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Taxes, Outward Orientation, and Growth Performance in Korea

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and
John Whalley

Tax policies have contributed relatively little to Korea's extraordinary growth: less than 10 percent of Korean growth between 1962 and 1982, and about 3 percent of export growth. Indirect tax exemptions (rebates of sales and excise taxes on exports) have contributed far more to growth than have direct measures (mainly corporate tax rebates for exporters).

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This paper — a product of the Public Economics Division, Country Economics Department — is one of a series commissioned by the Division's Tax Incentives Evaluation Project. An earlier draft of this paper was presented at a World Bank conference on Tax Policy in Developing Countries. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Ann Bhalla, room N10-059, extension 37699 (51 pages with tables).

Trela and Whalley use an applied general equilibrium model to investigate the contribution of outward-oriented policies to the earlier years of Korean growth.

They conclude: One should look beyond tax policy for the main factors underlying strong Korean growth. Tax policy accounts for 6.2 to 7.9 percent of Korean growth between 1962 and 1982, and only 6.7 percent between 1962 and 1972. Tax policy in Korea has accommodated high growth in Korea rather than driven it.

Indirect tax exemptions (rebates of sales and excise taxes on exports) have contributed far more to Korea's growth than have direct measures (mainly corporate tax rebates for exporters). But nontax measures (tariff rebates, interest preferences, direct cash subsidies, and export premia) have played an even greater part in Korea's development process.

High savings rates (almost 38 percent of GDP in 1988) and high investment rates have been central to Korean growth performance. So have significant transfers of labor from rural to urban sectors, especially in the early phases of growth. Export promotion policies, which stimulate manufacturing, moved labor from the low-efficiency rural sector to the high-efficiency urban sector.

During the period of Korea's extraordinary growth since the early 1960s, tax policy has been used to promote changing economic objectives in different ways.

In the outward-oriented phase of economic expansion (1961-72), rebates of direct and indirect taxes on exports were used to encourage growth.

In the second phase, when Korea was promoting the growth of heavy industry (steel and chemicals), investment tax credits, tax holidays, and other tax incentives were used to facilitate sector-specific capital accumulation.

In the most recent trade liberalization and structural adjustment phase (1980-89), the revenue-raising potential of the value-added tax has played an important part in the move toward policy neutrality.

Mean growth rates have remained high in each phase, and have seemed to be resilient in the face of frequent policy changes. In 1989, however, the growth rate fell sharply, export growth was negative, and there was talk of a new "economic crisis."

Despite these changes in tax policy, Korean growth has consistently achieved high levels since the early 1960s.

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TAXES, OUTWARD ORIENTATION, AND GROWTH PERFORMANCE IN KOREA *

by

Irene Trela and John Whalley

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I. INTRODUCTION

While the literature that attempts to explain growth performance in Korea and other Asian NIC's has grown in recent years,[1] little of it has explicitly examined the role of taxes in the growth process. Moreover, literature on Korean tax policy has merely documented changes in tax structure as growth has occurred[2] and made illustrative calculations on such issues as the impact of taxes on the cost of capital, and has failed to evaluate the role of tax policies in the growth process. Capturing all the elements underlying Korean growth performance (high savings rates, human capital accumulation, intersectoral resource shifts) in a single model is difficult and is well beyond current capabilities. Nonetheless, given the current state of the literature, we believe that some modelling evaluation of the contribution of tax policy to growth in Korea can be done and is useful.

In this paper, we use an applied general equilibrium model that we have used earlier (Trela and Whalley (1989)) to investigate the contribution of outward oriented policies to the earlier years of Korean growth, through induced intersectoral resource transfers and impacts on effort and labor supply in agriculture and manufacturing sectors. While we have only focused on one aspect of the Korean growth experience, what seems to emerge from the model calculations is that one should look beyond tax policy for the main factors underlying strong Korean growth. Model calculations portray the tax component of outward oriented policies as

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1/ See Chenery et al. (1986).

2/ See World Bank (1987a), Choi (1988) and Kim (1988).

accounting for 6.2 to 7.9 percent of Korean growth between 1962 and 1982, and only 6.7 percent between 1962 and 1972. This conclusion mirrors what we portray as the robustness of Korean growth performance to various policy regime switches, including tax policy. High savings rates (amounting to almost 38 percent of GDP in 1988)[3] and high investment rates have been central to the Korean growth performance, as have significant transfers of labor from rural to urban sectors, especially in the early phases of growth. What we suggest, therefore, is that tax policy in Korea should be seen as accommodating high growth in Korea, rather than being one of the key factors driving it.

We also emphasize how, in Korea's extraordinary growth performance since the early 1960s, tax policy has been used in several different ways to meet the economic objectives of the tim . First, in the outward oriented phase of economic expansion (1961-72), direct and indirect rebate and exemption schemes for exporters were used to encourage high growth. Then, in the second phase when the growth of heavy industry (steel and chemicals) was being promoted, the tax system was used to facilitate sector specific capital accumulation. Subsequently, in the most recent growth phase (1979 onwards), the revenue raising potential of the VAT has played an important part in the move towards policy neutrality. Mean growth rates have remained high in each phase, and have seemed to be resilient to these frequent switches in policy. However,in 1989 there has been a sharp fall in the growth rate, export growth has been negative and there has been talk of a new "econo ic crisis".

3/ See Park (1989), Table 3.

II. TAXES, OUTWARD ORIENTATION AND GROWTH IN KOREA - THE RECORD

The existing literature attributes the success of Korea's economic growth in large part to the policy shift in the 1960s from import substitution to export promotion.[4] This is not to say that Korea's growth rates can be explained solely by changes in trade policy. In fact, the policy structure in Korea is substantially more complex than this, and there have been three distinct regime switches since the early 1960s. Growth in Korea has also been more volatile than in other Asian NICs, such as Taiwan and Hong Kong, with prolonged periods of extraordinarily rapid growth followed by years in which growth rates have been zero and even negative.

The mean growth rate in Korea over the period from 1961 to 1986, has been very high--around 8.3 percent--but there have been repeated major and dramatic policy changes following perceived crisis as in 1973 and 1979. Policy from 1961 through to 1972 was markedly characterized by outward orientation, involving duty remissions, tax rebates on exports, registration schemes for importers and other elements of policy tied to export performance. This was followed by a period between 1973 and 1979 in which development of heavy and chemical industries, including iron and steel, non-ferrous metals, ship building, general machinery, chemicals and electronics, was stressed while many earlier export performance policies and tax holidays and other outward oriented incentives used for targeted

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4/ For some useful interpretive essays and research studies on the proximate causes of success, see Brown (1973), Hasan and Rao (1979), Kruger (1979), Kwack (1988) and Scitovsky (1985). Opposing the conclusions from these studies are the results from Chenery et al. (1986), Table 11-3, which seems to indicate that outward oriented policies have been relatively unimportant to Korean growth.

industries were withdrawn. Since 1980, policies have focused instead on structural adjustment and trade liberalization, with a pronounced move towards neutrality in policy and the removal of most existing incentives.

Growth in Korea has been remarkably resilient to these switches in tax regime and policy. Taxes played their role in the early outward oriented strategy through the rebating of cascading sales and excise taxes, and the rebating of a portion of corporate taxes to export industries. However, as protection has been reduced in the trade liberalization and structural adjustment phase, so duty remissions have become progressively less important. Furthermore, a number of the tax rebate schemes linked to exports have been eliminated over the last 10 to 15 years.[5] In the process, the Korean tax system has matured from a relatively narrowly based system, focused on traditional excisables, trade and other taxes, to a system with a broadly based value added tax that accounts for a major portion of revenues, along with income and corporate taxes with much wider coverage and more sophisticated administration than in most other developing countries.[6]

A. Growth Performance and Korean Policy Regimes

Korea achieved an 8.3 percent annual rate of real GNP growth between 1961 and 1986. This was among the highest in the world and contrasts with an annual growth rate of approximately four percent in the preceding 1954-60 period. Korea effectively transformed itself from an underdeveloped predominantly agricultural economy to a prominent newly industrialized country (NIC).

5/ See the discussion later in Section 2.

6/ See the discussion in Han (1986).

During the post-Korean War reconstruction period, from 1954-60, policy in Korea had been basically inward looking, with import substitution through tariffs and quotas for light manufactured and non-durable consumer goods. The government made some efforts to promote exports[7] but, although exports grew, they remained small, ranging from 2.2 percent to 4.1 percent of GNP.

The 1960s saw major changes in policy moves away from an inward looking, import substituting towards an outward oriented development strategy. A comprehensive export promotion scheme was introduced, involving a range of incentives: preferential credit for exports; indirect tax exemptions on inputs for export production and export sales; a reduction of corporate and income taxes on export earnings; wastage allowances on imported raw materials for export production; accelerated depreciation allowances for fixed capital directly used in export production; foreign loan guarantees; and import and export financing assistance. Import controls were liberalized so that entrepreneurs could import machinery and equipment free of tariffs for use in export production. Foreign loans were encouraged to fill the domestic savings gap and, with the devaluation of the Korean won in 1964 and interest rate reforms in 1965, interest rates on ordinary loans from banking institutions were substantially raised. As a result, bank deposits increased rapidly, enlarging the supply of loanable funds to Korean exporters.

