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DISCUSSION PAPER SERIES

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EFFECTS OF CHILD DEATH ON FERTILITY IN THAILAND *

Masanori hashimoto
University of Washington, seattle

Chira Hongladarom
Thammasat University, Bangkok

This paper investigates effects of child mortality on fertility. We share the widely held view that the key to the understanding of demographic transition lies in the timing of declines in fertility and child mortality. Our research focuses on the degree to which a dead child is replaced sequentially and the speed with which such replacement is accomplished. Thus, we consider responses to child death in general rather than just to infant mortality. We argue that an effective replacement is facilitated by economic development, as health, nutritional and sanitary conditions improve with rising income. Since replacement is know to be superior in minimining "excess" births to any other mode of response to the prospast of child death (Heer and Smith 1968 and Ben-Porath 1976), an increased understanding of the replacement behavior will be crucial in clarifying the fertility/child mortality relationship.

The data are for Thailand, and we examine cohort as well as urban-rural differences. First, certain features of Thailand relevan to the economics of demography are briefly described. Discussion of the hypothesis and empirical analysis follows.

Some Relevant Background

Thailand is still a predominantly rural nation, with only one large metropolitan area, that of Bangkok-Thonburi.[1/] In 1970, only eight and one-half percent of the populstion lived in this area. The ten largest urban areas combined still accounted for only ten percent of the total population. In the same year, over seventy-eight percent of the economically active population worked in agriculture, forestry, hunting and fishing.

Thailand has, however, undergone some economic and demographic chabges since the second World War. During the 1952-56 period, the gross domestic product grew at an annual rate of about five percent. In subsequent years the GDP growth rate has accelerated; rising from a little over seven percent in 1957-1960 to slightly above eight percent in the 1960-1969 period.

The country is still characterized by rather high birth and mortality rates. Life expectancy in the 1960's averaged only fiftyfour years for males and fifty-nine years for females. The crude birth rate stood at almost forty-nine in 1955, but after a gradual declining trend starting around 1960, it fell to about thirty-one per thousand population in 1970. The infant mortality rate averaged slightly more than eighty-four per thousand live births during the 1960's, but with improving health and sanitary conditions, it has declined in recent years. Thailand's traditionally pronatalist policies were gradually abandoned after the World Bank Economic Commission's report in 1959 warned of the adverse effects of high

population growth. Family planning, however, is not yet practiced extensively.

According to the 1970 Census, the labor-force participation rate is high, especially for females. Among the (30-49) age group, the male rate was over ninety-six percent and the female rate was only slightly less than eighty percent. Since unpaid family work predominates in agriculture, the main industry, these figures cannot be compared meaningfully with those for developed countries. Finally, the literacy rate is also high for a developing nation: for population groups over ten years old, it was eighty-nine percent for males and seventy-five percent for females. The high literacy rate undoubtedly reflects the high proportion of population which have completed some basic education. In 1970, among the (30-34) age group, eighty-seven percent of males and seventy-seven percent of females had completed at least six years of schooling.

Hypothesis

We propose that differences in both the magnitude and the speed of fertility adjustment to a child death largely reflect differences in -constraints -facing parents on the supply side. We assume that parents attempt to minimize the expected deviation from the number of children demanded in their lifetime.

It is useful to think of the parents' decision-making process in two stages. In the first stage, parents determine the number of children demanded taking into account gains and costs,

including their facundity constraints and the prospect of child mortality. In the second stage, they decide on the life cycle pattern of child accumulation.

To be sure, the two stages are likely to be mutually dependent. For example, the decision on how fast to acquire children affects the number of children demanded through the cost of children. It is only for analytical convenience that we view these decisions as being made sequentially. We focus on only the exogenous influences affecting the pattern of child accumulation. Some of these influences operate indirectly, through their effects on the demand for childrren. The presence of a possible feedback effect, from child accumulation to child demand, is ignored here.[2/]

Faced with the prospect of child mortality, parents will plan to produce more children than the number they ultimately want. It has been noted in the literature (e.g., Ben-Porath 1976) that, in achieving a given number of children demand, replacing dead children sequentially, i.e., replacement, entails fewer births than accumulating "excess" children in anticipation of child death. Dpending on the supply conditions facing them, however, parents may choose to accumulate "excess" children early in their life cycle to compensate for expected child death. The "excess" children while costly to bear and rear, confer benefit in the form of insurance against child death. While models based on the insurance consideration have been developed in the literature,[3/] they must be supplemented by supply-side considerations before one can analyze the determinants of the extent of child replacement.

Two relevant constraints facing parents on the supply side are the biologically determined minimum birth interval, and the limited years of the female reproductive span. Parents must aim at acquiring the number of children demanded within their reproductive span, which is usually a relatively short period, and early in their married lifetime. Note that the health and nutritional conditions facing parents critically affect both the length of the reproductive span and the size of the minimum interval. There is persuasive evidence in the literature indicating that inadequate nutrition caused delayed menarche, longer adolescent sterility, irregular menstrual function, higher pregnancy wastage and early menopause (Frisch 1975).

The supply-side considerations suggest that the greater the "excess" number of children to be accumulated, the earlier that parents must begin the accumulation process.[4/] Our basic argument is that parents are less likely to replace sequentially if they face conditions which lead them to begin the accumulation process earlier. In effect, a dead child is "replaced" by the excess children already planned. We shall discuss those conditions leading to early accumulation, and relate them to cohort and urban-rural differences in replacement behavior.

We hypothesize that, other things equal, parents accumulate more "excess" children and do so earlier in married life the higher the child mortality rates, the later in a child's life mortality is expected to occur, the more rapid the mother's fecundity falls

with her age and the greater the number of children demanded. Although researchers have recognized the relevance of these factors in the fertility/child mortality link (e.g., Preston 1975), their implications for the replacement behavior have not been fully studied.

If the overall mortality rate is high, parents who do not accumulate children early in married life face a greater likelihood than others of ending up with fewer children than they want. More important, the later into childhood and/or the parents' life cycle that mortality rates are expected to remain high, the greater will be the parents' incentive to accumulate children earlier for insurance purposes. This argument may be understood by looking at two contrasting cases. In one extreme case where child death is expected to occur after the reproductive period is over, replacement will be infeasible, and parents must accumulate enough children to compensate for later losses. At the other extreme, if the incidence of child death is only in infancy and thus before the mother is biologically able to conceive again, a birth subsequent to a child death is replacement.

If the mother's fecundity is expected to fall rapidly with age so that her reproductive span is short, the fear of future infecundity will generate an incentive to engage in early accumulation of children. Moreover, if the demand for children is large for exogenously determined reasons, birth intervals are likely to be close to their minimum, reducing parents' capacity to replace a dead child. Thus, given mortality characteristics, the greater

the demand for children, the more likely it is that by using only the replacement strategy, parents will ultimately experience a deficit in children. Note that this argument is still concerned with constraints on the supply side.

In a developing society in which health, sanitary and nutritional conditions await improvements, mortality rates tend to be high not only in infancy but also throughout childhood. Moreover, the same health and nutritional conditions contributing to child mortality also shorten parents' reproductive span. Economic activities in such a society almost always center around agriculture characterized by most rudimentary and labor intensive methods of production. The value of children, an important source of labor in such an economy, is high and costs of children, in terms of parents' time, food and shelter, are low, features which increase the demand for children. These conditions create incentives to accumulate children earlier, by marrying early and by devoting a greater proportion of their married lifetime to child-bearing activities.

According to our discussion, what is usually considered as "excess births" attributable mainly to "inadequate" contraceptive knowledge in developing societies may also reflect the accumulation phenomenon to an important degree. As the economy grows and production activities shift away from agriculture, the value of children falls while the costs of rearing them rises. Excess births tend to decrease not only because birth control technologies improve

but also because parents shift away from early accumulation to replacement in achieving their declining demand for children. Note that "contraceptive-knowledge" versus "early accumulation" as explanations for the excess birth phenomenon may be tested in principle by examining age at marriage. Postponement of marriage being a substitute for other contraceptive methods,[5] contraceptive effects will cause marriages to occur later in life, while the conditions necessitating accumulation cause marrieage to occur earlier in life. The common observation that people tend to marry earlier in less developed countries would suggest that early accumulation is relevant.[6] Of course, these observations may reflect other influences which must be controlled for before reaching a definitive conclusion.

The prediction about the speed of replacement is not clearcut. Once parents decide to replace a dead child, postponement will be more likely to result in a child deficit the higher the child mortality rates and the shorter the reproductive span. In other words, the poor health, nutritional and sanitary conditions which encourage early accumulation of children will make parents want to quicken the speed of any replacement. However, one reason for the decision to replace a particular death may be that an experience of child death has altered parents' perception of these supply-side conditions. Moreover, changes in perception may entail waiting for subsequent children to be born and their survival prospects ascertained. Since the degree of uncertainty about these conditions is likely to be greater the poorer these conditions, changes in perception and the resulting replacement may occur more slowly in poorer environments.

