Exchange Rates, Wages, and Productivity in Korea

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I. Introduction

The Korean economy has been widely recognized as one of the world's more rapidly growing economies in recent decades. Since Korea launched its First Five-Year Plan in 1962, it has grown at over 100% per year on average. The growth pace has slowed on occasion when the economy was faced with oil shocks and sluggish world demand, but, overall, exports based on comparative advantage of specific goods have fueled constant growth, even through periods when adverse situations abroad reduced foreign demand for export goods and raised domestic inflation. Simply on the basis of growth performance, the adoption of an outward-oriented growth strategy could be considered as an epochal change in the trade and industrial policies into the direction of export drive from the import substitution. Since the export promotion policies were adopted in the early 1960s, the exchange rate has resumed its role as a major economic variable with significant influence on the volume of exports and imports.

Traditionally, the Marshall-Lerner condition has to be satisfied to allow an exchange rate depreciation to have the desirable impact on the trade balance. Once this condition is satisfied, an exchange rate depreciation can easily lead to an improvement in the trade balance.

But, in reality, it is widely recognized that an exchange rate depreciation cannot guarantee improvement in the trade balance. If the depreciation and the induced income expansion lead to domestic price increases, the real exchange rate will not change enough to raise the competitiveness. Both the substitution and income effects of the relative price change will work against satisfaction of the Marshall-Lerner condition.

The other point to be made is that the depreciation gives rise to a reduction in the purchasing power of domestic goods or an increase in the relative price of traded goods. This worsening in the terms of trade represents the reduction in the standard of living paid as a price for an increase in the competitiveness.

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In addition to the above two issues directly related to the currency depreciation, demand management policies and capital flight problems are at the heart of exchange rate policies (Diaz Alejandro, 1981; Dornbusch, 1985). Latin American countries in particular have suffered from huge budget deficits and currency overvaluation. In addition, capital flight has virtually destroyed the consistent exchange rate policy. The reason for overvaluations may be found in the government's concern over the standard of living and the inflationary impact of the currency devaluation. The periods during which the real effective exchange rate was appreciated registered already-high inflation rates stemming from factors other than the currency devaluation, such as adverse external conditions and loose demand management policies.

The policy rules for exchange rates and monetary expansion that accommodate price disturbances, by themselves, explain the increased persistence in wage and price disturbances if expectations about accommodating macroeconomic policies affect the wage-setting process to cause a slower adjustment of wages and prices in response to unemployment (Dornbusch, 1982).

Korea has a different background. Because of its basicially sound public finance and strict capital controls (Aghevli and Marquez-Ruarte, 1985), the concern here is how to mitigate the domestic inflationary impact of devaluation. To enhance competitiveness, wages and productivity management as well as the macroeconomic considerations were part of the exchange rate policy (Dornbusch, 1986a; Dornbusch and Park, 1986). Among these, we emphasize the role of productivity, which contributed to the sustained competitveness of manufactures exports.

Korea suffered from high inflation rates over the past two decades until 1982. The devaluation of domestic currency might add to the domestic inflationary pressures and thereby reduce the real wage to workers or the standard of living, although it would raise the external competitiveness. As shown in Table 1, the nominal exchange remained at a constant level for a long time and then was adjusted by a substantial margin. The nominal purchasing power parity exchange rates and the real effective exchange rate showed fluctuations to a certain extent.

On can raise the questions of how Korea has been able to fix the exchange rate for a long time without causing a serious decline in competitiveness, and of when it adjusted the exchange rate. We intend to provide a simple answer in this paper by focusing on the role of productivity as the main factor for eliminating the sharp conflicts among exchange rate depreciation, competitiveness, and the standard of living.

