Employment, agriculture | 0 | 0 | 1.7119 |
| 34 | Employment, non-agriculture | 0 | 0 | 1.8704 |
| 35 | Land use | 0 | 0 | 1.9111 |
| 36 | Forest benefits use | 0 | 0 | 2.1853 |
| 37 | Capital use, weighted average | 0 | 1.6138 | 2.1813 |
| 38 | Capital use, agriculture | 0 | 1.0520 | 1.7407 |
| 39 | Capital use, non-agriculture | 0 | 1.6466 | 2.2070 |

**Table 8** Key distributional and institutional results: BASE, ELAS_CAP and ELAS closures
*Percentage changes (if not indicated as million baht changes, **MB**)*

| Line | Institutional Variables | BASE | ELAS_CAP | ELAS |
|---|---|---|---|---|
| 1 | Real household consumption | | | |
| | - LowAg | 2.1992 | 2.7715 | 3.3737 |
| | - HighAg | 4.1316 | 4.6202 | 4.7200 |
| | - LowNag | 2.8949 | 3.2175 | 3.6750 |
| | - HighNag | 4.4440 | 4.7683 | 4.9653 |
| 2 | Social welfare (utility) | | | |
| | - LowAg | 3.1750 | 4.0014 | 4.8713 |
| | - HighAg | 7.0617 | 7.7013 | 8.0664 |
| | - LowNag | 4.4447 | 4.9409 | 5.6440 |
| | - HighNag | 7.6019 | 7.8142 | 8.2746 |
| 3 | Household incomes | | | |
| | - LowAg | 5.0893 | 5.5705 | 5.7231 |
| | - HighAg | 5.1495 | 5.9818 | 6.3516 |
| | - LowNag | 5.5691 | 6.0540 | 6.5863 |
| | - HighNag | 5.7916 | 6.1740 | 6.7395 |
| 4 | Savings (**MB**) | | | |
| | - LowAg | 0 | 0 | 0 |
| | - HighAg | 0 | 0 | 0 |
| | - LowNag | 0 | 0 | 0 |
| | - HighNag | 0 | 0 | 0 |
| | - Corporation | 0 | 0 | 0 |
| | - Government | 0 | 0 | 0 |

**Table 9(a)** Distribution of extra factor incomes across institutions (**MB**) the ELAS_CAP simulation

| | LabAg | LabNag | Land | CapAg | CapNag | Forest | Total (MB) |
|---|---|---|---|---|---|---|---|
| **Corporation** | | | | | *82,210 | | *82,210 |
| **LowAg** | 5,274 | 2,558 | 1,959 | 2,655 | 5,090 | 115 | 17,372 |
| **HighAg** | 308 | 1,324 | 1,955 | 1,110 | 1,474 | 59 | 6,130 |
| **LowNag** | 881 | 25,457 | 1,030 | 170 | 6,394 | 5 | 33,857 |
| **HighNag** | 245 | *61,238 | 1,414 | 53 | 9,084 | 1 | *71,956 |
| **Total (MB)** | 6,469 | *90,517 | 6,298 | 3,929 | *104,172 | 161 | 211,444 |

