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In explaining why service prices differ across countries (both developed and developing countries), most studies have paid attention to the role of structural variables such as population, trade balance, resource abundance etc., by using a full employment assumption. Due to the existence of high urban unemployment in developing countries, the assumption of full employment is not suitable.

The objective of this study is to build general-equilibrium models that can be used to explain the service-price differences across developing countries by incorporating rural-urban migration and urban unemployment. Internal migration from rural to urban areas is allowed because of distortions in labor market. The current work includes structural variables that are used in the literature, such as agricultural land, mineral resources, labor endowment, trade deficit, population, and tourism, along with 2 new variables,

manufacturing capital and services capital. This study also considers the effects of macroeconomic policies (fiscal and monetary policies) on service prices which are neglected in the literature.

The theoretical models suggest that, ceteris paribus, larger land area, mineral resources, higher trade deficits, tourist receipts, and money supply increase service prices, but larger populations reduce service prices. The effects of services capital, labor force, the terms of trade, and government spending are ambiguous from the theoretical models.

An empirical study is performed to test the theoretical implications. The empirical results suggest that larger endowments of land, mineral resources, manufacturing capital, labor force, and services capital, as well as higher trade deficits, tourist receipts, government spending, and money supply increase the service prices. Conversely, larger populations reduce service prices as predicted.

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CHAPTER 1

INTRODUCTION AND REVIEW OF LITERATURE

I. INTRODUCTION

According to the United Nations International Comparison Project (ICP), services have been defined as goods that can not be stored. Most services are nontradable goods. ICP has defined services/commodities and tradables/nontradables as "tradables consist of all commodities except construction; nontradables consist of all services plus construction" [Kravis, Heston and Summers (1982) p.193].

As per capita income increases, the share of income spent on services tends to increase. Kravis, Heston and Summers (1982) find that it is the rise in service prices, not quantities, that pushes up expenditures on services as income increases.[1] When countries are ranked in order of increasing real GDP per capita, table 1.1 shows that service prices are relatively low for low-income countries. Most studies assume that real income per capita is the most important explanatory variable; however, Officer's (1989) empirical study indicates that natural resource endowment, not real income per capita, is the most important variable in explaining the variation of service prices across countries. Recently, Falvey and Gemmell (1991) have shown that prices of services and real income per

capita might not have a positive relationship.

If the "law of one price" holds and consumption weights of nontradables are the same across countries, real price levels are dependent on the price of services (nontradables).[2] Factors that influence the relative price of nontradables will also influence the real price level. In the literature, the "Productivity Differential" and "Factor Endowment" models assume that the "law of one price" holds. Table 1.1 shows that prices of tradables (commodities) differ across countries. However, differences in price levels are smaller for tradables (commodities) than for nontradables (services).

In many developing countries, though there is substantial unemployment in destination cities, migration from rural to urban areas still occurs. The consequence is high urban unemployment. Table 1.2 shows the high rates of urban unemployment in some developing countries. Table 1.3 shows the average annual change of urban unemployment in some developing countries, and reveals that LDCs have increasing rates of urban unemployment. While urban unemployment exists, urban wages are still maintained at high levels (minimum wages) compared to rural wages. Most of the migrants are young adults in the age groups of high productivity. The migrants will continue to move to urban areas as long as their expected income in urban areas is higher than their income in rural areas.

TABLE 1.1 PRICE STRUCTURE

PRICE STRUCTURE					
Group and Country	**Commodities**	**Services**	**Tradable Goods**	**Nontra-dable Goods**	**GDP**
Group I :	118.0	66.1	121.1	74.5	100
Malawi	114.9	64.2	116.3	75.3	100
Kenya	112.3	81.6	114.6	86.1	100
India	128.3	46.9	134.3	57.3	100
Pakistan	116.2	65.5	117.1	76.0	100
Sri Lanka	129.6	49.2	140.0	55.9	100
Zambia	109.3	83.4	115.2	88.9	100
Thailand	104.5	86.2	105.8	89.0	100
Philippines	128.5	51.6	125.2	67.3	100
Group II :	105.1	89.6	110.3	91.0	100
Korea	106.4	81.9	109.4	86.4	100
Malaysia	103.6	92.6	122.4	80.8	100
Colombia	106.6	88.7	119.0	82.8	100
Jamaica	108.9	87.3	110.5	90.4	100
Syria	99.4	102.1	92.4	115.7	100
Brazil	105.4	88.0	108.3	89.6	100
Group III :	106.5	86.5	108.5	90.2	100
Romania	116.6	61.2	125.5	72.7	100
Mexico	104.3	89.6	112.9	84.9	100
Yugoslavia	110.6	76.5	104.3	94.1	100
Iran	97.7	104.7	104.9	93.0	100
Uruguay	110.7	85.1	106.5	93.0	100
Ireland	98.9	101.9	96.8	103.3	100
Group IV :	106.7	83.7	108.3	90.7	100
Hungary	113.7	68.0	113.8	84.5	100
Poland	113.9	65.5	116.9	81.4	100
Italy	97.9	104.4	101.1	98.7	100
Spain	101.4	96.8	101.5	98.2	100

TABLE 1.1 (CONTINUED)

PRICE STRUCTURE					
Group and Country	**Commodities**	**Services**	**Tradable Goods**	**Nontra-dable Goods**	**GDP**
Group V :	92.0	119.2	89.2	113.2	100
U.K.	97.9	102.9	95.2	104.7	100
Japan	92.5	118.2	84.4	117.3	100
Austria	96.9	107.3	89.7	113.9	100
Neterlands	86.1	139.3	85.5	122.6	100
Belgium	88.6	129.3	86.4	118.5	100
France	91.9	119.1	91.7	110.0	100
Luxembourg	93.5	115.6	88.6	112.1	100
Denmark	91.1	115.2	92.1	106.9	100
Germany	89.1	125.5	89.3	113.7	100
Goup VI :	82.8	136.0	80.9	126.0	
US	82.8	136.0	80.9	126.0	100

Source : World Product and Income (1982).

In explaining service price differences across countries, most studies have been concerned with the role of structural variables in determining the service price level. Attention has been directed toward real income, population, resource abundance, tourism, education, the trade balance, the share of nontradables, the foreign trade ratio and money growth. These variables have been used with varying degrees of success. Clague (1988) has questioned the appropriateness of, the share of nontradables in GDP, which is included in the empirical studies by Kravis and Lipsey (1983, 1988) and Officer (1989), and of the foreign trade ratio, which is included in the regression by Kravis and Lipsey (1983, 1988). This will be discussed later in the literature review. Unlike other studies, which always cite structural variables, Feldman and Gang (1987, 1990) and Feldman (1991) have paid attention to economic policies such as financial repression, tariffs and production subsidies to explain the variation of service prices across developing countries. By introducing distortion to the labor market, Feldman (1991) shows that tariffs and/or production subsidies may reduce service prices. This result contradicts the conventional wisdom.

All studies that use structural variables in explaining the variation of service prices (and/or the price level) across countries employ the full employment assumption. However, in many developing countries, though there is substantial unemployment in destination cities, migration from

rural to urban areas still occurs. The consequence is high urban unemployment. Table 1.2 shows the high rates of urban unemployment in some developing countries. Table 1.3 shows the average annual change of urban unemployment in some developing countries, and reveals that LDCs have increasing rates of urban unemployment. While urban unemployment exists, urban wages are still maintained at high levels (minimum wages) compared to rural wages. Most of the migrants are young adults in the age groups of high productivity. The migrants will continue to move to urban areas as long as their expected income in urban areas is higher than their income in rural areas.

TABLE 1.2 RATES OF URBAN AND RURAL UNEMPLOYMENT

RATES OF URBAN AND RURAL UNEMPLOYMENT (percentage of the active population)				
Country	**Year**	**Town(s)**	**Urban unemployment**	**Rural unemployment**
AFRICAN:				
Algeria	1966	urban areas	26.6	-
Benin	1968	urban areas	13.0*	-
Burundi	1963	capital city	18.7*	-
Ghana	1960	large towns two large cities	12.0 9.0*	- -
Ivory Coast	1963	capital city	15.0*	-
Kenya	1968-69	capital city 2nd largest city	10.0* 14.0*	- -
Morocco	1960	urban areas	20.5	5.4
Nigeria	1963	urban areas	12.6	-
Sierra Leone	1967	capital city	15.0	-
Cameroon	1962 1964	largest city capital city	13.0* 17.0*	- -
Tanzania	1965 1971	urban areas 7 towns	7.0 5.0*	3.9 -
Zaire	1967	capital city	12.9	-
LATIN AMERICA:				
Argentina	1968	capital city	5.4	-
Bolivia	1966	urban areas	13.2	-
Chile	1968	urban areas	6.1	2.0
Colombia	1967	urban areas	15.5	-
Costa Rica	1966-67	capital city	5.6	-
El Salvador	1961	capital city	6.6	-
Guatemala	1964	capital city	5.4	-
Guyana	1965	capital city	20.5	-

TABLE 1.2 (CONTINUED)

RATES OF URBAN AND RURAL UNEMPLOYMENT				
Country	**Year**	**Town(s)**	**Urban unemployment**	**Rural unemployment**
Honduras	1961	capital city	7.8	-
Jamaica	1960	capital city	19.0	12.4
Panama	1960 1967	urban areas urban areas	15.5 9.3	3.6 2.8
Peru	1964 1969	capital city capital city	4.2 5.2	- -
Uruguay	1963	urban areas	10.9	2.3
Venezuela	1961 1968	urban areas urban areas	17.5 6.5	4.3 3.1
ASIA:				
India	1961-62	urban areas	3.2	1.7
Indonesia	1961	"	9.5	-
Iran	1966	"	5.5	11.3
Korea	1963-64	"	7.0	1.8
Malaysia	1967	"	11.6	7.4
Philippines	1967	"	13.1	6.9
Sigapore	1966	"	9.1	-
Sri Lanka	1959-60	"	14.3	10.0
Syria	1967	"	7.3	-
Thailand	1966	"	2.8	-

Source: Michael P. Todaro (1979)

* men only.

TABLE 1.3 URBAN UNEMPLOYMENT IN SOME DEVELOPING COUNTRIES
(average annual change)

COUNTRY	1980	1981	1982	1983	1984	1985	1986	1987	1988
Argentina	2.3	4.5	4.7	4.2	4.6	6.1	5.2	5.9	6.5
Bolivia	7.1	5.9	8.2	8.5	6.9	5.8	7.0	5.2	11.7
Brazil	6.3	7.9	6.3	6.7	7.1	5.3	3.6	3.8	4.0
Chile	11.8	9.0	20.0	18.9	18.5	17.2	13.1	11.9	11.2
Colombia	9.7	8.2	9.3	11.8	13.5	14.1	13.8	11.8	11.4
Costa Rica	6.0	9.1	9.9	8.6	6.6	6.7	6.7	5.6	5.2
Ecuador	5.7	6.0	6.3	6.7	10.6	10.4	12.0	12.0	13.0
Guatemala	2.2	2.7	6.0	9.9	9.1	12.0	14.2	12.6	12.0
Honduras	8.8	9.0	9.2	9.5	10.7	11.7	12.1	13.0	13.1
Mexico	4.5	4.2	4.1	6.7	6.0	4.4	4.3	3.9	3.6
Nicaragua	22.4	19.0	19.9	18.9	21.1	22.3	21.7	-	-
Panama	10.4	10.7	10.1	11.7	12.4	15.6	12.6	14.1	20.8
Paraguay	3.9	2.2	5.6	8.3	7.3	5.2	6.1	5.6	-
Peru	7.1	6.8	6.6	9.0	8.9	10.1	5.3	4.8	-
Uruguay	7.4	6.7	11.9	15.5	14.0	13.1	10.7	9.3	9.2
Venezuela	6.6	6.8	7.8	10.5	14.3	14.3	12.1	9.8	-

SOURCE : Statistical Abstract of Latin American, 1990
- = data are not available

The objective of this study is to develop models for explaining service price differences across developing countries. Rural-urban migration and urban unemployment will be included in the theoretical models. The extended Harris-Todaro's (1970) model, which includes services (nontraded goods), will be used for the supply side of the models. Three-sector (manufacturing, agriculture and services), four-factor (three specific factors and mobile labor) general equilibrium model will be used to analyze the effects of changes in exogenous variables on service prices.

It is assumed that this small, open economy consists of two regions. The urban region produces both manufacturing and services, while the rural region produces only agricultural goods. Goods are produced under constant returns to scale technologies. Internal migration from rural to urban areas is allowed because of distortions in the labor market. A minimum wage, which is higher than the market-clearing level, is imposed in the urban area, whereas the wage in rural area is determined by the labor market. Unlike other studies, this current study will consider both the effects of structural variables (specific factor endowments, labor force, the terms of trade, trade deficit, population and tourism) and of macroeconomic policies (fiscal and monetary policies) on service prices. None of the literature considers the effects of fiscal policy on service prices and none of them has included the money supply in the theoretical framework. In

previous studies, Kravis and Lipsey (1983) and Clague (1986, 1988) include the growth of money supply in the regression analysis without providing a theoretical basis. The new variables suggested by the current theoretical model, such as manufacturing capital, services capital, money supply, and fiscal spending, will be used in the regression analysis along with other variables that are common in the literature such as the trade balance, land, mineral resources, population, the terms of trade and tourism.

The theoretical models derived here suggest that land, mineral resources, manufacturing capital, trade deficit, tourism and money supply have positive effects on service prices, while population has a negative effect on service prices. Labor force, services capital, the terms of trade, and fiscal spending have ambiguous effects on service prices.

The empirical results suggest that, ceteris paribus, larger land, mineral resources, manufacturing capital, labor force, services capital, higher trade deficit, tourist receipts, government spending, and money supply increase the service prices. Conversely, a larger population reduces service prices.

Organization of this work is as follows. A discussion of the literature for the existing theoretical and empirical studies is provided in the rest of this chapter. Chapter 2 develops the Basic Model for explaining differences in service prices across developing countries and also develops the

Extended Model by including tourism as an additional variable in the demand for services. Chapter 3 presents the Modified Model by including macroeconomic policies, i.e., monetary and fiscal policies. Data requirements and empirical results are presented in Chapter 4. Chapter 5 summarizes the major conclusion of the work.

II. REVIEW OF LITERATURE

Several different approaches have arisen in explaining differences in prices of services (and price levels). The literature can be classified into five groups :

1. Productivity Differential Model (Ricardian Model),
2. Factor Endowment Model,
3. Specific Factor Model,
4. Economic Policy Model, and
5. Others.

These five different models will be considered and the major areas of agreement and controversy will also be discussed.

Productivity Differential Model: Balassa (1964), Samuelson (1964), and Kravis, Heston and Summers (1982).

In this model, countries are assumed to have different levels of labor productivity. International differences in labor productivity for tradables are assumed to be greater than for nontradables. Prices for tradables are set in world

markets, while prices for nontradables are determined in the home markets. Wages in the industries producing tradable goods depend on productivity, and these wages prevail also in nontradable goods industries. Given that productivity in tradable goods industries is relatively low in low-income countries, this implies a low wage. This low wage also applies in nontradable goods industries, where productivity is roughly comparable across countries. The consequence is low prices for nontradable goods in low-income countries.

Factor Endowment Model: Bhagwati (1984), Kravis and Lipsey (1983, 1988), and Quabria (1990).

This model focuses on resource abundance and factor proportion. Kravis and Lipsey's (1983) explanation is quite similar to Bhagwati's (1984), so only Bhagwati's model will be discussed here.

Bhagwati (1984) uses a capital-labor model to explain why a low-income country has low relative prices of services. Bhagwati considers a two-factor, two-country, and three-sector (two commodities and services) model. One commodity is relatively more capital-intensive than the other, while services are labor-intensive. He assumes that there is complete specialization so factor price equalization across countries does not exist. He then assumes that low-income countries are abundantly endowed with labor; this results in relatively low productivity and low wages. In the high-income

countries, capital is abundant so labor is productive and relatively expensive. The high-income country will produce and export the capital-intensive traded commodity while the low-income country will produce and export the labor-intensive commodity. Trade will equate the prices of traded commodities between countries. In the low-income country, a lower wage-rental ratio implies that one unit of more labor-intensive traded goods can be exchanged for more services than in the high-income country; this implies that the relative price of services is lower.