7/ These included provisions for converting export earnings into foreign exchange certificates that were traded at a premium in a free market. Moreover, the export/import link system entitled holders of foreign exchange certificates to import certain popular (luxury) items which were not otherwise available. Direct subsidies on exports and preferential interest rates on loans for export activities were used, although not extensively. See Westphal and Kim (1977), pp. 1-2 - 1-3.

The success of Korea's economic growth is often attributed in large part to these outward oriented policies. As can be seen from Table 1, exports grew rapidly, reflecting major expansion in the production of labor intensive manufactures (textiles, apparel, plywood and footwear) in which exporters were believed at this time to have a significant comparative advantage. The annual growth rate of exports in volume terms was about 30 percent between 1961 and 1972, and real GNP grew at an annual rate of 8.2 percent. The manufacturing sector was the dominant force in this export growth; manufactured exports were 18.2 percent of total exports in 1961 but reached 88 percent by 1972.

The expansion of manufacturing in domestic product (from 8.9 percent in 1961 to 20 percent in 1972)[8] also induced a shift in the labor force from agriculture and other primary industries, where output per worker was low, to manufacturing and other activities, where it was higher. Table 2 indicates that 63.1 percent of the working population was in agriculture in 1963. This proportion steadily declined to 50.6 percent by 1972. The percentage of workers employed in manufacturing increased from 8.7 percent in 1963 to 14.2 in 1972; total employment increased by about 38 percent between 1963 and 1972. Hence, the expansion of non-agricultural employment was achieved both by sectoral shifts of labor and by an increase in total employment. The share of employment in the social overhead capital and service sectors also increased from 28.2 percent in 1963 to 35.2 percent in 1972.

In the early 1970s, the government began to change the direction of policy away from general export promotion towards sectoral development, focusing on heavy and chemical industries (HCI). This change in policy

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8/ This data is from the Economic Planning Board (1982), Table 3-15d.

TABLE 1
MAJOR ECONOMIC INDICATORS OF KOREAN GROWTH, 1955–1986
(Unit: US–$ and %)

	Per capita GNP	Growth rate of GNP (1975 Constant Won)	Inflation rate (GNP deflator)	Gross fixed investment to GNP	National saving to GNP	Growth rate of exports	Exports to GNP Ratio	Manufacturing Exports to Total Exports Ratio
55	65	4.1	62.1	10.2	5.2	22.1	2.9	—
	66	–1.4	34.0	10.3	–1.9	–9.0	2.3	—
	74	7.6	22.2	10.6	5.5	33.9	2.2	—
	80	5.5	–1.3	10.2	4.9	24.6	2.8	—
	81	3.8	1.3	11.0	4.2	15.0	3.4	—
	79	1.1	11.7	10.8	0.8	20.8	4.1	—
	82	5.6	14.0	11.7	2.9	38.7	6.3	18.2
	87	2.2	18.4	13.7	3.2	13.0	6.0	27.0
	100	9.1	29.3	13.5	8.7	9.0	5.4	51.7
	103	9.6	30.0	11.3	8.7	23.5	6.7	51.6
	105	5.8	6.2	14.8	7.4	35.9	9.5	62.3
	125	12.7	14.5	20.2	11.8	42.4	11.9	62.4
	142	6.6	15.6	21.4	11.4	32.7	13.6	70.0
	169	11.3	16.1	25.0	15.1	39.5	14.7	77.3
	210	13.8	14.8	25.8	18.8	36.1	15.4	79.0
970	252	7.6	15.6	24.7	16.2	19.6	15.0	83.6
71	288	9.1	12.9	22.5	14.5	21.1	16.1	86.0
	318	5.3	16.3	20.4	15.7	36.0	20.6	87.7
	395	14.0	12.1	23.2	21.4	53.0	30.0	88.2
	540	8.5	30.4	25.6	19.3	–0.8	28.4	90.2
	590	6.8	24.6	25.3	16.8	19.0	28.2	88.3
	797	13.4	21.0	24.4	22.2	41.5	32.0	89.8
	1008	10.7	15.9	27.3	25.4	23.3	32.7	87.5
	1392	11.0	21.6	31.3	27.3	12.5	30.6	89.9
	1640	7.0	20.0	33.2	26.5	–1.1	27.7	90.1
	1589	–4.8	25.3	32.3	20.8	10.2	34.4	92.3
1	1719	6.6	15.4	28.7	20.5	15.0	37.8	92.9
	1773	5.4	6.7	30.5	20.9	6.5	36.9	93.7
	1914	11.9	3.9	31.3	25.3	15.5	37.5	94.4
	2044	8.4	3.8	31.3	27.9	10.0	38.7	95.0
	2047	5.4	4.1	30.8	28.6	2.1	37.7	95.4
	2300	12.3	2.7	31.4	32.6	26.5	42.5	94.6

not available

ource: Choi (1988), Table II–I; Economic Planning Board (1976); Economic Planning Board (1988).

TABLE 2
EMPLOYMENT AND LABOUR PRODUCTIVITY IN KOREA BY SECTOR, 1963–86

	Employment				Production Per Worker (1975 Constant Thousand Won)		
	Employed Population (thousand person)	Agriculture, Forestry, and Fishery (%[a])	Mining and Manufacturing (%[a])	Social Overhead Capital and Others (%[a])	Agriculture, Forestry, and Fishery	Mining and Manufacturing	Social Overhead Capital and Others
1963	7662	63.1	8.7	28.2			
1964	7799	61.9	8.8	29.3			
1965	8206	58.6	10.3	31.0			
1966	8423	57.9	10.8	31.3	432	1902	692
1967	8717	55.2	12.8	32.0			
1968	9155	52.4	14.0	33.6			
1969	9414	51.3	14.3	34.4			
1970	9745	50.4	14.3	35.2	541	3110	1041
1971	10066	48.4	14.2	37.4			
1972	10559	50.9	14.2	35.2			
1973	11139	50.0	16.3	33.7			
1974	11586	48.2	17.8	34.0			
1975	11830	45.9	19.1	35.0	658	4589	1851
1976	12556	44.6	21.8	33.5			
1977	12929	41.8	22.4	35.8			
1978	13490	38.4	23.2	38.4			
1979	13664	35.8	23.7	40.5			
1980	13706	34.0	22.6	43.4	731	9190	4667
1981	14048	34.2	21.3	44.5			
1982	14424	32.1	21.9	46.1			
1983	14515	29.7	23.3	47.0			
1984	14417	27.1	24.2	48.7			
1985	14935	24.9	24.5	50.6			
1986	15505	23.6	25.9	50.0			

Note: [a] Percent of total employed population
Sources: Economic Planning Board (1982, 1986, 1988) and Kim (1988).

reflected several factors. Among them were rising relative labor costs and concerns over slower growth in traditional labor intensive export industries; rising import barriers in developed countries against labor intensive manufactures; and the desire to develop domestic production of intermediate inputs to supply the earlier export industries.[9] This sectoral growth drive was supported by a wide range of measures including import protection for infant industries, industry specific tax preferences and credit rationing. Targeted industries in this sectoral growth drive included steel, metal products, chemicals, ship building, machinery and auto production.

Under this new policy, light industry saw its share of gross output fall between 1975 and 1980 (Table 3). Heavy industry, on the other hand, saw its share almost double between 1970 and 1975 and rise further by 1980. The share of manufacturing in production increased further from 40.3 percent in 1970 to 51.0 percent in 1980. The HCI promotion also contributed to an upgrading in exports, the share of HCI products in total exports increasing from 21.3 percent in 1972 to 38.3 percent by 1980.[10] The share of agriculture in production continued to decline from 17 percent in 1970 to 8.3 percent in 1980.

Large investments in the targeted HCI industries, however, created several adverse effects during this period, including (allegedly) excessive real wage increases in these industries, insufficient investment in light industries and capital market distortions. The government response was to deign a Comprehensive Stabilization Program in mid-1979 that included

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9/ See Kwack (1986), pp. 76-77.

10/ This data is from Choi (1988), p. 11 and Pyo (1989), Table 6.

TABLE 3
INDUSTRIAL COMPOSITION OF KOREAN OUTPUT - SELECTED YEARS
(Percentage shares in total output)

	1970	1975	1980	1983
Agriculture	17.0	12.8	8.3	8.2
Mining	1.1	0.9	0.8	0.7
Manufacturing	40.3	50.4	51.0	50.0
Light industry	28.4	29.5	24.7	22.1
Food, beverages and tobacco	15.9	14.4	10.8	9.6
Textiles and leather	7.1	9.9	8.4	7.0
Lumber and wood products	1.4	1.2	1.0	0.9
Paper printing and publishing	1.4	1.4	1.6	1.8
Nonmetallic metal manufacturing	1.4	1.5	1.9	1.8
Miscellaneous manufacturing	1.2	1.1	1.0	1.0
Heavy and chemical products	11.9	20.9	26.3	27.9
Chemical and chemical products	5.9	10.8	12.6	11.8
Primary metal manufacturing	2.0	3.4	5.1	5.0
Metal products and machinery	4.0	6.7	8.6	11.2
Construction	8.6	6.2	8.0	8.2
Social overhead	6.7	6.7	8.1	8.9
Services	26.3	23.0	23.8	23.9

Source: World Bank (1987b), Tables 1.1 and 1.2.

stringent monetary and fiscal measures as well as new policy measures to promote greater industrial neutrality. The underlying forces that had prompted this new program were, however, strongly reinforced in 1979-80 by a poor grain harvest, a second oil shock, rising interest rates and domestic political disturbances. These events combined to produce a negative real growth rate of 4.8 percent in 1930, an inflation rate of 25.3 percent (as measured by an increase in the GNP deflator) and a current account deficit at a record level of nine percent of GNP. The government thus began a new policy effort in 1980, reflecting three goals: achieving price stability; renewing rapid economic growth; and achieving an improvement in income distribution. This strategy was reflected in a range of stabilization and adjustment programs, which are documented in Choi (1988) and World Bank (1987a).