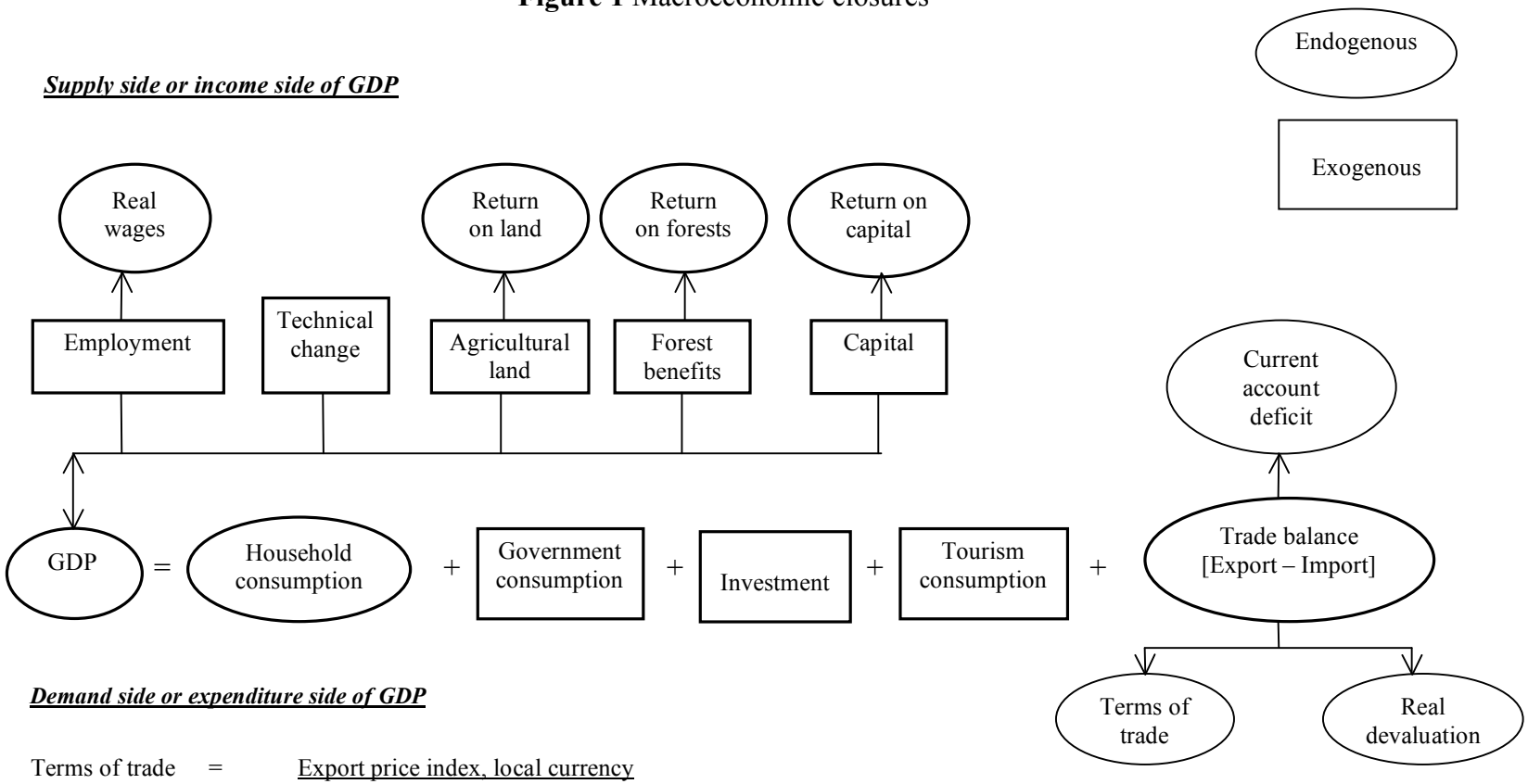
* Indicate the major gainers

**Table 9(b)** Distribution of extra factor incomes across institutions (**MB**) the ELAS simulation

| | LabAg | LabNag | Land | CapAg | CapNag | Forest | Total (MB) |
|---|---|---|---|---|---|---|---|
| **Corporation** | 0 | 0 | 0 | 0 | *123,308 | 0 | *123,308 |
| **LowAg** | 7,812 | 3,827 | 2,929 | 3,973 | 7,626 | 162 | 26,048 |
| **HighAg** | 453 | 1,976 | 2,922 | 1,655 | 2,201 | 79 | 9,185 |
| **LowNag** | 1,311 | 38,177 | 1,535 | 245 | 9,582 | 5 | 50,777 |
| **HighNag** | 358 | *91,849 | 2,111 | 70 | 13,616 | 1 | *107,926 |
| **Total (MB)** | 9,694 | *135,768 | 9,437 | 5,883 | *156,252 | 231 | 317,164 |

* Indicate the major gainers

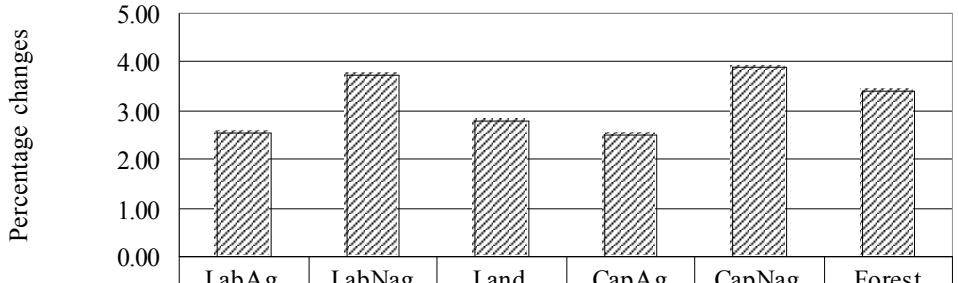
**Figure 1** Macroeconomic closures




Terms of trade = Export price index, local currency / Import price index, CIF local currency

Real devaluation = Import price index, CIF local currency / GDP price index, from expenditure side

**Figure 2** Gains from factor incomes of each factor the BASE simulation




| | LabAg | LabNag | Land | CapAg | CapNag | Forest |
|---|---|---|---|---|---|---|
| Changes | 2.5326 | 3.7236 | 2.7861 | 2.4952 | 3.8809 | 3.4006 |

**Figure 3(a)** Changes in sectoral outputs in terms of AMS aggregates the BASE simulation

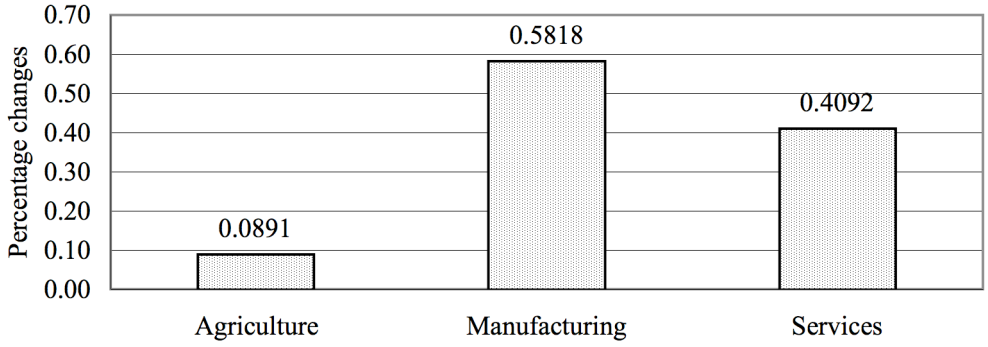
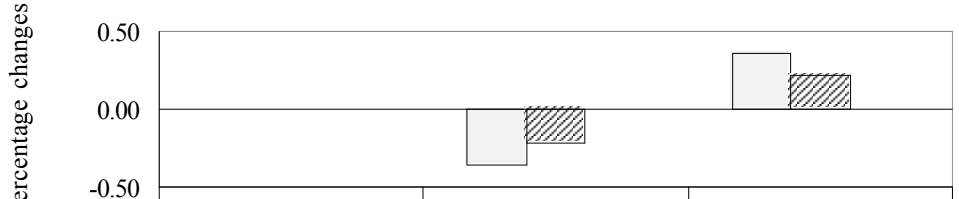