Quabria (1990) argues that Bhagwati's model with three goods (two-traded and one non-traded goods) and two factors will induce the following limitations: "factor prices are determined exogenously by international factors, domestic demand considerations are redundant for determining the prices of non-traded good" (Quabria p.358). He uses a two-factor (labor and capital), and two-commodity (traded and nontraded services) general equilibrium model. He then assumes that each commodity is produced under a constant return to scale production function, the non-traded service sector is labor intensive, and the country is a small, fully employed open economy. The prices of traded goods are given, while the price of non-traded goods is determined endogenously. He finds that with other things remaining the same, the larger population results in lower prices of services.

Both the "Productivity Differential Model" and the

"Factor Endowment Model" assume that the "law of one price" holds, i.e., prices of traded goods are equalized across countries by international trade. The difference between these two models is that the "Productivity Differential Model" relies on the difference in production functions, while the "Factor Endowment Model" relies on the difference in factor abundance.

Specific Factor Model: Clague (1985, 1986, 1988), and Panagariya (1988).

Clague (1985) has offered an explanation for the difference in price levels across countries. His approach also relies on differences in factor endowments but differs from the previous one in that he uses the specific-factor model. His model has two versions: a simpler and a more general version. In the simpler version, labor is the only mobile factor of production. There are three sectors; export, import-competing and services (domestically consumed services and tourist services). Export and import-competing industries are produced by using labor and specific factors while services are produced by using only labor. Prices in the service sector are determined domestically while prices of export and import-competing goods are determined by the international market. In the more general version, both capital and labor are the mobile factors. Services are produced by using capital and labor. Capital is also the

additional factor of production for the export and import-competing industries. Clague argues that, ceteris paribus, the relatively low prices of services in poor countries are the result of smaller endowments of specific factors.[3]

Panagariya (1988) has argued that scale economies may explain low service prices in LDCs. He uses a two-country (poor and rich), and three-sector (manufacturing, agricultural and services sector) model. He assumes that two commodities are traded but services are nontraded, manufacturing is subject to increasing returns to scale while agriculture and services exhibit constant returns. He also assumes that the two countries are identical except for size. This means that the rich country's endowment of each factor is more than that of the poor country by a fixed proportion. The rich country's manufacturing sector is larger than that of the poor country. Due to an increasing return to scale, the rich country's manufacturing will have lower unit costs. Thus the rich country has higher per capita income and its economy becomes relatively specialized in manufacturing. Higher per capita income will induce higher demands for services. On the other hand, the more specialized the manufacturing, the lower the relative supply of services. Higher demand for and lower supply of services result in the higher service prices in the rich country.

The distinction between Clague and Panagariya is that Panagariya allows increasing returns to scale in one of the

traded goods. The different result is due to country size. In Clague's model with constant returns to scale, country size will not affect the price level [proposition 2 in Clague (1985)]. But in Panagariya's model, as noted by Clague (1988), country size is the only source of difference in per capita income. Suppose that two countries have identical per capita resource endowments and technology; then the larger country will have higher per capita income and also higher prices of services.

Clague (1988) argues with Kravis and Lipsey about the appropriateness of including the foreign trade ratio as an explanatory variable. In all of Kravis and Lipsey's work, the foreign trade ratio[4] is included and found to have a positive relationship with the price level. The reason given by Kravis and Lipsey for including this variable is that greater exposure to trade will raise the price of a country's abundant factor of production. They assume that the poor country is labor-abundant, while the rich country is capital-abundant; nontradable services are labor-intensive relative to tradable goods. Thus, the greater exposure to trade will raise the price of labor and services in poor countries. So a poor country with greater exposure to trade is expected to have higher relative prices of services.

Clague points out that a country with a low foreign trade ratio is not necessarily viewed as being closer to autarky than a high foreign trade ratio country. In his formal model,

Clague points out that the foreign trade ratio might have a positive, zero or negative relationship with the price level. Variations in the foreign trade ratio are explained by using differences in resource abundance, resource diversity or trade barriers.[5] Only resource abundance supports Kravis and Lipsey's empirical results but this is not consistent with the explanation that they have.

Clague also considers the share of nontradables in GDP as an improper theoretical variable to include in the regression. The expected relationship of the nontradables' share and the price level depends on whether international variation in the nontradables' share arises from the supply side or the demand (or preference) side. If variations in the nontradables' share arises from the supply side, then, according to the specific factor model, the coefficient of the nontradables' share in the price level should be positive. This is consistent with Kravis and Lipsey's empirical work. But according to Clague, if the variation arises from the supply side, then the basic supply factors should belong in the regression, not the nontradables' share.

Economic Policy Model: Feldman and Gang (1987, 1990), and Feldman (1991).

Feldman and Gang (1987, 1990) and Feldman (1991) argue that low LDC service prices can be explained by the effects of economic policy. This is distinct from other literature.

Feldman and Gang (1987, 1990) develop a model that focuses on differential access to credit between rural (agriculture) and urban workers. They assume that in the urban economy the modern sector imposes a high minimum wage, while the wage in the informal sector (nontraded goods) is flexible. They also assume that the interest rate in the modern sector is zero and labor does not save or leave outstanding debt. They show that if the demand for agricultural labor is perfectly elastic (i.e., the wage rate is constant), then an increase in the interest rate paid by rural workers[6] will depress prices of non-traded goods. Financial repression[7] reduces rural workers' incomes, which causes them to migrate into the urban informal sector. This causes the wage rate in the urban informal sector, and also prices of non-traded goods, to fall.

Feldman (1991) develops a three-sector (manufacturing, agriculture and home goods) goods model to demonstrate the impact of two different policies: financial repression and tariff and subsidies,[8] on the prices of services. Manufacturing and home goods are produced in the urban region, while agricultural goods are produced in the rural region. Manufacturing and agricultural goods are internationally traded goods while the home goods sector is a nontraded service. The wage rate in the agricultural and home sectors is determined by the labor market, while a minimum wage is imposed in the manufacturing sector. He assumes that labor is

mobile between sectors but capital is a sector-specific factor. Home goods are produced by using only labor. He again finds that financial repression depresses service prices. This result is consistent with Feldman and Gang (1987, 1990).

The interesting result is that tariff and production subsidies can lower the nontraded services prices also. This is in contrast with the conventional wisdom which believes that protectionism pushes up the prices of nontraded goods.

Others: Bergstrand (1991), Falvey and Gemmell (1991) and Officer (1989).

Bergstrand (1991) tries to explain the variation in the real exchange rate by using both two supply-oriented hypotheses (the "Productivity Differential" and the "Factor-Endowments models) and the demand-oriented hypotheses. Assuming nonhomothetic tastes, the demand-oriented hypothesis suggests that nontraded services are luxuries, while traded commodities are necessities. For the supply side, he assumes that the economy produces two goods by using two factors (capital and labor), and both factors are under full employment. He shows that, assuming nonhomothetic tastes, countries with higher real per capita income will have higher demand for nontraded services relative to traded commodities. This raises the prices of services relative to commodities.

Falvey and Gemmell (1991) focus on the explanation of

differences in service prices across countries. They disagree with the previous studies which treat real income per capita as an exogenous variable. They argue that

> "differences in real income per capita are merely a proximate cause of price differences, while the true "causes" are the underlying technology or factor endowment. Treating real income as an exogenous rather than an endogenous variable makes the interpretation of the resulting equation rather difficult" [Falvey and Gemmell (1991) p.1296].

They assume that production functions across countries are identical[9] and treat real income per capita as an endogenous variable. They then develop a model in which differences in prices of services and real income per capita across countries are expressed as functions of factor endowments, the trade balance, population and the price of traded goods. One of the interesting results is that real income and prices of services are not necessarily positively correlated.

Officer (1989) criticizes the existing studies of national price levels. He argues that there is an analytical relationship between the price level and the nontradable/ tradable price ratio that is based on the specific index selected for purchasing power parity. Previous econometric studies have ignored this analytical relationship, which leads to improper specifications. Based on the analytical relationship, the share of nontradables in output should be included as an independent variable in the price level regressions if a Paasche, Fisher, or Geary-Khamis purchasing power parity index is used.

Officer suggests that the nontradable/tradable price ratio should be used as a dependent variable instead of the price level because the structural determinants of the price level operate through affecting this ratio. In the case where nontradable/tradable price ratio data are not available, he suggests using the analytical relationship between the price level and the nontradable/tradable price ratio to convert price level data to nontradable/tradable price ratio data.

Officer rejects use of short run variables, particularly monetary variables, in his empirical study. To the extent that the "law of one price" holds, he believes that the variables that should be included in the price level regression should be the ones that directly affect the nontradable/tradable price ratio or are part of the analytical relationship between the price level and the price ratio. If the "law of one price" does not hold, Officer suggests that the factors which explain the failure of the "law of one price", such as monopoly and oligopoly, transportation costs, product differentiation, and trade restriction be included in the regression.

He also criticizes previous studies for not investigating the relative importance of the determinants of the price level. The literature always assumes that real per capita income is the most important explanatory variable. In his empirical study, by using the "beta coefficient"[10] Officer finds that natural resources, instead of real income per

capita, are the most important explanatory variable.

Clague (1989) compliments Officer for his contribution in developing the analytical relationship between the price level and the nontradable/tradable price ratio. While he agrees with Officer that the share of nontradables and price level are determined jointly, he disagrees about including the share of nontradables in the price level or the relative price of nontradables to tradables ratio equation. In Officer's empirical results, the natural resource variable has a negative, instead of positive, sign as suggested in Clague's (1985) model. It is possible that Officer's data on natural resource measures demand for instead of supply of natural resources. Clague also criticizes Officer for excluding monetary variables from the regression. Clague argues that the existence of product differentiation and market imperfection allow monetary factors to influence the price level.

Table 1.4 presents a summary of expected and empirical results of the relationship between service prices (and price level) and explanatory variables from the literature.

TABLE 1.4 SUMMARY OF LITERATURE

Authors	Dependent Variable	Independent Variable	Expected Sign	Empirical Results
1. Productivity Differential Model				
Balassa(1964), Samuelson(1964) Kravis, Heston and Summers(1982)	Prices of Services	Productivity of Labor	+	
2. Factor Endowment Model				
Bhagwati(1984)	Prices of Services	Relative Labor Abundance	+	
Kravis and Lipsey(1983)	Price Level	Real GDP Per Capita Openness Share of Nontradable in GDP Educated and Skilled Personnel Abundant Resources Money Growth	+ + + - + -	+ + + N.A. N.A. -
Kravis and Lipsey(1988)	Prices of Nontradable	Real GDP Per Capita Openness Share of Tradable in GDP	+ + -	+ + -
Quabria(1990)	Prices of Services	Population	-	

TABLE 1.4 (CONTINUED)

Authors	Dependent Variable	Independent Variable	Expected Sign	Empirical Results
3. Specific - Factors Model				
Clague(1985)	Price Level	1. Simple Version (Labor,Specific Factor) Factor Endowment -Specific Factor Tourism Efficiency Term of Trade 2. General Version (Capital,Labor,Specific Factor) Factor Endowment -Specific Factor -Capital Efficiency Tourism	 + + + ambiguous + ambiguous + +	
Clague(1986)	Price Level	Real Income Per Capita Trade Balance Mineral Share in GDP Tourism Education Money Growth	+ - + + - -	+ - + + - -

TABLE 1.4 (CONTINUED)

Authors	Dependent Variable	Independent Variable	Expected Sign	Empirical Results
3. Specific - Factors Model(cont.)				
Clague(1988)	Price Level	Real Income Per Capita	+	+
		Resources Abundance	+	
		-Share of Mineral Production in GDP		+
		-Population Density		-
		Level of Educational Attainment	-	-
		Foreign Trade Ratio	ambiguous	-
		Trade Balance	-	nil
		Tourism	+	nil
		Money Growth	-	-
Panagariya (1988)	Prices of Services	Economies of Scale	-	
4. Economic Policy Model				
Feldman and Gang(1987,1990)	Relative Price of Non-Traded Goods	GDP/M_2 (financial repression)	-	-
Feldman(1991)	Prices of Services	Financial Repression	-	
		Tariff	-	
		Output Subsidy	-	

TABLE 1.4 (CONTINUED)

Authors	Dependent Variable	Independent Variable	Expected Sign	Empirical Results
5. Others				
Bergstrand (1991)	Relative Prices of Services to Commodities	Productivity in Commodities Relative to Services	+	
		Capital:labor Endowment Ratio	+	
		Real GDP Per Capita	+	
Falvey and Gemmell(1991)	Prices of Services	Factor Endowment	ambiguous	
		-Agricultural Land		+
		-Mineral Resources		+
		-Skilled and Unskilled Labor		-
		-Capital		+
		Population	ambiguous	-
		Real Trade Deficit	+	+
		Prices of Tradable	+	+
Officer(1989)	National Price Level,Nontradable /Tradable Price Level Ratio	Real GDP Per Capita	+	+
		Share of International Services	ambiguous	+
		Natural Resources	ambiguous	-
		Literacy	-	-
		Share of Nontradable	+	+

Notes

1. Because when each country's quantities are measured in international prices, the share of income spent on services remains at almost the same level as per capita income rises.

2. $P = PPP/ER$ (1)

where P is price level, PPP is purchasing power parity, and ER is exchange rate expressed as domestic currency per unit of base country currency.

A purchasing power parity measures prices of goods in a given country relative to prices in a base country. PPP can be expressed as an index of prices of importables (P_1), exportables (P_2), and nontradables goods (P_3) as follow:

$$PPP = (P_1/P_1^0)^{\phi_1}(P_2/P_2^0)^{\phi_2}(P_3/P_3^0)^{\phi_3}$$

where P_i are given country's prices, P_i^0 are base country's prices, and ϕ_i are consumption weights.

If the "law of one price" holds, then prices of traded goods are equalized across countries :

$$P_1 = P_1^0 ER$$

$$P_2 = P_2^0 ER$$

If the "law of one price" holds and the consumption weights of nontradables are the same across countries, the price level in (1) can be expressed as :

$$P = PPP/ER = (P_3/P_3^0)$$

3. Actually, all of the theoretical results can be reported as the following three propositions [Clague (1985) p.1003-1005];

> "Proposition 1. If two countries have the same level of real income, the one with the inferior endowment of natural resources will have a lower real price level.
>
> Proposition 2. If a large and a small country have the same combined value of specific resources per capita and the same real income per capita, and if the labor intensity of the export and import-competing sectors are equal, the two countries will have the same real price level.
>
> Proposition 3. If two countries have the same level of per capita resource endowments and real income, the one with the greater tourist receipts and the inferior factor efficiency will have a higher real price level."

4. This is "openness" according to Kravis and Lipsey.

5. If variation in the foreign trade ratio across countries is due to differences in resource abundance, in the specific-factor model, comparing two countries with identical population and per capita incomes shows that, if relative resource abundance occurs in the export sector, the country with higher resource abundance will have a higher foreign trade ratio and therefore a higher price level.

The more resource-diverse is the endowment, the greater is self-sufficiency or the lower is the foreign trade ratio. In Clague's model, an increase in resource diversity can be captured by an increase in the endowment of the specific factor in the import-competing industry combined with a decrease in the endowment of the specific factor in export sector. The price level will not affect the outcome as long as the total endowment of resources per capita does not change.

The degree of openness in a country with higher trade barriers will be less than the one with lower trade barriers. In the specific-factor model, the country with higher import barriers will have a higher price level.

6. This is called "financial repression" according to Feldman and Gang (1987).

7. "Financial repression describes a set of policies that extract revenue from financial system and use the system to funnel resources into specific sectors of the economy" [Feldman and Gang (1987) p.31].

8. Tariffs and production subsidies have been used to promote import-competing industries.

9. Because production functions are assumed to be identical across countries, the "Productivity Differential" explanation of differences in the price level can not be applied.

10. The "beta coefficient" is the product of the estimated coefficient and the ratio of the standard deviation to the mean.

CHAPTER 2

DETERMINANTS OF SERVICE PRICES IN DEVELOPING COUNTRIES

I. INTRODUCTION

The excessive level of urban unemployment, which results from the flow of rural workers to the cities, is a serious problem in most of the less developed countries (LDCs). Wages in the urban areas in LDCs are institutionally maintained above the market-clearing level while the wages in rural areas are determined at the market clearing level. In the presence of artificially high wages in urban areas, unemployment will persist.