Stringent monetary and fiscal policies were implemented first. Once macroeconomic imbalances were largely eliminated, the government undertook major trade and financial reforms. Average tariff rates were lowered from 35 percent in 1980 to 23.7 percent in 1983, and then further lowered to 12.7 percent by 1988. Quotas were sharply reduced, and restrictions on direct foreign investment were substantially relaxed.

Financial liberalization measures included the privatization of commercial banks, lower entry barriers in financial markets, partial deregulations of interest rates offered by financial intermediaries and the abolition of preferential loan policies. A Fair Trade and Antimonopoly Law was adopted (1981), designed to prevent anticompetitive practices, and strategic promotion of industries was replaced by more indirect and functional support for industries in order to promote greater industrial neutrality.

This stabilization and adjustment program was remarkably successful. Between 1983 and 1988, the rate of growth of real GNP averaged 10.2 percent, while domestic inflation (GNP deflator) averaged 3.8 percent (compared to 20.8 percent during the period 1973-79). The current account balance continued to improve throughout the 1980s and reached a record surplus of $14.3 billion by 1988.[11]

In 1989, however, the Korean economy produced yet another downturn in growth performance, and there is now growing concern that it is heading into a further crisis.[12] Estimates for 1989 indicate that real GNP growth fell from 12 to 6.7 percent, the current account surplus fell from $14.2 billion to $5 billion, the inflation rate rose to six percent and export volumes declined by 6.5 percent, the first such decline since the early 1960s.[13] The Koreans believe that these dramatic changes are the result primarily of a sharp deterioration in Korea's export competitiveness, caused by the appreciation of the won over the past three years, and social and political moves toward democratization since 1987 which have prompted large wage increases.[14]

B. Korean Tax Policy during the Growth Process

Disentangling the contribution of tax policy to this strong growth is difficult, not only because of the changes in tax policies that have occurred, but because of the many other factors that have influenced Korean growth.

11/ This data is from Pyo (1989), Table 7 and Oum (1989), Table 1.

12/ See Park (1989), p. 2.

13/ This data is from Park (1989), p. 34, and Oum (1989), Table 1.

14/ See Oum (1989), p. 13.

Korea's tax system is composed of both national and local taxes. As the share of local taxes in total revenues is small,[15] we only discuss national taxes. The importance of taxes, measured by tax revenues as a proportion of GNP, has risen as growth has occurred in Korea, increasing from 9.1 percent in 1962 to 15.5 percent in 1987 (see Table 4). This growth in taxes has been uneven, reflecting periods of lower growth in the economy, as in 1963-65 when revenue to GNP ratios fell, and periods in which substantial tax cuts have been used for incentive purposes, as in 1972-73.

In 1977, a VAT replaced eight indirect taxes and has since become the single largest source of revenue in Korea, accounting for 25.3 percent of tax revenues in 1987. Since the introduction of the VAT, indirect taxes have increasingly become the most important source of revenue in Korea. The shares of direct and indirect taxes in total national revenues reversed in importance from 42.3 percent and 26.6 percent respectively in 1976 to 23.4 percent and 40.3 percent in 1987.

C. Tax Incentives

Perhaps the most relevant aspect of tax policy in Korea to evaluating the contribution of tax policy to strong growth performance has been the use of tax incentives.[16] These have taken different forms in the three periods of growth outlined above.

15/ During the period 1962-87, the local tax share ranged from 8.1 percent to 17.3 percent. See Economic Planning Board (1982, 1988).

16/ The discussion that follows draws on Westphal and Kim (1977), Hong (1979), Scitovsky (1985), World Bank (1987a) and Choi (1988).

TABLE 4
STRUCTURE OF NATIONAL TAXES IN KOREA, 1962–87
As percentage of total national taxes

	Direct Taxes				Indirect Taxes								
	Income tax	Corporation tax	Business tax	Others	VAT	Special Consumption tax	Liquor tax	Commodity tax	Others	Stamp revenue	Custom duties	Defense surtaxes	National Taxes as a percentage of GNP
1962	16.2	7.2	6.9	3.1	—	—	8.9	16.7	13.8	2.3	23.9	—	9.1
1963	19.1	9.6	8.2	2.7	—	—	8.9	12.1	14.5	2.5	20.5	—	7.1
1964	23.0	11.0	8.6	2.8	—	—	7.9	8.8	12.6	2.3	22.0	—	5.9
1965	21.4	10.4	8.0	2.8	—	—	6.9	12.9	12.3	1.4	23.0	—	7.2
1966	23.2	12.4	8.3	3.0	—	—	7.2	11.8	11.2	1.7	20.1	—	9.2
1967	23.9	12.3	8.9	3.3	—	—	6.3	11.9	11.1	1.8	19.7	—	10.9
1968	24.5	12.7	9.0	2.8	—	—	5.7	11.4	12.5	1.3	19.5	—	12.7
1969	26.5	12.6	8.8	2.7	—	—	6.1	11.7	12.6	1.2	17.0	—	13.3
1970	25.2	12.7	9.3	3.5	—	—	6.5	9.5	17.1	4.9	15.2	—	13.1
1971	26.4	13.9	9.3	3.5	—	—	6.8	8.6	17.7	0.6	12.8	—	13.3
1972	24.2	12.6	11.2	3.7	—	—	6.5	8.5	16.8	1.8	13.6	—	11.4
1973	23.7	9.5	11.5	4.8	—	—	6.5	9.6	16.4	1.6	15.8	—	10.8
1974	19.5	13.1	11.5	4.5	—	—	6.3	9.4	18.2	1.6	15.0	—	12.1
1975	15.8	10.4	15.8	4.1	—	—	6.5	9.4	13.7	1.0	14.4	5.0	13.8
1976	16.7	8.9	13.6	3.0	—	—	4.9	8.7	13.0	0.8	14.4	14.0	15.1
1977	14.7	9.8	8.7	0.8	10.1	4.2	5.1	5.0	9.3	0.8	16.1	14.2	14.8
1978	13.9	10.6	—	0.5	24.9	9.7	5.8	0.0	0.7	0.7	19.2	14.0	15.3
1979	14.0	11.2	—	0.4	24.7	11.0	6.0	—	0.8	0.8	16.6	14.4	15.5
1980	12.5	9.2	—	0.6	27.8	11.0	5.6	—	1.0	0.6	14.5	16.2	15.8
1981	13.5	9.0	—	1.0	27.4	10.1	5.7	—	1.1	0.8	13.5	16.6	16.1
1982	13.2	10.2	—	1.2	27.4	8.7	5.2	—	1.4	0.7	13.3	15.4	16.6
1983	12.3	9.4	—	1.0	27.8	8.6	4.8	—	1.4	0.7	15.9	14.2	17.0
1984	12.2	9.2	—	0.8	26.9	8.9	4.9	—	1.6	0.7	15.9	14.7	16.4
1985	13.4	10.2	—	0.6	26.3	8.9	4.5	—	1.6	0.7	14.2	15.1	16.3
1986	14.1	9.4	—	0.6	25.9	8.6	4.4	—	1.7	0.7	15.4	14.6	16.2
1987	13.6	9.3	—	0.5	25.3	8.8	4.5	—	1.7	0.6	17.0	14.4	15.5

—: data not applicable.
Sources: Economic Planning Board (1982, 1988)

1961-1972

In the 1960s, the main focus of Korean policy was on export growth, which the government of the day equated with nation building. The government saw tax incentives as a way of promoting growth of foreign exchange earnings, particularly from labor intensive exports in which Korea was believed to have a comparative advantage. The most prominent measures were those rebating indirect taxes on inputs (whether imported or domestically purchased) into export production and indirect taxes on export sales.[17] These operated alongside tariff exemptions on capital equipment and raw materials imported for export production. Beyond these were direct tax exemptions on income from export business, and a 20 percent exemption on income from tourism and sales of goods and services to U.N. military forces in Korea; although from 1962 on, all income from activities earning foreign currency was given this same treatment, and the exemption rate was raised to 50 percent.

Export incentives also included special depreciation arrangements, first introduced in 1962. Machinery and equipment used in export production and/or sales qualified for an additional allowance equivalent to 30 percent of the normal depreciation allowance. From 1966 on, the scheme changed slightly, making the allowance 30 percent if the export share of total revenues exceeded 50 percent, and 15 percent if the share was less than or equal to 50 percent. In 1971, the formula for the latter case was

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17/ There is a substantial literature that stresses the neutrality for trade of switches between origin (or production) based indirect taxes with no border tax adjustments, and destination (or consumption) based indirect taxes under which such adjustments occur. (See Johnson and Krauss (1970) and Whalley (1979)). In Korea, however, the tax rebate was also seen as undoing existing export biases in the policy structure as much as it was an explicit export incentive. Thus, one can argue that it had a very favorable influence on exports.

changed to 30 percent times twice the share. Machinery and equipment used by small and medium sized firms (SMF's) were also eligible for an additional 30 percent special depreciation allowance from 1968 onwards.