To summarize, our hypothesis implies the following testable propositions concerning cohort and urban-rural differences im the fertility/child mortality relationship. Note that the supply-side conditions, such as health, nutrition and sanitation, have been improving over time. Therefore, older women, who made fertility decisions earlier in time, are expected to have accumulated more and as a result to exhibit a smaller magnitude of replacement. Note also that the supply-side conditions which increase early accumulation of children are more prevalent in rural than in urban areas. Therefore, the magnitude of replacement should be smaller in rural than in urban areas. Differences in the speed of replacement are left as an empirical question.

These and related propositions will be examined by estimating a fertility/child mortality relationship, allowing for interactions with mother's age, for rural and urban areas of Thailand. The urban areas are disaggregated into the Bangkok-Thonburi metropolitan area and other provincial towns.

Data and the Regression Specification

Our data base is provided by the "Longitudinal Study of Social, Economic and Demographic Change in Thailand" conducted in 1969 and 1970 by the Institute of Population Studies at the Chulalongkorn University in collaboration with the Population Council in New York.[7/] The survey covers 1,500 rural and 2,000 urban household, and treats a wide range of aspects on demography, and economic -and social life. Of particular interest for our study is the informatien

on the fertility and mortality history of each household. The availability of explicit information on the timing of child death is unique to this study, a feature which was not available to Ben-Porath (1976) when he investigated the fertility/mortality link in Israel. For the bulk of our empirical analysis we shall rearrange the original data, whose unit of observation is household, into a sample whose unit of observation is birth while retaining relevant family information associated with each birth.

The basic regression specification used to test the implication of the hypothesis is given by :

$$y = \alpha + (\beta_0 + \delta_0 A)D_0 + (\beta_1 + \delta_1 A)D_1 + (\beta_2 + \delta_2 A)D_2 + \sum_j \gamma_j X_j$$

where, α',β!s δ's and γ's are coefficients to be estimated. The dependent variable y, is a dummy variable which is unity if the particular birth is the final birth in the family and zero otherwise. We are interested in examining how the experience of previcus child deaths affect whether or not a particular birth is the final birth. To the extent that parents replace a dead child, the likelihood of a subsequent birth being the final one is reduced. The child death experience associated with the K^{th} birth is represented by a set of dummy variables. The first variable D_0 is unity if a child died between the $(K-1)^{th}$ and the K^{th} births. The second variable D_1 is unity if a child died between the $(K-2)^{th}$ and the $(K-1)^{th}$ births. Finally, D_2 is unity if a child died anytime before the $(K-2)^{th}$ birth. Thus, the pattern of the coefficients of these dummy variables captures distributed lag effects of, or the speed of adjustment to, a child death experience,

while the sum of the coefficients indicate the extent to which a dead child is replaced. The child death variables are interacted with A, the current age of the mother, to test the predictions about the age/child mortality interaction.

The variables X_j's represent other relevant factors affecting the likelihood that a particular birth is the final birth. These include father's and mother's educational attainments (in years), age of mother, birth order and family wealth.[8/] According to recent findings by economists investigating fertility,[9/] father's education exerts mainly wealth effects increasing the number of children demanded, while mother's education exerts mainly the cost-of-time effects decreasing the number of children demanded. Thus, the higher the father's education, the less likely it is for any birth to be the final birth; conversely, the higher the mother's education, the more likely it is for any birth to be the final one. The predicted effect of mother's age on whether or not a particular birth is a final birth is ambiguous. Older women had a greater demand for children, thereby making it less likely for any birth to be the final birth. On the supply side, however, the higher incidence of infecundity and child mortality may have increased the likelihood for any birth to be the final birth for older women. The direction of the effect of mother's age is, therefore, an empirical question. Birth order is included to control for the life-cycle effects. The higher the birth order, the more likely it is for any birth to be the final birth. Since family wealth increases the demand for children, the likelihood of any birth is less, the greater is wealth.

Empirical findings are summarized in Tables 1 through 4. Table 1 reports summary statistics for the relevant variables calculated from the survey. The regional pattern of the means of these variables contains few surprises. Table 2 presents the regression estimates. Since the ordinary least squares method is not appropriate for the model involving a dichotomous dependent variable, we used the generalized least squares method of Goldberger (1964, pp. 249-50).[10/] The set of child death variables is significant at one percent for the whole Kingdom, at five percent for Bangkok-Thonburi, at ten percent for provincial towns, but not highly significant for rural areas.[11/] Except for four cases, the coefficient for the interaction term for child death and age is positive suggesting,[12/] as predicted, that older cohort of women replace less when a child dies. We shall reexamine the interaction effects later in Table 3.

As anticipated, mother's education obtains positive coefficients in all the regressions, and they are significant at more than the one percent level except in the regression for rural areas. The coefficient for father's education is always negative, and much smaller than that for mother's education, though significant only in the regression for the whole country. These findings are consistent with the prediction based on our hypothesis. Effects of mother's age evaluated at the mean of the child death variables are positive in all the regressions, and are significant at ten percent or better in all except the rural areas.[13/] This finding suggests that the supply side effects dominate the demand

side effects in the cohort differences in the stopping probability associated with any birth. Birth order obtains expected positive and significant coefficient in all the regressions. The result for the family wealth variable is mixed. The expected negative coefficients appear for the provincial and rural regressions, but the coefficient for Bangkok-Thonburi is positive and significant.

As noted earlier, predominantly positive coefficients for the child death/mother's age interaction terms indicate that older women replace less, as expected. Table 3 summarizes the findings on cohort differences in the speed of replacement. The numbers in the table are the ratios of the coefficients for the interaction terms to the coefficients for the child-death dummy variables. The ratios indicate how mother's age alters the distributed lag pattern on replacement. The ratios are larger for earlier lags in all the areas for which they can be calculated. Thus, it appears that older cohort of women have greater lags in replacement.

Table 4 examines the magnitude and the lag pattern of replacement avaluated at the mean mother's age. The magnitude of replacement, reported in rows (4) and (5), indicate, as expected, a larger (in absolute value) response in more urbanized areas. The statistical significance of these coefficients are low, however, As for the lag pattern of replacement, regression coefficients (and their t-values) of the D's in Table suggest a shorter lag in rural lthan in urban areas. However, when the lag pattern

is evaluated at the mean mother's age as reported in Table 4, D_0 obtains anomalous, though insignificant in most cases, positive coefficients in all the regressions. Moreover, the overall evidence does not indicate differential lag pattern between urban and rural areas.

Although these somewhat ambiguous urban-rural differences do not conflict with our hypothesis, we can think of two possible explanations for them. One is that these women had children when the country as a whole was predominantly rural with the result that relevant supply constraints were similar among regions. As an indirect evidence for this explanation, if the lag pattern is evaluated at an age somewhat less than the mean, say at age forty, the urban-rural differences in the sum of coefficients continue to hold, but the regression for rural areas shows a distinctly faster response than that for urban areas.[14/] It appears, therefore, that the urban-rural distinction is more pronounced for younger women, who had children in more recent years. The other explanation is that women living in urban areas at the time of survey may have lived in rural areas during their child-bearing years. Since economic growth tends to be accompanied by migratory movement of population from rural to urban areas, this explanation may be significant. Unfortunately, given the data limitations, we could not investigate this possibility.

Summary

We hypotheaized that in a developing society, the supply-side constraints associated with child mortality and mother's fecundity exert significant influences on parents' response to child death. We predicted a greater magnitude of replacement of a dead child by an additional birth among more recent cohorts of women and among women living in more urbanized areas. By and large, the empirical findings based on the Thailand data agree with these predictions. The speed of replacement was found to be slower for older women in all areas except for rural areas. Anomalous signs for the relevant coefficients made it meaningless to evaluate cohort differences in the speed of response for rural areas.

Our findings, of smaller magnitudes of replacement for older women and for women living in more urbanized areas, underscore the importance of "excess" children for insurance purposes against child -death in a society where health, nutritional and sanitary conditions are poor. As these conditions improve with economic development, replacement becomes increassingly predominant as a response to -child death reducing "excess" births. Therefore, our findings are consistent with a typical demographic transition where births tend to fall following an exogenous decline in child mortality rates.

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FOOTNOTES

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1/ The following brief discussion contains materisls culled from the National Economic and Social Development Board (1974), Mauer, et. al,, (1973), and Hongladarom(1978).

2/ The feedback effect arises because bearing and rearing of an extra child entails costs. An increased child survival rate decreases the number of " extra" children needed to assure a given number of survivors and -thereby lowers the cost of achieving that number, As a result, the number of children demanded will rise. In assessing the fertility/mortality link, this feedback effect must be offset against the now smaller number of children needed for "insurance." A growing

number of empirical studies raport that an increased child survival rate is associated with a decrease in the birth rate, suggesting that the feedback effect may be small. See, for example, Schultz (1978).