The literature which explains the differences in national price levels and/or service prices by using structural variables such as factor endowments, trade balance etc. has two deficiencies. First, all of the models that were used in previous studies employed the full employment assumption. In general, this assumption is not true especially when applied to the developing countries. Moreover, none of the previous studies pays attention to the model of developing countries. The previous models were applied to both developed and developing countries. These models might not be suitable for the developing countries. As pointed out by Kravis and Lipsey (1983), developing countries (and two centrally planned economies) do not fit the model as well as the developed countries. The objectives of this chapter are:

1. To develop a model explaining the differences in service prices in developing countries by taking urban unemployment into account. The generalized Harris-Todaro model incorporating services will be used;[1]

2. To compare the predicted results from the current model with those from the recent study by Falvey and Gemmell (1991). In doing so, the variables explaining the international differences in the prices of services will be the same, i.e., the factor endowments, the price of tradables (or the terms of trade corresponding to the current model), the balance of trade and population;

3. To extend the model by including an additional variable, tourism, for explaining the differences in service prices in LDCs.

The rest of this chapter is organized as follows: Section II describes the supply and demand sides of the model. Section III provides a complete model. Section IV explores the effects of factor endowments, population, the trade balance and the terms of trade on service prices. Section V compares the predicted results to Falvey and Gemmell's results and also discusses the specification of the regression equation which is used to estimate the relationship of service prices and explanatory variables. Section VI presents the Extended Model, investigates the effects of factor endowments, population, trade balance, the terms of trade and tourism on service prices, and also further discusses the specification

of the regression equation. Section VII presents the conclusion.

II. Supply and Demand Sides of the Model

A small open economy consisting of two regions which produce two traded goods and urban services (a non-traded good) can be considered as follows:[2]

Urban region: This region produces a manufacturing good (X) and urban services (or nontraded goods,Z)[3], which are produced by using labor and capital specific to each sector.

Rural region: Only the agricultural good (Y) is produced in the rural region. It is produced with the help of labor and land or mineral resources.

Labor is perfectly mobile, and is used in the production of all the goods in both regions; the sector-specific factor is completely immobile. We assume that all the goods markets operate under perfect competition and each good is produced by utilizing constant returns to scale technology. Factors exhibit positive but diminishing marginal products and positive cross-partial derivatives. Let the country export agricultural goods and import manufacturing goods with given world prices.[4]

Supply Side of the Model

Production functions in the urban manufacturing sector, urban services sector and rural agricultural sector are given

by the following:

$$X = X(L_x , K) \tag{1}$$

$$Z = Z(L_z , V) \tag{2}$$

$$Y = Y(L_y , T) \tag{3}$$

where L_i denotes employment of labor of the i th sector (i = X, Z, Y). K and V denote employment of capital specific to the urban manufacturing sector and urban services, respectively. T denotes land or mineral resources used in the rural sector.

As in the Harris-Todaro's (1970) model, the urban wage (W_x) is institutionally set at levels higher than the market-clearing level and therefore creates urban unemployment. The rural wage (W_y) is determined by the labor market. By following the Harris-Todaro model, an equilibrium is achieved when the rural wage, W_y, is equal to the expected urban wage which is defined as the minimum wage (W_x) weighted by the probability of employment in the urban region. Thus, there is a wage differential between the rural and urban areas.

Let L_u denote the level of urban unemployment. The migration equilibrium condition can be written as,

$$W_x = (1 + \lambda)W_y \tag{4}$$

where $\lambda = L_u/(L_x + L_z)$ is the ratio of the unemployed to the

urban employed or the urban unemployment ratio, and hence, $1/(1 + \lambda)$ represents the probability of finding a job.

By the perfect competition assumption, labor is paid according to its value of marginal product, that is:

$$W_x = P_t \, X_L \tag{5}$$

$$W_x = P_n \, Z_L \tag{6}$$

$$W_y = Y_L \tag{7}$$

where P_t denotes the relative price ratio of good X in terms of good Y. P_n denotes the relative price ratio of good Z in terms of good Y. Note that $X_L = \partial X/\partial L_x$ is the marginal product of labor for the manufacturing good, etc.

The relative price of services, P_n, needs to be determined endogenously while the relative price of the traded good, P_t, is fixed by the small country assumption.

Let $\bar{L}$ be the inelastic supply endowment of labor. Labor market equilibrium requires that labor demand equals its supply:

$$(1 + \lambda)(L_x + L_z) + L_y = \bar{L} \tag{8}$$

The market equilibrium for specific factors also requires that the specific factor demand in sector i (i = X, Z, Y), respectively, is equal to the specific factor supply in sector i ; that is:

$$K = \bar{K} \tag{9}$$

$$V = \bar{V} \tag{10}$$

$$T = \bar{T} \tag{11}$$

where $\bar{K}$ and $\bar{V}$ denote the endowments of capital specific to the manufacturing good and urban services sectors, respectively; and $\bar{T}$ is the quantity of land or mineral resources available.

This completes the specification of the supply side of the extended Harris-Todaro model. By facing the given relative goods' prices, P_t and P_n , and the factor endowments ($\bar{K}$, $\bar{V}$, $\bar{T}$ and $\bar{L}$), firms determine the optimal amount of labor employment, L_i , i.e., $L_i = L_i(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})$. Hence, the production functions in (1) - (3) can be expressed as functions of the goods' prices and the factor endowments:

$$X = X(L_x, K) = X(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \tag{12}$$

$$Z = Z(L_z, V) = Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \tag{13}$$

$$Y = Y(L_y, T) = Y(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \tag{14}$$

Relegating the mathematics of the comparative statics to Appendix 1, the consequences of changes in goods prices and factor endowments on the production of each good are as follows:

An increase in the price of the manufacturing goods (P_t) will lower the real wage in the manufacturing sector and lead

firms to employ more workers. The additional workers in the manufacturing might be obtained from urban unemployed workers and/or directly from the rural areas. Therefore, an increase in the manufacturing price will increase manufacturing output and reduce agricultural output, but will not affect the production of services. The results can be denoted as $\partial X/\partial P_t > 0$, $\partial Y/\partial P_t < 0$ and $\partial Z/\partial P_t = 0$. Similarly, the results of a change in the service prices are as follows: $\partial X/\partial P_n = 0$, $\partial Y/\partial P_n < 0$ and $\partial Z/\partial P_n > 0$.

An increase in manufacturing capital ($\bar{K}$) will induce higher production of the manufacturing good. As a result, the demand for labor in the manufacturing sector will increase. Firms can obtain additional workers from the unemployed and/or from the rural regions. Hence, an increase in manufacturing capital increases the supply of the manufacturing good, reduces the agricultural good and leaves the production of services unaffected. That is, $\partial X/\partial \bar{K} > 0$, $\partial Y/\partial \bar{K} < 0$ and $\partial Z/\partial \bar{K} = 0$. Similarly, an increase in the services capital will not affect the production of the manufacturing good but will increase services and reduce the supply of the agricultural good: $\partial X/\partial \bar{V} = 0$, $\partial Z/\partial \bar{V} > 0$ and $\partial Y/\partial \bar{V} < 0$. Increases in land or mineral resources have no effect on the production of manufacturing and services but will increase the supply of the agricultural good: $\partial X/\partial \bar{T} = 0$, $\partial Z/\partial \bar{T} = 0$ and $\partial Y/\partial \bar{T} > 0$. The results of changes in labor endowments are $\partial X/\partial \bar{L} = 0$, $\partial Z/\partial \bar{L} = 0$ and $\partial Y/\partial \bar{L} > 0$, respectively.

Changes in goods prices and factor endowments also affect urban unemployment. An increase in P_t, P_n, $\bar{K}$ and $\bar{V}$ will push up the value of the marginal product of labor in the manufacturing or services sector. This leads to an increase in the demand for labor in the urban area which results in a fall in urban unemployment. On the other hand, the higher expected urban wage causes labor to migrate from the rural to the urban area which raises urban unemployment. But as shown in Appendix 1, the increase in demand for labor dominates the rural-urban migration. So the net result is the urban unemployment ratio decreases, i.e., $\partial\lambda/\partial P_t < 0$, $\partial\lambda/\partial P_n < 0$, $\partial\lambda/\partial\bar{K} < 0$ and $\partial\lambda/\partial\bar{V} < 0$. An increase in land or mineral resources will increase output of the agricultural good. This induces a higher demand for labor in the agricultural sector, which can be obtained from the urban unemployed workers. Hence, the urban unemployment ratio reduces, i.e., $\partial\lambda/\partial\bar{T} < 0$. The increase in labor endowment will increase the agricultural production which will demand more labor. The additional demand for labor might be met by the increased labor endowment and/or by urban unemployed workers. However, the higher labor endowment might cause higher urban unemployment. As shown in Appendix 1, the higher urban unemployment is dominant, i.e., $\partial\lambda/\partial\bar{L} > 0$.

The supply side of the model can be represented by the GNP function or the economy's revenue function, which is the maximized value of total production of the economy, i.e.,

$R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) = \max \{P_t X(L_x, \bar{K}) + P_n Z(L_z, \bar{V}) + Y(L_y, \bar{T})$ subject to $(1 + \lambda)(L_x + L_z) + L_y = \bar{L}\}$ with respect to L_i, $i = X, Z, Y$. From the first-order conditions of the revenue maximizing problem, we get $R_{\bar{K}} = \partial R/\partial \bar{K} = P_t X_{\bar{K}}$, $R_{\bar{V}} = \partial R/\partial \bar{V} = P_n Z_{\bar{V}}$, $R_{\bar{T}} = Y_{\bar{T}}$, $R_{\bar{L}} = Y_{\bar{L}}$, $R_\lambda = \partial R/\partial \lambda = - W_y(L_x + L_z)$,[5] where $X_{\bar{K}} = \partial X/\partial \bar{K} > 0$, $Z_{\bar{V}} = \partial Z/\partial \bar{V} > 0$, $Y_{\bar{T}} = \partial Y/\partial \bar{T} > 0$ and $Y_{\bar{L}} = \partial Y/\partial \bar{L} > 0$.

Demand Side of the Model

We assume that an economy is inhabited by N[6] identical individuals. An individual's expenditure function can be defined as:

$e(P_t, P_n, u) = \min(P_t c_x + P_n c_z + c_y)$, with respect to c_x, c_z and c_y, subject to $u(c_x, c_z, c_y) \geq u$, where c_i denotes consumption on good i, $i = x, z, y$.

Given that all individuals are identical, we can write aggregate expenditure in this economy as:

$$E(P_t, P_n, u) = N\, e(P_t, P_n, u)$$

III. The Basic Model

The general equilibrium of an economy can be described by the following 2 conditions: 1. The aggregate budget constraint is satisfied; and 2. The domestic market for the services is in equilibrium:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) + b \quad (15)$$

$$E_{pn}(P_t, P_n, u) = R_{pn}(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda)$$
$$= Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \quad (16)$$

where b denotes the balance of trade deficit in nominal terms, $E_{pn}(\cdot) = \partial E/\partial P_n$ is the equilibrium demand for services, and $R_{pn} = \partial R/\partial P_n$ is the equilibrium supply of services.

Note that, from the above comparative static's results, we obtain that λ is a function of P_t, P_n, $\bar{K}$, $\bar{V}$, $\bar{T}$ and $\bar{L}$. So equations (15) and (16) contain seven exogenous variables (P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$, N, b) and two unknown variables (u and P_n). With two equations and two unknowns, the model is determined and can be solved for equilibrium u and P_n.

IV. The Effects of Exogenous Changes

This part will consider the effects of exogenous changes on the service prices. Exogenous changes will be considered in four cases:

1. changes in factor endowments,
    1.1 changes in specific factor endowments ($\bar{K}$, $\bar{V}$ and $\bar{T}$),
    1.2 changes in labor force ($\bar{L}$),
2. changes in the terms of trade (P_t),
3. changes in the balance of trade (b), and
4. changes in population (N).

For simplicity of explanation, we follow Beladi and Chao (1992) by assuming that $m = (P_n E_{pn.u})/E_u$ denotes the domestic consumers' marginal propensity to consume services which lies in [0,1], where $E_{pn.u} = \partial E_{pn}/\partial u$, and $E_u = \partial E/\partial u$; $c = -(P_n/E_{pn})(\partial E_{pn}/\partial P_n)$ denotes the consumption substitution for a given utility in response to change in P_n, $s = (P_n/Z)(\partial Z/\partial P_n)$ denotes the substitution in production response to a change in P_n along the transformation frontier, and $\beta = -(W_y/P_n)(L_x + L_z)(\partial\lambda/\partial P_n)/(\partial Z/\partial P_n)$. By using the comparative-static results in Appendix 1, we can show that $\beta = Z_L Y_{LL}(1 + \lambda)(L_x + L_z)/[Z_L Y_{LL}(1 + \lambda)(L_x + L_z) - Z_L Y_L]$, which lies in [0,1].

To derive the expressions for changes in the exogenous variables, we differentiate (15) and (16) to yield:

$$E_u du + [W_y(L_x + L_z)\partial\lambda/\partial P_n]dP_n = [(R_{pt} - E_{pt}) - W_y(L_x + L_z)\partial\lambda/\partial P_t]dP_t - e(P_t, P_n, u)dN + [P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]d\bar{K} + [P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}]d\bar{V} + [Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]d\bar{T} + [Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]d\bar{L} + db \quad (17)$$

$$E_{pn.u} du - (c + s)z/p_n dP_n = (E_{pt} - E_{pn.pt})dP_t + Z_{\bar{V}} d\bar{V} + Z_{\bar{L}} d\bar{L} \quad (18)$$

By using Cramer's rule, we can solve for the impacts of exogenous changes on the service prices.

1. Changes in Factor Endowments

1.1 The impact of changes in manufacturing capital:

$$\partial P_n/\partial \bar{K} = \{m[P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]\}/z\{c + s(1 - m\beta)\} \quad (19)$$

Equation (19) shows that the impact of manufacturing capital on service prices consists of two effects. The first term on the RHS of (19) represents the direct growth effect ($R_{\bar{K}} = P_t X_{\bar{K}} > 0$) while the second term is the gain from the growth-induced employment effect. Both effects have positive impacts on service prices. Hence, an increase in manufacturing capital unambiguously raises service prices. This result gives us proposition 1:

PROPOSITION 1: Other things being equal, the developing country which is endowed with more (less) manufacturing capital will have higher (lower) service prices.

1.2 The impact of changes in land or mineral resources:

$$\partial P_n/\partial \bar{T} = \{m[Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]\}/z\{c + s(1 - m\beta)\} \quad (20)$$

The impact of land or mineral resources on service prices consists of the direct growth effect ($R_{\bar{T}} = Y_{\bar{T}} > 0$); which is represented by the first term on the RHS of (20); and the gain from the growth-induced employment effect, which is the second term in equation (20). As a result, an increase in land or mineral resources unambiguously raises service prices. This leads to the following proposition:

PROPOSITION 2: The developing country which is endowed with more (less) land or mineral resources will have higher (lower) service prices, other things being equal.

1.3 The impact of changes in services capital:

$$\partial P_n/\partial \bar{V} = \{-P_n Z_{\bar{V}} + m\{P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}\}/z\{c + s(1 - m\beta)\} \quad (21)$$

The impact of changes in services capital consists of a supply response, which is represented by the first term on the RHS of (21), and a demand response, which is represented by the second and third terms on the RHS of (21). The demand response consists of the direct growth effect and the growth-induced employment effect which are represented by the second and third terms, respectively. The supply response of an increase in services capital results in a reduction of service prices, while the demand response will push up service prices. As a result, an increase in services capital has an ambiguous effect on service prices. This result leads to the third proposition:

PROPOSITION 3: Other things being equal, the developing country endowed with relatively more services capital will have higher service prices than the one with relatively less services capital if supply effect is dominated by the direct growth effect and the growth-induced employment effect.

1.4 The impact of changes in labor endowments:

$$\partial P_n/\partial \bar{L} = \{-P_n Z_{\bar{L}} + m[Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]\}/z\{c + s(1\ m\beta)\} \quad (22)$$

The supply response and demand response comprise the impacts of labor endowments on service prices. The first term on the RHS of (22) denotes the supply response, whereas the demand response is expressed by the second and third terms. Recalling that $Z_{\bar{L}} = 0$, only the demand response affects service prices. The demand response consists of two effects: the direct growth effect which is represented by $Y_{\bar{L}}$ (= $R_{\bar{L}} > 0$), and the loss from the induced unemployment effect which is the third term on the RHS. These two effects work in opposite directions. The direct growth effect raises the service prices while the induced unemployment effect will lower the service prices. Hence, there is an ambiguous effect of labor endowments on the service prices. The above result can be used to develop the following proposition:

PROPOSITION 4: Other things being equal, the developing country with the relatively greater labor endowment will have higher (lower) service prices than the one with relatively lower labor endowment if the gain from direct growth of the labor endowment is more (less) than the loss from the unemployment effect.