**Figure 3(b)** Changes in factor use in terms of AMS aggregates the BASE simulation




| | Agriculture | Manufacturing | Services |
|---|---|---|---|
| Capital | 0.0000 | -0.3560 | 0.3572 |
| Labor | 0.0000 | -0.2206 | 0.2211 |
| Land | -0.0053 | 0.0000 | 0.0053 |

**Figure 3(c)** Changes in imports in terms of AMS aggregates
the BASE simulation

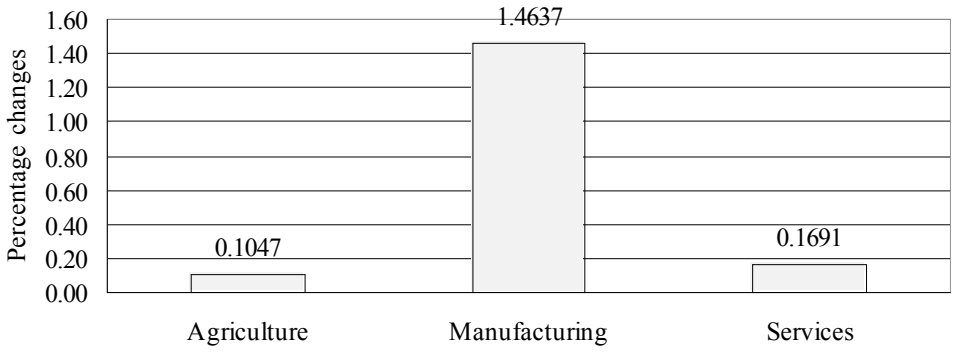



**Figure 4(a)** Changes in sectoral outputs in terms of tourism aggregates
the BASE simulation

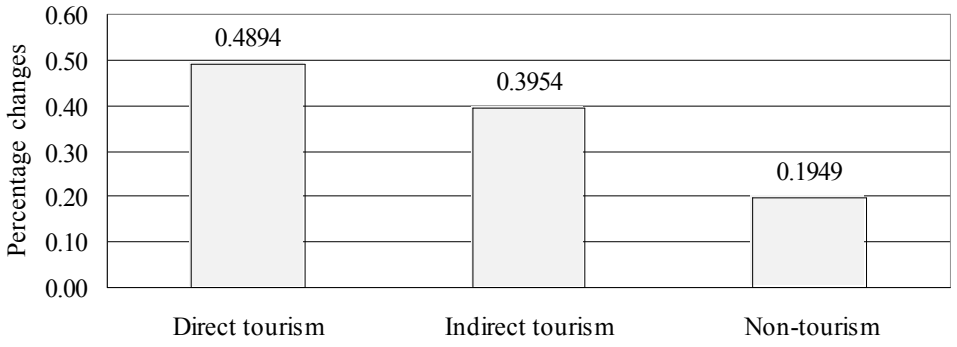
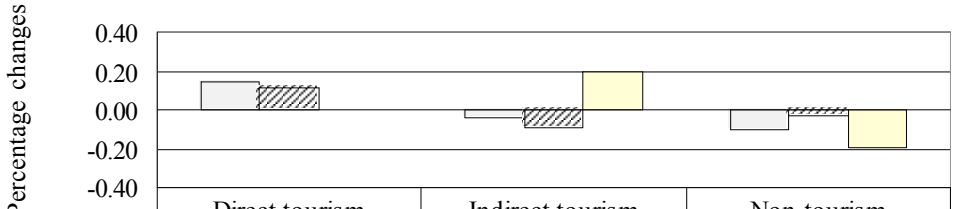



**Figure 4(b)** Changes in factor use in terms of tourism aggregates
the BASE simulation




| | Direct tourism | Indirect tourism | Non-tourism |
|---|---|---|---|
| Capital | 0.1399 | -0.0412 | -0.0986 |
| Labor | 0.1176 | -0.0873 | -0.0302 |
| Land | 0.0000 | 0.1911 | -0.1907 |