[Table 1] Exchange Rates and Terms of Trade

Year	Nominal Exchange Rate[1)]	Index of Exchange Rate	Nominal Effective Exchange Rate[2)]	Purchasing Power Parity[2)]	Real Effective Exchange Rate[2)]	Terms of Trade
1963	130.00	21.40	18.20	95.42	81.16	111.00
1964	255.00	41.98	34.78	139.33	115.43	111.90
1965	271.00	44.61	36.96	138.11	114.40	114.40
1966	270.00	44.45	36.19	130.96	106.63	127.70
1967	268.00	44.12	35.32	123.83	99.12	132.20
1968	276.65	45.54	36.58	119.83	96.25	137.70
1969	288.16	47.44	37.88	119.81	95.66	132.60
1970	310.56	51.13	41.09	122.64	98.56	133.80
1971	347.15	57.15	46.78	127.16	104.09	132.70
1972	392.89	64.68	56.04	129.78	112.44	132.10
1973	398.32	65.58	60.40	141.76	130.58	125.40
1974	404.47	66.59	59.46	126.16	112.65	102.10
1975	484.00	79.68	70.57	125.90	111.50	92.10
1976	484.00	79.68	70.37	118.15	104.35	105.10
1977	484.00	79.68	74.15	113.34	105.47	112.40
1978	484.00	79.68	83.18	104.40	108.98	117.80
1979	484.00	79.68	80.38	96.31	97.15	115.30
1980	607.43	100.00	100.00	100.00	100.00	100.00
1981	681.03	112.12	117.54	98.87	103.65	97.90
1982	731.08	120.36	118.66	104.67	103.19	102.20
1983	775.75	127.71	126.62	111.51	110.56	103.10
1984	805.98	132.69	129.85	116.91	114.41	105.30
1985	870.02	143.23	138.47	125.39	121.22	105.90
Coefficient[3)] of Variation		0.44	0.52	0.12	0.10	

Notes: 1) Yearly average.
2) Using as weights each year's trade volume of seven major trading partners, i.e., U.S., Germany, Netherlands, Japan, U.K., Canada, France.
Purchasing power parity = (index of exchange rate) × (relative price)
Real Effective exchange Rate = (nominal effective exchange rate) × (relative price)
3) Standard deviation/mean.

Productivity is most often beyond the control of policymakers. In Korea, however, high outward-oriented growth was accompanied by high productivity growth, which was in turn made possible at least in part by the active role of government in allocating resources toward the enhancement of productivity. For example, exporters were provided with substantial policy loans at a preferential rate. The incipient increase in money supply caused inflation, but also certainly promoted production. As far as growth is associated with inflation, an increase in producitivity might be associated with lower real wages unless money wages also rise. In fact, money wages changed in response to movements in productivity. The higher the productivity, the higher real-wage demands. Furthermore, the real appreciation in a time of high inflation and high growth contributed to an increase in the real wage, as we will see later. The reverse was true in periods of low inflation and low growth. Accordingly, an increase in real wages with real appreciation or a decrease in real wages with real depreciation have not prevented the consistency of exchange rate policies necessary to achieve sustained competitiveness and sustained employment at the same time.

The paper proceeds as follows. Section II briefly reviews Korea's exchange rate system since the 1950s. Section III analyzes the linkages between real exchange rates and real wages, emphasizing the roles of producitivity, terms of trade, capital cost, and import restrictions. The real effective exchange rate serves to measure the price competitiveness, but the changes in real wages are dissected to enable investigation of the real cost burden of real appreciation or real cost abatement of real depreciation. Section IV explains changes in the relative prices of nontraded goods by focusing on real effective exchange rates and on the relative producitivity of traded and nontraded goods. The conclusion is offered in Section V.

II. The Brief Review of the Exchange Rate System in Korea

Before the government actively engaged in promoting exports through all available means in the early 1960s, the exchange rate remained overvalued during the 1950s for the purposes of avoiding inflation acceleration and earning more foreign currency in exchange for won currency sale to U.N. forces. Undoubtedly, overvaluation of the won deters exports and promotes imports, but policymakers did not attempt to gain export competitiveness through devaluation. As Korea's major exports were primary goods such as tungsten ore and agar-agar, they overlooked

the incentives for export through devaluation, depending instead on the tight quantitative restrictions on imports. Exporters were granted import rights and could obtain foreign exchange premiums on domestic market. Furthermore, they were provided with sizeable export subsidies.