3/ Examples of these models appear in Ben-Porath (1976), Hashimoto (1978) and Schultz (1969, 1978).

4/ We believe that the term "hoarding" often used in the literature refers to this behavior. Evidently, parents are said to hoard more if they accumulate more "excess" children and/or if they accumulate these children earlier in married life in anticipation of some child deaths.

5/ Hashimoto (1978) reported evidence indicating that the Japanese used postponement of marriage as a contraceptive measure before the wide dissemination, after World War II, of condoms and legal abortions.

6/ Within Thailand, age of marriage appears to corform to the expected pattern. For 1970 in the largest urban area, Bangkok-Thonburi, the average female age at first marriage was 21.7, while in the provincial urban areas, it was 21.8. (Contrast this with the average first marriage age in rural areas, 20.6).

7/ The description of the survey is found in Hongladarom (1978).

8. The welth variable is a rather arbitrary measure reflecting material possessions. This measure was developed by the staff at the Institute of Population Studies, Chulalongkorn University sity. This variable is a weighted sum of possessions where the weight for rural areas is the cost of each item, but the weight for the urban areas is inverse of the frequency of items owned among the households. See Hongladarom (1978), pp.61-62) for details.

9. See, for example severl studies appearing in Schultz (1974.

10. This method corrects for heteroscedasticity, but does not restrict the range of the expected value of the dependent variable to between zero and unity. An alternative method would be a logit procedure. Unfortunataly, of several logit programs attempted at the University of Washington, some did not function at all, and others yielded totally incomprehensible results.

11. The F-values for the child death variables are $F(6,8481) = 4.97$ for the whole Kingdom, $F(6,2319) = 2.72$ for Bangkok-Thonburi, $f(6,2039) = 1.69$ for provincial towns and $F(6,4070) = 1.20$ for rural areas.

12. The F=values for the interaction terms are F(3,8981 = 5.39 for the whole Kingdom, F(3,2319) = 0.70 for Bangkok-Thonburi, F(3,2039) = 1.53 for provincial towns and F(3,4070 = 2.37 for rural areas.

13. Mother's age effects at the mean value of child-death dummy variables (and the t-values in parentheses) are; 0.0023(2.20) for the whole Kingdom. 0.0028 (1.87) for Bangkok-Thonburi, 0.0017(1.69) for provincial towns and 0.0005 (1.35) for rural areas.

14. Also, Hongladarom's (1978, pp. 65-68) results based on the regression specifications without age-interaction show that rural mothers replace faster than urban mothers,

TABLE 1

MEANS AND STANDARD DEVIATIONS (IN PARENTHESES) OF SELECTED VARIABLES (MOTHER'S AGE ≥ 35 YEARS)

	Whole Kingdom*	Urban Areas		Rural Areas
		Bangkok-Thonburi	Provincial Towns	
Live Birth per Household	5.97	5.21 (2.94)	5.56 (3.01)	6.57 (4.08)
Child Death per Household	0.90	0.44 (0.84)	0.78 (1.21)	1.21 (1.47)
Mother's Education in Years	2.72	3.77 (4.00)	3.25 (3.15)	1.86 (2.07)
Father's Education in Years	4.47	5.39 (4.95)	4.86 (4.20)	3.62 (3.25)
Mother's Age	45.59	44.12 (7.77	45.07 (8.64)	46.59 (8.77)
Index of Family Wealth	--	23.22 (18.82)	17.29 (14.38)	7.63 (28.50)
Stopping Probability for Any Birth	0.120 (0.32)	0.153 (0.36)	0.137 (0.14)	0.091 (0.29)

* Since the data were not combined into the whole Kingdom until the sample was rearranged, the means except for the stopping prohability were calculated as the weighted average of area means. The standard doviations were not calculated. Index of family wealth for rural areas is not comparable with those in urban areas.

Source: Longitudinal Study of Social, Economic and Demographic Change in Thailand (1969-70).

TABLE 2

REGRESSIONS (GLS) OF STOPPING PROBABILITY
BY REGION OF RESIDENCE IN THAILAND
(t-VALUES IN PARENTHESES)

		Urban Areas		
	Whole Kingdom	Bangkok-Thonburi	Provincial Towns	Rural Areas
D_0	-0.2752 (-3.60)	-0.1097 (-0.49)	0.1672 (1.22)	-0.3008 (-2.53)
Age x D_0	0.0064 (0.69)	0.0030 (0.57)	-0.0034 (-1.26)	0.0069 (2.50)
D_1	-0.0398 (-0.44)	-0.2961 (-1.47)	-0.0318 (-0.19)	0.1787 (1.48)
Age x D_1	0.0007 (0.33)	0.0047 (1.10)	0.0006 (0.15)	-0.0039 (-1.54)
D_2	-0.1659 (-2.01)	0.0709 (0.36)	-0.4001 (-2.22)	0.0966 (0.89)
Age x D_2	0.002 (1.22)	-0.0037 (-0.88)	0.0067 (1.81)	-0.0025 (-1.05)
Mother's Education	0.0203 (8.37)	0.0125 (3.13)	0.0193 (2.43)	0.0039 (1.51)
Faher's Education	-0.0014 (-2.91)	-0.0031 (-1.43)	-0.0025 (-1.04)	-0.0010 (-1.58)
Mother's Age	-0.00001 (-0.04)	0.0024 (3.07)	0.0011 (1.30)	-0.00002 (-0.03)
Birth Order	0.0657 (9.77)	0.0545 (5.11)	0.0413 (3.53)	0.0388 (3.74)
Family Wealth*	---	0.0026 (5.75)	-0.0010 (-2.08)	-0.0002 (-1.60)
Intercept	0.0643 (2.54)	-0.1455 (-3.75)	-0.0096 (-0.15)	0.0400 (1.12)
$\bar{R}^2$	0.012	0.048	0.006	0.004
SEE	0.298	0.370	0.322	0.255
Sample Size	8903	2503	2101	4389

* Family wealth cannot be included in the regression for the whole Kingdom because of its different definitions for urban and rural areas (see Note).

Source: Longitudinal Study of Social, Economic and Demographic Change in Thailand (1969-70).

TABLE 3

EFFECTS OF MOTHER'S AGE (COHORT):
RESPONSE OF STOPPING PROBABILITY TO CHILD DEATH*

	Whole Kingdom (%)	Urban Areas		
		Bangkok-Thonburi (%)	Provincial Towns (%)	Rural Areas (%)
D_0	2.33	2.73	--	2.29
D_1	1.76	1.59	1.89	--
D_2	1.21	--	1.67	--

* The numbers are estimates of $(\delta_i / |\beta_i|, i = 0,1,2)$ in in the regression specified in the text (p. 10). The missing entries indicate that the signs of the coefficients for the D_i's and for the interactive terms are contrary to theoretical expectation (cf. Table2), making the ratio meaningless.

Source: Longitudinal Study of Social, Economic and Demographic Change in Thailand (1969-70).

TABLE 4

LAGGED RESPONSE TO CHILD DEATH IN THE STOPPING PROBABILITY (SP) AT THE MEAN MOTHER'S AGE* (t-VALUES IN PARENTHESES)

		Whole Kingdom	Urban Areas: Bangkok-Thonburi	Urban Areas: Provincial Towns	Rural Areas
(1)	D_0	0.016 (2.62)	0.023 (0.53)	0.0140 (0.89)	0.017 (1.79)
(2)	D_1	-0.008 (0.51)	-0.089 (2.28)	-0.005 (0.20)	-0.001 (1.10)
(3)		-0.075 (3.11)	-0.002 (2.20)	-0.099 (2.07)	-0.018 (0.92)
(4)	Sum	-0.067 (2.23)	-0.158 (1.65)	-0.090 (1.30)	-0.002 (1.10)
(5)	$\frac{(4)}{\text{mean SP}} \times 100$	-55.8%	-103.3%	-65.7%	-2.2%

* The numbers in rows (1), (2) and (3) are estimates of $(\beta_j + \beta_j \bar{A})$ in the regression specified in the text (p. 10).

Source: Longitudinal Study of Social, Economic and Demographic Change in Thailand (1969-70).

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Thailand's Tourism: An Analysis of Visitor Length of Stay and Expenditures

by

James F.T. Moncur

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1. INTRODUCTION :

The Thai visitor industry has grown at a rapid pace over the last couple of decades. Between 1957 and 1977, the number of visitors[1/] entering the country has trended upward at about 17.5% annually.[2/] This growth began on a very modest base (44,375 visitors in 1957), and one can hardly expect that rate to hold for the near future. But even within the present decade, the visitor count has nearly doubled, after rising some 10% a year, to over 1,220,000 persons in 1977.