**Figure 4(c)** Changes in imports in terms of tourism aggregates
the BASE simulation

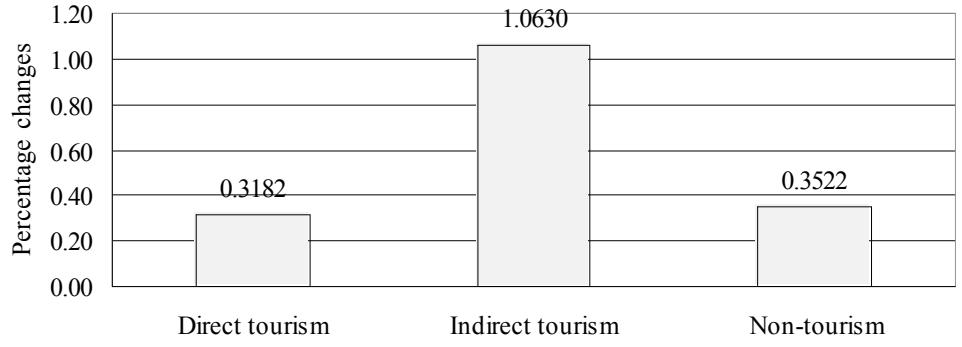



**Figure 5(a)** Changes in sectoral outputs in terms of trade aggregates
the BASE simulation

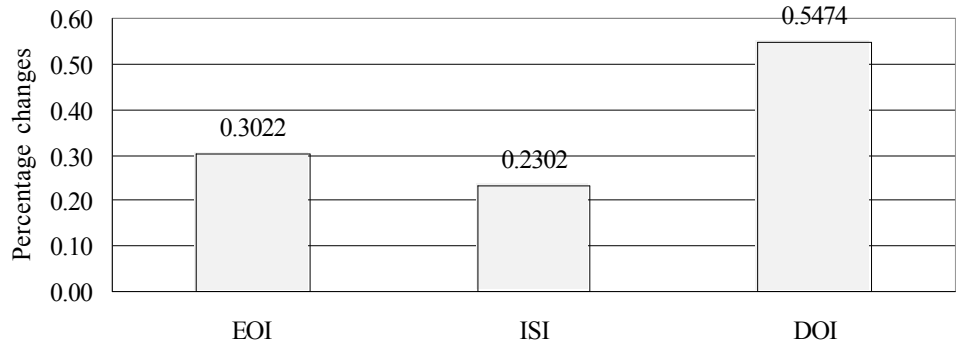
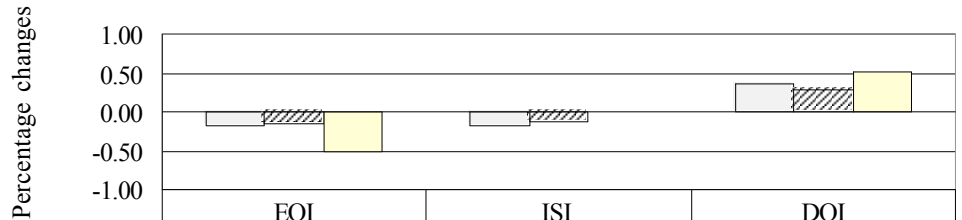



**Figure 5(b)** Changes in factor use in terms of trade aggregates
the BASE simulation




| | EOI | ISI | DOI |
|---|---|---|---|
| Capital | -0.1830 | -0.1855 | 0.3695 |
| Labor | -0.1633 | -0.1280 | 0.2919 |
| Land | -0.5024 | 0.0002 | 0.5047 |

**Figure 5(c)** Changes in imports in terms of trade aggregates
the BASE simulation

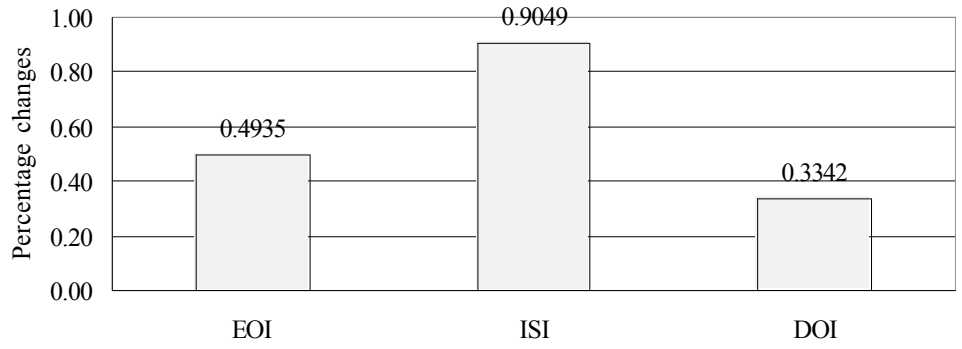
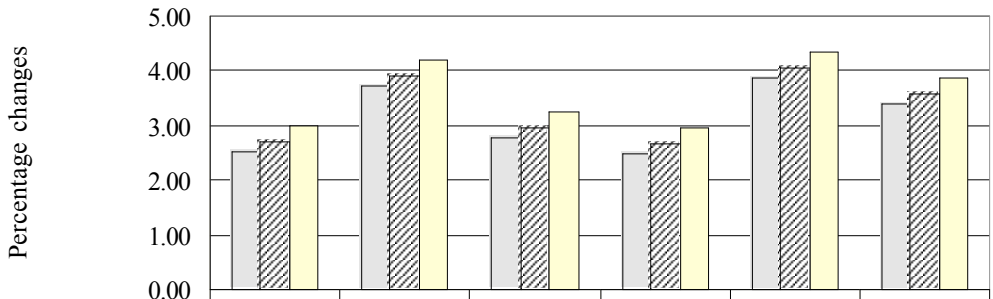



**Figure 6** Gains from factor income of each factor
BASE, ELAS_CAP and ELAS




| | LabAg | LabNag | Land | CapAg | CapNag | Forest |
|---|---|---|---|---|---|---|
| BASE | 2.5326 | 3.7236 | 2.7861 | 2.4952 | 3.8809 | 3.4006 |
| ELAS_CAP | 2.6978 | 3.8888 | 2.9513 | 2.6604 | 4.0461 | 3.5658 |
| ELAS | 2.9913 | 4.1823 | 3.2448 | 2.9539 | 4.3396 | 3.8593 |