This line of exchange rate policies was altered in the early 1960s as the foreign aid was reduced and the government dedicated itself to the goal of export-driven growth. By that time import substitution in nondurable consumer goods had been completed, and further steps of import substitution in machinery, consumer durables and intermediate products seemed to be improper due to the small domestic market and the large capital requirements involved. Rather than pursuing the slow growth path with import substitution, policymakers chose export-driven high growth.

In 1961, the official exchange rate increased 104% from 62.5 won to 127.5 won per dollar. This drastic devaluation contributed to absorbing the import premiums caused by quantitative controls and unifying the multiple exchange rates for commodities. However, the expansionary monetary and fiscal policies of the military government caused accelerating inflation. This lessened the effect of currency devaluation, so that another devaluation was needed to increase the real exchange rate.

The second large devaluation from 130 won to 256 won per dollar was carried out in 1964, but it was accompanied by fiscal and monetary reforms to reduce the inflationary pressure of devaluation. Although the government encountered many difficulties, such as accelerating inflation during the transition, it revealed its strong intention to pursue a consistent export-promotion policies by implementing monetary and fiscal reforms. In fact, the year of 1964 was really the watershed year after which the government depended on a comprehensive export drive policy.

By March 1965, the government had implemented a floating unified exchange-rate policy to ensure the stability of the real exchange rate, although it was interrupted by the government intervention in the foreign exchange market near the end of 1965. The won rate was maintained at about 271 per dollar up to 1968, when it began to depreciate again to maintain purchasing-power parity. The won was valued largely in consideration of the weighted percentage difference in inflation rates between Korea and her major trading partners until June 1971. Table 1 confirms that the nominal purchasing power parity exchange rates remained quite constant during this period. In the following period the exchange rate floated upward, then was pegged at a certain level. This pattern of exchange rate adjustment continued until December 1974, when the exchange rate was again pegged at 484 won per dollar through January

1980.

The pegging of the won to the U.S. dollar ended with Korea's 20 percent devaluation in January 1980 and the simultaneous adoption of a new exchange rate regime in February 1980. Under the new regime, the exchange rate of the won to the U.S. dollar was to be determined on the basis of movements of exchange rates of major trading partners and other factors affecting Korea's external position. With this currency basket system, the exchange rate changed more flexibly to maintain external competitiveness.

Despite the fact that the exchange rate was determined in the different ways, both the purchasing power party (PPP) exchange rate and the real effective exchange rate showed relatively small variance throughout the period since 1962, as a result of government's efforts to provide consistent incentives to exporters (Table 1). In this sense, we might say that Korea has succeeded in maintaining the external competitiveness throughout the period. Korea's experience with real exchange rates contrasts sharply with that of its Latin American counterparts. Table 2 shows the variable real exchange rates in Latin America. Argentina, Chile, and Mexico, in particular, experienced the extremely variable real exchange rates and, to make things worse, massive appreciation during 1978-81, when external circumstances were untenable enough to create the current debt crisis.

[Table 2] Real Exchange Rates in Latin America[1)]

(Index 1980-82 = 100)

	Argentina	Brazil	Chile	Mexico	Venezuela
1975	66	123	66	107	94
1976	81	122	74	106	97
1977	64	119	79	93	96
1978	74	108	72	94	93
1979	101	97	79	98	89
1980	116	85	95	104	91
1981	107	103	108	114	109
1982	76	112	97	82	109
1983	71	86	87	78	116
1984	80	86	90	92	86
1985	71	85	79	90	93
1986*	63	75	72	68	94

Source: Morgan Guaranty; also from Dornbusch (1986a).
Note: 1) Higher Values mean real appreciation.

