

An Analysis of Brisk Exports and Sluggish Domestic Demand Using a Nontradables Model: The Case of Korea

Dongkoo Chang* and Youngjun Choi**

This study employs a nontradables model to analyze the current economic situation characterized by brisk exports yet sluggish domestic demand in Korea. The present conjuncture is not easily explained by traditional views that increased exports will generate increased domestic demand. The depreciation of the won after the currency crisis along with economic liberalization raised the relative prices of tradables and contributed to an increase in their production. On the other hand, this condition has reduced demand for nontradables and the production of them.

The nontradables model explains that the divergent performance of tradables and nontradables can be resolved by a combination of short-term and long-term policies. Appreciation of the won based on the market mechanism supplemented by an aggregate demand expansion policy can be used in the short-term. In the long run, a gradual structural adjustment in the nontradables sector and a steady flow of funds into it, and especially the services sector, are suggested in order to prevent the tradables sector from impeding the growth of the nontradables sector.

JEL Classification Number : C32, F10, F31

Key words : Two-sector Economy Model(Nontradables Model), Exchange Rate, Relative Prices of Nontradables

*Head of Macroeconomics Studies Team, Institute for Monetary & Economic Research, the Bank of Korea(Tel 82-2-759-5417, E-mail: dchang@bok.or.kr)

**Economist of Macroeconomics Studies Team, Institute for Monetary & Economic Research, the Bank of Korea(Tel 82-2-759-5425, E-mail: yjchoi70@bok.or.kr)

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I. Introduction

Despite a well-performing export sector, the Korean economy has recently been facing sluggish domestic demand such as a slowdown in consumption and investment. The deepening economic polarization in Korea has emerged as a major economic concern because it could be detrimental to Korea's economic growth potential. Quite a few approaches have been used to explain economic polarization in Korea. One is the economic structural approach, which attributes the polarization of the economy between domestic demand and export to changes in economic environment both at home and abroad and to the weakening of inter-industry relations(The Bank of Korea a 2004, KDIa 2004). Another is the exchange rate approach(Buffie and Won 2001, Kim 2003, Yoon 2004, KDIb 2004) in which the depreciation of Korean won after the currency crisis leads to price increases for imported capital goods and a decrease in real incomes with a consequent dampening of domestic demand in forms as consumption and investment.¹⁾

Because Korea liberalized its economy at a quite rapid pace along with the shift of exchange rate policy to a free-floating exchange rate regime, in the post-crisis period, the impact of the exchange rate on the economy grew relatively bigger than in the pre-crisis period(Chang 2002) and this impact was asymmetrically distributed among economic sectors. Before the currency crisis, Korea maintained a managed floating exchange rate regime with narrow fluctuation bands and so the impact of external shocks on the domestic economy was cushioned.

After the crisis, however, as the range of fluctuations in the exchange rate widened,²⁾ the impact of external shocks on the tradables sector and nontradables sector of the economy became asymmetrical. After the crisis, economic liberalization and depreciation of the Korean won worked favorably for the tradables sector and helped it to grow continuously. On the other hand, the nontradables sectors such as services industries faced relatively weak domestic demand. Similarly, in the case of Mexico, after it was hit by a currency crisis in

Note : 1) As for causes of brisk export and sluggish demand, economic cyclical factors as well as economic policy factors are also recently addressed such as excellent export performance from worldwide economic recovery; contraction of domestic investment from dramatic increase in outward foreign direct investment; and contraction of domestic consumption from a sharp increase in credit delinquencies and household debts, and increases in uncertainties.

2) The range of fluctuation compared to the previous day(average, %) : 0.11 during 1990~1997(except for the period of currency crisis 1997.11~1998. 3) → 0.27 during 1999~2003 → 0.34 as of the second quarter in 2004.

1994, economic liberalization and depreciation of peso resulted in the dramatic growth of the tradables sector but sluggish demand in the nontradables sector(Tornell et al. 2004).