Whether and to what extent this growth continues in the future is a question of importance to all elements of the tourist industry. But growth in the number of visitors tells only a part of the story. Some groups dealing with visitors depend as much on the duration of visits and the level of visitors' spending while they stay, as on the gross visitor count. For example, hotels, restaurants, shopkkepers, local tour agents, entertainment concerns and the like can expect quite different types and levels of business depending on whether a million visitors stay one day each and spend $50 a day, or stay ten days each, spending $5 a day. By the same token, governments must consider all three factors--the number of

visitors, their length of stay and their spending levels--in planning for development of the industry, as well as in projecting tax revenues.

Analyses of the tourism industry have tended to concentrate on the question of demand forecasting, using either the number of visitors or their (collective) total expenditures as a measure of demand. (See Archer, 1976). Little or no work using microeconomic data appeared until recent studies by Mak, Moncur & Yonamine (1977), and Mak & Nishimura (1977). This paper uses such data to study the determinants of length of stay (LS) and per capita daily expenditures (PCDE) of tourists to Thailand.

The Tourist Organization of Thailand's 1974 visitor expenditures survey provides data for the study, supplemented by information on airfare and flight times from each country of residence of visitors in the sample, Since this survey was only partially analyzed after its completion the following section of this paper describes its results in some detail. The next section lays out a model for analysis of tourism and presents estimates of its equations. The role of quality is considered in Section 4. Finally, we note some conclusions.

2. Data : The 1974 Visitor Expenditure Survey

Immigration authorities collect a great deal of data on the number of visitors to a country. Any further information about the visitors, however-- where they came from, what they did, how they spent money and so on--requires a carefully planned and rather expensive survey. This study uses the results of such a survey done by the Tourist Organization of Thailand (TOT) between March 1974 and February 1975. TOT representatives interviewed departing visitors at exit points (mostly Bangkok's Don Muang Airport). This survey was not designed to accommodate the present study and so falls short of providing all relevant information. But it contains considerably more data than has heretofore been analyzed for what it might reveal about Thailand's tourist market.[3/]

Over 2,100 interviews were recorded throughout the 12-month period. The National Statistical Office (NSO) screened the results and estimated average lengths of stay and expenditures of the country's visitors. Excluding interviews with overland visitors as well as incomplete questionnaires left 1,493 observations. Each observation describes the characteristics of a visitor party with data on 1) average daily total expenditures; 2) expenditures on lodging, food and several other items; 3) length of stay in Thailand; 4) nationality; 5) country of residence; 6) sex of respondent; 7) whether the party travels on a package tour or as free independent travelers (FIT's); 8) and 9) whether the party visited Chiang Mai or Pattaya (among other sites); 10) the season the visit took place.

We supplemented the TOT survey with data on two more variables : 11) transportation cost; and 12) duration of flight to Bangkok. The questionnaire did not ask the price of transportation; indeed many travelers on package tours probably could not separate airfare from other items included in their package anyway. Hence we obtained from travel agency rate books (the ABC World Airways Guides) the summer season, economy class, roundtrip airfare, at both standard and group discount rates, for flights to Bangkok from a central city within each of the countries (or states, for U.S. residents) of origin in the sample. The resulting figures gloss over the great variety of discounts, service levels, alternative routes and so on, but provide at least an index of air transportation costs.

As an alternative measure of the cost of transportation, we also determined flight time for a direct route to Bangkok. Unlike the airfare figures, flight time does not vary according to class of service, special discounts and so on. But not every visitor from a given origin travels the same route to Bangkok. And the importance of flight time varies depending on the individual traveler's valuation of his or her time. Lack of any measure of income, which might help correct for this, is for present purposes a serious omission in the available data.

NSO also used data from tour operators to fill some blanks --for example, hotel rates for parties on package tours. The survey's visitor expenditure figures result from two separate questions on the interview form. Question 15 asks directly for the visitor's

estimate of his party's average daily expenditures on all items. Question 16 then asks for a breakdown into amounts spent on lodging, food, entertainment, clothing, gifts & souvenirs,and several other items. We use the sum of itemized expenditures, converted to a per-capita-daily basis, in the following work. By this measure, the sample's 1,493 interviews, covering 9,796 vistor-days, average $ 40.77 per person daily. [4] By comparison, visitors to Hong Kong spent slightly more than US $ 100 daily per capita in 1976. [5] Recent estimates of the same figure for U.S. visitors to Hawaii fall in the neighborhood of US $ 40 per person daily, with package tour visitors spending slightly more per day than FIT travelers (Mak, Moncur & Yonamine).

The 1,493 respondents listed 51 different nationalities, although nearly two-thirds were citizens of only five countries : the United States, Australia, Japan, West Germany and the United Kingdom. Judged against the number of arrivals at Don Muang Airport from March 1974 through February 1975 (the sample period), U.S., Australian and U.K. citizens, considered together, are over-represented by nearly 50 percent, while Japan, West Germany and Taiwan had about one-third too few interviewees (to mention only countries with fairly large absolute numbers in Thailand's overall visitor count for the period).[6] Neighboring countries--especially Malaysia and Singapore--also were shorted.

The sample is also biased with respect to seasonality. The first six months of the sample period are all over-represented vis-a-vis the last six months, judged, again, against the distribution of arrivals at Don Muang airport. Fig. 1 shows monthly distribution of population and sample as well as the mean distribution over the years 1963-75.

About 30 percent of the 1,493 visitors in the sample came on a package tour (but not necessarily with a tour group) while 64 percent came as FIT travelers. Package and FIT visitors stayed virtually the same number of days--4.55 vs. 4.67 days, respectively--but package travelers reported spending somewhat more--US $ 44.14 vs. $ 39.01 per person daily.

About 82 percent of the interviewees were men. Over half the surveyed parties were on their first trip to Thailand; 14 percent had visited once before; 30 percent were on their third trip and less than 1 percent had visited four or more times previously. About 8 percent of the visitors took a side trip to Chiang Mai and almost 14 percent went to Pattaya.

The sample's 1,493 questionnaires cover 2,137 individuals, thus averaging 1.4 persons per travel party. The expectable economies of party size show up in per capita daily expenditure figures which decline steadily from US $ 45 for single-person parties to $23 for parties of five. The 2,137 persons accounted for 9,796 visitor-days, yielding an average length of stay of 4.6 days. Fig. 2 displays the length-of-stay distribution. Up to a point, per capita caily spending clearly declines as visitors' lengths of stay increase, as shown in Fig. 3. However, the connection between expenditures and length of stay is complicated by inter-relatedness between these variables and others, as the regression analysis reported below brings out.

Very few respondents gave complete details as asked for all 23 components of expenditures. We have consolidated the 13 major categories into 6, the distribution of which appears in Table 1. Split between package tour and FIT travelers, the distributions remain virtually unchanged, judging by the X^2 criterion, although the lower overall per capita daily spending by FIT travelers traces principally to lodging, entertainment and gifts.

Parties of one to four persons tended to have similar distributions of expenditures between categories, with variations of only 3 or 4 percent in each category. Five-person parties, however, spent relatively a little more on food and entertainment, and a bit less on gifts and souvenirs.

Although the U.S.A., Australia and Japan contributed the largest numbers of visitors to the survey, they ranked first, second and fourth in terms of visitor-days, and only twelfth, nineteenth and twenty-seventh in spending per capita per day, as shown in Table 2. Note that for many countries, the number of observations is so small as to preclude any generalizations.

3. A Model of Thai Tourism and its Results.

> "According to the law of demand, the lower the price of vacations, the more vacations I should take. Yet I take only one per year. Obviously, the law of demand must be wrong. Is it?"

Alchian and allen's (1977, p. 76) basic microeconomics question expresses quite well the problem one faces in judging the level of tourism activity by the number of visitor arrivals. A "visit" consists of a bundle of goods and services. If the price of a vacation rises, I can adjust by going some place closer to home; by shortening my visit, renting less costly hotel rooms; eating less costly meals, and the like; or by cutting back on consumption of goods and services not included in the vacation, including savings; or, most likely, some combination of these three possibilities.

In a sense, such visits pose the opposite problem to that addressed by Lancaster (1966) in his reformulation of demand theory. He suggested that economists replace analysis of goods per se by studies of their separately identifiable characteristics (color, taste, speed, number of rooms, etc.) and how those characteristics combine to make up the good. For most goods, this approach faces the question of the unobservability of prices of non-marketed characteristics and how they combine to affect the observable product price. For tourist visits, however, price of the characteristics (hotel rooms, meals, souvenirs) are observable; the good itself (a vacation) along with its "price", is now the unobservable unit.

Unobservable though "one vacation" may be, one can think not of the number of visits I make, but the length of my stay. The consumer's decision, then, focuses on the number of days to remain at a given location. Few economists would dispute the proposition that the market for days at some destination follows the law of demand--the higher the price of a day's stay, the fewer days a consumer will demand, other things equal.