While other features of the tax regime in these years were not directly tied to trade performance, they nonetheless affected economic performance in the trade area. Tax holidays had been provided in Korea from 1949 onwards for selected industries that were deemed to be "important" for national economic development. Over the years, these had included ship building, machinery, basic metal, petrochemicals and chemical fertilizers. Typically, these were classified into one of two groups, each with a different tax holiday schedule. The first group, which included oil refining, steel, ship building, iron and steel, copper, cement, and chemicals, were eligible for a complete tax holiday for five years. For the second group, a three year corporate tax exemption of 100 percent applied. Over the years minor changes were made to these schedules. In 1968, they were abolished, but the notion of using incentives for selected industries took root in the tax system.

In 1968, a six percent investment tax credit was given to qualified firms operating in selected industries. These were ship building, steel and iron, chemical fertilizer, synthetic fiber, autos, machinery, straw pulp, food processing, petrochemicals, electronic equipment, electrical machinery and equipment, construction and some mining industries. In 1970, a 6 to 10 percent investment tax credit was provided for investment in machinery and equipment in iron and steel manufacturing, with the larger firms receiving the higher rate. Tax incentives under a 1972 Presidential Emergency Decree also included a 10 percent temporary investment tax credit for investment using domestic capital goods

manufactured prior to 1975, and a 40 to 80 percent special depreciation allowance for fixed assets employed by firms in selected industries. From 1970 on, the five-year tax holiday with 100 percent exemption was only given to selected petrochemical industries.

Thus, the picture in the initial outward oriented phase of Korean growth was of a number of tax measures used to spur development, including tax rebates and exemptions for exports. While not necessarily central, tax policy clearly played a role in outward orientation and growth during this period.

1973-1979

In the early 1970s, the Korean government began to scale down its export promotion schemes, and started giving higher priority to sectoral development, focused primarily on heavy and chemical industries.

Indirect tax rebates on exports were changed in 1977. A destination based VAT replaced eight existing indirect taxes, making rebating of indirect taxes both easier and more transparent. The VAT was regarded in Korea as providing a simpler and more effective way to rebate taxes on exports because exports are zero rated under the VAT.[18] Indirect tax refunds for exports have sharply increased following the introduction of the VAT, in part because the tax rate has increased. For example, the indirect tax refund as a percent of export increased from six percent in 1976 to nine percent in 1978 and to 10 percent in 1982.[19]

18/ One can argue that no export subsidy is involved with VAT rebates on exports, since they compensate for taxes on imports and have no effect on trade flows. However, results from Choi (1984) show that the government had underestimated the border tax adjustment under the previous tax system. In this sense, the adoption of the VAT had a positive effect on trade flows.

19/ See Choi (1984), Table 14. It appears that Choi has made an error in reporting his figures, labelling them as percentages rather than ratios.

There were also changes in direct taxes and their incentive features. In 1973, the 30 percent corporate tax exemption on export earnings was replaced by two tax free reserve funds, one to develop new foreign markets and the other to defray export or foreign investment losses. Under the former, licensed exporters could deduct one percent of their foreign exchange earnings from taxable income for deposit in a reserve fund. After a grace period of two years, the amount was to be added evenly to taxable income over the following three years. Under the new export and foreign investment program, any firm earning foreign exchange could deduct an amount not exceeding either the total sales in foreign exchange or 50 percent of total incomes, depending on which figure was the lowest, and, as in the foreign market serve system, add it back into taxable income after a two year grace period.[20]

There were other changes. In 1974, the system of prior tariff exemptions for capital equipment imported for export production was changed to an installment payment system. The tariff exemptions on raw material inputs for export production were dropped in favor of a drawback system in 1975. Under this system, exporters were required to pay tariffs and indirect taxes when importing their inputs, but these were rebated when exports were actually shipped out.

Change also occurred in the tax system outside the trade based incentives. In 1974, a major reform replaced all major tax incentives to key industries with a "special tax treatment for key industries program".

20/ A further tax free reserve scheme was introduced later (1977) to deal with price fluctuations. Any licensed exporter could deduct additions to a reserve fund from its taxable income within a limit of five percent of inventory asset value, as evaluated at the end of the accounting period. This amount was also added to taxable income after a one year grace period.

Under this new system, eligible firms in selected industries could get either a tax holiday for five years, with 100 percent tax exemption for the first three years and 50 percent exemption for the following two years, an eight percent investment tax credit for machinery and equipment (10 percent for investments using domestic capital goods) or an additional 100 percent special depreciation allowance. Industries selected for this treatment included ship building, naphtha cracking plants, selected machine and electronics manufacturers, iron and steel, fertilizer, copper, lead and zinc smelting, selected mining and refining and electric power generation. Firms in iron and steel, petrochemicals, ship building, chemical fiber, chemical pulp, marine food processing and other food processing industries not qualifying for the three optional benefits were entitled to a 60 percent special depreciation allowance for machinery and equipment investment. The special depreciation rate for SMF's was also raised from 30 to 50 percent by the tax eform of 1977.

Thus in the heavy industry promotion phase of Korean growth, export tax incentives no longer played a central role compared to that played by industry incentive schemes, whose effect was to concentrate Korean investment over this period on a relatively small number of industries.

1980-1989

In 1980 and in the face of financial losses and structural distortions caused by the HCI drive, Korea began pursuing a policy of structural adjustment and liberalization that stressed neutrality in policy.

Once again changes in tax policy followed. Substantial modifications were made to the tax system in 1981. Effective from 1982, petrochemicals, steel, non-ferrous metal refining, chemical fertilizer and power generation were excluded from the industry beneficiary list. The 60 percent special depreciation system and the tax holiday option were terminated and eligibility for the special tax credit was limited to the machinery and electronics industries. Also, the tax credit rate was reduced to six percent (10 percent for investment using domestic capital goods), and then it was halved to three percent (five percent for investment using domestic capital goods) in 1983.

A distinctive feature of the tax incentives used in recent years is that they are not designed to affect the sectoral structure of the economy but rather to promote greater industrial neutrality by correcting market failures or compensating for them throughout the economy. As part of its new functional approach, the government has attempted to promote SMF's, in order to offset the power of conglomerates and to speed the adoption of new technologies. Up to 15 percent of the book value of the fixed business assets at the end of the previous accounting period can be reserved as a taxable income deduction. If after a four year grace period, actual investment expenditures exceed the reserved amount, they are added evenly to taxable income over the succeeding three years. If, on the other hand, the reserved amount exceeds actual investment expenditures, the difference is added to taxable income in the fourth year.

Further new incentives include a six year personal income tax exemption of 100 percent for the first four years and 50 percent for the subsequent two years for owners of newly established SMF's in rural or sea districts in manufacturing, mining, construction, transportation or fishery

industries, and of SMF's organized in technology intensive industries. Furthermore, newly organized SMF's are given a 50 percent deduction from property taxes for five years and a 50 percent reduction in acquisition and registration taxes for two years. Tax incentives for companies investing in newly organized SMF's include tax free reserves for investment losses, 100 percent exemption from capital gains tax and a special 10 percent tax rate on dividend income.

D. Incentive Effects of Tax Arrangements for Exports

Establishing the exact incentive effects of these measures and how they have changed over time is difficult. For the analysis we make here, we draw heavily on a recent study by Kim (1988) that estimated the export subsidy effect of a range of tax and non-tax policies in Korea over the period 1958-83 (see Table 5). We use these estimates in our subsequent model calculations of the effects of Korean tax policies on outward orientation and growth. Kim included only those policies for which both consistent time series data were available and which were quantitatively significant. These included direct cash subsidies, exchange rate premia, interest subsidies, indirect tax exemptions, tariff exemptions and direct tax reductions (exclusive of accelerated depreciation provisions and reserve funds both for developing export markets and for covering export losses).