## Appendix Table A-1
## 2006 Travel and Tourism (T&T) World Satellite Accounts (Direct and Indirect Impacts)

| No. | Sorted by Share of Total GDP | T&T Share of Total GDP (%) | T&T Share of Total Employment (%) | T&T Share of Total Exports (%) |
|---|---|---|---|---|
| | **WORLD** | **10.3** | **8.7** | **6.4** |
| 1 | Macau | 85.7 | 95.0 | 71.6 |
| 2 | Antigua and Barbuda | 85.4 | 95.0 | 72.9 |
| 3 | Aruba | 78.0 | 93.8 | 28.3 |
| 4 | Anguilla | 74.7 | 80.5 | 86.4 |
| 5 | Maldives | 66.6 | 57.6 | 64.8 |
| 6 | British Virgin Islands | 54.7 | 74.4 | 48.0 |
| 7 | Seychelles | 54.1 | 68.5 | 51.2 |
| 8 | Saint Lucia | 51.0 | 51.9 | 68.4 |
| 9 | Bahamas | 50.1 | 62.9 | 71.5 |
| 10 | Vanuatu | 47.0 | 42.4 | 72.8 |
| 11 | Guadeloupe | 44.1 | 42.0 | 29.0 |
| 12 | Virgin Islands | 42.9 | 52.8 | 45.6 |
| 13 | Barbados | 41.4 | 46.9 | 54.4 |
| 14 | Angola | 40.5 | 33.3 | 0.4 |
| 15 | Cayman Islands | 34.4 | 40.9 | 31.2 |
| 16 | St. Vincent and the Grenadines | 33.8 | 30.5 | 56.2 |
| 17 | Fiji | 33.1 | 31.0 | 42.2 |
| 18 | Jamaica | 33.1 | 29.2 | 50.4 |
| 19 | Other Oceania | 31.8 | 38.9 | 50.0 |
| 20 | Grenada | 29.9 | 27.6 | 34.4 |
| 21 | Dominica | 29.5 | 27.1 | 47.4 |
| 22 | Saint Kitts and Nevis | 28.4 | 29.0 | 34.0 |
| 23 | Mauritius | 26.3 | 28.1 | 32.8 |
| 24 | Malta | 26.1 | 31.9 | 22.2 |
| 25 | Cyprus | 23.3 | 29.7 | 33.4 |
| 26 | Belize | 22.0 | 21.8 | 31.4 |
| 27 | Dominican Republic | 21.3 | 18.4 | 36.0 |
| 28 | Jordan | 21.1 | 19.5 | 27.7 |
| 29 | Bahrain | 20.9 | 24.4 | 15.9 |
| 30 | Croatia | 20.1 | 23.1 | 32.0 |
| 31 | Cambodia | 19.6 | 15.4 | 19.5 |
| 32 | Sao Tome and Principe | 19.4 | 15.5 | 72.4 |
| 33 | Cape Verde | 18.7 | 17.0 | 43.8 |
| 34 | Tunisia | 18.1 | 17.0 | 17.5 |
| 35 | Morocco | 17.9 | 15.5 | 31.3 |
| 36 | Spain | 17.8 | 19.1 | 17.0 |
| 37 | Tonga | 17.5 | 15.2 | 46.2 |
| 38 | Iceland | 17.4 | 19.0 | 15.7 |
| 39 | Hong Kong | 17.1 | 15.9 | 3.8 |
| 40 | Costa Rica | 16.7 | 16.4 | 21.3 |
| 41 | Austria | 16.6 | 19.1 | 13.3 |
| 42 | Estonia | 16.0 | 13.9 | 10.5 |
| 43 | Bulgaria | 16.0 | 13.6 | 17.8 |
| 44 | Montenegro | 15.7 | 16.8 | 37.6 |
| 45 | Portugal | 15.5 | 17.7 | 13.0 |

## Table A-1 (continued)

| Sorted by Share of Total GDP | T&T Share of Total GDP (%) | T&T Share of Total Employment (%) | T&T Share of Total Exports (%) |
|---|---|---|---|
| 46 New Zealand | 15.4 | 15.9 | 20.9 |
| 47 Slovakia | 15.4 | 13.6 | 3.5 |
| 48 Greece | 15.1 | 15.9 | 35.1 |
| 49 Bermuda | 15.0 | 18.1 | 20.2 |
| 50 Eqypt | 15.0 | 12.6 | 20.2 |
| 51 Mexico | 14.7 | 19.1 | 6.1 |
| 52 Trinidad and Tobago | 14.6 | 17.3 | 6.1 |
| 53 Slovenia | 14.6 | 16.9 | 8.5 |
| 54 Cuba | 14.6 | 12.6 | 50.1 |
| 55 Malaysia | 14.6 | 12.6 | 6.5 |
| 56 Gambia | 14.6 | 11.7 | 18.9 |
| 57 Syria | 14.4 | 15.3 | 25.4 |
| 58 Switzerland | 14.3 | 18.0 | 7.8 |
| 59 Brunei Darussalam | 14.3 | 15.0 | 0.7 |
| 60 Thailand | 14.3 | 10.7 | 10.6 |
| 61 China | 13.7 | 10.2 | 3.6 |
| 62 Czech Republic | 13.6 | 12.6 | 6.0 |
| 63 Turkey | 13.5 | 7.8 | 20.2 |
| 64 Kiribati | 13.1 | 10.7 | 10.8 |
| 65 Libya | 12.8 | 12.5 | 0.9 |
| 66 Australia | 12.2 | 12.8 | 16.3 |
| 67 United Arab Emirates | 12.1 | 11.7 | 1.9 |
| 68 Albania | 11.9 | 9.6 | 43.8 |
| 69 Bosnia and Herzegovina | 11.8 | 9.5 | 17.3 |
| 70 Panama | 11.5 | 10.9 | 11.2 |
| 71 France | 11.4 | 13.8 | 8.9 |
| 72 Qatar | 11.4 | 11.6 | 2.2 |
| 73 Kenya | 11.4 | 9.2 | 21.6 |
| 74 Canada | 11.1 | 11.9 | 4.0 |
| 75 Lebanon | 10.9 | 10.6 | 11.6 |
| 76 Vietnam | 10.9 | 8.7 | 3.5 |
| 77 Italy | 10.8 | 11.9 | 8.6 |
| 78 Uruquay | 10.7 | 11.8 | 15.2 |
| 79 Namibia | 10.7 | 10.7 | 17.4 |
| 80 Ethiopia | 10.7 | 8.3 | 30.5 |
| 81 United States | 10.5 | 10.9 | 9.5 |
| 82 Singapore | 10.3 | 8.3 | 2.2 |
| 83 Comoros | 10.1 | 8.2 | 35.1 |
| 84 Iran | 9.8 | 8.7 | 3.9 |
| 85 Oman | 9.7 | 10.6 | 4.2 |
| 86 Congo, Democratic Republic | 9.7 | 8.1 | 0.6 |
| 87 Honduras | 9.6 | 7.9 | 13.0 |
| 88 Sri Lanka | 9.6 | 7.9 | 10.7 |
| 89 Luxembourg | 9.4 | 13.4 | 2.8 |
| 90 Japan | 9.4 | 10.9 | 2.4 |