One faces many problems in applying this unit of analysis. First, if vacations are denominated in terms of length of stay, what is the "price" of a day's stay? The multitude of market commodities composing a day's stay makes it difficult, if not impossible, to define the price, let alone measure it. But an operational analog is available in a visitor's expenditures, on a per capita, per day basis. This provides us with measures of "quantity" (length of stay, denoted LS) and "price" (per capita daily expenditures, PCDE).

A second problem immediately confronts us, though : these definitions of price and quantity leave the matter of quality all too ambiguous. PCDE, especially, can vary either because two consumers purchase a well-defined good at different unit prices or because the good is not so well-defined and they actually receive products differing in quality. The quality differences between my neighbor's trip and mine do not, however, vitiate the usefulness of analyzing a "day's stay" as a unit of quantity. Economists commonly must aggregate commodities differing in varying degrees of detail for study of a general category. A Datsun and a Rolls

differ enormously; yet they both belong to the usefully analyzed category of automobiles. Also, it is possible to make some adjustments for quality in data defining a market. That these adjustments are quite ad-hoc in nature lead me to postpone further consideration to Section 4 of this paper. For the present, I assume that a day's stay is a day's stay; all are equal in quality.

Another definitional ambiguity arises from the fact that a traveler often visits several destinations, as with tours of Asia, say, or Europe. How does this multiplicity of destinations in an Asian tour affect demand for days in, say, Bangkok? Given the choice, what determines a traveler's willingness to stay an extra day in Bangkok rather than go on to the next scheduled stop?

Package tours pose a closely related problem. A package buyer already has a well-defined bundle of goods and services before setting foot in his destination, thus removing, to whatever degree the package is inclusive, the many choices an FIT consumer would make.[7/] Variations in prices of components of a package have at most a diminished effect. One could argue that tour agents now offer a great variety of packages, thereby giving the traveler a wide range of choice over the mix of goods in his package. Still, the range of choice is more limited, and information cannot be as available to package travelers as to FIT's at the times each makes purchase decisions. Hence for present purposes, I will brush package buyers into the to-be-explored-in-future-study category, and consider only free, independent travelers (FIT). The multiple

destinations question gets the same treatment. Thus I assume that each visitor arrives at his destination with no thought of other stops and with no strings attached to his purse.

The role of travel costs pose a further problem. Clearly, travel cost (or airfare, since that is the principal means of travel to destinations such as motivate the model) cannot be lumped in with on-site expenditures as determinants of length of stay. Aside from discontinuities reflecting certain discount fares, travellers between two cities pay the same fare whether they stay overnight or a month or forever at their destination. As a working hypothesis, this study adopts the approach of Mak & Nishimura (1977), which concludes that airfare can be thought of, in the context of its effect on travelers' length of stay, as akin to an amusement park entrance fee (see Oi, 1974) or, more generally, a lump-sum tax. As such, airfare may induce some potential visitors not to come to a destination at all, if it wipes out expected consumer surplus from the visit. But a traveler who does come will not decrease his length of stay to compensate for higher airfare.[8/]

The foregoing considerations lead to a model in which LS depends upon PCDE, as a surrogate of price, along with other factors. The other factors include characteristics of the individual traveler and specific details of the trip. PCDE, in turn, depends on most of the same personal and trip characteristics that affect LS, though not by LS itself. Hence we may write

$$LS = f(PCDE, X, Y) \qquad (1)$$

$$PCDE = g(X,Y) \qquad (2)$$

where

LS = length of stay, in days

PCDE = per capita daily expenditures

X = vector of personal characteristics of the travel party

Y = vector of details of the trip

If equation (1) represents demand, the model should also include a supply function (which (2) manifestly is not), if only to allow identification of (1). For present purposes, however, we may assume supply to be fixed in the short run, the only period for which we can draw any conclusions from the available one-year cross-section data. A city's hotel room count, available restaurants and so on are mostly unaugmentable within a year's time.

The available data includes age (denoted AGE) and sex (SX) of the interviewee as well as the size of his travel party (SPRTY) and the number of previous visits to Thailand (TRPNO) as elements of X. Unfortunately, the survey did not ascertain income or any good proxy for income--a rather serious ommission for present purposes.

Details of the trip (elements of the vector Y) include the visitor's travel status (NPKDG); a peak-season dummy variable (NSZ1); two dummy variables for specific attractions visited (NS 10 and NS 13); the cost of lodging (RLDG); and variables on the time and

money costs of travel (FTIM and FARE, respectively.) Finally, defining XNET = PCDE - RLDG, equations (1) and (2) become

$$LS = f(AGE, SX, SPRTY, TRPNO, FARE, FTIM, RLDG, XNET, NS10\ NS13, NSZ1) \quad (3)$$

$$PCDE = g(AGE, SX, SPRTY, TRPNO, FARE, FTIM, RLDG, NS\ 10, NS\ 13, NSZ\ 1) \quad (4)$$

Removing all the observations on package-tour travelers undoubtedly extends the biases noted in Section 2 above. The remaining 1,048 observations have an average length of stay of 4.6 days and average per capita daily expenditure of US $ 55.92.[9/]

Assuming that (3) and (4) are linear in form, one may apply ordinary least squares to estimate coefficients. Note that equation (3) separates PCDE into lodging expenditures, RLDG, and other spending, XNET = PCDE - RLDG. One expects both to be negatively related to LS. The discussion on airfare leads us to posit zero coefficients for both FARE and FTIM. One also anticipates that travelers who go to sites outside Bangkok (for whom NS10 = 1 or NS13 = 1) will stay longer than others. The remaining coefficients could have either sign.

The results, shown in Table 3, generally confirm these expectations. Note that as expected, the "price" variable XNET enters the equation with a negative coefficient : visitors spending an extra dollar per capita per day tended to stay .021 days less, or, if one may safely extrapolate, visitors spending an extra $ 50 daily, per capita, shorten their sojourn by a day in accordance with the law of demand. The hotel cost variable RLDG shows a similar relationship : an extra $ 1 per capita daily is associated with .058

days shorter stay in the country. Note that hotel costs appear to affect length of stay more than other expenditures, judging by the regression coefficients. However, the beta coefficients reverse this ranking. Similarly, the elasticities of LS with respect to XNET or RLDG turn out to be almost the same : -.19 and -.17 respectively, evaluated at average values of all variables.

Note next that the coefficients of travel cost, FARE and FTIM, are both positive, but neither differs significantly from zero, thus lending support to the lump-sum tax interpretation of airfare. However, FARE and FTIM have a rather high simple correlation coefficient ($r = .78$). Thus multicolinearity alone might account for this lack of significance. Indeed, excluding FTIM brings FARE into the model with a significant and positive coefficient. Excluding FARE does not make FTIM significant. Neither of these alternate specifications causes much change in the other coefficients, however, and either one alone seems a misspecification of the model. An attempt to account for high colinearity by using the ratio of FARE to FTIM resulted in a positive but insignificant coefficient on FARE/FTIM and little change otherwise. In light of these results, the equation reported in Table 3 seems to hold up as it.

However, one should remember that our data on both FARE and FTIM are not actually, or even reported figures, but simply the economy class fares and most-direct-route flight times for residents of each country to Bangkok. Hence much of the true variation is missing.

The strongest determinants of LS, as measured by both the regression coefficients and the corresponding beta coefficients (not shown here), are the two site variables, NS 10 and NS 13. Regression coefficients indicate that the 9 percent of sampled FIT visitors who included a side trip to Chiang Mai (NS 10 = 1) stayed 4.4 days longer than others, on the average, while the 12 percent who went to the beach resort community of Pattaya (NS 13 = 1) extended their stay an average of 3.7 days.

The visitor's age, sex and season of visit seem to have no effect on length of stay, while travelers in larger parties (SPRTY) or with more experience of previous visits to Thailand (TRPNO) shorten their visits somewhat.

Theory gives little guidance on the expenditures equation (4). However, intuition suggests that PCDE should rise with age; indeed, age might be a proxy--albeit extremely rough--for income, on which the survey has no data. Similarly, one expects per capita daily spending to be lower for larger parties, reflecting economies in lodging expenses (a double room rents for much less than twice the price of a single) and perhaps other sources. The results bear out both expectations. (Table 3, last column).

If lodging and non-lodging items are complementary goods, then as lodging rates increase, and quantity consumed shrinks, (for a given quality) one would expect to see non-lodging expenditures cut back. However, with the real-world complexities reflected in a cross-section sample, one must anticipate that observed lodging

and non-lodging expenditures will rise together : travelers who rent expensive hotel rooms also tend to buy more of other goods and in better qualities. Hence one expects the coefficient of RLDG in the PCDE equation to be positive which it is. The unmeasured variation of quality shows up clearly. We return to this problem in the next section.