The export subsidy effect of direct tax exemptions was derived as the difference between tax liabilities in the absence of any such exemptions and actual direct tax payments. The incentive effect of different interest rates was determined in any analogous fashion. The interest subsidy was the difference between the interest paid at the non-

TABLE 5
ESTIMATES OF NET AND GROSS EXPORTS SUBSIDIES PER DOLLAR OF EXPORT FOR KOREA, 1958–1983
(ANNUAL AVERAGES)

Year	official exchange rate (won/$)	Various export subsidies calculated per U.S. dollar of export (won)								Ratio to exchange rate (percent)	
		Direct cash subsidies	Export dollar premium	Direct tax reductions for exporters	Interest rate preference for exporters	Net export subsidies[a]	Indirect tax exemptions for exporters	Tariff Rebates for exporters	Gross export subsidies[a]	Net export subsidies	Gross export subsidies
	(1)	(2)	(3)	(4)	(5)	(6=2+3+4+5)	(7)	(8)	(9=6+7+8)	(10=6/1)	(11=9/1)
1958	50.0	0.0	64.0	–	1.2	65.2	–	–	65.2	130.4	130.4
1959	50.0	0.0	84.7	–	1.3	86.0	–	–	86.0	172.0	172.0
1960	62.5	0.0	83.9	–	1.2	85.1	–	–	85.1	136.2	136.2
1961	127.5	7.5	14.6	–	1.0	23.1	–	–	23.1	18.1	18.1
1962	130.0	10.3	–	0.6	0.9	11.8	5.1	4.7	21.6	9.1	16.6
1963	130.0	4.1	39.8	0.8	2.9	47.6	5.3	6.6	59.5	36.6	48.8
1964	214.3	2.9	39.7	0.7	6.0	49.3	7.6	10.1	67.0	23.0	31.3
1965	265.4	–	–	2.3	7.6	9.9	13.9	15.4	39.2	3.7	14.8
1966	271.3	–	–	2.3	10.3	12.5	17.8	21.3	51.6	4.6	19.0
1967	270.7	–	–	5.2	14.7	20.0	17.8	24.6	62.4	7.4	23.1
1968	276.6	–	–	3.0	15.2	18.2	19.9	39.6	77.7	6.6	28.1
1969	288.2	–	–	3.7	14.7	18.4	27.4	34.3	80.1	6.4	27.8
1970	310.7	–	–	3.5	17.3	20.8	27.0	40.4	38.1	6.7	28.4
1971	347.7	–	–	4.8	18.1	22.8	32.2	48.0	103.0	6.6	29.6
1972	391.8	–	–	1.9	10.5	12.5	26.4	66.3	105.2	3.2	26.9
1973	398.3	–	–	1.4	7.4	8.7	21.0	64.4	94.2	2.2	23.7
1974	407.0	–	–	–	8.6	8.6	22.5	55.1	86.3	2.1	21.2
1975	484.0	–	–	–	12.9	12.9	33.8	34.3	81.0	2.7	16.7
1976	484.0	–	–	–	12.3	12.3	33.6	35.9	81.8	2.5	16.9
1977	484.0	–	–	–	9.4	9.4	53.1	30.6	93.1	1.9	19.2
1978	484.0	–	–	–	11.0	11.0	53.6	30.0	94.6	2.3	19.5
1979	484.0	–	–	--	11.0	11.0	56.6	30.3	97.9	2.3	20.2
1980	618.5	–	–	–	20.6	20.6	74.6	36.4	131.6	3.3	21.3
1981	686.0	–	–	–	15.0	15.0	n.a.	n.a.	n.a.	2.2	n.a.
1982	737.7	–	–	–	3.0	3.0	n.a.	n.a.	n.a.	0.4	n.a.
1983	781.2	–	–	–	0.0	0.0	n.a.	n.a.	n.a.	0.0	n.a.

n.a.: not available

[a]Totals may not add up due to rounding errors.

Source: Kim (1988), Table 3.1

preferential commercial bank lending rate and the interest actually paid. Similar calculations were made for the various other tax and non-tax export incentives.

Several interesting observations flow from Table 5. Exchange rate policy, via the foreign exchange premia, played an important role in stimulating exports during the late 1950s and early 1960s, before being changed in 1965. Furthermore, the largest export incentives were during the 1960s and early 1970s, during which time the effects of export promotion schemes notably increased. Beginning in the early 1970s, however, the government tried to reduce the scope of export incentives. Kim's estimates clearly show fluctuations in these subsidies from 29.6 percent in 1972 to a low of 16.7 percent in 1975 and, with subsequent rises, to a high of 21.3 percent in 1980. Gross export subsidies in this data declined from 136.2 percent of the official exchange rate in 1960 to 18.1 percent in 1961 mainly because of the substantial depreciation of the won and the resulting rapid increase in exports. Net export subsidies per U.S. dollar declined from 23 percent of the official exchange rate in 1964 to about four to seven percent during 1965-67, mainly because of the abolition of the export/import link system.

Table 5 also clearly indicates the growing importance of tax policy as part of the outward oriented strategy of the 1970s. The direct tax reductions for exporters were consistently small and had disappeared by the early 1970s. But indirect tax exemptions for exporters grew from approximately one third of gross export subsidies in 1965 to approximately one half by 1980. Adoption of the destination basis VAT system in 1977, under which exports are zero rated, increased the border tax rebates on exports sharply and were included by Kim (1988) as part of his export subsidy measure.

III. USING A GENERAL EQUILIBRIUM MODEL TO EVALUATE THE TAX CONTRIBUTION TO OUTWARD ORIENTATION AND GROWTH IN THE EARLY GROWTH PHASE IN KOREA

It is difficult to evaluate the effects that the tax policy component of outward oriented policy has had on Korean growth over the last three decades in a single consistent model framework, because of the regime switches and the changes that have occurred in the economy. Savings rates have risen sharply, there has been substantial human capital accumulation, resources have transferred from the rural to the urban sector and so on. Therefore, the incentive effects of the various tax schemes used over the years have come into play on several different margins, all of which ought ideally to be captured in any assessment of the contribution of taxes to growth. These include the effects of tax changes on export performance, savings, investment and sectoral structure, among others.

Rather than try to build a comprehensive model from scratch, our approach has been to use a model that we developed earlier (Trela and Whalley (1989)) to analyze the contribution made by intersectoral resource transfers and by tax incentives to outward orientation and to growth in the early growth phase in Korea. This two sector model[21] does not include the effects of such general factors as savings and human capital, but it does capture the effects of export promotion on manufacturing, the effects of tax policies on rural/urban migration and, importantly, the endogenous determination of effort in both the manufacturing and the non-manufacturing sectors.

21/ Our model can be used in higher dimensionality form. In part, because of the complexity in implementing migration conditions linking sectors, we limit ourselves here to two sectors.

Relative to other multisectoral modelling efforts that have looked at growth in Korea and other Asian NICs (see Chenery et al. (1986)), this model uses average product pricing of labor in agriculture, reflecting traditional family farming arrangements. Decisions regarding effort in all sectors are endogenously determined through utility maximizing behavior. Average product pricing of labor in agriculture, in contrast to marginal product pricing in manufacturing sectors, generates lower effort in agriculture than in manufacturing, which is matched by a correspondingly lower wage rate in agriculture than in manufacturing. Promoting manufacturing through exports thus transfers labor from the low effort agricultural sector to the high effort manufacturing sectors, thereby fueling growth.

We have used this model to assess the importance of tax policies for Korean growth, especially in the earlier phase (1962-72). As we emphasize above, the second and third phases of this period of growth sharply curtailed some of the key features of the outward oriented policies of the early years. In addition, many of the features that fostered high Korean growth are not captured by the model, such as high savings rates and rapid human capital accumulation, to mention but two.

Our modelling strategy is to construct a microconsistent data set for a given base year to which the model is calibrated. We then compute counterfacturals, in which a new equilibrium for the model is found in which outward oriented policies (including the tax elements of outward orientation) are removed. Comparing the two equilibria gives an assessment of the contribution of outward oriented policies to GDP during the year. Because of the work involved in constructing base year data sets for each

of a series of years, we use two alternative base years and sequentially introduce the policy variable characteristics of earlier or later years for comparison with the policy neutral equilibrium.

Thus, using what we term the 1962 base year model, we compute a policy neutral equilibrium and then we compare sequentially the 1962 model with 1962 policies, with 1963 policies, with 1964 policies and so on. The policy contribution to GDP from each year's policy regime is assessed and the combined effect over 10 (or 20) years evaluated. We also use a 1982 base year model in which earlier policies (1981, 1980, ...) can be sequentially introduced in the same way. This procedure allows us to evaluate the contribution of the tax component of outward oriented policies to growth through induced intersectoral resource transfers. We are also able to evaluate the contribution of outward oriented policies in general, the specific indirect tax component of policies and the specific direct tax component of policies.

In the model, Korea is treated as a small, open, price taking economy. The resource endowment of the economy comprises three primary factors--capital, labor and land. Only two of these appear as inputs for any sector. The rural sector uses only land and labor, while the urban sector uses capital and labor. The effort supply of workers is endogenous; rural/urban migration proceeds in response to differences in worker utility across sectors.

Utility is assumed to be a positive function of consumption and a negative function of effort, with individuals trading off differences in effort against differences in income. In the rural sector, employment means family members work not for wages but for an equal share in the output of the family farm. Workers in the rural sector thus receive a

return for marginal effort that is less than their marginal value product because of this sharing rule, which means that they tend to supply too little effort. Workers in the urban sector are paid their marginal product, and hence a reallocation of labor from the rural to the urban sector will typically increase national output, because prospective migrants would put forth greater effort in the urban sector because they would be receiving their full marginal product. We induce rural/urban migration in the model by introducing policy incentives to promote exports, including tax policies.

(a) Production

The two production sectors that appear in the model are distinguished by the types of goods they produce. The rural sector specializes in the production of a single agricultural good (sector/good 1), while the urban sector produces several manufactured goods (sector/good 2). The output of each good is produced according to a CES production function:

$$(1) \qquad Q_j = F\gamma_j \left[\alpha_j L^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\alpha_j)\left(\sum_{q=1}^{N_j} \epsilon_j^q \right)^{\frac{\sigma_j - 1}{\sigma_j}} \right]^{\frac{\sigma_j}{\sigma_j - 1}}, \quad j = 1$$

$$(2) \qquad Q_j = \gamma_j \left[\alpha_j K^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\alpha_j)\left(\sum_{q=1}^{N_j} \epsilon_j^q \right)^{\frac{\sigma_j - 1}{\sigma_j}} \right]^{\frac{\sigma_j}{\sigma_j - 1}}, \quad j = 2$$

where Q_j represents the output of sector j, γ_j is a constant defining units of measurement, α_j is a share parameter, F denotes the number of farms, ϵ_j^q

is the effort of a typical worker in sector j, L denotes for land used per farm in agriculture, K and N_j are capital and labor[22] and σ_j is the elasticity of substitution between factor inputs.