## Table A-1 (continued)

| | Sorted by Share of Total GDP | T&T Share of Total GDP (%) | T&T Share of Total Employment (%) | T&T Share of Total Exports (%) |
|---|---|---|---|---|
| 91 | Belgium | 9.4 | 10.6 | 3.0 |
| 92 | Martinique | 9.4 | 10.0 | 13.5 |
| 93 | United Kingdom | 9.4 | 8.6 | 7.1 |
| 94 | Germany | 9.3 | 10.1 | 3.4 |
| 95 | Laos | 9.3 | 7.3 | 20.6 |
| 96 | Papua New Guinea | 9.2 | 7.5 | 4.0 |
| 97 | Uganda | 9.2 | 7.3 | 24.6 |
| 98 | Philippines | 9.1 | 10.8 | 6.5 |
| 99 | Finland | 9.1 | 9.7 | 4.2 |
| 100 | Poland | 9.1 | 8.5 | 7.2 |
| 101 | Hungary | 9.0 | 8.6 | 5.7 |
| 102 | Venezuela | 9.0 | 8.2 | 1.1 |
| 103 | Gabon | 9.0 | 8.1 | 2.2 |
| 104 | Lithuania | 8.8 | 7.5 | 7.8 |
| 105 | Indonesia | 8.7 | 7.2 | 8.4 |
| 106 | Solomon Islands | 8.6 | 7.1 | 7.6 |
| 107 | Netherlands | 8.5 | 8.2 | 4.4 |
| 108 | El Salvador | 8.5 | 7.4 | 20.6 |
| 109 | Ghana | 8.5 | 6.9 | 16.8 |
| 110 | Ukraine | 8.3 | 6.8 | 5.4 |
| 111 | Saudi Arabia | 8.2 | 8.7 | 3.5 |
| 112 | South Africa | 8.2 | 7.5 | 10.8 |
| 113 | Nepal | 8.2 | 6.4 | 21.4 |
| 114 | Botswana | 8.0 | 9.6 | 12.1 |
| 115 | Argentina | 8.0 | 9.5 | 9.6 |
| 116 | Denmark | 8.0 | 8.1 | 5.4 |
| 117 | Yemen | 8.0 | 6.7 | 2.5 |
| 118 | Norway | 7.9 | 10.1 | 3.3 |
| 119 | Sweden | 7.9 | 8.0 | 5.4 |
| 120 | Ecuador | 7.9 | 6.8 | 3.5 |
| 121 | Senegal | 7.9 | 6.5 | 17.6 |
| 122 | Guyana | 7.9 | 6.5 | 3.9 |
| 123 | Russian Federation | 7.8 | 6.6 | 2.8 |
| 124 | Tanzzania | 7.8 | 6.2 | 29.6 |
| 125 | Ireland | 7.7 | 7.2 | 3.1 |
| 126 | Peru | 7.7 | 7.1 | 7.0 |
| 127 | Sudan | 7.7 | 6.3 | 0.8 |
| 128 | Israel | 7.6 | 9.0 | 5.9 |
| 129 | Reunion | 7.6 | 8.5 | 2.4 |
| 130 | Swaziland | 7.6 | 8.0 | 4.4 |
| 131 | Bolivia | 7.6 | 6.2 | 10.4 |
| 132 | Nicaragua | 7.4 | 5.9 | 17.1 |
| 133 | Haiti | 7.4 | 5.8 | 18.6 |
| 134 | Kuwait | 7.3 | 7.3 | 0.9 |
| 135 | Suriname | 7.2 | 6.6 | 5.3 |