[Table 3] Exchange Rates, Wages, and Productivity in Manufacturing

(average annual percentage change)

	Nominal Exchange Rate	Real Effective Exchange Rate	Nominal Wage	Consumer Price Index[1]	Real Wage[2]	Labor[3] Productivity	Unit Labor Cost(₩)	Unit Labor Cost($)[4]
1960-64	40.7		13.6	15.6	-1.7	7.5	5.8	-24.8
1964-69	2.5	-3.7	23.8	11.9	10.6	16.9	5.9	3.3
1969-73	8.4	8.1	18.6	11.0	6.9	9.9	7.9	-0.5
1973-79	3.3	-4.8	32.3	17.9	12.2	11.5	18.6	14.9
1979-85	10.3	3.8	14.5	10.4	3.7	11.2	3.0	-6.6

Notes: 1) Using consumer price index for Seoul City during 1960-64.
2) Nominal wage/Consumer price index.
3) Korea Productivity Center figures.
4) Unit labor cost in won currency/Nominal exchange rate.

Nevertheless, since Korea's real effective exchange rate also showed variations, albeit minor ones compared with those in Latin American cases, we divided the period from 1960 to 1985 into five sub-periods as shown in Table 3, according to the ups and downs of the real exchange rate.

The real appreciation during 1964-69 and 1973-79 stemmed largely from the slow depreciation of the nominal exchange rate. For example, the nominal exchange rate was adjusted upward by 2.5% during 1964-69 and 3.3% per year on average during 1973-79, while it was depreciated 40.7% during 1960-64 and 8.4% during 1969-73. The reason for this is that the government was concerned about the domestic inflation caused by an exchange rate depreciation. The authorities tried to avoid further devaluation whenever they thought that export incentives other than currency devaluation and the favorable external conditions would allow them to achieve the export target each year.

Due to the strong export promotion, the nominal value of commodity exports increased about 480 times from 55 million U.S. dollars in 1962 to 26.4 billion dollars in 1985. The annual growth rate of nominal exports averaged 31 percent, substantially higher than the 20 percent growth of nominal imports. Despite this remarkable export growth, the trade balance continued to show deflecting the huge initial deficit, which was about ten times as large as exports.

III. The Linkages Between the Real Exchange Rate and Real Wages

1. Theoretical Considerations

One of the most important issues in exchange rate policy is the linkage among real depreciation, competitiveness, and the standard of living. Since the real exchange rate, measured as the ratio of the price of traded goods to the price of home goods, is influenced by the nominal exchange rate, domestic wage level, and productivity, the analysis of the relationships among them deserves attention.

To investigate determinants of the real wage-real exchange rate linkage, we first derive the real wage function. The real wage (w) is defined as the money wage (W) deflated by the CPI. The consumer price is a weighted average of prices of exportables (Px), importables (Pm), and nontraded goods (Pn). The price of nontraded goods is set by the unit labor requirements (a_n) multiplied by the money wage (W) and the financial cost,

where r is the effective real cost of capital.

$$w = \frac{W}{CPI} \tag{1}$$

$$CPI = Px^{\alpha}\ Pm^{\beta}\ Pn^{\gamma} \tag{2}$$

$$Pn = a_n W(1 + r) \tag{3}$$

Combining equations (1) to (3), we obtain an real wage equation in the following.

$$w = \left(\frac{Px}{Pm}\right)^{-\alpha} \left(\frac{Pm}{Pn}\right)^{-\beta} \left(\frac{W}{Pm}\right)^{\alpha} \left(a_n (1+r)\right)^{-(\beta+\gamma)} \tag{4}$$

A real depreciation, here implied by a rise in Pm/Pn, results in a decline is real wages, so that a real depreciation causes a reduction in the standard of living. On the other hand, an improvement in the terms of trade, a rise in Px/Pm, is related to a decease in real wages if the money wages in terms of importables (W/Pm) remains constant. An increase in labor productivity in nontraded goods ($1/a_n$) or a fall in the real capital cost raises real wages. Finally, real wages deflated by the consumer price is a positive function of real wages in terms of importables, so the immediate impacts of changes in the price of importables on the real wage in terms of the consumption bundle are also taken into consideration.