2. The Impact of Changes in the Terms of Trade:

$$\partial P_n/\partial P_t = \{-P_n Z_{pt} + P_n E_{pn.pt} + m[(R_{pt} - E_{pt}) - W_y(L_x + L_z)\partial\lambda/\partial P_t]\}/z\{c + s(1 - m\beta)\} \quad (23)$$

where $E_{pn.pt} = \partial C_z/\partial P_t > 0$ by assuming that manufacturing and services are substitute goods in consumption.

Equation (23) shows that there are two parts for the impact of the terms of trade deterioration on the price of services: the supply response and the demand response. The first term on the RHS of (23) represents the supply response. Recall that $Z_{pt} = 0$, so the supply response has no effect on service prices. The second and third terms represent the demand response which consists of the substitution effect and the income effect, respectively.

The income effect consists of the direct loss of the terms-of-trade deterioration and the gain from price-induced employment. The substitution effect and the price-induced employment effect will raise service prices. But the direct loss of the terms-of-trade deterioration will lower service prices. Hence, the effect of the terms of trade on service prices is ambiguous.[7]

The above result gives us the following proposition:

PROPOSITION 5: Other things being equal, the developing country with relatively higher terms of trade deterioration will have higher service prices compared to the one with

relatively lower terms of trade deterioration if the substitution effect and the price-induced employment dominate the direct loss of the terms-of-trade decline.

3. The Impact of the Balance of Trade:

$$\partial P_n/\partial b = m/z\{c + s(1 - m\beta)\} \quad (24)$$

Equation (24) shows that the trade deficit has a positive effect on the price of services. Trade deficit implies that people in that country spend more than they earn. This will cause excess demand in the services market. Service prices need to increase in order to eliminate this excess demand. The magnitude of the marginal propensity to consume services will determine the magnitude of the impact of the trade deficit on service prices. This leads to the following proposition:

PROPOSITION 6: Other things being equal, the developing country with the relatively higher (lower) trade deficit will have higher (lower) service prices.

4. The Impact of Population:

$$\partial P_n/\partial N = \{-me(P_t, P_n, u)\}/z\{c + s(1 - m\beta)\} \quad (25)$$

Equation (25) expresses that increases in population will lower the service prices. An increase in population will lower expenditure per capita and this will lower service prices. The magnitudes of the marginal propensity to consume

services and of the real income per capita will determine the magnitude of the impact of population on service prices. This result gives us the following proposition:

PROPOSITION 7: Other things being equal, the developing country with more (less) population will have lower (higher) service prices.

V. Empirical Implications

Comparison of the Predicted Results

In this part the expected results of changes in the exogenous variables on the prices of services from the above model and those from Falvey and Gemmell's (1991) model will be compared. These can be summarized in table 2.1.

TABLE 2.1 COMPARISON OF THE EXPECTED RESULTS FROM CURRENT MODEL TO FALVEY AND GEMMELL'S

EXOGENOUS VARIABLES	FALVEY AND GEMMELL'S	CURRENT MODEL'S
1. factor endowments[1]	ambiguous	
1.1 land		+
1.2 mineral resources		+
1.3 labor		ambiguous
1.4 capital		
1.5 manufacturing capital		+
1.6 services capital		ambiguous
2. price of tradables /terms of trade[2]	+	ambiguous
3. balance of trade[3]	+	+
4. population	ambiguous	-

Note that :

1. Falvey and Gemmell's model does not separate each factor endowment effect, but items 1.1-1.4 are included in their empirical study.

2. This is the price of tradables according to Falvey and Gemmell's model but substitutes the terms of trade according to the current model.

3. Falvey and Gemmell consider the balance of trade in real terms but the current model considers balance of trade in nominal terms.

The Specification of the Regression Equation

The objective of this chapter is to explain differences in service prices across the developing countries by using the model developed in section II. Therefore, we specify an equation relating service prices (P_n) to the following exogenous variables:

- manufacturing capital ($\bar{K}$),
- services capital ($\bar{V}$),
- land (T_d),
- mineral resources (T_m),
- labor which includes both skilled labor (L_s) and unskilled labor (L_{un}),
- the terms of trade (P_t),
- balance of trade (b), and
- population (N).

This gives the following estimating equation:

$$P_n = \theta_0 + \theta_1\bar{K} + \theta_2\bar{V} + \theta_3 T_d + \theta_4 T_m + \theta_5 L_s + \theta_6 L_{un} + \theta_7 P_t + \theta_8 b + \theta_9 N + d \qquad (26)$$

where θ_0 is constant,

$\theta_1 = \partial P_n/\partial\bar{K} > 0$,

$\theta_2 = \partial P_n/\partial\bar{V} \gtrless 0$,

$\theta_3 = \partial P_n/\partial T_d > 0$,

$\theta_4 = \partial P_n/\partial T_m > 0$,

$\theta_5 = \partial P_n/\partial L_s \gtrless 0$,

$\theta_6 = \partial P_n/\partial L_{un} \gtrless 0$,

$\theta_7 = \partial P_n/\partial P_t \gtrless 0$,

$\theta_8 = \partial P_n/\partial b > 0$,

$\theta_9 = \partial P_n/\partial N < 0$, and

d is a random error term.

VI. Extended Model

This part consists of three sections. First, the Extended Model will be developed by including tourism as an additional variable, then the effects of the exogenous variables on the service prices will be explored. Finally, the specification of the regression equation will be discussed.

The Extended Model

In the previous section, it was assumed that services are nontradables. But in fact, some services that are bought from or sold to foreigners become tradables.[8] For example, expenditures by Thais when traveling abroad are in fact Thailand's imports of services whereas expenditures of foreign tourists in Thailand are Thailand's exports of services. Governments, especially in some developing countries, try to promote the tourist sector because tourism is a major source of export earnings. Tourists might affect the domestic

service prices because tourists need the services from restaurants, hotels, travel agents,etc. Tourist expenditure represents additional demand for domestic services causing an increase in service prices, so it is reasonable to include tourism as one of the explanatory variables for international differences in service prices.

The supply side of the Basic Model [equ.(1) to (14)] can apply to the Extended Model. But for the demand side, we need to consider the tourist demand for domestic services which is given by:

$$D^N(P_t, P_n, \alpha)$$

where α is a shift parameter, $\partial D^N/\partial P_t > 0$, $\partial D^N/\partial P_n < 0$ and $\partial D^N/\partial \alpha > 0$.

The general equilibrium of an economy can be described by the following conditions: 1. The aggregate budget constraint is satisfied, and 2. The market for services is in equilibrium, i.e., the domestic and tourist demand for services is equal to domestic supply of services:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) + b \qquad (27)$$

$$E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) = R_{pn}(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) = Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \qquad (28)$$

Equations (27) and (28) contain eight exogenous variables (P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$, N, b, α) and two unknown variables (P_n and u). Therefore, the model is determined.

The Effects of Exogenous Changes

Exogenous changes will be considered in five cases:

1. changes in factor endowments ($\bar{K}$, $\bar{V}$, $\bar{T}$ and $\bar{L}$),
2. changes in the terms of trade (P_t),
3. changes in balance of trade (b),
4. changes in population (N), and
5. changes in tourism (α).

By totally differentiating (27) and (28), we obtain

$$E_u du + [-D^N + W_y(L_x + L_z)\partial\lambda/\partial P_n]dP_n = [(R_{pt} - E_{pt}) - W_y(L_x + L_z)\partial\lambda/\partial P_t]dP_t - e(\cdot)dN + [P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]d\bar{K} + [P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}]d\bar{V} + [Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]d\bar{T} + [Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]d\bar{L} + db \quad (29)$$

$$E_{pn}du - (1/P_n)[cE_{pn} + sZ + tD^N]dP_n = [Z_{pt} - E_{pn.pt} - D^N_{pt}]dP_t - D^N_\alpha d\alpha + Z_{\bar{V}}d\bar{V} + Z_{\bar{L}}d\bar{L} \quad (30)$$

where $t = -(\partial D^N/\partial P_n)(P_n/D^N)$ denotes the elasticity of tourist demand for domestic services.

By solving equations (29) and (30), the comparative-static results of the impacts of exogenous changes on service prices are as follows:

1. Changes in Factor Endowments:

1.1 The impact of changes in manufacturing capital:

$$\partial P_n/\partial \bar{K} = \{m[P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]\}/A \qquad (31)$$

1.2 The impact of changes in land or mineral resources:

$$\partial P_n/\partial \bar{T} = \{m[Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]\}/A \qquad (32)$$

1.3 The impact of changes in services capital:

$$\partial P_n/\partial \bar{V} = \{-P_n Z_{\bar{V}} + m\{P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}\}/A \qquad (33)$$

1.4 The impact of changes in labor endowments:

$$\partial P_n/\partial \bar{L} = \{-P_n Z_{\bar{L}} + m[Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]\}/A \qquad (34)$$

2. The Impact of Changes in the Terms of Trade:

$$\partial P_n/\partial P_t = \{-P_n Z_{pt} + P_n E_{pn.pt} + P_n D^N_{pt} + m[(R_{pt} - E_{pt}) - W_y(L_x + L_z)\partial\lambda/\partial P_t]\}/A \qquad (35)$$

where $A = cE_{pn} + sZ(1 - m\beta) + tD^N - mD^N$, which is positive by the stability condition that $sZ(1 - m\beta) + tD^N + cE_{pn} > mD^N$.[9]

The first term on the RHS of (35) represents the supply response while the second, third and fourth terms represent the demand response. The demand response consists of the substitution effect which is represented by the second and third terms and the income effect which is the fourth term.

By introducing tourism into the model, one additional term is obtained, i.e., the substitution effect due to tourists which has a positive effect on service prices.

3. The Impact of Balance of Trade:

$$\partial P_n/\partial b = m/A \tag{36}$$

4. The Impact of Population:

$$\partial P_n/\partial N = \{-me(P_t, P_n, u)\}/A \tag{37}$$

The results from equations (31)-(37) show that all the propositions in section III can also apply to the Extended Model. Introducing tourism into the model may increase[10] the magnitude of the impacts of factor endowment, the terms of trade, trade deficit, and population on service prices while the expected results are still the same as the previous model in section IV.

5. The Impact of Tourism:

$$\partial P_n/\partial \alpha = \{P_n D_\alpha^N\}/A \tag{38}$$

Equation (38) shows that an increase in tourism increases the service prices. Following Copeland (1991), the RHS of equation (38) can be decomposed as:

$$\partial P_n/\partial \alpha = \{D_\alpha^N/(A - mD^N)\}\{P_n + [mP_nD^N/A]\} \tag{38.1}$$

Equation (38.1) shows that the changes in tourism on

service prices consist of two effects. By following Corden and Neary's (1982) terminology, the first term on the RHS of equation (38.1) represents the direct effect which is the increase in service prices. The second term on the RHS of equation (38.1) represents the indirect spending effect which is induced by the real income change.

This leads to the following proposition:

PROPOSITION 8: Other things being equal, the developing country with relatively greater (lesser) tourist receipts will have higher (lower) service prices.

When comparing the effect of tourism on service prices with Copeland's (1991) result (with the full employment assumption), it is found that the current model predicts a higher magnitude of changes in service prices and welfare effect.[11]

Specification of the Regression Equation

The estimating equation of the extended model is as follow:

$$P_n = \mu_0 + \mu_1\bar{K} + \mu_2\bar{V} + \mu_3 T_d + \mu_4 T_m + \mu_5 L_s + \mu_6 L_{un} + \mu_7 P_t + \mu_8 b + \mu_9 N + \mu_{10}\alpha + d_1 \quad (39)$$

where μ_0 is a constant term,

$\mu_1 = \partial P_n/\partial\bar{K} > 0$,

$\mu_2 = \partial P_n/\partial\bar{V} \gtrless 0$,

$\mu_3 = \partial P_n/\partial T_d > 0$,

$\mu_4 = \partial P_n/\partial T_m > 0$,

$\mu_5 = \partial P_n/\partial L_s \gtrless 0$,

$\mu_6 = \partial P_n/\partial L_{un} \gtrless 0$,

$\mu_7 = \partial P_n/\partial P_t \gtrless 0$,

$\mu_8 = \partial P_n/\partial b > 0$,

$\mu_9 = \partial P_n/\partial N < 0$,

$\mu_{10} = \partial P_n/\partial \alpha > 0$, and

d_1 is a random error term.

VII. CONCLUSION

This chapter has examined the effects of factor endowments, the terms of trade, balance of trade and population for the factor-specific Harris-Todaro model with urban services. We have shown that, ceteris paribus, larger land area, mineral resources, manufacturing capital and trade deficit unambiguously increase service prices. Conversely, a larger population reduces service prices. A larger labor force, larger services capital, and the terms of trade deterioration have ambiguous effects on the service prices. In comparing the expected results to Falvey and Gemmell's, only the effects of labor and the trade deficit are consistent.

An increase in tourism is expected to have a positive effect on service prices. When the tourism variable is introduced into the model, only the magnitude of the effects

changes while the expected effects of the exogenous variables on service prices remain the same

Notes

1. The model used in this chapter is in fact a particular case of the general model presented by Beladi and Chao (1992).

2. United Nations International Comparison Project (ICP)'s data set has defined nontradables as services plus construction.

3. This is a weak point because several services are also provided in rural regions and some services are also traded.

4. This assumption is consistent with most LDCs.

5. This shows that unemployment causes a loss to the economy which can be measured by the rural wage. Recall that $\lambda = L_u/(L_x + L_z)$, therefore a unit rise in λ leads L_u to increase by $(L_x + L_z)$ units, so the loss is $W_y(L_x + L_z)$.

6. $N = L_x + L_z + L_y + L_u + L_0$, where L_0 represents population who are not in labor force (such as child, retired worker). Thank for Dr. Joe Kerkvliet to point out for the possibility of multicollinearity between labor force $(L_x + L_z + L_y + L_u)$ and population (N).

7. This is exactly Beladi and Chao's (1992) result.

8. See the examples of trade in services in Feketekuty (1988).

9. See Appendix 3 for the proof.

10. This is true if elasticity of tourist demand for domestic services is less than the sum of domestic demand for services and domestic marginal propensity to consume services (or $t < m + c$).

11. From our Extended Model, the effect of tourism on domestic welfare is $du/d\alpha = \{D_{\alpha}^{N}D^{N} - W_{y}(L_{x} + L_{z})\partial\lambda/\partial P_{n}\}/A$. This is larger than the one presented in Copeland (1991) because of the induced employment effect (Recall that $\partial\lambda/\partial P_{n} < 0$ from Appendix 1).

CHAPTER 3

MACROECONOMIC POLICIES AND SERVICE PRICES

I. INTRODUCTION

In this chapter the relationship between macroeconomic policies and service prices will be discussed. The growth of the money supply has been included in empirical studies without a theoretical basis by Kravis and Lipsey (1983) and Clague (1986, 1988). The current study will introduce the money supply into the theoretical model and also into the empirical study to explain differences in service prices across developing countries. Another variable that might explain differences in national price levels and/or service price levels is fiscal spending. Changes in the level of government expenditures on services affect the relative price of services by altering the demand for services. So the purpose of this chapter is to modify the Extended Model developed in chapter 2 (section VI) by incorporating fiscal and monetary policies.[1]

The remainder of this chapter is organized as follows: Section II describes the supply and demand sides of the Modified Models.[2] Section III provides a complete Modified Model by including fiscal policy and analyzes the effects of factor endowments, the terms of trade, population, tourism and fiscal spending on service prices.[3] Section IV provides a complete Modified Model by including monetary policy and also

explores the effects of factor endowments, the terms of trade, population, tourism and money supply on the service prices. Section V discusses the specification of the regression equations to estimate the relationship of these variables on service prices. Section IV offers the conclusion.

II. Supply and Demand Sides of the Model

Supply Side of the Model

The supply side of the model can be represented by the economy's revenue function, i.e., $R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) = \max\{P_tX(L_x, \bar{K}) + P_nZ(L_z, \bar{V}) + Y(L_y, \bar{T})$ subject to $(1 + \lambda)(L_x + L_z) + L_y = \bar{L}\}$ with respect to L_i, $i = X, Z, Y$.

Demand Side of the Model

We assume that the economy's population consists of N identical individuals. The representative individual's utility function depends on consumption of manufacturing goods (c_x), services (c_z), and agricultural goods (c_y). The corresponding expenditure function[4] is given by

$$e(P_t, P_n, u) = \min\{[P_tc_x + P_nc_z + c_y] \text{ s.t. } u(c_x, c_y, c_z) \geq u\} \quad (1)$$

The aggregate expenditure of the economy can be expressed by

$$E(P_t, P_n, u) = Ne(P_t, P_n, u) \tag{2}$$

III. Fiscal Policy and Service Prices[5] (Modified Model I)

We define G as government spending, which is allocated between commodities (manufacturing and agriculture) and services as follows:

$$G = P_tG_x + P_nG_z + G_y \tag{3}$$

where G_i denotes government spending on good i, i = X, Z, Y.