## Table A-1 (continued)

| Sorted by Share of Total GDP | T&T Share of Total GDP (%) | T&T Share of Total Employment (%) | T&T Share of Total Exports (%) |
|---|---|---|---|
| 136 Madagascar | 7.0 | 5.6 | 7.4 |
| 137 Korea, Republic of | 6.8 | 7.4 | 2.4 |
| 138 Macedonia | 6.8 | 6.3 | 3.6 |
| 139 Algeria | 6.8 | 5.9 | 0.7 |
| 140 Brazil | 6.7 | 6.4 | 2.2 |
| 141 Lesotho | 6.7 | 5.5 | 4.9 |
| 142 Sierra Leone | 6.7 | 5.2 | 22.8 |
| 143 Guatemala | 6.6 | 5.7 | 18.1 |
| 144 Nigeria | 6.6 | 5.5 | 0.1 |
| 145 Benin | 6.3 | 5.1 | 14.7 |
| 146 Pakistan | 6.3 | 5.1 | 4.4 |
| 147 Puerto Rico | 6.2 | 6.4 | 5.8 |
| 148 Colombia | 6.2 | 5.5 | 6.2 |
| 149 Chile | 6.0 | 6.3 | 5.0 |
| 150 Guinea | 6.0 | 4.9 | 6.1 |
| 151 Malawi | 6.0 | 4.7 | 7.4 |
| 152 Latvia | 5.8 | 5.0 | 5.8 |
| 153 Mali | 5.8 | 4.7 | 13.4 |
| 154 Paraquay | 5.7 | 5.0 | 2.8 |
| 155 Rwanda | 5.4 | 4.3 | 30.4 |
| 156 India | 5.3 | 5.4 | 3.3 |
| 157 Zimbabwe | 5.3 | 4.7 | 6.2 |
| 158 Yugoslavia | 5.0 | 4.5 | 4.7 |
| 159 Romania | 4.8 | 5.8 | 2.5 |
| 160 Cote d'Ivoire | 4.8 | 4.1 | 1.1 |
| 161 Cameroon | 4.8 | 4.0 | 4.3 |
| 162 Belarus | 4.8 | 4.0 | 2.1 |
| 163 Chinese Taipei | 4.6 | 5.2 | 2.9 |
| 164 Togo | 4.6 | 3.7 | 4.8 |
| 165 Burma | 4.3 | 4.0 | 3.3 |
| 166 Chad | 4.3 | 3.5 | 3.0 |
| 167 Burundi | 4.3 | 3.4 | 1.6 |
| 168 Curacao | 4.1 | 5.1 | 9.2 |
| 169 Zambia | 4.1 | 3.4 | 9.0 |
| 170 Bangladesh | 3.7 | 3.0 | 0.8 |
| 171 Burkina Faso | 3.2 | 2.6 | 14.1 |
| 172 Niger | 3.1 | 2.6 | 7.2 |
| 173 Dem Rep of the Congo | 3.0 | 2.3 | 0.1 |
| 174 Central African Republic | 2.5 | 2.0 | 2.3 |

**Source:**
The 2006 Travel & Tourism Economic Research, World Travel & Tourism Council (WTTC)
http://www.wttc.org/2006TSA/

**Table A-2** Lists of elasticities used in the research

| Elasticities | Definitions |
|---|---|
| e1 | CES elasticities between occupational types |
| e2 | CES elasticities between labor and capital |
| e3 | CES elasticities between natural resources (land and forest benefits) |
| e4 | CES elasticities between primary factors (labor-capital composites and natural resources) |
| e5 | CES elasticities between intermediate inputs |
| e6 | CES elasticities between primary factors and intermediate input composites |
| e7 | Reciprocal of export demand elasticities |
| e8 | Reciprocal of tourism demand elasticities |
| e9 | Armington elasticities between domestic and importable products |
| e10 | Reciprocal of CET between domestic and exportable products |
| e11 | Household expenditure elasticities for commodities, the poorest 80%, agriculture |
| e12 | Household expenditure elasticities for commodities, the richest 20%, agriculture |
| e13 | Household expenditure elasticities for commodities, the poorest 80%, non-agriculture |
| e14 | Household expenditure elasticities for commodities, the richest 20%, non-agriculture |