On the factor side, land and capital are assumed to be sector specific while labor is intersectorally mobile, although because of the differential effort decision across sectors, wage rates are not equalized across sectors. In equilibrium, factors are fully employed:

$$(3) \qquad \bar{L} = L$$

$$(4) \qquad \bar{K} = K$$

$$(5) \qquad \bar{N} = FN_1 + N_2$$

where $\bar{L}$, $\bar{K}$ and $\bar{N}$ define the economy's fixed factor endowments.

Assuming that urban producers wish to minimize their costs and given that capital supply is fixed, producers in the urban sector choose the labor input that minimizes their costs:

$$(6) \quad \min Z = w_j \sum_{q=1}^{N_j} \epsilon_j^q + \lambda_j \left[Q_j - \gamma_j \left[\alpha_j a + (1-\alpha_j) \left(\sum_{q=1}^{N_j} \epsilon_j^q \right)^{\frac{\sigma_j - 1}{\sigma_j}} K^{\frac{\sigma_j - 1}{\sigma_j}} \right]^{\frac{\sigma_j}{\sigma_j - 1}} \right], \quad j = 2$$

where w_j is the price of labor in the urban sector measured in efficiency units. This leads to the first order condition:

22/ In the agricultural sector, N_j is labor per farm.

$$(7) \qquad w_j = \frac{P_j \gamma_j \left[\alpha_j K^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\alpha_j)\left(\sum_{q=1}^{N_j} \epsilon_j^q\right)^{\frac{\sigma_j - 1}{\sigma_j}}\right]^{\frac{\sigma_j}{\sigma_j - 1}} (1-\alpha_j)}{\left(\sum_{q=1}^{N_j} \epsilon_j^q\right)^{\frac{1}{\sigma_j}}}, \quad j = 2$$

where P_j is the price of good j produced in the urban sector.

The optimal amount of labor in the rural sector is determined using the average product pricing rule for labor:

$$(8) \qquad w_j = \frac{P_j \gamma_j \left[\alpha_j K^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\alpha_j)\left(\sum_{q=1}^{N_j} \epsilon_j^q\right)^{\frac{\sigma_j - 1}{\sigma_j}}\right]^{\frac{\sigma_j}{\sigma_j - 1}}}{N_j}, \quad j = 1$$

where w_j is the return to labor in the rural sector.

The return to capital in the urban sector is derived by residual:

$$(9) \qquad r = \frac{P_j \gamma_j \left[\alpha_j K^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\alpha_j)\left(\sum_{q=1}^{N_j} \epsilon_j^q\right)^{\frac{\sigma_j - 1}{\sigma_j}}\right]^{\frac{\sigma_j}{\sigma_j - 1}} - w_j \sum_{q=1}^{N_j} \epsilon_j^q}{K}, \quad j = 2$$

(b) Consumption

Consumers are differentiated according to their sector of residence, although their utility functions defined over goods and effort (leisure) are the same. We assume an augmented CES form:

$$(10) \qquad U = \left[\sum_{j=1}^{2} \beta_j X_j^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}} - \frac{\epsilon^z}{z\delta}$$

where X_j defines consumption of good j, β_j is a share parameter, θ is an elasticity parameter and $z > 1$ and $\delta > 0$ are constants, with z measuring the curvature of the disutility of effort function and δ defined as a units term in this sub-function.

Each consumer owns labor and an equal proportion of the economy's capital endowment which, along with transfers, yields consumer incomes. If T^q denotes transfers (recycled tax revenues) received by individual q($\sum_{q=1}^{\bar{N}} T^q = T$), $\bar{K}^q$ denotes capital owned by individual q($\sum_{q=1}^{\bar{N}} \bar{K}^q = \bar{K}$) and X_j^q are purchases of good j by individual q, then individual budget constraints can be written as follows:

for workers in the rural sector

$$(12) \qquad \sum_{j=1}^{2} P_j X_j^q = w_1 + r\bar{K}^q + T^q$$

and for workers in the urban sector

$$(13) \qquad \sum_{j=1}^{2} P_j X_j = w_2 \epsilon_2 + r\bar{K}^q + T^q$$

Maximizing (10) subject to (12) and (13) yields the demand functions:

$$(14) \qquad X_j^q = \frac{I_j^q \, \beta_j^\theta}{P_j^\theta \left[\sum_{j=1}^{2} P_j^{1-\theta} \beta_j^\theta \right]}, \qquad j = 1,2$$

where I represents consumer income.

Substituting (14) into (10) yields the indirect utility function:

$$(15) \qquad U = I\,C - \frac{\epsilon^z}{z\delta}$$

$$\text{where } C = \left[\left[\sum_{j=1}^{2} \frac{\beta_j^\theta}{\left(P_j^{\theta_j - 1} \left(\sum_{k=1}^{2} P_k^{1-\theta} \beta_k^\theta \right) \right)^{\frac{\theta-1}{\theta}}} \right] \right]^{\frac{\theta}{\theta-1}}$$

Substituting (7) and (13) into (15) and optimizing with respect to ϵ_2 implies the optimal effort of a typical individual in the urban sector:

$$(16) \qquad \epsilon_2 = [w_2 C \delta]^{\frac{1}{z-1}}$$

Substituting (8) and (12) into (15) and optimizing with respect to ϵ_1 implies that the optimal effort of a typical individual in the rural sector satisfies:

$$(17) \qquad \gamma P_1 (1-\alpha_1) \delta C = \frac{\epsilon_1^{z-1+\frac{1}{\theta}} N_1^{\frac{\theta+1}{\theta}}}{\left[\alpha_j L^{\frac{\theta-1}{\theta}} + (1-\alpha_1) \left(\sum_{q=1}^{N_j} \epsilon_1^q \right)^{\frac{\theta-1}{\theta}} \right]^{\frac{1}{\theta-1}}}$$

(c) Government

Government interventions in taxes, subsidies and transfers are also incorporated in the model. The government collects net revenues from the tax subsidy system and is assumed to distribute them on an equal per capita basis. In the model, we only capture those components of government revenues that are affected by taxing imports and subsidizing exports.

Revenue raised is thus given by:

$$R = \sum_{j}^{2} t_j P_j^w (X_j - Q_j) \tag{18}$$

where X_j and Q_j are consumption and production respectively, and t_j is the ad valorem tariff rate applied to imports of good j evaluated at world prices P_j^w. Subsidies paid are thus given by:

$$S = \sum_{j=1}^{2} \frac{s_j}{(1-s_j)} P_j^w Q_j \tag{19}$$

where s_j is the subsidy rate applied to production of good j.

In setting the parameters of the model, we use estimates of effective subsidy rates in Korea. Thus neither rebates of indirect or direct taxes on exports nor import duty remissions on exports are directly modelled, but are captured through the parameter values used to represent trade taxes and export subsidies. These are modelled in ad valorem form.

The government net revenue T is, therefore, given by:

$$T = R - S \tag{20}$$

The expenditure side of the government budget consists only of transfers to households as the government makes no real expenditures on goods. The government collects tariff revenues, pays export subsidies and transfers its net revenues to individuals such that in equilibrium its

budget is balanced. If transfers are made in lump sum form and are distributed on an equal per capita basis, then transfers received by each individual are:

$$(21) \qquad T^q = \frac{\bar{T}}{\bar{N}}, \quad q = 1,\ldots,\bar{N}$$

(d) Foreign Sector

A specification of the external sector (rest of the world (ROW)) completes our model. The ROW produces the same number of goods as the domestic Korean economy and produces both imports and exports so that, in equilibrium, it meets Korean desired net trades. Foreign and domestically produced goods are treated in the model as homogeneous commodities; commodities are treated as importables if net imports by Korea are positive and as exportables if net imports are negative.

The model incorporates an external balance condition which requires that the value of imports equal the value of exports evaluated at world prices:

$$(22) \qquad \sum_{j=1}^{2} P_j^w (X_j - Q_i) = 0$$

Korea is modelled as a taker of prices on world markets for all tradeables where P_j^w denote the fixed world prices. The relationship between Korean domestic producer prices and world prices for importables is:

$$(23) \qquad P_j = P_j^w (1 + t_j), \quad j = 1$$

and for exportables is

$$(24) \qquad P_j = \frac{P_j^w}{(1-s_j)}, \quad j = 2.$$

(e) Equilibrium

We use an iterative search procedure to solve for the equilibrium combination of rural to urban employment in the model. From this, commodity demand and supplies are determined as are net trades. Because of the small, open economy assumption, equilibrium in the model involves factor market clearing and government budget balance, with trade balance a property of such an equilibrium. We begin by making an initial estimate of the wage rate in the urban sector and of the return to labor in the rural sector. We then vary the parameters until an equilibrium is found that produces a set of factor prices that clears goods and factor markets, that holds external balance conditions and that equalizes utility across the two sectors.