The most surprising result in the expenditures equation is the negative and significant coefficient on the dummy variable NS 10, indicating that the interviewee took a trip to Chiang Mai. Such visitors tended to spend more than US $ 11 less per capita daily than others, other things equal. In part, this may result from lower prices and less luxurious accommodations offered in Chiang Mai (more so at the time of the survey than now).

4. The Problem of Quality Variation

The estimates of the previous section rely on the assumption that all visits are of a common quality level. This assumption is untrue and causes some problems of interpretation, as already noted. To fully specify a trip's quality level, however, brings on more problems than there are goods and services involved in producing the trip, with solutions beyond the capacity of the available data and the scope of this study. However, one can examine the problem on a rather ad hoc basis.

Simple demand theory suggests that as income rises, consumers will buy more of what they perceive to be superior goods. Most aspects of trips to such destinations as Bangkok are manifestly superior goods, as is also the quality dimension of the particular goods and services bought. Thus one expects higher-income travelers to buy more lodging as well as more of other visit-related goods than lower income travelers. Indeed, whether reflecting income variation or simply taste, one is not at all surprised to see lodging expenditures positively related to total spending, especially in a cross-sectional sample.

But a large part of this phenomenon reflects not so much increases in quantity as in quality. Indeed, to the extent that lodging and other items purchased on a trip are complementary, one expects increases in the price of lodging (say) to go along with decreases in the quantity of other goods. But for the concommitant changes in quality over the range of prices involved, one might

also expect a trade-off of spending between lodging and other items, depending, of course, on the cross elasticities.

One way to bring out this trade-off from a cross-sectional sample is suggested by Mak & Nishimura (1977) : Assume that two vacations which differ in spending by only a few dollars (per capita daily) have equivalent quality, while those differing by some greater amount represent different quality levels. Any definitions of "a few dollars" and "greater amount" will necessarily be arbitrary, of course, but one can simply divide the sample into quantiles (say, five). Then, take any expenditure variation within a given quantile as a reflection of greater purchases at a given quality level, while moving from one quantile to the next involves an increase in quality. Thus regressions done on observations whose spending falls within a given quantile should show the expected negative relationship between lodging and other spending, even though this relationship is positive for the sample as a whole.

This procedure worked admirably with the Hawaii data studied by Mak & Nishimura. In the Thai case, however, it helps not at all. All five quintiles turn out positive coefficients on the RLDG variable just as for the sample taken as a whole.

Taking another approach, one might attempt to specify quality of the trip explicitly. In principle, this requires tracing down each of the items purchased and somehow indexing its quality. However, one may identify quality of the overall experience with

quality of one or more major components--in particular, with hotel accommodations. In turn, the quality of a hotel is probably very highly correlated with its room rental rates. The hotel expenditures variable RLDG then provides one possible measure of the hotel's quality. However, RLDG represents reported lodging expenditure and so includes much variation due to reporting errors, group and other discounts, seasonal rate changes, and even personal bargaining, for a given type of accommodation. Hence a better index of quality would be the hotel's listed (with TOT) rate for, say, a double room. 10/ Some hotels did not file a list rate, (which we denote H) but for 900 of the 1,048 FIT observations for which H is known, it averages US $ 24.21 per person per day, while RLDG averages only US $ 16.23 over the same sample.

Perhaps the simplest and most intuitively appealing adjustment results from replacing PCDE or XNET, in equations (2) and (3) with PCDE/H and XNET/H. Certain other variables seem to call for the same change (e.g., FARE, FTIM) though exactly which ones is not clear a priori. The following model seemed to perform best, in terms of R^2, among several attempted :

$$LS = f(AGE,SX,SPRTY,TRPNO,FARE,FTIM, RLDG,XNET/H,NS10, NS13, NSZ1) \quad (5)$$

$$PCBE/H = g(AGE,SX,SPRTY,TRPNO,FARE/H,RLDG,NS10,NS13,NSZ1) \quad (6)$$

Results appear in Table 4. The changes have little effect on the LS equation, aside from the coefficient of XNET/H itself. $\beta_{XNET/H}$, however is considerably larger than β_{XNET} in Table 3 so

increase in XNET/H now goes along with a decrease in LS of about 1/5 (.194) of a day instead of 1/50 (.021) of a day.

The negative sign of $\beta_{XNET/H}$ implies that while an increase in XNET itself still is associated with a decrease in length of stay, a higher quality vacation (higher H), given XNET, goes along with a longer stay.[11/] An increase in quality, for a given price, shifts the demand function up to the right.

On the expenditures side, equation (6) yields quite different coefficients from equation (4). Appearances largely deceive, however : though the coefficients in Table 4 fall much below (except for $\beta_{FARE/H}$) the corresponding numbers in Table 3, they have the same signs (except for β_{AGE}, which becomes insignificant). Spending per unit of quality is affected in about the same ways, by each dependent variable, as unadjusted spending. The insignificance of β_{AGE} suggests that the effect shown by AGE on PCDE traces back to the higher quality purchased by older visitors. However, the unexpected positive sign noted before, on β_{RLDG}, remains, as does the finding that visitors who went to Chiang Mai (NS13 = 1) spent less, per capita daily per unit of "quality".

This quality adjustment leaves a number of problems, of course, For one, the coefficient of RLDG in the expenditures equation still has its awkward positive sign. Also, as with any ad hoc procedure, we cannot rest too easily with the particular specification of equations given in Table 4. And for some purposes, an adjustment

of some other form might work better---a subtractive adjustment, for example. Finally and most glaringly, this procedure doesn't even make it entirely clear what quality is, as distinct from quantity : how does one buy greater quantity of, say, hotel rooms, without either staying longer or also buying higher quality? Clearly the problem requires further study.

5. Summary and Conclusions

This paper has presented a model of the determinants of length of stay and per capita daily expenditures of visitors to Thailand, using a sample of 1,048 FIT visitors taken in 1974-75. With some exceptions, the results generally support our expectations about the effect of such factors as non-lodging expenditures (on length of stay) and lodging expenses, airfare, flight duration, party size and site variables on both per capita daily expenditures and length of stay. We approached the difficult problem of accounting for quality variation by using a listed hotel rate, rather than rates actually paid, as an index of quality. While these results offer some promise, they require more detailed research on both the conceptual and empirical level.

The model has several limitations. In addition to those already mentioned one should note that the biases in the sample dilute the degree of confidence one can safely place in its results. Also, a number of relevent variables were omitted, for lack of the necessary data. Income is perhaps the most important. The visitor's paid vacation time is another : staying any longer requires a substantial increase in cost of the visit, when it is possible at all, and reflects the allocation of time.

The model was not constructed with any particular policy question in mind, though its usefulness for several such questions should be obvious. For example, the average length of stay--4.6 days--falls somewhat short of that for visitors to other destinations:

U.S. visitors to Hawaii stayed an average of 10.6 days in 1974, whil Hong Kong's figure stood at 3.9 days. One way to change this is to reduce the costs of visiting, by, for example, reducing taxes levied on hotels. Of course, such a policy has other impacts that must also be accounted for : the effect on non-lodging expenditures, for example, and on government revenues.

Since the site-visit variables, NS10 and NS13, both significantly affect LS, greater promotion of Chiang Mai and Pattaya would help to lengthen the average stay. The same probably goes for such attractions as Sukhothai and Phuket, to mention two of several possibilities which were not included in this study. Some study is also needed of why travelers who go to Chiang Mai spend so much less than others. These questions would benefit from a model taking more explicit account of the multi-destination character of many, if not most, trips involving a visit to one of the upcountry sites.