Equation (4) apparently shows that real depreciation gives rise to a decline in real wages unless the increase in labor productivity prevents it from declining. A gain in real wages and the resulting increase in the standard of living is possible through real appreciation if labor productivity is constant.

This analysis could be restated with an intuitive explanation. To implement real depreciation, the authorities should either increase the nominal exchange rate or reduce domestic inflation. If the domestic inflation rate can be lowered by factors such as reduced material and capital costs that are not considered in our pricing of domestic firms, wages need not decline to reduce inflation. If not, wages are an easy target. Thus depreciation-induced domestic inflation or slowed wage increases result in a decline in real wages if the productivity stays put.[1)]

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1) Recently, domestic firms' pricing policy models draw on models of industrial organization to explain the exchange rate and price adjustment (Dornbusch, 1986b; Krugman, 1986; Mann, 1986). Yet, the industrial organization theory has not been able to suggest the elegant pricing rules that can be easily applied to our studies.

Therefore, the standard of living can be enhanced at the cost of a loss in competitiveness. As higher labor incomes are spent on home goods, they will stimulate employment in the short run. But in the medium to long run, substitution effects dominate the short-run income effect. As the increased real wages that are required to improve the standard of living become a cost burden of firms, wage demands will become inconsistent with the level of competitiveness that maintains full employment with balanced trade.

An increase in productivity eliminates the sharp conflicts among the higher standard of living, competitiveness, and higher employment. With higher productivity, a high target wage would not necessarily create serious problems in employment and trade balance. Macroeconomic policies on the other hand, do little to alleviate conflicts among them. Restrictive demand will suppress the inflation but cause unemployment, while loosened demand will increase employment but reduce competitiveness.

In equation (4), the real exchange rate is measured by the relative price of foreign goods and domestic goods, taking into account the purchasing power parity of domestic goods vis-a-vis foreign goods. We can, however, also measure the real echange rate as the relative price of traded goods, admitting the existence of exportables. Then the relative price of traded goods can be assumed to be a linear homogenous function of the relative price of exportables and that of importables.

$$R = \frac{(Px)^{\alpha}\ (Pm)^{\beta}}{Pn} = \left(\frac{Px}{Pn}\right)^{\alpha}\ \left(\frac{Pm}{Pn}\right)^{\beta} \tag{5}$$

We further introduce a simple pricing rule for domestic firms such as

$$Px = a_x W,\ Pn = a_n W \tag{6}$$

where a_x and a_n represent the unit labor requirements of exportables and nontraded goods, respectively.

Then equation (5) becomes

$$R = \left(\frac{a_x}{a_n}\right)^{\alpha}\ \left(\frac{Pm}{P_n}\right)^{\beta} \tag{7}$$

Equation (7) shows that the relative price of trade goods is determined by the relative productivity of exportables and the relative price of imported goods. Roughly speaking, a decrease in the productivity of traded goods or real depreciation that is meant by an increase in the relative price of imported goods leads to an increase in the relative price of traded goods.

2. Korean Experience

Korea has been singled out as a case where rapid productivity growth and proper macroeconomic policies have helped the government pursue a consistent exchange policy and a strong export drive. Certainly the financial problems associated with a huge budget deficit and capital flight no longer plague the nation. When financial problems are not important, the export competitiveness versus wage demands are duly focused within the framework of domestic firm's pricing.