IV. USING THE GENERAL EQUILIBRIUM MODEL TO ANALYZE THE ROLE OF TAX POLICIES IN KOREA'S OUTWARD ORIENTED GROWTH STRATEGY

We have used the model described above in counterfactual equilibrium analysis to assess the contribution of tax policy to growth in Korea. As indicated above, we calibrate the model to a microconsistent data set for a given base year incorporating a number of outward oriented growth policies used in that year, including tax policies. Because of data difficulties, we have built data sets for two years only, 1962 and 1982, representing recent and early years in Korea's growth process. This yields two alternative models, a 1962 and a 1982 base year model.

Using each base year model, we perform a series of counterfactual equilibrium calculations. First, we remove the export subsidy component of the policy mix used in the base year, yielding what we term an "export policy neutral equilibrium" (in other words, tariffs remain present). This

enables us to assess the contribution to Korean growth of policies pursued in the base year. The contribution to growth of policies pursued in other years is evaluated by introducing the policies of the alternative year into the model in place of the base year policies and computing a new equilibrium in the presence of each. Comparison between each of the equilibria and the policy neutral equilibrium then provides the model estimates of the year's policy contribution to growth in the year. The effects of policies over a number of years are evaluated as the sum of the individual year's effects.

We have performed these calculations using both the 1962 and 1982 base year models; different results are obtained in each case, depending upon the choice of base year model. We also perform calculations for different types of policy evaluation, for a removal of all export subsidies, for the tax component alone and for the direct (or indirect) tax component.

Calibration

Parameter values for the production and demand functions in the model are determined by using calibration techniques. Calibration procedures that are widely used in other applied general equilibrium models are followed (see Mansur and Whalley (1984)). The requirement for parameter values chosen in this way is that they should be capable of replicating the base year microconsistent data set as an equilibrium solution to the model, given extraneous estimates of elasticities of substitution, policy parameters, endowments and other data.

The first step in calibration is to break down the base yeab microconsistent data, constructed in value terms, into separate price and quantity data. For this purpose, a unit's convention is adopted (also see Mansur and Whalley (1984)) that defines physical units for commodities as those amounts that sell for one currency unit ($1.00 U.S.).[23] For factors, base year equilibrium data on the price of capital, labor employment, and urban/rural earnings differentials are used to decompose capital and labor payments into separate price and quantity observations.

The share parameters for the demand and production functions can then be determined by calibration, dependant upon the choice of elasticity values for the production and utility functions in the model. In the rural sector, the values of the share parameter α_j are taken from the average product pricing rule for labor and from the first order condition from producer cost minimization in the urban sector.

These are:

$$\alpha_j = \frac{\left[\left|\frac{w_j N_j}{\gamma_j P_j}\right|^{\frac{\sigma_j - 1}{\sigma_j}} - \left(\sum_{q=1}^{N_j} \epsilon_j\right)^{\frac{\sigma_j - 1}{\sigma_j}}\right]}{L_j^{\frac{\sigma_j - 1}{\sigma_j}} - \left(\sum_{q=1}^{N_j} \epsilon_j\right)^{\frac{\sigma_j - 1}{\sigma_j}}}, \quad j = 1 \tag{25}$$

$$\alpha_j = \frac{1}{1 + \frac{w_j}{r}\left|\frac{N_j}{\sum_{q=1} \epsilon_j}\right|^{\frac{1}{\sigma_j}}}, \quad j=2 \tag{26}$$

23/ The 1962 and 1982 benchmark data on production and labor income in won are converted into U.S. dollars using official exchange rates from the Economic Planning Board (1964, 1984). Trade data for both years are reported in U.S. dollars.

γ_1, the units term in the production function, is arbitrarily set equal to one allowing equation (25) to be solved for α_1. The value for γ_2 is then derived by residual using equation (9), given the units' definition for output.

Demand side parameters are determined in an analogous fashion using calibration techniques, except that first order conditions for utility maximization are used. Taking the derivative of (10) with respect to X_j yields:

$$(27) \qquad \frac{\beta_j}{\beta_k} = \frac{P_j}{P_k}\left[\frac{X_j}{X_k}\right]^{\frac{1}{\theta}}, \quad j = 1,2, \quad k = 1,2,$$

Normalizing so that $\sum_{j=1}^{2} \beta_j = 1$, individual β_j values can be obtained. Because ϵ_2 can be arbitrarily set equal to one in the base case data, the value for δ can be derived from (16). ϵ_1 can then be determined directly from the equal utility condition linking the manufacturing and agricultural sectors.

The microconsistent data sets to which we calibrate our model are built for the two years of 1962 and 1982, each chosen to reflect different stages of Korean growth. One is largely pre-outward orientation, and the other post-outward orientation and for a more recent year. In constructing these data sets, different basic data sources have been used and various incompatibilities between source materials have had to be dealt with. Adjustments have been made to the data, both to resolve incompatibilities (differences in definition, and measurement differences) and to ensure that the equilibrium conditions of the model are satisfied in the data.

Data on the income of urban wage earners for both years is from the Economic Planning Board (1964, 1984). The urban wage rate (in terms of efficiency units) is calculated by dividing the urban wage bill by the product of the number of employed persons in the urban sector and the effort level of a typical worker in this sector, which is arbitrarily set equal to 1.0 in the base case equilibrium data. Data on urban employment for both years is also from the Economic Planning Board (1964, 1984). The average farm income per worker is estimated using data on urban/rural differences in earnings taken from Hong (1979). Since the data from Hong are only available up to 1976, we use the 1976 data and assume that they also reflect urban/rural differences in earnings in 1982. The rural wage bill is estimated as the product of average farm income per worker and the number of persons employed in the rural sector. Data on rural employment in each year is from Economic Planning Board (1982, 1986).

The income return to capital in the urban sector is estimated as the residual of the value of production less labor income. To translate this into an observation on the physical quantity of capital used in determining parameters in the model, an estimate of the rate of return on capital in manufacturing is needed. We use estimates on average rates of return on capital during 1954-61 and 1972-75 (the last period available to us) from Hong (1979) and assume them to be roughly equivalent to the rates in 1962 and 1982.

Data on the value of production and net trade[24] by commodity for each year are from the Economic Planning Board (1964, 1984) except for data on agricultural production, which from our model definition is equal to labor income from employment in the rural sector. For each commodity, the value of consumption is determined as the residual between the value of production and trade. The value of trade evaluated at world prices must, for general equilibrium consistency, satisfy trade balance, and a scaling procedure incorporating the import data is used to ensure that condition holds.

The model also requires elasticity values for production and demand functions. We use values of 1.5 and -1.5. The unobservable parameter z, which measures the curvature of the utility function, we assume to be 1.5. Because of the potentially crucial nature of these values for model behavior, we use these values as our central set of values around which sensitivity analyses are performed.

To incorporate outward oriented growth policies into the model, data are also required on tariffs and export subsidies. Since agriculture is the only good that is imported in our model, we need tariff rates only on this product. We use the weighted average tariff rate on primary products (adjusted for rebates) in 1968 (the earliest period available to us) from Westphal and Kim (1977) and assume it to be be roughly equivalent to the tariff rate in 1962. For tariff rates in 1982, we use a simple average tariff rate on live animals and vegetable products in 1982 from World Bank (1987a).

24/ Korea was a net importer of manufacturing goods in both 1962 and 1982 and is treated as a net exporter of manufacturing goods in the model. We make the strong assumption that net exports of manufacturing goods in 1982 are given not by net trade in total manufacturing goods but rather in specific aggregate categories (consumption and investment goods) of which Korea was a net exporter in 1982. In 1962, Korea was a net importer in all specific aggregate categories (consumption, investment and raw material goods). Therefore, we use 1982 export data on the composition of trade to produce our 1962 microconsistent data set.

Data on subsidy rates are taken from Table 5, which we reproduced from Kim (1988). Since 1980 is the most recent year for which detailed information on subsidy rates from this source is available, we use the 1980 data and assume it to be roughly equivalent to the rates in both 1981 and 1982.

Table 6 reports some summary statistics from the two data sets we have constructed. The rapid expansion in the economy between 1962 and 1982 is evident, as is the change in the industrial composition of employment and output, and the changes in importance of trade to the economy. What remains to be established is how significant tax policies were in promoting outward orientation and how great a contribution they made to Korea's strong growth performance.

V. RESULTS

We have used the general equilibrium model described above to assess the contribution of tax policies to Korean growth as part of the outward oriented growth strategies used in recent decades. The counterfactual policy exercises we have performed involved a series of counterfactual experiments in which the base year (1962 or 1982) policies are removed, and a new equilibrium for the model is computed and compared to the benchmark equilibrium. This comparison yields estimates of quantitative changes in all the endogenous model variables under the policy change. Further counterfactual experiments are then performed in which outward oriented tax policies during each year of the specified time periods (1963-82, 1963-72 or 1981-62) are sequentially introduced. For each of these policy changes, a new counterfactual equilibrium is computed and compared with the same no policy equilibrium.