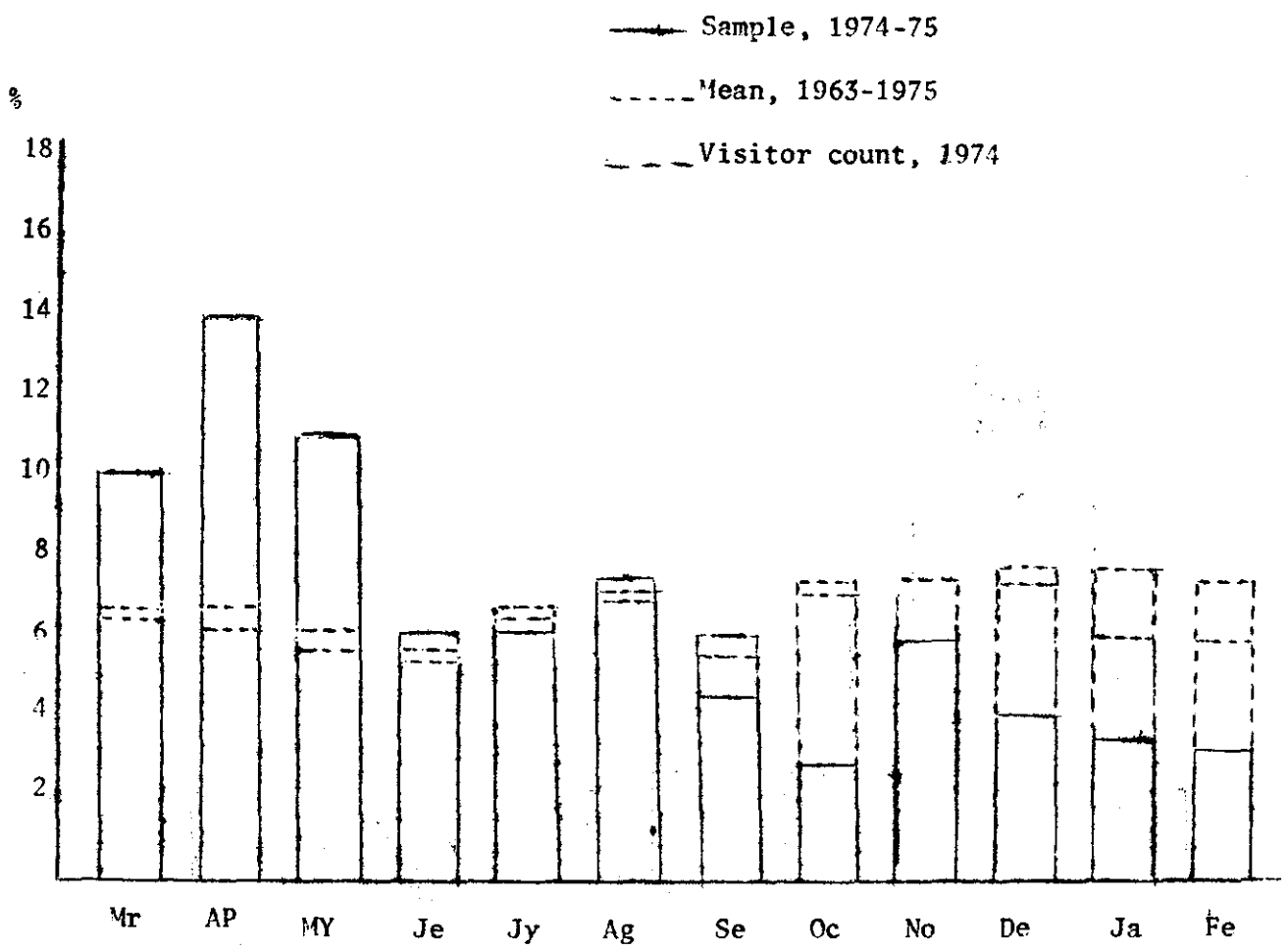


Fig. 1.---Monthly distribution of sample visitors' arrivals; mean of total arrivals, 1963-1975; and visitor count, 1974.

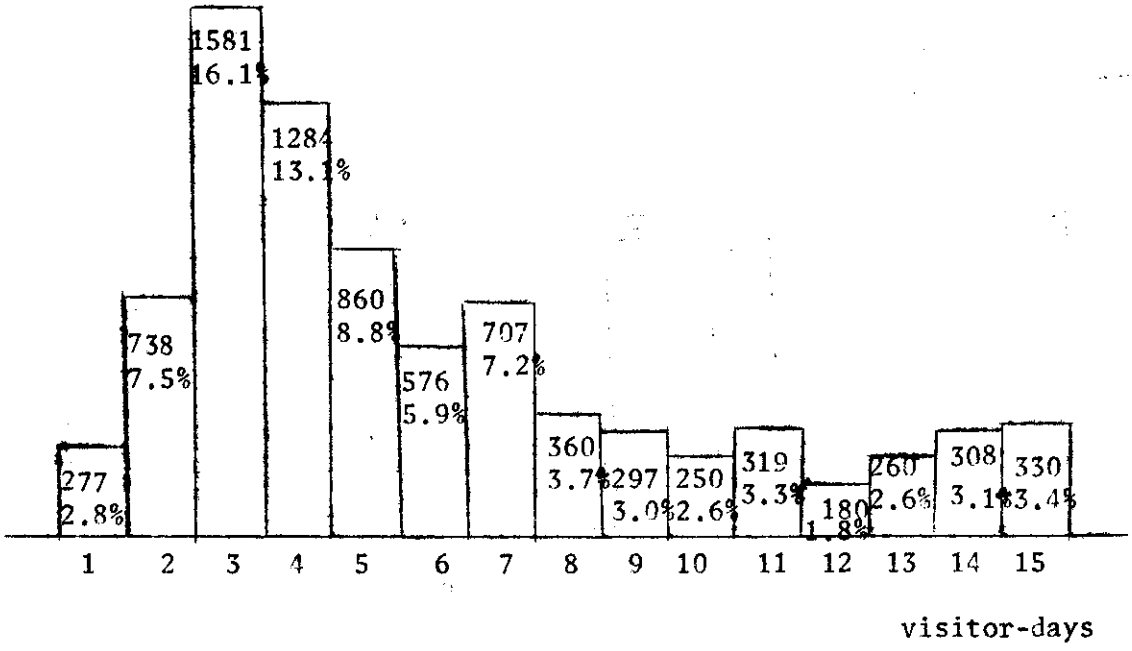
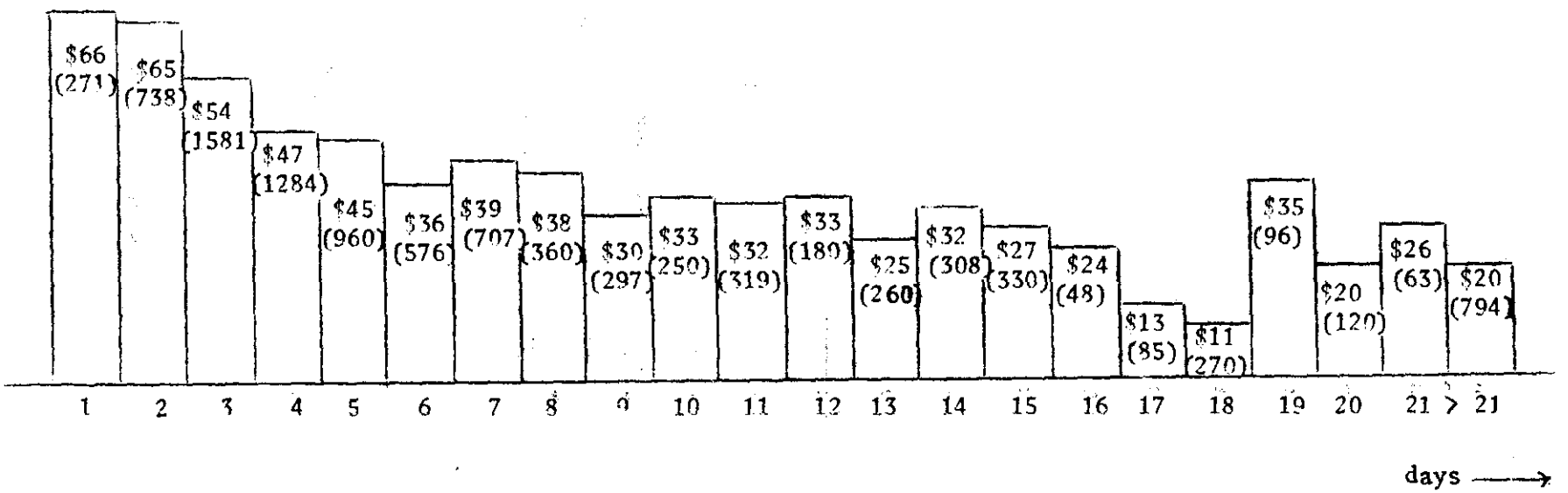


Fig. 2.-- Length of stay distribution (by visitor-days)

Figures indicate number, and percent of total, of visitor-days spent in Thailand. The 2137 persons covered by the 1493 parties in the survey stayed a total of 9796 visitor-days, or, on average 4,58 visitor-days per visitor. In addition to the 8321 visitor-days accounted for in the chart, 53 parties, with 69 persons, spent a total of 1475 visitor-days in the country, staying 16-30 days each.



Length of Stay

Fig. 3. ---Per capita daily expenditures for varying lengths of stay.

The 258 parties, accounting for 738 visitor-days, that stayed two days each spent, on average, at the rate of US $ 64.52 per capita daily.