**Table A-3** Elasticities used in the research (see definitions of e1 to e14 in table A-2)

| No | Activity Commodity | e1 | e2 | e3 | e4 | e5 | e6 | e7 | e8 | e9 | e10 | e11 | e12 | e13 | e14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Paddy | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.964 | 0.137 | 0.738 | 0.309 |
| 2 | Maize | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.978 | 0.964 | 0.137 | 0.738 | 0.309 |
| 3 | Sorghum | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.511 | 0.964 | 0.137 | 0.738 | 0.309 |
| 4 | Cassava | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.332 | 0.964 | 0.137 | 0.738 | 0.309 |
| 5 | FlowerOth | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.861 | 0.165 | 1.001 | 0.279 |
| 6 | BeanNut | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 1.577 | 0.891 | 0.151 | 0.901 | 0.443 |
| 7 | Vegetable | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.658 | 0.128 | 0.863 | 0.54 |
| 8 | Fruit | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.891 | 0.151 | 0.901 | 0.443 |
| 9 | Sugarcane | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.791 | 0.206 | 0.86 | 0.201 |
| 10 | Coconut | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.891 | 0.151 | 0.901 | 0.443 |
| 11 | PalmBean | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.823 | 0.187 | 0.985 | 0.52 |
| 12 | KenafJute | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 1.453 | 0.327 | 1.121 | 0.748 |
| 13 | CottonKapok | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 1.453 | 0.327 | 1.121 | 0.748 |
| 14 | TobaccoLeaf | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 1.223 | 0.212 | 0.891 | 0.175 |
| 15 | CoffeeTea | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 1.34 | 0.15 | 1.245 | 0.306 |
| 16 | Rubber | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 1.318 | 0.332 | 0.93 | 0.755 |
| 17 | CattleBuff | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.954 | 0.175 | 1.019 | 0.664 |
| 18 | Swine | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.954 | 0.175 | 1.019 | 0.664 |
| 19 | OthLiveStoc | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.954 | 0.175 | 1.019 | 0.664 |
| 20 | Poultry | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.954 | 0.175 | 1.019 | 0.664 |
| 21 | PoultryProd | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.823 | 0.187 | 0.985 | 0.52 |
| 22 | SilkFarm | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 1.453 | 0.327 | 1.121 | 0.748 |
| 23 | AgService | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 24 | LogCoalWood | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 1.73 | 0.482 | 1.24 | 0.776 |
| 25 | OthForest | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.1 | 1.73 | 0.482 | 1.24 | 0.776 |
| 26 | MarineFish | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.964 | 0.124 | 0.958 | 0.563 |
| 27 | FreshFish | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.1 | 0.964 | 0.124 | 0.958 | 0.563 |
| 28 | Lignite | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 29 | CrudeOilGas | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 30 | IronOre | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 31 | TinMining | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 32 | Tungsten | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 33 | OthMining | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 34 | Fluorite | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 35 | SaltMfg | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 36 | AgProcess | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.964 | 0.137 | 0.738 | 0.309 |
| 37 | RiceMilling | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.586 | 0.964 | 0.137 | 0.738 | 0.309 |
| 38 | TapiocaMfg | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.964 | 0.137 | 0.738 | 0.309 |
| 39 | SugarMfg | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.753 | 0.791 | 0.206 | 0.86 | 0.201 |
| 40 | OthFoodMfg | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.861 | 0.165 | 1.001 | 0.279 |
| 41 | Beverage | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 1.265 | 1.282 | 0.181 | 1.068 | 0.241 |
| 42 | TobaccoMfg | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.223 | 0.212 | 0.891 | 0.175 |
| 43 | Textile | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.453 | 0.327 | 1.121 | 0.748 |
| 44 | Clothing | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.453 | 0.327 | 1.121 | 0.748 |
| 45 | LeatherShoe | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.318 | 0.332 | 0.93 | 0.755 |
| 46 | WoodProd | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.799 | 2.361 | 0.784 | 1.317 |

**Table A-3** (continued)

| No | Activity Commodity | e1 | e2 | e3 | e4 | e5 | e6 | e7 | e8 | e9 | e10 | e11 | e12 | e13 | e14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | Furniture | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.799 | 2.361 | 0.784 | 1.317 |
| 48 | PaperProd | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 49 | PrintPublsh | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 50 | ChemProd | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 51 | PetroProd | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 52 | RubberPlast | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 1.558 | 1.576 | 1.403 | 1.324 | 1.752 |
| 53 | NonMetalPro | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.576 | 1.403 | 1.324 | 1.752 |
| 54 | BasicMetal | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.576 | 1.403 | 1.324 | 1.752 |
| 55 | FabMetalPro | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.576 | 1.403 | 1.324 | 1.752 |
| 56 | Machinery | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.576 | 1.403 | 1.324 | 1.752 |
| 57 | ElectricMac | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.576 | 1.403 | 1.324 | 1.752 |
| 58 | TransprtEqp | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.253 | 0.408 | 1.47 | 1.988 |
| 59 | OthMfg | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.253 | 0.408 | 1.47 | 1.988 |
| 60 | Electricity | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 61 | GasMfgDist | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 62 | PipeWater | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 63 | Construct | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.799 | 2.361 | 0.784 | 1.317 |
| 64 | Trade | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |
| 65 | Restaurant | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |
| 66 | Hotel | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |
| 67 | Transport | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.253 | 0.408 | 1.47 | 1.988 |
| 68 | Communicate | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.253 | 0.408 | 1.47 | 1.988 |
| 69 | BankFinance | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 70 | Insurance | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 71 | OwnDwelling | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.799 | 2.361 | 0.784 | 1.317 |
| 72 | BusinessSrv | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 73 | PubAdmDef | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 74 | Education | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |
| 75 | MedHealth | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.359 | 0.903 | 1.324 | 0.862 |
| 76 | NonProfit | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 1.73 | 0.482 | 1.24 | 0.776 |
| 77 | RecEntertan | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0.7 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |
| 78 | Repairs | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 79 | PersnHouSrv | 0.5 | 1.2 | 0 | 1.2 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.943 | 0.196 | 0.858 | 0.496 |
| 80 | Water | 0.5 | 0.7 | 0 | 0.7 | 0.5 | 0.5 | 0.833 | 0.5 | 0 | 0.1 | 0.751 | 0.183 | 1.071 | 0.691 |
| 81 | TourDom | 0.5 | 1.2 | 0 | 1.2 | 0 | 0 | 0.833 | 0.5 | 0 | 0.1 | 1.512 | 0.424 | 1.689 | 0.865 |

**Table A-4** Frisch LES parameter = - (total spending/luxury spending)

| Households | Frisch |
|---|---|
| The poorest 80% of households, agriculture | -1.444 |
| The richest 20% of households, agriculture | -1.709 |
| The poorest 80% of households, non-agriculture | -1.536 |
| The richest 20% of households, non-agriculture | -1.709 |