Following Frenkel and Razin (1985), Devereux (1987) and Chao and Yu (1991), the fiscal spending rule is as follows:

$$P_tG_x + G_y = \gamma G \tag{4}$$

$$P_nG_z = (1 - \gamma)G \tag{5}$$

where γ and $(1 - \gamma)$ are the government spending propensities on commodities and services, respectively, and $0 \leq \gamma \leq 1$.

We assume that government spending is financed by a lump-sum tax in the amount of TA. So the government budget constraint can be represented as:

$$G = P_tG_x + P_nG_z + G_y = TA \tag{6}$$

The general equilibrium of an economy can be represented by the following two conditions: 1. The aggregate budget constraint is satisfied, i.e., the private expenditure is equal to the after-tax income of individuals; and 2. The services market is in equilibrium, i.e., the total demand for services by individuals, tourism and government is equal to the domestic supply of services:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - TA \quad (7)$$

$$E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) + G_z = R_{pn}(\cdot) \quad (8)$$

where $D^N(\cdot)$ is the tourist demand for services and $R_{pn}(\cdot)$ is the equilibrium supply of services. Note that $R_{pn}(\cdot) = Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})$.

By substituting (5) in (8) and (6) in (7), we obtain:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - G \quad (9)$$

$$E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) + [(1-\gamma)/P_n]G = R_{pn}(\cdot) \quad (10)$$

where $D^N(\cdot)$ is the tourist demand for services and $R_{pn}(\cdot)$ is the equilibrium supply of services.

Equations (9) and (10) contain eight exogenous variables (P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$, N, α and G) and two unknown variables (u and P_n). Thus the model is determined.

The Effects of Exogenous Changes

Exogenous changes will be considered in five cases:

1. changes in factor endowments,
   1.1 changes in specific factor endowments ($\bar{K}$, $\bar{V}$ and $\bar{T}$),
   1.2 changes in the labor force ($\bar{L}$),
2. changes in the terms of trade (P_t),
3. changes in population (N),
4. changes in tourism (α), and
5. changes in fiscal spending (G).

Totally differentiating equations (9) and (10) yields:

$$E_u du + [W_y(L_x + L_z)(\partial\lambda/\partial P_n) - D^N - G_z]dp_n = [R_{pt} - E_{pt} - W_y(L_x + L_z)(\partial\lambda/\partial P_t)]dP_t + [P_t X_{\bar{K}} - W_y(L_x + L_z)(\partial\lambda/\partial\bar{K})]d\bar{K} + [P_n Z_{\bar{V}} - W_y(L_x + L_z)(\partial\lambda/\partial\bar{V})]d\bar{V} + [Y_{\bar{T}} - W_y(L_x + L_z)(\partial\lambda/\partial\bar{T})d\bar{T} + [Y_{\bar{L}} - W_y(L_x + L_z)(\partial\lambda/\partial\bar{L})]d\bar{L} - dG - e(\cdot)dN \quad (11)$$

$$E_{pn.u}du - (1/P_n)[cE_{pn} + sZ + tD^N - (1 - \gamma)(G/P_n)]dP_n = (Z_{pt} - E_{pn.pt} - D^N_{pt})dP_t - D^N_\alpha d\alpha + Z_{\bar{V}}d\bar{V} + Z_{\bar{L}}d\bar{L} + [(1 - \gamma)/P_n]dG \quad (12)$$

Using Cramer's rule, we can solve for the impacts of exogenous changes on service prices as follows:

1. Changes In Factor Endowments:

   1.1 The impact of changes in manufacturing capital:

$$\partial P_n/\partial\bar{K} = \{m[P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]\}/\Delta_1 \quad (13)$$

1.2 The impact of changes in land or mineral resources:

$$\partial P_n/\partial \bar{T} = \{m[Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]\}/\Delta_1 \quad (14)$$

1.3 The impact of changes in services capital:

$$\partial P_n/\partial \bar{V} = \{-P_n Z_{\bar{V}} + m\{P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}\}/\Delta_1 \quad (15)$$

1.4 The impact of changes in labor endowments:

$$\partial P_n/\partial \bar{L} = \{-P_n Z_{\bar{L}} + m[Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]\}/\Delta_1 \quad (16)$$

2. The Impact of Changes in the Terms of Trade:

$$\partial P_n/\partial P_t = \{-P_n Z_{pt} + P_n E_{pn.pt} + P_n D_{pt}^N + m[(R_{pt} - E_{pt}) - W_y(L_x + L_z)\partial\lambda/\partial P_t]\}/\Delta_1 \quad (17)$$

3. The Impact of Population:

$$\partial P_n/\partial N = \{-me(P_t, P_n, u)\}/\Delta_1 \quad (18)$$

4. The Impact of Tourism:

$$\partial P_n/\partial \alpha = \{P_n D_\alpha^N\}/\Delta_1 \quad (19)$$

Recall that m denotes the marginal propensity to consume services, c denotes the consumption substitution for a given utility in response to changes in P_n, s denotes the substitution in production response to a change in P_n along the transformation frontier, t denotes the elasticity of tourist demand for domestic services, and $\beta = -(W_y/P_n)(L_x + L_z)(\partial\lambda/\partial P_n)/(\partial Z/\partial P_n)$.

$\Delta_1 = cE_{pn} + sZ(1 - m\beta) + tD^N + (1 - m)G_z - mD^N > 0$ by the stability condition.[6]

The impacts of changes in $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$, N and α can be explained as in chapter 2 and proposition (1)-(5) and (7)-(8) still hold. But the magnitude of the impacts are smaller than those in the previous chapter.[7]

5. <u>The Impact of Fiscal Spending</u>:[8]

$$\partial P_n/\partial G = \{(1 - \gamma) - m\}/\Delta_1 \qquad (20)$$

Fiscal expansion reduces resources available for private sector consumption. Therefore, fiscal expansion will increase public demand for services and reduce the private demand for services which are represented by the first and second terms on the RHS of (20). The effect of fiscal spending on service prices is ambiguous. It is determined by the transfer criterion which depends on the spending propensities (on services) of the private consumers relative to those of the government. If the government's spending propensities on services is greater than that of private consumers, i.e., $(1 - \gamma) > m$, then fiscal expansion induces an increase in service prices. Conversely, fiscal expansion will result in a fall in service prices if $(1 - \gamma) < m$. The extreme case for which $(1 - \gamma) = 0$, i.e., when the total government spending falls on commodities, will induce a decrease in service prices. The other extreme for which $(1 - \gamma) = 1$, i.e., when the total government spending falls on services, will cause an increase

in service prices. When $(1 - \gamma) = m$, the government has the same propensity to spend on services as the consumers. Thus, the transfer does not have an effect on service prices. The current model with tourism indicates a smaller impact of government spending on service prices than does Chao and Yu's (1991) result.

IV. Monetary Policy and Service Prices (Modified Model II)

Monetary policy is employed by the central bank to control the supply of money as an instrument for achieving the objectives of the economic policy.[9]

Assume that money is the only financial asset. Thus the demand for money balances is proportional to the level of nominal income which can be represented as follows:

$$M^d = kR(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) \qquad (21)$$

where M^d represents the demand for money or the desired money holding, and k represents the reciprocal of the income velocity of money. Assume that k is constant.[10]

By following Dornbusch (1973a, 1973b) it can be assumed that (dis)hoarding is proportional to the stock of excess demand for money. Therefore, the (dis)hoarding function can be expressed as:

$$H = \rho(M^d - \bar{M}) \qquad (22)$$

where H denotes hoarding, $\bar{M}$ denotes the supply of money or actual money balances which is assumed to be fixed in the short run, and ρ denotes the rate of adjustment for the money market to be in equilibrium. An expansion (contraction) of monetary policy increases (reduces) the money stock which will reduce (increase) hoarding since it creates a stock of excess supply (demand).

By substituting (21) into (22), we obtain

$$H = \rho[kR(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - \bar{M}] \qquad (23)$$

The general equilibrium of an economy can be represented by the following two conditions: 1. The aggregate budget constraint is satisfied, i.e., expenditure is equal to income less hoarding; and 2. The services market is in equilibrium, i.e., the total demand for services by domestic consumers and tourists is equal to domestic supply:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - H \qquad (24)$$
$$E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) = Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})$$

From equation (24), we may view hoarding as the balance of trade surplus or the value of excess supply of traded goods. By substituting (23) into (24), we obtain:

$$Ne(P_t, P_n, u) = R(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - \rho[kR(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}, \lambda) - \bar{M}] \qquad (25)$$

$$E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) = Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L}) \quad (26)$$

Equations (25) and (26) contain eight exogenous variables (P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, N, α and $\bar{M}$) and two unknown variables (u and P_n). Thus the model is determined.

The Effects of Exogenous Changes

Exogenous changes will be considered in five cases:

1. changes in factor endowments,
   1.1 changes in specific factor endowments,
   1.2 changes in labor force,
2. changes in the terms of trade,
3. changes in population,
4. changes in tourism, and
5. changes in money supply.

Totally differentiating equations (25) and (26) yields:

$$E_u du + [\rho k R_{pn} - (1 - \rho k) W_y (L_x + L_z)(\partial\lambda/\partial P_n) - D^N] dp_n = [(1 - \rho k) R_{pt} - E_{pt} - (1 - \rho k) W_y (L_x + L_z)(\partial\lambda/\partial P_t)] dP_t + (1 - \rho k)[P_t X_{\bar{K}} - W_y (L_x + L_z)(\partial\lambda/\partial\bar{K})] d\bar{K} + (1-\rho k)[P_n Z_{\bar{V}} - W_y (L_x + L_z)(\partial\lambda/\partial\bar{V})] d\bar{V} + (1 - \rho k)[Y_{\bar{T}} - W_y (L_x + L_z)(\partial\lambda/\partial\bar{T}) d\bar{T} + (1 - \rho k)[Y_{\bar{L}} - W_y (L_x + L_z)(\partial\lambda/\partial\bar{L})] d\bar{L} + \rho d\bar{M} - e(\cdot) dN \quad (27)$$

$$E_{pn.u} du - (1/P_n)[cE_{pn} + sZ + tD^N] dP_n = (Z_{pt} - E_{pn.pt} - D^N_{pt}) dP_t - D^N_\alpha d\alpha + Z_{\bar{V}} d\bar{V} + Z_{\bar{L}} d\bar{L} \quad (28)$$

Using Cramer's rule, the impact of exogenous changes on service prices can be expressed as follows:

1. <u>The Impacts of Changes in Factor Endowments</u>:

1.1 The impact of changes in manufacturing capital:

$$\partial P_n/\partial \bar{K} = \{m(1 - v)[P_t X_{\bar{K}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{K}]\}/\Delta_2 \quad (29)$$

1.2 The impact of changes in land or mineral resources:

$$\partial P_n/\partial \bar{T} = \{m(1 - v)[Y_{\bar{T}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{T}]\}/\Delta_2 \quad (30)$$

1.3 The impact of changes in services capital:

$$\partial P_n/\partial \bar{V} = \{-P_n Z_{\bar{V}} + m(1 - v)[P_n Z_{\bar{V}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{V}]\}/\Delta_2 \quad (31)$$

1.4 The impact of changes in labor endowments:

$$\partial P_n/\partial \bar{L} = \{-P_n Z_{\bar{L}} + m\{(1 - v)[Y_{\bar{L}} - W_y(L_x + L_z)\partial\lambda/\partial\bar{L}]\}\}/\Delta_2 \quad (32)$$

2. <u>The Impact of Changes in the Terms of Trade</u>:

$$\partial P_n/\partial P_t = \{-P_n Z_{pt} + P_n E_{pn.pt} + P_n D_{pt}^N + m\{[(1 - v)R_{pt} - E_{pt}] - (1 - v)W_y(L_x + L_z)\partial\lambda/\partial P_t\}\}/\Delta_2 \quad (33)$$

3. <u>The Impact of Changes in Population</u>:

$$\partial P_n/\partial N = \{-me(P_t, P_n, u)\}/\Delta_2 \quad (34)$$

4. The Impact of Tourism:

$$\partial P_n/\partial \alpha = \{P_n D^N_\alpha\}/\Delta_2 \qquad (35)$$

where $\Delta_2 = cE_{pn} + sZ[1 - m(1 - \rho k)\beta] + m\rho kR_{pn} + tD^N - mD^N > 0$ by the stability condition.[11]

$\nu = \rho k$ denotes the marginal propensity to save.

Equations (29)-(35) show that propositions (1)-(5) and (7)-(8) still hold.

5. The Impact of Money Supply:

$$\partial P_n/\partial \bar{M} = [m\rho]/\Delta_2 \qquad (36)$$

Equation (36) expresses that an increase in money supply (the monetary expansion) will raise the service prices. An expansion of monetary policy increases the money stock which will reduce hoarding. An increase in hoarding implies an increase in expenditure relative to income. This will induce excess demand in services market. Service prices have to increase in order to eliminate the excess demand. The magnitude of the effect depends on the marginal propensity to consume services and the speed with which the gap between demand for money and supply of money is closed.

V. The Specification of the Regression Equation

By using modified versions of models I and II, the following two equations [(37) and (38)] are estimated to explain differences in service prices across developing

countries related to the following exogenous variables:

- manufacturing capital ($\bar{K}$),
- services capital ($\bar{V}$),
- land (T_d),
- mineral resources (T_m),
- skilled labor (L_s) and unskilled labor (L_{un}),
- terms of trade (P_t),
- population (N),
- tourism (α),
- government spending (G), and
- money supply ($\bar{M}$).

This gives the estimating equation for Modified Model I as follow:

$$P_n = \theta_0 + \theta_1\bar{K} + \theta_2\bar{V} + \theta_3 T_d + \theta_4 T_m + \theta_5 L_s + \theta_6 L_{un} + \theta_7 P_t + \theta_8 N + \theta_9 \alpha + \theta_{10} G + \epsilon_0 \quad (37)$$

where θ_0 is constant,

$\theta_1 = \partial P_n/\partial \bar{K} > 0$,

$\theta_2 = \partial P_n/\partial \bar{V} \gtrless 0$,

$\theta_3 = \partial P_n/\partial T_d > 0$,

$\theta_4 = \partial P_n/\partial T_m > 0$,

$\theta_5 = \partial P_n/\partial L_s \gtrless 0$,

$\theta_6 = \partial P_n/\partial L_{un} \gtrless 0$,

$\theta_7 = \partial P_n/\partial P_t \gtrless 0$,

$\theta_8 = \partial P_n/\partial N < 0$,

$\theta_9 = \partial P_n/\partial \alpha > 0$,

$\theta_{10} = \partial P_n/\partial G \gtrless 0$, and

ϵ_0 is a random error term.

The equation to be estimated for Modified Model II is as follow:

$$P_n = \Gamma_0 + \Gamma_1 \bar{K} + \Gamma_2 \bar{V} + \Gamma_3 T_d + \Gamma_4 T_m + \Gamma_5 L_s + \Gamma_6 L_{un} + \Gamma_7 P_t + \Gamma_8 N + \Gamma_9 \alpha + \Gamma_{10} \bar{M} + \epsilon_1 \quad (38)$$

where Γ_0 is constant,

$\Gamma_1 = \partial P_n/\partial \bar{K} > 0$,

$\Gamma_2 = \partial P_n/\partial \bar{V} \gtrless 0$,

$\Gamma_3 = \partial P_n/\partial T_d > 0$,

$\Gamma_4 = \partial P_n/\partial T_m > 0$,

$\Gamma_5 = \partial P_n/\partial L_s \gtrless 0$,

$\Gamma_6 = \partial P_n/\partial L_{un} \gtrless 0$,

$\Gamma_7 = \partial P_n/\partial P_t \gtrless 0$,

$\Gamma_8 = \partial P_n/\partial N < 0$,

$\Gamma_9 = \partial P_n/\partial \alpha > 0$,

$\Gamma_{10} = \partial P_n/\partial \bar{M} > 0$, and

ϵ_1 is a random error term.

IV. Conclusion

In this chapter we have examined the theoretical effects of factor endowments, the terms of trade, population, tourism, government spending and money supply for the Harris-Todaro type dual economy with urban services. We have shown that, ceteris paribus, larger land area, mineral resources, manufacturing capital, tourism and money supply will be expected to push up service prices. Conversely, a larger population is expected to reduce service prices, while a larger labor supply, services capital, the terms of trade deterioration and government spending have ambiguous effects on service prices.