Tabel 3 gives some idea on these views. The average annual CPI inflation rate during 1960-1985 was 13.4%. The high inflation rates were caused by several factors including oil price hikes and somewhat loose monetary and fiscal policies. This paper does not measure how much inflation could be attributed to the monetary and fiscal policies and concentrates rather on the wage costs.

The notable thing is that real depreciation, as measured by an increase in real effective exchange rate, is associated with a slow wage increase. The periods of real appreciation, 1964-69 and 1973-79, saw a high real-wage increase of over 10%, while those periods of real depreciation, 1960-64, 1969-73, and 1979-85, registered low real-wage increase.

Labor productivity, however, backed up the wage increase. During 1964-69 and 1973-79, the high increase of real wages resulted from a high productivity increase as well as real appreciation. A real appreciation in those periods therefore would not cause adverse impacts on employment even in the long term, as the high labor productivity checked a rise in unit labor cost in home currency. The increased wage demands have not been directly linked to the cost burden of firms.

The case is different for real depreciation. During 1969-73, the real depreciation at an annual average rate of 8% was accompanied with a weakened real wage push of 7% per year. This stimulated employment and strengthened the external competition in the long term. But the slowdown in productivity growth brought about a higher labor cost burden than that of the previous period of real appreciation.

This observation leads us to conclude that labor producitivity played an important role in the implementation of the exchange rate policy. The high producitivity gave room for real appreciation, incipient higher standard of living, and maintenance of external competitiveness. On the contrary, an increase in production costs due to a slowdown in productivity was offset by an exchange rate depreciation.

The above general description about wages, productivity, and exchange rate, however, is not without reservations. The period of 1973-

79 strikingly contrasts with the period of 1979-85. While the real effective exchange rate changed in the opposite direction to roughly the same extent, the labor productivity growth was relatively stable between the two periods. In addition, as a result of nominal wage adjustment, the unit labor cost drastically increased during 1973-79 and showed a minor increase during 1979-85. Therefore, it seems that some excessive real appreciation or real depreciation has been carried out in each period. In the former, excessive real appreciation might have caused an excessive worsening of competitiveness. In the latter, excessive real depreciation might have created very strong export competitiveness, but at a cost of loss in labor income. This issue will be dealt with in the next section.

To recapitulate, the nominal exchange rate has been upward adjusted constantly to enhance the competitiveness of Korea's exports, thereby raising the real exchange rate in purchasing power parity terms. Sometimes, however, the real exchange rate appreciated and was accompanied by an acceleration of real wage increase. The constant increase of real wages was also supported by the high growth of labor productivity.

3. Determinants of the Real Exchange Rate-Real Wage Linkage

We could think of several variables that determine the link between real wages and the real exchange rate, but we depend upon equation (4) that highlights the determinants of the linkage such is the terms of trade, labor productivity, real wages in terms of importables, and real capital cost.

In addition, developing countries typically implement exchange rate policies with accompanying changes in trade measures other than an exchange rate adjustment. Sometimes, commercial policies of export subsidies, tariffs and quotas had a greater impact on trade than exchange rate policies had. The complicated picture of exchange rate-cum-subsidy policies has been the focal point of the analysis.

Korea is not an exception in this respect. Its periodic devaluation is sometimes reinforced by the enlarged export subsidies and the tightened quantitative restrictions on imports. But from a long-term perspective, foreign trade became more liberalized throughout the period. In particular, the periods of 1965-67 and 1978-79 exhibited rapid liberalization due mainly to the relaxed quantitative restrictions on imports. It is interesting, however, to see that the real appreciation occurred during those periods.