TABLE 6
SUMMARY FEATURES OF 1962 AND 1982 MICROCONSISTENT DATA SETS USED TO EVALUATE INPUTS OF TAX POLICIES IN KOREA'S OUTWARD ORIENTED GROWTH STRATEGY

	1962 Microconsistent Data Set	1982 Microconsistent Data Set
Value of GDP (millions U.S. dollars)	1935.59	92587.56
Ratio of employment in manufacturing to agriculture	1:15	1:2
% of GDP in		
imports[a]	16.0	43.9
exports[a]	6.0	36.9
Manufactured exports as % total exports[b]	27.0	93.7
Average tariff rate on imports (%)	13.4	7.09
Average export subsidy rate (%)	16.6	21.3

Notes: a) The numbers used in the model are smaller due to netting out of two–way trade.
b) These figures are based on actual data. In the model Korea only exports one manufactured good on a net basis.

The sum of the effects from each of the experiments across each of the years during the 1962-82 period are reported in Table 7. The average annual increase in GDP over this period that can be attributed to tax policies is small, only 0.54 percent using the 1982 base year model or less than 10 percent of actual average annual Korean growth in real GDP. A similar result is reached with each of the other model experiments, which use the 1962 base year model. These results suggest that tax policies played only a minor role in Korea's outward oriented developmental process, even in the early phases of Korean growth (1962-72). These policies also clearly had the effect of inducing migration from the rural to the urban sector. The effect of removing 1982 tax policies using the 1982 base year model shows the share of labor in agriculture as increasing to 70.63 percent from its 1982 benchmark level of 67.35 percent, while the share of labor employed in manufacturing falls from 32.67 to 29.37 percent. Also, these policies caused exports of manufacturing goods to expand by 1.07 percent on an annual basis over the 20 year period.

Using the same modelling approach, the relatively small contribution of tax policies to growth can also be broken down into two separate effects--direct tax reductions (mainly corporate tax rebates for exporters) and indirect tax exemptions (rebates of sales and excise taxes on exports). These results are reported in Table 8. Results indicate that indirect tax exemptions have contributed far more to Korean growth than have direct tax measures, which have been relatively inconsequential.

Table 8 also shows the results of a model experiment in which both the tah and non-tax components of outward oriented Korean growth strategies are removed. The quantitative magnitudes involved emphasize the dominant role that non-tax components (tariff rebates, interest preferences, direct

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OF KOREAN TAX POLICIES 1962–82

	Contribution over 20 years of outward oriented tax policies using 1982 base model	Contribution over 20 years of outward oriented tax policies using 1962 base model	Contribution over 10 years of outward oriented tax policies using 1962 base model	Actual average annual growth rate 1962–82	1962–72
Annual Average Growth Rate (%)					
GDP	0.54	0.68	0.62	8.65	9.25
Exports of Manufactures using 1982 base model[d]	1.07	n.a.	n.a.	35.37	55.66
Imports of Agriculture using 1982 base model[d]	1.10	n.a.	n.a.	11.94[a]	21.58[a]

	1982 base year model with 1982 policies	1982 base year model with tax policy neutral mix	1962 base year model with 1962 policies	1962 base year model with tax policy neutral mix	Actual Distribution[b] 1962[c]	1972	1982
Distribution of Employment (%)							
Agriculture	67.35	70.63	93.73	94.16	63.1	50.6	32.1
Manufacturing	32.67	29.37	6.21	5.84	36.9	49.4	67.9

Notes:

[a]Figures are based on imports of food and live animals.

[b]The distribution is between agriculture and nonagriculture.

[c]Based on the 1963 distribution.

[d]Trade growth using the 1962 base model are unrealistically high because of the small manufactured export base involved, and are not reported.

TABLE 8
ASSESSING THE EFFECTS OF TAX POLICIES ON KOREAN GROWTH USING THE 1982 BASE MODEL

Annual Average Growth Rate (%)	Contribution of indirect tax component of outward oriented Korean growth strategy	Contribution of direct tax component of outward oriented Korean growth strategy	Contribution of combined tax component of outward oriented Korean growth strategy	Contribution of both tax and non-tax components of outward oriented Korean growth strategy	Actual average annual growth rates
GDP	0.51	0.03	0.54	1.40	8.65
Exports of Manufactures	1.01	0.07	1.07	2.64	35.37
Imports of Agriculture	1.04	0.07	1.10	2.66	11.94[a]

Distribution of Employment (%)	1982 base year model with 1982 policies	1982 base year model without 1982 indirect tax policies	1982 base year model without 1982 direct tax policies	1982 base year model with tax policy neutral mix	1982 base year model with export policy neutral mix	Actual Distribution[b] 1962[c]	1982
Agriculture	67.35	70.63	67.32	70.63	73.27	63.1	50.6
Manufacturing	32.67	29.37	32.68	29.37	26.73	36.9	49.4

Notes:
[a] Figures are based on imports of food and live animals.
[b] The distribution is between agriculture and nonagriculture.
[c] Based on the 1963 distribution.

cash subsidies and export premia) have played in Korea's development process. Overall, however, the results seem to imply that outward oriented policies in Korea have had little significance in promoting growth.[25]

Table 9 reports on the sensitivity of these results to certain key model parameters. Three sets of parameters are varied--demand and production function elasticities and the utility function curvation parameter that affects effort decisions. Table 9 suggests that model results are sensitive to the values chosen for the substitution elasticities in production, but less to the other model parameters examined. The importance of production side elasticities is that their values affect the slope of the marginal value product of labor schedules in the two sectors, and hence the size of intersectoral resource transfers associated with alternative policies. Even with this sensitivity of results, however, the quantitative magnitudes that emerge still indicate that the main factors underlying Korean growth in recent decades lie outside of tax policy.

VI. CONCLUSION

This paper discusses and evaluates the role of tax policy in the Korean growth process from the early 1960s to the late 1980s. As such, it seeks to do two things: (i) to document and describe the evolution of

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25/ A recent study, Chenery et al. (1986), also uses a multisectoral general equilibrium model for analyzing the contribution of trade policy to growth in Korea. The results of their model simulations indicate that outward oriented policies account for as much as one percent of output growth in Korea. Our results indicate a somewhat larger contribution to growth. However, our model only provides a very partial view of the Korean growth process, as savings, investment, human capital formation and many other factors are missing.

TABLE 9
SENSITIVITY ANALYSIS OF ASSESSMENTS OF THE CONTRIBUTION OF TAX POLICIES TO KOREAN GROWTH USING THE 1982 BASE MODEL

Average Annual Growth Rate	Assessment as in Table 7	As in Table 7, but with substitution elasticities in production set equal to 0.75	As in Table 7, but with substitution elasticities in consumption set equal to -0.75	As in Table 7, but with the utility function curvature parameter, z, set equal to 2.50	Actual annual growth rate
GDP	0.54	0.24	0.54	0.54	8.65
Exports of Manufacturers	1.07	1.57	1.06	1.06	35.37
Imports of Agriculture	1.10	1.60	1.10	1.10	11.94[a]

	1982 base year model with 1982 policies	1982 base year model with tax policy neutral mix	1982 base year model with tax policy neutral mix	1982 base year model with tax policy neutral mix	1982 base year model with tax policy neutral mix	Actual Distribution[b] 1962[c]	1982
Distribution of Employment (%)							
Agriculture	67.35	70.63	69.42	70.63	70.63	63.1	50.6
Manufacturing	32.67	29.37	30.58	29.37	29.37	36.9	49.4

Notes:
[a] Figures are based on imports of food and live animals.
[b] The distribution is between agriculture and nonagriculture.
[c] Based on the 1963 distribution.

Korean tax policies over this developmental sequence; and (ii) to use a general equilibrium model developed earlier by the authors to provide an initial quantitative assessment of the role that tax policies may have played in this growth.

What emerges from the first section of the paper is a picture of a tax system in Korea that has evolved over nearly 30 years from a system raising small amounts of revenue from a series of narrowly based taxes to a more broadly based, mature system raising more revenue that relies heavily on a broadly based VAT. Throughout this period, the Korean tax system has also been remarkably adept in responding to the various swings in Korean growth policies. In the outward oriented phase (1961-71), rebates of direct and indirect taxes on exports were used; in the heavy and chemical industry phase (1973-79) investment tax credits, tax holidays and other incentives for these industries were used; and in the most recent trade liberalization and structural adjustment phase (1980-89), neutrality in tax policy has been the approach. The GDP growth rate in each of these phases has been consistently high, which implies that the changing tax system in Korea has probably facilitated rather than fueled high growth.

In the second part of the paper, we use a general equilibrium model (Trela and Whalley (1989)) that we have already used on a previous occasion to investigate the significance of intersectoral resource transfers for Korean growth and to assess the contribution of tax policy in Korea. This model provides only a very partial view of the Korean growth process, as savings, investment, human capital formulation and many other key factors are missing. But unlike earlier modelling efforts, this uses a structure in which agriculture is represented by traditional farming patterns with an equal sharing of the proceeds between farm members. As a

result, effort levels in agriculture are lower than in manufacturing which has marginal product pricing of labor, with an accompanying differential between the urban wage and (implicit) rural wage. Export promotion policies, which stimulate manufacturing, move labor from the low efficiency rural sector to the high efficiency urban sector.

Using this model to examine the contribution of tax oriented policies in the earlier years of Korean growth seems to indicate a relatively modest role for taxes, accounting for less than 10 percent of actual Korean growth over the period 1962-82 and over the intensive outward oriented phase of 1962-72. However, around three percent of export growth can be attributed to these policies.

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