Table 1.--Average spending per visitor day selected items

Item	Amount	Percent
Lodging	US $11.86	29.1
Food	7.90	19.4
Entertainment	6.56	16.1
Clothing	1.92	4.7
Gifts $ souvenirs	9.73	23.9
Other	2.81	6.9
All items	US $40.77	100.0

Table 2.--Per capita daily spending, ranked by country of residence

Rank	Country	Number in sumple	Number of visitor-days	Per capita daily Expenditures
1	Austria	11	34	US$ 89.41
2	Central America	3	18	75.94
3	New Zealand	22	105	64.72
4	Spain	6	29	60.24
5	Portugal	5	16	53.63
6	Taiwan	13	61	52.66
7	South America	3	32	52.31
8	Indonesia	9	40	50.17
9	Singapore	33	106	47.71
10	Cambodia	5	18	47.17
11	Hong Kong	39	187	45.52
12	U.S.A.	363	2509	45.26
13	S. Vietnum	7	34	44.26
14	Ireland	7	55	43.62
15	W. Germany	104	802	43.42
16	Africa	13	42	42.64
17	Italy	16	123	42.25
18	Canada	20	104	42.16
19	Australia	213	1536	41.91
20	Greece	2	13	41.23
21	Laos	1	1	US$ 41.00
22	Sweden	59	497	40.82
23	Norway	23	158	40.32
24	Nepal	4	12	39.67
25	France	20	110	39.01
26	Netherland	29	247	37.43
27	Japan	158	734	37.42
28	U.K.	93	582	36.29
29	S. Korea	4	21	35.43
30	Switzerland	38	291	35.25
31	Middle East	15	118	34.98
32	Finland	11	125	33.86
33	Pakistan	8	16	33.44
34	Others N.E.C.	13	75	32.68
35	Belgium	8	70	31.28
36	India	29	91	31.13
37	Denmark	37	341	30.99
38	Burma	5	25	27.72
39	Sri Lanka	3	11	25.91
40	Malayasia	14	77	19.78
41	Philippines	27	340	16.81
	TOTAL SAMPLE	1493	9697	US$ 40.74

Residents of individual countries in South America, Africa, the Middle East have been consolidated to match the grouping on TOT's published visitor statistics. The sample included a total of 51 different nations.

Table 3. Determinants of Length-of-Stay and Per Capita Daily Expenditures : OLS Estimates

	Length of Stay (LS)		Expenditures (PCDE)	
	$\hat{\beta}$	$t_{\hat{\beta}}$	$\hat{\beta}$	$t_{\hat{\beta}}$
Intercept	6.008	-	22.052	-
AGE	-.008	- .954	.244*	3.227
SX	-.517	-1.401	2.309	.700
SPRTY	-.385*	-2.067	-6.081	-3.678
TRPNO	-.288*	-2.112	0.794	.653
FARE	.629	1.468	7.139	1.869
FTIM	.020	.440	- .269	- .662
RLDG	-.058*	-5.736	1.653*	18.706
XNET	-.021*	-6.143	-	-
NS10	4.368*	9.763	-11.056*	-2.776
NS13	3.723*	9.862	2.000	.593
NSZ1	.173	.699	- .669	- .302
R^2	.2777		.3249	
F	36.203		46.901	
n	1084		1084	

See the List of Variables for notation.

t-statistics are for the hypothesis $\beta_i = 0$. The critical value, at the 5% significance level, is 1.96.

Table 4. --Quality-adjustment : results for length of stay and per capita daily expenditures

Independent Variables	Dependent Variables			
	LS		PCDE/H	
	$\hat{\beta}$	$t_{\hat{\beta}}$	$\hat{\beta}$	$t_{\hat{\beta}}$
CONSTANT	5.045	-	1.147	-
AGE	- .019*	-2.209	- .002	.388
SX	- .444	-1.164	.230	.981
SPRTY	- .124	- .685	- .474*	-4.293
TRPNO	- .125	- .927	- .174*	2.101
FARE	.349	.829	-	-
FTIM	.038	.852	-	-
RLDG	- .057*	-6.005	.045*	7.642
XNET/H	- .194*	-3.567	-	-
NS10	4.192*	8.646	- .984*	-3.183
NS13	3.934*	10.140	.230	.959
NSZ1	.346	1.411	- .048	- .319
FARE/H	-	-	21.455*	12.609
R^2	.2591		.2113	
F	28.225		26.496	
n	900		900	

See the list of variables for notation.

t-statistics refer to the hypothesis $\beta_i = 0$. An * indicates a coefficient significant different from zero at the 5% level, for which the critical value is 1.96 (with 888 degrees of freedom).

List of Variables

AGE :	interviewee's age
FARE :	airfare from interviewee's country of residence to Bangkok (US $1,000)
FTIM :	airline travel time to Bangkok (hours)
H :	listed (with the Tourist Organization of Thailand) hotel room rate, used as a quality index
LS :	length of stay
NPKGD :	= 1 for a free undependent traveler; 0 for package tour
NSxx :	dummy variables representing visits to specific attractions in Thailand. x = 10 denotes Chiang Mai; xx = 13 refers to the beach resort, Pattaya.
NSZ1 :	dummy variable = 1 if visit originates in peak season
PCDE :	per capita daily expenditures of a travel party
RLDG :	reported lodgine expenditures, per person daily, for travel party
SPRTY:	number of persons traveling together
SX :	sex (dummy variable : 0 = male)
TRPNO:	number of trips to Thailand
XNET :	PCDE-RLDG

FOOTNOTES

1/ The term 'visitor' applies to all foreigners entering the country for between one and 30 days' stay, whatever their purpose in coming.

2/ Growth rates quoted in this paper are the slope coefficients from loglinear regressions, $\ln X_t = \alpha + \beta t$, where X_t is the time-series in question. The β's thus represent the trend of growth over the period, rather than the rate implied by the beginning- and end-year values of X. Data for number of visitors is from TOT, Statistical Report of Visitors to Thailand : January-December 1975 (Bangkok, n.d.) and subsequent up-dates.

3/ The survey is also somewhat out of date by now, especially in light of economic and political developments in Thailand and the Southeast Asian region that affect, among other things, tourism activity. A new survey is currently in progress.

4/ This estimate of per capita daily spending differs from NSO's estimate of $57.85. This results partly from a difference in samples used--we excluded questionnaires from visitors arriving by land as well as some which lacked data on variables necessary for our model. But perhaps more important is the different averaging procedures. If x_{ki} represents expenditure on item k reported on questionnaire i, while s_i and d_i denote respectively the number of persons and length of stay of the i^{th} party, our figure of $40.74 results from the formula

$$\frac{\Sigma_i \Sigma_k x_{ki}}{\Sigma_i (s_i d_i)}$$

NSO, on the other hand, derived its $37.85 estimate from

$$\frac{\Sigma_i \left(\frac{\Sigma_k x_{ki}}{(s_i d_i)} \right)}{\Sigma_i s_i}$$

5/ Calculated from data provided by the Hong Kong Tourist Association Research Department.

6/ χ goodness-of-fit statistic allows us to reject the hypothesis of equivalent distributions of sample and population on the basis of the term for the U.S. alone, not to mention several combinations of two or three other nationalities. Unfortunately, no data exists for arrivals by country of origin, rather than nationality, against which one could check the sample; however, the sample's country-of-origin and nationality distributions are essentially the same except for the U.K. and Hong Kong, which suggests that a number of U.K. citizens living in Hong Kong accounts for the only significant disparity.

7/ For example, Heller (1974) reports that the great majority of Japanese visitors to Hawaii come on four-nights-and-five-days group tours. These tours, sold by a small number of market-dominating tour firms, tend to be quite inclusive and highly standardized. The same may hold for Japanese tourists to Thailand, who made up the largest nationality, aside from Malaysians, in the 1975 visitor count.

8/ As discounts and drastic reductions in airfares become increasingly common, the money cost of airfare becomes less and less an over-powering sum compared to other costs. This in turn leads one to wonder whether the above interpretation should give way, in the future, to a view, prompted by Gronau (1971), that travel costs--in both time and money terms--are just one expenditure component of a trip, so that as travel costs rise, visitors will substitute toward other components, and make the trip less often. Since the other components--hotels, meals, entertainment--are correlated with time, this leads to the hypothesis that higher travel costs will lengthen the average length of stay. However, Gronau's model must be viewed in the context of determining the traveler's overall allocation of time and money between travel, on-site activities and other items (including more or fewer visits) rather than the simpler context envisioned here of studying LS and PCDE for a traveler on a speciffic trip.

9/ This figure is the mean value, over 1,048 observations, of each party's per capita daily spending--the figures used in the present model. Total spending, divided by the number of visitor-days covered by the 1,048 observations, was US $38.17.

10/ The listed and reported rates diverge remarkably for Bangkok hotels: the correlation coefficient between these rates from the present sample is only .39.

11/ RLDG and H are positively correlated, so that if one replaced RLDG in the LS equation reported in Table 4, one would get $\beta_H < 0$, Just as $\beta_{RLDG} < 0$. This use of H, then leads to the conclusion that higher H tends to associate with shorter LS--in contrast to the interpretation of H just mentioned. But H is not the price of lodging on which consumers act, so using H by itself would misspecify the model.

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