Table 4 shows the behavior of variables that determine the link

[Table 4] Determinants of the Real Wage-Real Exchange Rate Linkage

(Average annual percentage change)

Period	Real Wage	Real Effective Exchange Rate	Terms of Trade	Labor Productivity (KPC)	Labor Productivity (value added)			Wages in Terms of Imports[1]	Real Capital Cost	Trade Liberalization Ratio[2]
					Manufacturing	Non-manufacturing	Total			
1964-69	10.6	-3.7	3.5	16.9	7.7	7.0	7.0	21.3	3.0	93.0
1969-73	6.9	8.1	-1.4	9.9	10.2	3.4	4.5	0.7	-3.3	-1.4
1973-79	12.2	-4.8	-1.4	11.5	5.9	5.5	5.9	13.4	-0.4	5.3
1979-83	3.7	3.8	-1.4	11.2	4.7	3.2	3.5	2.5	-0.1	4.2

Notes: 1) Nominal wages in manufacturing/(dollar unit price of imports $_9$ nominal exchange rate)

2) Based on Kim's calculation (Kwang Suk Kim, The Timing and Sequencing of a Trade Liberalization Policy-The Korean Case, manuscript, March 1986).

between the real wage and real exchange rate. The terms of trade registered the relatively constant decrease since 1969, contributing to the real wage increase. The trade liberalization was associated with higher real wage increase. Other things being equal, an increase in real capital cost would cause a decrease in real wages. But we cannot observe this trend simply by looking at the table since it was dominated by the other influential determinants of real wages.

Productivity and wages in terms of importables might be dominating the linkage between the real wage and real exchange rate. Whereas the productivity showed the realtively constant increase, the most variable were the wages in terms of importables whose changes strongly reflect the changes in the nominal wages themselves.

Now, can we answer the question about the excessive real appreciation during 1973-79 and the excessive real depreciation during 1979-85 that has been raised in the previous section? Referring to Table 4 where the determinants of real wages are listed, we cannot find a clear-cut answer.

The low increase in real wages during 1979-85 should be explained by not only the real depreciation but the slow productivity growth and slow nominal wage increase and others. This complicated relationship between real wages and the real exchange rate suggests that a simple measure of overvaluation be bound to be seriously erroneous (Dornbusch, 1984). Although Table 4 enlightens various determinants, each of which contributes to the understanding of various channels of the real wage-real exchange linkage, more attention should be drawn to the real exchange rate and productivity.

IV .The Internal Relative Price and Productivty

The real exchange rate is most often defined as the relative price of traded goods, but in the foregoing, it was defined as the purchasing-power-parity adjusted effective exchange rates (or real effective exchange rate). In this section, we investigate the relationships among the internal relative price, the real effective exchange rate and the relative produvtivity of traded goods. Equation (5) to (7) already showed the relationships among them, in which decreases in the productivity of traded goods and purchasing power of domestic goods led to an increase in the relative price of trade goods.

We now measure the relative price of traded goods as the ratio of the manufacuturing sector's deflator to the non-manufacturing sector's deflator, considering manufactured goods as the trade goods (Balassa,

1964; Kravis, 1986). There are many disputes about the proper range of traded goods, but we do not pursue a detailed discussion here.

The changes in the deflator and productivity in each sector are shown in Table 5. The real exchange rate as the relative price of traded goods showed a persistent appreciation, but the speed of appreciation coincides with the changes in the real effective exchange rate in the last column of Table 5. An appreciation in real effective exchange rate goes with more appreciation in the relative price of traded goods, while a depreciation in real effective exchange rate goes with less appreciation in the internal relative price, except for the period of 1969-73. During 1969-73, the relatively high growth of productivity in the manufacturing sector gave rise to an excessive decrease in the relative price even with the depreciation in the real effective exchange rates of over 8% during the same period.

During 1979-85, the increasing rate of the manufacturing sector's deflator was still below the increasing rate of the non-manufacturing sector's deflator, but the difference between them was narrowed down to 2% point. Considering that the productivity in the manufacturing sector increased more than the productivity in the non-manufacturing sector during that period, the slowdown in real appreciation of the internal relative price could result from real depreciation of real effective exchange rate. In turn, the constant decline in the internal relative price originates in the rapid increase in the manufacturing sector's productivity.