Notes

1. Fiscal and monetary policies will be separately introduced into the Extended Model.

2. These are exactly the same as those in chapter 2.

3. For simplicity, we will assume that trade is balanced (the market equilibrium conditions for the traded goods are satisfied).

4. The expenditure function represents the minimum expenditure on X, Y, and Z needed to achieve utility level, u, given the price levels.

5. See Chao and Yu (1992) for the general case of introducing a public good.

6. See Appendix 4 for deriving the stability condition.

7. Because the value of denominator (Δ_1) > the value of denominator (A) in chapter 2.

8. The result is similar to Chao and Yu's (1991) result.

9. The instruments of monetary control are open-market operations, rediscount rates and reserve requirements.

10. We assume that the velocity is determined mainly by institutional factors and in the short-run it is treated as a constant.

11. See Appendix 5 for the proof.

CHAPTER 4

EMPIRICAL RESULTS

The previous chapters (chapter 2 and 3) have presented the theoretical models which suggest the variables that are proper for the empirical work. The variables of interest are service prices, land, mineral resources, population, labor force, the terms of trade, trade balance, government spending, money supply, tourism, manufacturing capital and services capital. In order to test the theoretical models, empirical work was performed by using alternative definitions of services and nontradables.

This chapter is organized as follows. Section I discusses the definitions and sources of the data used. Section II presents the empirical results.

I. The Data[1]

Data used in this current work are cross-section for 37 developing countries (Botswana, Cameroon, Ethiopia, Kenya, Malawi, Morocco, Nigeria, Senegal, Tanzania, Tunisia, Zambia, Zimbabwe, India, Indonesia, Korea, Pakistan, Philippines, Sri Lanka, Greece, Ireland, Portugal, Spain, Argentina, Bolivia, Brazil, Chile, Colombia, Dominican, Ecuador, El Salvador, Guatemala, Honduras, Panama, Paraguay, Peru, Uruguay, and Venezuela). Data were collected for our selected developing countries[2] included in phase IV of the International

Comparison Project as reported in the United Nations and Commission of the European Communities (UN-CEC). Nine developing countries (Hungary, Poland, Yugoslavia, Mali, Israel, Costa Rica, Ivory Coast, Hong Kong, and Madagascar) are left out due to the incompleteness of the data required. The following are highlights of the definitions and sources of data. The sources of data will be discussed in detail in Appendix 6.

Land and Mineral Resources

Data on the quantity of the agricultural land resource were taken from the Food and Agricultural Organization (FAO). As stated by Clague (1988) and Falvey and Gemmell (1991), land is measured as the sum of arable, permanent crop and permanent pasture land.[3]

The proxy for mineral resources is the product of GDP times the share of mineral production in GDP. Both data were obtained from the World Tables (World Bank).

Population and Labor Force

Labor force data are the product of population and labor-force-participation rates.[4] The data on population and participation rates were obtained from the World Tables (World Bank).

An educational variable is used to measure the stock of human capital.[5] By following Falvey and Gemmell (1991), the

labor force was crudely divided into skilled and unskilled labor by using enrollments at the secondary level.

The Terms of Trade, Trade Balance, and Tourism

The terms of trade[6] is the ratio of export to import prices. The terms of trade data were taken from the World Tables.

Trade deficit is the difference between the values of imports and exports. The IMF Balance of Payment Statistics provides data on trade surpluses[7] which is the value of merchandise exports less the value of merchandise imports. In this current work, the data of trade deficits average for 1979-81 were used in order to smooth the deviations in the short run, as appropiate for an equilibrium model.

The proxy for tourism is the percentage of tourist receipts in GDP. The data on tourist receipts and GDP were obtained from the IMF Balance of Payment Statistics and from Part two of Phase IV of the International Comparison Project, respectively.

Government Spending and Money Supply

Government spending includes spending on goods and services, wages and salaries, interest payments, and subsidies. Data were taken from the Government Finance Statistical Yearbook.

Data on money supply were obtained from International

Financial Statistics. Money (M_1) equals the sum of currency outside banks plus private sector demand deposits. Quasi-Money comprises time and savings deposits. Money (M_2) equals the sum of M_1 and quasi-money. M_2 was used in the current empirical study.

Service Prices[8]

Falvey and Gemmell (1991, table A1) provide estimates of service price indexes based on the expenditure data in Phase IV of the ICP report. The data were calculated from price levels and expenditures on goods in 1980 which were provided in Part two of Phase IV of the International Comparison Project. Nontradables are all services plus construction. Although the Phase III report provides 151 expenditure categories allocated to "tradables", "services", and "construction", Phase IV provides only 37 condensed expenditure categories. Therefore, several categories are "mixed" because they include both services and commodities. The dependent variables in this current work are the price index of services, nontradables, services plus mixed and nontradables plus mixed.

Manufacturing Capital and Services Capital

Manufacturing and services capital formation were used for the proxies of manufacturing and services capital. The data were obtained from the ICP Section, United Nations Secretariat.

II. Empirical Results[9]

To test the models presented in previous chapters, equations (26) and (39) in chapter 2 and (37) and (38) in chapter 3 were estimated by using ordinary least squares (OLS). Four distinct definitions of the dependent variables are used, i.e., service prices (PS), services plus mixed (PSM), prices of nontradables (PNT), and prices of nontradables plus mixed (PNTM).[10] Nontradables are defined as services plus construction following the ICP's definition.

The empirical results are presented in two parts. The first part consists of the results from our Basic Model and the comparison of our results with those from Falvey and Gemmell's (1991). The second part is the results from the Extended Model (including tourism), the Modified Model I (including government spending) and the Modified Model II (including money supply).

The Current Basic Model's Results Versus Falvey and Gemmell's Results

Current Basic Model's Results

Tables 4.1 and 4.2 present the regression results for alternative definitions of labor factor: total labor force and skilled/unskilled labor, respectively. Some features of the results may be stated:

1. The regression results are quite similar with alternative definitions of services/nontradables.

2. The estimated coefficients on land, mineral resources, manufacturing capital, and trade deficits are always positive as predicted. These confirm that higher land or mineral resources or manufacturing capital induce a direct growth effect and growth-induced employment effect, and the resulting excess demand for services raises their prices. Trade deficits mean that people in that country spend more money than they earn. This causes excess demand for services which will push up service prices.

3. The estimated coefficients on population are negative which confirms our hypothesis and they are often statistically significant at the 1-percent level. The results confirm our theoretical expectation that, ceteris paribus, a larger population will lower expenditure per capita which will lower service prices.

4. The coefficients on services capital take positive signs, indicating that, ceteris paribus, a higher endowment of services capital increases the demand for services (which consists of a direct growth effect and the growth-induced employment effect) by more than an increase in supply. This leads to an increase in service prices.

5. The results show that the estimated coefficients on labor force are always positive and statistically significant at the 1-percent level, indicating that a strong gain from the direct growth effect is sufficient to outweigh any loss from the unemployment effect.

6. The coefficients on the terms of trade variable take negative signs (with one exception), indicating that the substitution effect and the price-induced employment effect are dominated by the direct loss of the terms of trade deterioration.

TABLE 4.1 REGRESSION RESULTS FROM THE BASIC MODEL (USING THE TOTAL LABOR FORCE FOR LABOR FACTOR)

	(1) PS	(2) PSM	(3) PNT	(4) PNTM
CONSTANT	31.691** (11.554)	50.120*** (13.866)	33.523** (12.261)	48.280*** (13.250)
LAND	0.2665* (0.1332)	0.1745 (0.1506)	0.2901** (0.1330)	0.2172 (0.1459)
MINERAL RESOURCE	0.0135 (0.0087)	0.0069 (0.0095)	0.0271*** (0.0089)	0.0211** (0.0099)
SERVICES CAPITAL	0.0151 (0.0186)	0.0126 (0.0198)	0.0056 (0.0151)	0.0052 (0.0168)
MANU. CAPITAL	0.0355 (0.0454)	0.0948* (0.0425)	0.0341 (0.0387)	0.076* (0.0404)
TRADE DEFICIT	0.0138 (0.0145)	0.0039 (0.0155)	0.0309** (0.0139)	0.0233 (0.0151)
TERMS OF TRADE	-0.0028 (0.0777)	-0.068 (0.0914)	0.0219 (0.0872)	-0.0335 (0.0899)
LABOR FORCE	3.6587*** (1.0852)	2.3376*** (0.77431)	3.7843*** (0.8372)	2.6866*** (0.6537)
POPULATION	-1.5883*** (0.4383)	-1.0806*** (0.31741)	-1.6492*** (0.3431)	-1.2249*** (0.2726)
	R^2 = 0.7181 $\bar{R}^2$ = 0.6376 DF. = 28	R^2 = 0.6664 $\bar{R}^2$ = 0.5711 DF. = 28	R^2 = 0.7117 $\bar{R}^2$ = 0.6293 DF. = 28	R^2 =0.6881 $\bar{R}^2$ =0.5990 DF. = 28

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

TABLE 4.2 REGRESSION RESULTS FROM THE BASIC MODEL (SEPARATING THE LABOR FORCE INTO SKILLED/UNSKILLED)

	(5) PS	(6) PSM	(7) PNT	(8) PNTM
CONSTANT	36.976*** (11.517)	46.843*** (14.541)	39.865*** (11.476)	47.111*** (13.596)
LAND	0.1160 (0.1236)	0.2679** (0.1296)	0.1094 (0.1346)	0.2505* (0.1247)
MINERAL RESOURCE	0.0054 (0.0091)	0.0119 (0.0081)	0.0173* (0.0089)	0.0229** (0.0089)
SERVICES CAPITAL	0.0297* (0.0159)	0.0035 (0.0182)	0.0231* (0.0130)	0.0019 (0.0147)
MANU. CAPITAL	0.0847* (0.0463)	0.0643 (0.0648)	0.0931** (0.0379)	0.0656 (0.0553)
TRADE DEFICIT	0.00690 (0.0151)	0.0082 (0.0143)	0.0227 (0.0135)	0.0248* (0.0139)
TERMS OF TRADE	-0.0272 (0.0762)	-0.0529 (0.0971)	-0.0074 (0.0793)	-0.0281 (0.0931)
SKILLED LABOR	2.4562** (1.0483)	3.0827** (1.1280)	2.3413*** (0.7578)	2.9523*** (0.9303)
UNSKILLED LABOR	5.0898*** (1.1576)	1.4502 (1.3978)	5.5017*** (0.9380)	2.3701* (1.3070)
POPULATION	-1.8437*** (0.1078)	-0.9222** (0.4155)	-1.9556*** (0.3150)	-1.1684*** (0.3694)
	R^2 = 0.7396 $\bar{R}^2$ = 0.6528 DF. = 27	R^2 = 0.6740 $\bar{R}^2$ = 0.5653 DF. = 27	R^2 = 0.7428 $\bar{R}^2$ = 0.5653 DF. = 27	R^2 =0.6892 $\bar{R}^2$ =0.5856 DF. = 27

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

TABLE 4.3 FALVEY AND GEMMELL'S RESULTS (USING THE LABOR FORCE FOR LABOR FACTOR)

	(1) PS	(2) PSM	(3) PNT	(4) PNTM
LAND	0.210** (0.035)	0.229** (0.046)	0.127** (0.043)	0.156** (0.049)
MINERAL RESOURCE	0.013 (0.276)	-0.039 (0.360)	0.191 (0.342)	0.126 (0.393)
LABOR FORCE	-0.131** (0.045)	-0.147** (0.058)	-0.108* (0.054)	-0.123* (0.062)
CAPITAL	0.117** (0.055)	0.110 (0.072)	0.102 (0.067)	0.096 (0.077)
POPULATION	-0.256** (0.022)	-0.295** (0.029)	-0.208** (0.029)	-0.243** (0.033)
TRADE DEFICIT	1.300 (3.528)	2.973 (4.598)	3.075 (4.388)	4.079 (5.043)
PRICES OF TRADABLES	0.336** (0.048)	0.205** (0.062)	0.408** (0.059)	0.296** (0.068)
	R^2 = 0.900	R^2 = 0.837	R^2 = 0.854	R^2 = 0.806

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

TABLE 4.4 FALVEY AND GEMMELL'S RESULTS (SEPARATING THE LABOR FORCE INTO SKILLED/UNSKILLED)

	(5) PS	(6) PSM	(7) PNT	(8) PNTM
LAND	0.219** (0.045)	0.242** (0.058)	0.118** (0.055)	0.155** (0.064)
MINERAL RESOURCE	0.060 (0.321)	0.031 (0.418)	0.136 (0.400)	0.123 (0.460)
SKILLED LABOR	0.023 (0.532)	0.086 (0.693)	-0.289 (0.651)	-0.135 (0.749)
UNSKILLED LABOR	-0.188 (0.201)	-0.234 (0.262)	-0.041 (0.246)	-0.119 (0.283)
CAPITAL	0.088 (0.117)	0.064 (0.152)	0.137 (0.144)	0.098 (0.165)
POPULATION	-0.256** (0.023)	-0.295** (0.029)	-0.207** (0.029)	-0.243** (0.034)
TRADE DEFICIT	1.464 (3.610)	3.222 (4.703)	2.855 (4.503)	4.065 (5.181)
PRICES OF TRADABLES	0.334** (0.048)	0.204** (0.063)	0.410** (0.060)	0.296** (0.069)
	R^2 = 0.898	R^2 = 0.834	R^2 = 0.851	R^2 = 0.801

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

2. Comparison of Current Model's Empirical Results to Falvey and Gemmell's

Falvey and Gemmell's (1991) regressions are presented in tables 4.3 and 4.4 using the labor force as a labor factor and separating the labor force into skilled and unskilled labor, respectively.

Comparison of the results from our model in table 4.1 to those from Falvey and Gemmell's in table 4.3 will be summarized in table 4.5.

Comparison of the results from our model in table 4.2 to those from Falvey and Gemmell's in table 4.4 are summarized in table 4.6.

A striking result is the opposite signs of estimated coefficients on labor force. The estimated coefficients on labor force from Falvey and Gemmell's are negative while those from the current model are positive. This indicates that with a higher labor endowment, developed countries have more loss from the unemployment effect than gain from the direct growth of the labor endowment due to relatively lower labor:capital technology in these countries. In the developing countries, the converse effects are found.

TABLE 4.5 COMPARISON THE EMPIRICAL RESULTS FROM CURRENT MODEL TO FALVEY AND GEMMELL'S (USING THE LABOR FORCE FOR LABOR FACTOR)

DEPENDENT VARIABLES	EMPIRICAL RESULTS		SIGNIFICANT DIFFERENT FROM ZERO* (10 % level or better)	
	FALVEY AND GEMMELL'S	CURRENT MODEL'S	FALVEY AND GEMMELL'S	CURRENT MODEL'S
LAND	+	+	yes	some
MINERAL RESOURCE	+ (with one exception)	+	no	some
CAPITAL	+		no (with one exception)	
SERVICES CAPITAL		+		no
MANU. CAPITAL		+		some
TRADE DEFICIT	+	+	no	no (with one exception)
TERMS OF TRADE		- (with one exception)		no
PRICES OF TRADABLES	+		yes	
LABOR	-	+	yes	yes
POPULATION	-	-	yes	yes

* The term "all" represents all estimated coefficients which are statistically significantly different from zero in all regressions with alternative dependent variables (PS, PSM, PNT, and PNTM).

The term "some" represents the estimated coefficients which are statistically significant in two regressions but are insignificantly different from zero in the other two regressions with alternative dependent variables.

The term "no" represents the estimated coefficients which are insignificant in all regressions with alternative definitions of dependent variables.

TABLE 4.6 COMPARISON THE EMPIRICAL RESULTS FROM CURRENT MODEL TO FALVEY AND GEMMELL'S (SEPARATING THE LABOR FORCE INTO SKILLED/UNSKILLED)

DEPENDENT VARIABLES	EMPIRICAL RESULTS		SIGNIFICANT DIFFERENT FROM ZERO (10% level or better)	
	FALVEY AND GEMMELL'S	CURRENT MODEL'S	FALVEY AND GEMMELL'S	CURRENT MODEL'S
LAND	+	+	yes	some
MINERAL RESOURCE	+	+	no	some
SKILLED LABOR	ambiguous	+	no	yes
UNSKILLED LABOR	-	+	no	yes (with one exception)
CAPITAL	+		no (with one exception)	
SERVICES CAPITAL		+		some
MANU. CAPITAL		+		some
TRADE DEFICIT	+	+	no	no (with one exception)
TERMS OF TRADE		-		no
PRICES OF TRADABLES	+		yes	
POPULATION	-	-	yes	yes

Empirical Results from Extended Model, Modified Model I and Modified Model II[11]

1. Empirical Results from Extended Model

Tables 4.7 and 4.8 present the regression results from the Extended Model for alternative measures of the labor factor: labor force and skilled/unskilled labor, respectively.