[Table 5] The Relative Price of Manufacturing Goods and Productivity

(average annual percent change)

	Deflator			Labor Productivity[1]			
	Manufac-turing (A)	Non-manu. (B)	Relative Price (A/B)	Manufac-turing (A)	Non-manu. (B)	Relative Pro. (A/B)	Real Effective Exchange Rate
1960-64	22.2	22.4	-0.1	-1.4	8.2	-8.9	
1964-69	-0.3	13.3	-4.7	7.7	7.0	0.6	-3.7
1969-73	5.1	15.2	-5.1	10.2	3.4	6.6	8.1
1973-79	17.5	23.9	-5.4	5.9	5.5	0.4	-4.8
1979-85	8.2	10.2	-2.1	4.7	3.2	3.0	3.8

Note: 1) Labor productivity is defined here as the real value-added per worker.

Certainly, this analysis neglects the impact of a structural shift in demand on the internal relative price, since our pricing rule is based on

the supply cost, not much on profit margin. Donbusch and Park (1986) made the hypothesis that the shift in investments from capital goods toward construction and the differing import content of these two investments would explain the persistent real appreciation in the internal relative price in Korea, although they seemed not to suggest the very convincing reason why such a shift occurred.

The next issue, but most important, is the relationship between the movements in the internal relative price and the industrial development patterns. Kim (1981) studied this issue thoroughly and concluded that:

> "The industrial development patterns in Korea cannot be explained solely by the sectoral price competitiveness in domestic and foreign markets nor by the degree of trade protection found in each sector. In manufacutring, for instance, the increasing rate of the domestic producer's prices in the export industry was not necessarily lower than that of other industries. Consequently, the average nominal rate of protection for the export industry was relatively high, contrary to our expectation."

V. Concluding Remarks

This paper reviewed the exchange rate policy in Korea since the export-promotion polices were adopted in the early 1960s. Concentrating on the impact of an exchange rate depreciation or appreciation on the competitiveness and the standard of living, we looked to solve the conflicts between competitiveness and the standard of living. It has been found that productivity growth was the key for maintaining export competitiveness, although the real appreciation for avoiding inflation brought about increases in real wages. In the face of slower productivity increase and stagnant economy, the government immediately implemented an exchange rate depreciation, sometimes changing the exchange rate system itself. This timely depreciation helped promote exports but at a cost of decreased standard of living.

Without a productivity increase, real appreciation needed to enhance real wages results in an employment problem in the medium to long run. Employment subsides or tax cuts only replace the employment problem with a budgetary problem, as can be found in the Latin American countries. Productivity increase are rarely at the policymakers' command. Instead, the efficiency in resource allocation, technological development, investment on human capital and etc. are required in a concerted efforts from the government, businesses, and individuals. In this situation, the

domestic firm's pricing policy resumes its priority when we consider the effectivness of an exchange rate policy.

The more important success of exchange rate policies in Korea is that it successfully managed monetary and fiscal instruments and kept tight controls on capital flows. Accordingly, it could largely avoid the macro-economic and financial problems for the exchange rate policy. The monetary, fiscal, income and exchange rate policies need to be aligned in an appropriate way. Failure to respond consistently to the large external shocks such as an oil price hike, a world recession, and high interest rates as they develop is one of the reasons for the exchange rate crises in Latin America.

We presented in this paper some identities and tables that showed the determinants of and their contribution to the real wage-real exchange rate linkages. The linkages are influence by the magnitude of changes in terms of trade, productivity in nontraded goods, wages in terms of importables, effective real capital cost, and import liberalization among others.

The year of 1986 is signified by a substantial real depreciation and dramatic improvement in the terms of trade due to the appreciation of Japanese yen and Deutche mark of over 30% and the sharp oil price drop. These would undoubtedly contribute to a slower real wage increase last year, although it would be offset by the last year's somewhat higher productivity growth.

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