When tourism is included in the Basic Model, the general outcome of the signs of the estimated coefficients on land, mineral resources, services capital, manufacturing capital, labor, skilled/unskilled labor and population are the same as those without tourism. The results indicate that higher services capital increases demand for services by more than an increase in the supply of services. However, the estimated coefficients on this variable have relatively large standard errors. The positive signs on the coefficients of labor indicate that the gain from the direct growth effect is more than the loss from the unemployment effect. The estimated coefficients for this variable are often significant at the 1-percent level, while the estimated coefficients for the terms of trade are ambiguous. When service prices and prices of nontradables include "mixed" categories, the results indicate that the substitution effect and price-induced employment effect are dominated by the direct loss of the terms-of-trade deterioration. The converse holds for service prices and prices of nontradables. When labor is separated into skilled/unskilled, the coefficients of the terms of trade

variable have negative signs (with one exception). The additional variable, tourism, has positive coefficients which confirm that higher tourist receipts will cause a direct effect and an indirect spending effect, leading to higher service prices, as expected.

TABLE 4.7 REGRESSION RESULTS FROM THE EXTENDED MODEL (USING LABOR FORCE FOR LABOR FACTOR)

	(1) PS	(2) PSM	(3) PNT	(4) PNTM
CONSTANT	26.478** (11.285)	45.917*** (13.634)	28.148** (11.648)	44.268*** (12.836)
LAND	0.2611** (0.1168)	0.1702 (0.1391)	0.2845** (0.1194)	0.2130 (0.1366)
MINERAL RESOURCE	0.0108 (0.0084)	0.0046 (0.0093)	0.0242** (0.0088)	0.0189* (0.0099)
SERVICES CAPITAL	0.0203 (0.0169)	0.0168 (0.0183)	0.0110 (0.0138)	0.0092 (0.0155)
MANU. CAPITAL	0.0250 (0.0431)	0.0864** (0.0386)	0.0233 (0.0369)	0.0684* (0.0372)
TRADE DEFICIT	0.0057 (0.0155)	-0.0025 (0.0166)	0.0226 (0.0153)	0.0171 (0.0163)
TERMS OF TRADE	0.0106 (0.0742)	-0.0570 (0.0890)	0.0357 (0.0831)	-0.0232 (0.0869)
LABOR FORCE	3.524*** (1.1461)	2.2289** (0.8103)	3.6454*** (0.9156)	2.5829*** (0.7023)
POPULATION	-1.5227*** (0.4616)	-1.0276*** (0.3312)	-1.5815*** (0.3741)	-1.1743*** (0.2919)
TOURISM	2.0827* (1.0469)	1.6793 (1.3436)	2.1475** (0.9726)	1.6028 (1.0549)
	R^2 = 0.7381 $\bar{R}^2$ = 0.6508 DF. = 27	R^2 = 0.6784 $\bar{R}^2$ = 0.5711 DF. = 27	R^2 = 0.7330 $\bar{R}^2$ = 0.6440 DF. = 27	R^2 =0.7000 $\bar{R}^2$ =0.5999 DF. = 27

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

TABLE 4.8 REGRESSION RESULTS FROM THE EXTENDED MODEL (SEPARATING THE LABOR FORCE INTO SKILLED/UNSKILLED)

	(5) PS	(6) PSM	(7) PNT	(8) PNTM
CONSTANT	26.557** (11.642)	46.318*** (13.471)	30.555*** (11.837)	46.983*** (12.525)
LAND	0.1283 (0.1119)	0.2806** (0.1168)	0.1217 (0.1252)	0.2619** (0.1145)
MINERAL RESOURCE	0.0039 (0.0087)	0.0104 (0.0087)	0.0158* (0.0088)	0.0215** (0.0091)
SERVICES CAPITAL	0.0326** (0.0154)	0.0066 (0.0173)	0.0261* (0.0129)	0.0047 (0.0142)
MANU. CAPITAL	0.0699 (0.0429)	0.0489 (0.0586)	0.0783** (0.0362)	0.0519 (0.0507)
TRADE DEFICIT	0.0006 (0.0157)	0.0017 (0.0157)	0.0164 (0.0144)	0.0189 (0.0154)
TERMS OF TRADE	-0.0127 (0.0741)	-0.0379 (0.0941)	0.0072 (0.0771)	-0.0146 (0.0898)
SKILLED LABOR	2.4742** (1.1492)	3.1014** (1.2033)	2.3594** (0.8621)	2.969*** (1.0015)
UNSKILLED LABOR	4.8096*** (1.1605)	1.1598 (1.3935)	5.2204*** (0.9996)	2.1097 (1.0015)
POPULATION	-1.7572*** (0.4219)	-0.8326* (0.4259)	-1.8688*** (0.3425)	-1.088*** (0.3886)
TOURISM	1.8261* (1.0642)	1.8927 (1.3208)	1.8331* (1.0586)	1.6972 (1.0276)
	R^2 = 0.7547 $\bar{R}^2$ = 0.6603 DF. = 26	R^2 = 0.6889 $\bar{R}^2$ = 0.5693 DF. = 26	R^2 = 0.7580 $\bar{R}^2$ = 0.6649 DF. = 26	R^2 =0.7022 $\bar{R}^2$ =0.5877 DF. = 26

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

2. Empirical Results from Modified Model I and II

The regression results from the Modified Model I are presented in table 4.9. The effects of land, mineral resource, manufacturing capital, tourist receipts, and population have the expected signs. These results confirm our hypotheses that larger land area, mineral resources, manufacturing capital or tourist receipts will induce excess demand for services, leading to higher service prices. The converse holds for population, i.e., a larger population leads to lower service prices. The estimated coefficients on this variable are always significant at the 1-percent level. The estimated coefficients on services capital have positive signs, indicating that, ceteris paribus, a greater endowment of services capital increases demand for services by more than an increase in supply. However, the estimated coefficients for this variable have relatively large standard errors. The coefficients on the terms of trade take negative signs (with one exception), indicating that the direct loss of the terms-of-trade deterioration is sufficient to outweigh the substitution and price-induced employment effects. The estimated coefficients for labor display positive signs and are often statistically significant at the 1-percent level. The results indicate that with a greater labor force, ceteris paribus, the gain from direct growth is greater than any loss from the unemployment effect. The additional variable, government spending, have positive signs which indicate that

government spending propensities on services is greater than that of private consumers. Thus the expected effect of an expansionary fiscal policy will be to increase service prices.

The general outcomes of Modified Model II are quite similar to those from Modified Model I. The additional variable in Modified Model II, money supply, takes positive signs as expected but the estimated coefficients have relatively large standard error. This indicates that an expansionary monetary policy can be expected to push up service prices.

TABLE 4.9 REGRESSION RESULTS FROM MODIFIED MODEL I

	(1) PS	(2) PSM	(3) PNT	(4) PNTM
CONSTANT	27.724** (11.314)	45.957*** (13.281)	35.429*** (10.711)	50.664*** (11.332)
LAND	0.2354*** (0.0837)	0.1829* (0.1001)	0.1872** (0.0722)	0.14159 (0.0834)
MINERAL RESOURCE	0.0079* (0.0041)	0.0045 (0.0044)	0.0073* (0.0041)	0.0041 (0.0041)
SERVICES CAPITAL	0.0225 (0.0162)	0.0135 (0.0171)	0.0104 (0.0123)	0.0052 (0.0134)
MANU. CAPITAL	0.0309 (0.0464)	0.0889* (0.0455)	0.0672* (0.0384)	0.1094*** (0.0358)
TERMS OF TRADE	0.0039 (0.0742)	-0.0577 (0.0876)	-0.0043 (0.0739)	-0.0586 (0.0763)
LABOR FORCE	3.5279*** (1.1869)	2.2074** (0.8223)	3.5834*** (1.0834)	2.5062*** (0.8211)
TOURISM	2.2116** (0.9439)	1.5505 (1.1914)	2.3780*** (0.8336)	1.6677* (0.9087)
GOVERNMENT SPENDING	0.00005 (0.0005)	0.0003 (0.0005)	0.0016*** (0.0004)	0.0018*** (0.0004)
POPULATION	-1.5200*** (0.4796)	-1.0231*** (0.3329)	-1.5487*** (0.4391)	-1.1410*** (0.3318)
	R^2 = 0.7372 $\bar{R}^2$ = 0.6495 DF. = 27	R^2 = 0.6792 $\bar{R}^2$ = 0.5723 DF. = 27	R^2 = 0.7432 $\bar{R}^2$ = 0.6576 DF. = 27	R^2 =0.7214 $\bar{R}^2$ =0.6286 DF. = 27

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

TABLE 4.10 REGRESSION RESULTS FROM MODIFIED MODEL II

	(1) PS	(2) PSM	(3) PNT	(4) PNTM
CONSTANT	31.058** (12.232)	41.726*** (14.116)	36.758*** (11.932)	45.063*** (12.601)
LAND	0.1526 (0.1085)	0.2765** (0.1304)	0.0896 (0.1239)	0.2139* (0.1203)
MINERAL RESOURCE	0.0041 (0.0037)	0.0096* (0.0056)	0.0086 (0.5948)	0.0129* (0.0075)
SERVICES CAPITAL	0.0308** (0.0114)	0.0071 (0.0164)	0.0303*** (0.0105)	0.0104 (0.0143)
MANU. CAPITAL	0.0535 (0.0717)	0.0478 (0.0716)	0.0631 (0.0667)	0.0409 (0.0684)
TERMS OF TRADE	-0.0089 (0.0781)	-0.0391 (0.0937)	-0.0037 (0.0803)	-0.0289 (0.0875)
SKILLED LABOR	2.4246** (1.1273)	3.0794** (1.2718)	2.1380** (0.8473)	2.7303** (1.0546)
UNSKILLED LABOR	4.5819*** (1.2773)	1.1354 (1.4282)	4.9281*** (1.2448)	1.8631 (1.5071)
POPULATION	-1.6868*** (0.4569)	-0.82178* (0.4576)	-1.7476*** (0.4018)	-0.9756** (0.4403)
TOURISM	1.8459* (0.9471)	1.9301 (1.1685)	2.1925** (0.9191)	2.1103** (0.8675)
M_2	0.0005 (0.0014)	0.0001 (0.0015)	0.0010 (0.0013)	0.0010 (0.0013)
	R^2 = 0.7554 $\bar{R}^2$ = 0.6613 DF. = 26	R^2 = 0.6889 $\bar{R}^2$ = 0.5692 DF. = 26	R^2 = 0.7538 $\bar{R}^2$ = 0.6591 DF. = 26	R^2 =0.6953 $\bar{R}^2$ =0.5782 DF. = 26

NOTES : Standard errors are given in parentheses.

* Significantly different from zero at the 10-percent level.

** Significantly different from zero at the 5-percent level.

*** Significantly different from zero at the 1-percent level.

Notes

1. The data on money supply, government spending, and trade deficit are the average value from 1979-1981 in order to smooth the deviations in the short run, as appropriate for an equilibrium model.

2. Developing countries are defined as those with real income less than 67% of the US level by following Clague's (1988) definition.

3. According to the FAO, the definition of land-use for each category is as follows:

> "Arable land refers to land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow or lying idle.
>
> Land under permanent crops refers to land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber; it includes land under shrubs, fruit trees, nut trees and vines, but excludes land under trees grown for wood or timber.
>
> Permanent meadows and pastures refers to land used permanently (five years or more) for herbaceous forage crops, either cultivated or growing wild." [FAO production Yearbook (1986)p.ix]

4. The participation rate is defined as " the activity rate of the labor force as a percentage of the population of all ages." [World Bank, World Tables (1984) p.x]

5. Clague (1988) estimated the stock of human capital in 1980 by using the weighted average of enrollments at the primary, secondary, and university levels. He found that by using enrollment data from 1950, 1960, and 1970 the results were not significantly different from those based on current enrollment rates in 1980.

6. The World Bank has defined terms of trade as "the relative level of export prices compared with import prices, calculated as the ratio of a country's index of average export price to the average import price index" [World Tables (1991) p. xiv].

7. The data taken from BOP Statistics need to have the opposite sign in order to be consistent with the variable suggested in our model.

8. Service prices in our theoretical models are the relative prices (by assuming prices of agriculture goods as a numeraire) for making model simplicity. However, the nominal price index of services are used in the empirical study.

9. Thank Dr. Patricia Linsey for suggesting that accomodating distribution of income may affect type of services and thus service prices. However, the empirical study incorporating the Gini coefficients are also performed. But due to the incompleteness and inconsistency of these data (Gini coefficients are available only 14 countries from our 37 sample developing countries and the data are available for

different year), the estimated results are inconclusive (the signs of the estimated coefficients are ambiguous and they are statistically insignificant).

10. Falvey and Gemmell (1991, table A1) provide estimates of alternative definitions of services and nontradables prices weighed by real consumption.

11. The regression results by using government spending and money supply in 1980 are very similar to those using the average value for 1979-1981.

CHAPTER 5

GENERAL CONCLUSIONS

None of the literature has tried to explain the observed differences in service prices across developing countries by using structural variables and macroeconomic policies. In addition, most of the models used in literature employ full employment assumption. The current work has attempted to close these gaps. The models used in the current work are general equilibrium models incorporating urban unemployment. The extended Harris-Todaro model which includes urban services is applied to the supply side of the model. The exogenous variables used that are common to the literature are agricultural land, mineral resources, labor endowments, trade deficits, population, the terms of trade and tourism. Several new variables that are included in our theoretical framework are manufacturing capital, services capital, government spending, and the money supply.[1] The relationships explaining service-price differences across developing countries as functions of these exogenous variables are derived in this current work. The service-price equations are estimated in order to test the models by using regression analysis. The overall outcomes provide strong support for the theoretical results. The comparison of the results that have been predicted from the models and the empirical results are as follows:

TABLE 5.1 SUMMARIZATION OF THE EXPECTED AND EMPIRICAL RESULTS FROM THE CURRENT WORK

EXPLANATORY VARIABLES	EXPECTED RESULTS	EMPIRICAL RESULTS
LAND, MINERAL RESOURCES	+	+
MANUFACTURING CAPITAL	+	+
SERVICES CAPITAL	ambiguous	+
LABOR FORCE	ambiguous	+
TRADE DEFICIT	+	+
TERMS OF TRADE	ambiguous	ambiguous
POPULATION	-	-
TOURISM	+	+
GOVERNMENT SPENDING	ambiguous	+
MONEY SUPPLY	+	+

Land and mineral resources are successful variables because the estimated coefficients are consistent with the theoretical prediction and are often statistically significant. Although the effect of the labor force can not be predicted from the theoretical point of view, the empirical results show that the labor force has a positive effect on service prices and the estimated coefficients of the labor force are often statistically significant at the 1-percent level. When the labor force is separated into skilled/ unskilled labor, these estimated coefficients always have positive signs and are often statistically significant at the 1-percent level. The negative signs on population are as predicted and they are always significant at the 1-percent level except in equation (6) in table 4.8 and equation (2) in

table 4.10 in which the coefficients are significant at the 10-percent level. Tourism has the expected sign but this variable is significant only when service prices or prices of nontradables are the dependent variables. The empirical results show that government spending has a positive effect on service prices. This means that government spending propensities on services are greater than that of private consumers. The empirical results confirm that manufacturing capital has a positive effect on service prices and also show that services capital has a positive effect. The estimated coefficients of the terms of trade and money supply have relatively large standard errors; therefore, these two variables should be tentatively included in the regressions.

When we compare the current models' results to those from Falvey and Gemmell (1991), a striking finding is that the estimated coefficients on the labor force have the opposite signs. One possible explanation might be that the developed countries which Falvey and Gemmell have included in their empirical study have a lower labor capital ratio technology than the developing countries which have been considered here. Thus with a higher labor force, ceteris paribus, the loss from the effect of unemployment is greater than the direct growth which is opposite to our results.

By summary, the empirical results suggest that:

1. ceteris paribus, the developing country which is endowed with more manufacturing capital will have higher service prices.

2. the developing country which is endowed with more land or mineral resources will have higher service prices, other things being equal.

3. other things being equal, the developing country endowed with relatively more services capital will have higher service prices because the supply effect and the growth-induced employment effect.

4. other things being equal, the developing country with the relatively greater labor endowment will have higher service prices because the gain from direct growth of the labor endowment is more than the loss from unemployment effect.

5. other things being equal, the developing country with the relatively higher trade deficit will have higher service prices.

6. other things being equal, the developing country with more population will have lower service prices.

7. other things being equal, the developing country with relatively greater tourist receipts will have higher service prices.

8. other things being equal, the developing country with relatively expansionary fiscal policy will have higher service prices.

9. other things being equal, the developing country with

relatively expansionary monetary policy tend to have higher service prices.

Further tests of our theoretical models, especially the two variables, i.e., the terms of trade and money supply, can be performed as soon as the new set of the International Comparison Project data are available.

I. Suggestions for Future Study

1. The assumption of perfect competition in the manufacturing sector might be relaxed. As pointed out by Rodrik (1988), the market structure of industrial sectors in developing countries is an imperfect competition.

2. It follows from the statement in 1., that the assumption of constant returns to scale should be relaxed too. It might be assumed that there exists an increasing returns to scale technology in industrial sectors.

3. The existence of a black market might be one possible explanation of why service prices in developing countries differ. Therefore, one might introduce restrictive trade regimes into the current theoretical model and follow Webb and Berger (1992) by using black market premiums as a proxy for trade regime restrictiveness in the empirical work.

Notes

1. The growth of money supply has been included in empirical studies by Kravis and Lipsey (1983) and Clague (1986, 1988).

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APPENDICES

APPENDIX 1

COMPARATIVE-STATIC RESULTS

Totally differentiating equations (4)-(8), and expressing the results in matrix form yields:

$$\begin{bmatrix} 0 & (1+\lambda)Y_{LL} & 0 & Y_L \\ P_t X_{LL} & 0 & 0 & 0 \\ 0 & 0 & P_n Z_{LL} & 0 \\ 1+\lambda & 1 & 1+\lambda & L_x+L_z \end{bmatrix} \begin{bmatrix} dL_x \\ dL_y \\ dL_z \\ d\lambda \end{bmatrix}$$

$$= \begin{bmatrix} -(1+\lambda)Y_{LT}d\bar{T} \\ -P_t X_{LK}d\bar{K} - X_L dP_t \\ -P_n Z_{LV}d\bar{V} - Z_L dP_n \\ d\bar{L} \end{bmatrix}$$

The determinant of the coefficient matrix is given by $D = P_t P_n X_{LL} Z_{LL}[Y_L - (1 + \lambda)(L_x + L_z)Y_{LL}] > 0$, and by using the diminishing marginal product assumption, i.e. $X_{LL} < 0$, $Y_{LL} < 0$ and $Z_{LL} < 0$.

Using Cramer's rule, we can solve for the following comparative static results:

$\partial L_x/\partial \bar{K} = \{-P_t P_n X_{LK} Z_{LL}[Y_L - (1 + \lambda)(L_x + L_z)Y_{LL}]\}/D > 0,$

$\partial L_x/\partial \bar{V} = 0,$

$\partial L_x/\partial \bar{T} = 0,$

$\partial L_x/\partial P_t = \{-P_n X_L Z_{LL}[Y_L - (1 + \lambda)(L_x + L_z)Y_{LL}]\}/D > 0,$

$\partial L_x/\partial P_n = 0,$

$$\partial L_x/\partial \bar{L} = 0,$$

$$\partial L_y/\partial \bar{K} = \{P_t P_n Y_L Z_{LL} X_{LK}(1 + \lambda)\}/D < 0,$$

$$\partial L_y/\partial \bar{V} = \{P_t P_n Y_L X_{LL} Z_{LV}(1 + \lambda)\}/D < 0,$$

$$\partial L_y/\partial \bar{T} = \{P_t P_n (1 + \lambda)(L_x + L_z) Y_{LT} X_{LL} Z_{LL}\}/D > 0,$$

$$\partial L_y/\partial P_t = \{(1 + \lambda) P_n X_L Y_L Z_{LL}\}/D < 0,$$

$$\partial L_y/\partial P_n = \{(1 + \lambda) P_t Y_L Z_L X_{LL}\}/D < 0,$$

$$\partial L_y/\partial \bar{L} = \{P_t P_n X_{LL} Z_{LL} Y_L\}/D > 0,$$

$$\partial L_z/\partial \bar{K} = 0,$$

$$\partial L_z/\partial \bar{V} = \{-P_t P_n\ X_{LL} Z_{LV}[Y_L - (1 + \lambda)(L_x + L_z) Y_{LL}]\}/D > 0,$$

$$\partial L_z/\partial \bar{T} = 0,$$

$$\partial L_z/\partial P_t = 0,$$

$$\partial L_z/\partial P_n = \{-P_t X_{LL} Z_L[Y_L - (1 + \lambda)(L_x + L_z) Y_{LL}]\}/D > 0,$$

$$\partial L_z/\partial \bar{L} = 0,$$

$$\partial \lambda/\partial \bar{K} = \{-(1 + \lambda)^2\ P_t P_n Y_{LL} Z_{LL} X_{LK}\}/D < 0,$$

$$\partial \lambda/\partial \bar{V} = \{-(1 + \lambda)^2 P_t P_n X_{LL} Y_{LL} Z_{LV}\}/D < 0,$$

$$\partial \lambda/\partial \bar{T} = \{-P_n P_t (1 + \lambda) X_{LL} Z_{LL} Y_{LT}\}/D < 0,$$

$$\partial \lambda/\partial P_t = \{-(1 + \lambda)^2 P_n X_L Y_{LL} Z_{LL}\}/D < 0,$$

$$\partial \lambda/\partial P_n = \{-(1 + \lambda)^2 P_t X_{LL} Y_{LL} Z_L\}/D < 0 \text{ ,and}$$

$$\partial \lambda/\partial \bar{L} = \{-(1 + \lambda) P_t P_n X_{LL} Y_{LL} Z_{LL}\}/D > 0.$$

APPENDIX 2

THE STABILITY OF THE BASIC MODEL

The model was examined for stability at the outset. By assuming that the traded goods market and the factor-specific markets adjusted instantly, the price of the services and the rural-urban migration were emphasized. It was assumed a Walrasian adjustment in the services market and a Marshallian adjustment in the labor market as in Beladi and Chao (1992):

$$\dot{P}_n = a\{E_{pn}(P_t, P_n, u) - Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})\} \quad (1)$$

$$\dot{L}_y = b\{W_y - W_x/(1 + \lambda)\} \quad (2)$$

where the dot above P_n and L_y represents the time derivative.

a and b are constants with positive value.

$E_{pn}(\cdot) - Z(\cdot)$ represents the excess demand in the service market.

$W_y - W_x/(1 + \lambda)$ represents wage differences between the rural and urban areas.

From equation (15) in the model, and by assuming trade is in balance, u is a function of P_n for any given P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$ and $\bar{L}$, so the excess demand for services depends only upon the price of services (P_n). By differentiating equation (15), we obtain $E_u du = - W_y(L_x + L_z)(\partial\lambda/\partial P_n)dP_n$, where $E_u = \partial E/\partial u > 0$.

A linear approximation of equation (1) and (2) above gives the adjustment process around the equilibrium values, P_n^e

and L_y^e, as follows:

$$\dot{P}_n = -a(Z/P_n)[c + s(1 - m\beta)](P_n - P_n^e) \quad (3)$$

$$\dot{L}_y = -b[W_x(\partial L_z/\partial P_n)/(\bar{L} - L_y)](P_n - P_n^e) + b[Y_{LL} - W_y/(\bar{L} - L_y)] (L_y - L_y^e) \quad (4)$$

From equation (3) and (4), the trace of the adjustment process is obtained as negative and the determinant as positive. This verifies that the equilibrium of the model is locally stable.

APPENDIX 3

THE STABILITY OF THE EXTENDED MODEL

This appendix will examine whether the Extended Model is stable. By assuming the adjustment as in Appendix 2, the following are obtained:

$$\dot{P}_n = a_0\{E_{pn}(P_t, P_n, u) + D^N(P_t, P_n) - Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})\} \quad (1)$$

$$\dot{L}_y = b_0\{W_y - W_x/(1 + \lambda)\} \quad (2)$$

where a_0 and b_0 are constants with positive values.

$\{E_{pn}(\cdot) + D^N(\cdot) - Z(\cdot)\}$ represents the excess demand in the services market.

From equation (27) in the Extended Model, u is a function of P_n for any given P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$ and $\bar{L}$ and assuming that trade is balanced, the excess demand for services depends only upon P_n. By differentiating equation (27), we obtain $E_u du = [D^N - W_y(L_x + L_z)\partial\lambda/\partial P_n]dP_n$.

The adjustment process around the equilibrium values, P_n^e and L_y^e, is as follows:

$$\dot{P}_n = (-a_0/P_n)\{cE_{pn} - mD^N + sZ(1 - m\beta) + tD^N\}(P_n - P_n^e) \quad (3)$$

$$\dot{L}_y = -b_0[W_x(\partial L_z/\partial P_n)/(\bar{L} - L_y)](P_n - P_n^e) + b_0[Y_{LL} - W_y/(\bar{L} - L_y)](L_y - L_y^e) \quad (4)$$

From equation (3) and (4), the local stability of the

Extended Model requires that $cE_{pn} + sZ(1 - m\beta) + tD^N > mD^N$ to make the trace of the adjustment process negative and the determinant positive.

APPENDIX 4

THE STABILITY OF THE MODIFIED MODEL I

This appendix will examine whether the Modified Model I is stable. By assuming the adjustment as in Appendix 2, the following are obtained:

$$\dot{P}_n = a_1\{E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) + G_z - Z(P^t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})\} \quad (1)$$

$$\dot{L}_y = b_1[W_y - W_x/(1 + \lambda)] \quad (2)$$

where the dot over P_n and L_y represents the time derivative.

a_1 and b_1 are constant with positive values.

$\{E_{pn}(\cdot) + D^N(\cdot) + G_z - Z(\cdot)\}$ represents the excess demand in the services market.

$W_y - W_x/(1 + \lambda)$ represents the wage differences in the rural and urban areas.

From equation (7) of the Modified Model I, u is a function of P_n for any given P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$ and TA, thus the excess demand for services depends only on P_n. By differentiating equation (7), we obtain $E_u du = [D^N + G_z - W_y(L_x + L_z)\partial\lambda/\partial P_n]dP_n$. A linear approximation of equation (1) and (2) above gives the adjustment process around the equilibrium values, P_n^e and L_y^e, as follows:

$$\dot{P}_N = -(a_1/P_n)[cE_{pn} + sZ(1 - m\beta) + tD^N + (1 - m)G_z - mD^N] \quad (P_n - P_n^e) \tag{3}$$

$$\dot{L}_y = -b_1[W_x(\partial L_z/\partial P_n)/(\bar{L} - L_y)](P_n - P_n^e) + b_1[Y_{LL} - W_y/(\bar{L} - L_y)] \quad (L_y - L_y^e) \tag{4}$$

From equation (3) and (4), the local stability of Modified Model I requires that $cE_{pn} + sZ(1 - m\beta) + tD^N + (1 - m)G_z > mD^N$ in order to make the trace of the adjustment process negative and the determinant positive.

APPENDIX 5

THE STABILITY OF THE MODIFIED MODEL II

This appendix will examine whether Modified Model II is stable. By assuming the adjustment as in Appendix 2, the following are obtained:

$$\dot{P}_n = a_2\{E_{pn}(P_t, P_n, u) + D^N(P_t, P_n, \alpha) - Z(P_t, P_n, \bar{K}, \bar{V}, \bar{T}, \bar{L})\} \quad (1)$$

$$\dot{L}_y = b_2[W_y - W_x/(1 + \lambda)] \quad (2)$$

where the dot over P_n and L_y represents the time derivative,

a_2 and b_2 are constants with positive values.

$\{E_{pn}(\cdot) + D^N(\cdot) - Z(\cdot)\}$ represents excess demand in the services market.

$W_y - W_x/(1 + \lambda)$ represents wage differences in rural and urban areas.

From equation (25) of the Modified Model II, u is a function of P_n for any given P_t, $\bar{K}$, $\bar{V}$, $\bar{T}$, $\bar{L}$ and $\bar{M}$, so the excess demand for services depends only on P_n. By differentiating equation (25), we obtain $E_u du = [D^N - \nu R_{pn} - (1 - \nu)W_y(L_x + L_z)\partial\lambda/\partial P_n]dP_n$. A linear approximation of equations (1) and (2) above gives the adjustment process around the equilibrium values, P_n^e and L_y^e, as follows:

$$\dot{P}_N = -(a_2/P_n)[cE_{pn} + sZ(1 - m(1 - \nu)\beta) + tD^N + m\nu R_{pn} - mD^N]$$
$$(P_n - P_n^e) \quad (3)$$

$$\dot{L}_y = -b_2[W_x(\partial L_z/\partial P_n)/(\bar{L} - L_y)](P_n - P_n^e) + b_2[Y_{LL} - W_y/(\bar{L} - L_y)]$$
$$(L_y - L_y^e) \quad (4)$$

From equation (3) and (4), the local stability of the Modified Model II requires that $cE_{pn} + sZ[1 - m(1 - \nu)\beta) + tD^N + m\nu R_{pn} > mD^N$ in order to make the trace of the adjustment process negative and the determinant positive.

APPENDIX 6

DATA SOURCES

All the data expressed in national currency units were converted to US dollar units by using official exchange rates in the International Financial Statistical (1982).

Part two of Phase IV of the International Comparison Project provides data on price levels and expenditure of 37 condensed categories for 60 countries (46 developing countries and 14 developed countries) in 1980. Following Kravis, Heston, and Summers (1982 p.69), these categories can be allocated to services, commodities or mixed. The categories can breakdown as follows:

Services : gross rents, health services, purchased transport, communication, recreational services, education, restaurants, cafe and etc., government (ICP concept).

Commodities : food, beverages and tobacco, clothing and footwear, furniture, household textiles, appliances, pharmaceutical-therapeutical, transport and communication equipment, equipment for recreation, books, periodicals and etc., producer durables, changes in stocks, and foreign balance.

Mixed : fuel and power, other household goods, operation

costs, restaurant, cafe and etc., minus miscellaneous goods and services.

Price indexes for services and nontradables (services plus construction), services plus mixed, nontradables plus mixed were calculated as weighted averages of the prices of each category by using real consumption expenditure weights. The results of these are shown in Falvey and Gemmell (1991, table A1).

The data on land were calculated from the sum of arable, permanent crop, and pasture land in the Food and Agriculture Organization (Production Yearbook, 1986). The data are for 1980. Data for Hungary, Poland, and Yugoslavia were not available.

The mineral share in GDP for 1980 was taken from the World Tables (World Bank, 1984). Data were not available for Mali, Israel, Hungary, Poland, Yugoslavia, and Costa Rica. The proxy for mineral resources is created by combining the mineral share data with GDP. The data on GDP are from Part two of Phase IV of the International Comparison Project.

The data on population and participation rates in 1980 are from the World Tables (World Bank, 1984). Labor-force data were calculated by combining the population data with participation rates. Labor-force data were roughly divided into two components, skilled and unskilled workers. The proxy for the skilled workers is the product of labor force and secondary enrollment rates. The data on enrollment rates are

from various issues (1983-86) of the UNESCO Statistical Yearbook.

The data on the terms of trade were taken from the World Tables (World Bank, 1991). Data were not available for Ivory Coast, Hungary and Poland. The data are for 1980 for every country considered except Sri Lanka. The data for Sri Lanka are for 1981.

The trade balance variable was taken from the Balance of Payment Statistics (IMF, 1984). The average value of trade deficit for 1979-81 was calculated.

The data on tourist receipts were taken from the Statistical Yearbook (United Nations, 1983/84). They are for 1980 for every country considered except Nigeria.

Government spending data were obtained from the Government Finance Statistical Yearbook (1984). Data were not available for Madagascar, Hong Kong, and Poland. The average value of government spending for 1979-81 was calculated.

Money supply (M_1) and quasi-money were taken from line 34 and 35, respectively of the International Financial Statistics (IMF, 1982). Money supply (M_2) was calculated from the sum of M_1 and quasi-money. Data were not available for Hong Kong, Hungary, and Poland. The average value of M_2 for 1979-81 was calculated.

Manufacturing and services capital formation in 1980 were calculated from the ICP Section (United Nations Secretariat).