This paper employs a two-sector economy model(a nontradables model) to examine empirically and theoretically the asymmetrical impact of the depreciation of the won on both the tradables and nontradables sectors after the currency crisis. The model divides the overall national economy into two sectors. One is the tradables sector, which is highly influenced by the international economy, and the other is the nontradables sector, which is closely related to domestic demand. The policy implications of our analysis are then suggested.

The structure of this paper is as follows. Section II introduces the general concept of the nontradables model as an analytical framework and in Section III the model is empirically tested to explain the situation of the Korean economy, which shows brisk exports yet sluggish domestic demand. Lastly, in Section IV, policy implications are drawn from analysis of the nontradables model.

II. A Nontradables Model

1. Usefulness of a nontradables model

A nontradables model³⁾ divides a small open economy into a tradables sector, which is closely related to the overseas economic environment, and a nontradables sector, which is not influenced as much by the global economic situation. As an analytical framework to examine the balance between the global and the domestic economy, the model helps us grasp the imbalances between the tradables and nontradables sectors.⁴⁾ The nontradables model illustrates that

3) Academics have been interested in the nontradables model since Cairnes(1874) because it has the advantage of explaining the price adjustment mechanism, which is related to the balances between the external and internal economy in open macroeconomics(Dornbusch 1980). Nontradables models can be classified as the Australian model, Latin American archetype, and the Scandinavian model. The Scandinavian model is also called a Ricardian model because it assumes labor as the one and only factor of production. The Australian model is based upon microeconomic theory and it can be used to analyze changes in relative prices and production in a small open economy in consideration of labor, capital and so on. This model is sometimes called a dependent economy model as it assumes a small open economy, and it means that the country is a price taker of tradables in the world market. As a result, the nontradables model has been developed along with the Australian model because changes in production and expenditure in both sectors can be analyzed with this model. However, there have been few theoretical approach and empirical research on the model in Korea.

4) Tradables are literally goods which are exported and imported and nontradables are products which are not

imbalances arising between the external and the internal economy because of economic disturbances can be restored to equilibrium by adjusting the relative prices of nontradables and by changing expenditure in the sector.

The traditional view cannot explain the recent juxtaposition of brisk exports and sluggish domestic demand because they indicate that currency depreciation would help boost exports through increased price competitiveness and bolster domestic consumption and investment through increased incomes. The nontradables model, which is based on microeconomic theory, explains, however, the asymmetrical impact of currency depreciation on the tradables and nontradables sectors, which mainly arises from changes in relative prices and real incomes.⁵⁾

2. Outline of the nontradables model

In a small open economy, when the international price of tradables is given and Gross Domestic Product in the economy is divided into the production of tradables and nontradables, it is possible to obtain equilibrium relative price and equilibrium relative quantity between the two sectors.⁶⁾ [Figure 1] illustrates three different lines. One is CC which is the Production Possibility Curve(PPC) of tradables and nontradables under given resource endowment and another is P_N , representing the marginal rate of transformation between tradables and nontradables. Lastly, CIC_0 refers to a social indifference curve between tradables and nontradables. In this model, it is assumed that, in the short-term, capital is not mobile between the two sectors while labor is mobile between the sectors.⁷⁾

At the point E, both production and consumption in the two sectors are in equilibrium because the relative price of nontradables⁸⁾ equals the marginal rate of transformation, which is the slope of the production possibility curve(CC), and the relative price of nontradables is equal to the marginal rate of substitution

traded. In recent papers, two kinds of approaches to the classification for tradables and nontradables are used. One is the product approach under which the total trade volume(export plus import) in GDP is regarded as tradables while consumption and investment in GDP are seen as nontradables. The other is the industry approach under which the output of manufacturing industries with high export dependency is classified as tradables whereas that of services industries with low export dependency is seen as nontradables(Knight and Johnson 1997).

5) The nontradables model assumes that the relative price of tradables and nontradables depends only on changes in the exchange rate.

6) Refer to Dornbusch(1980), Bruno(1976), Hanoch and Fraenkel(1979) for numerical analysis with the nontradables model(or two-sector economy model).

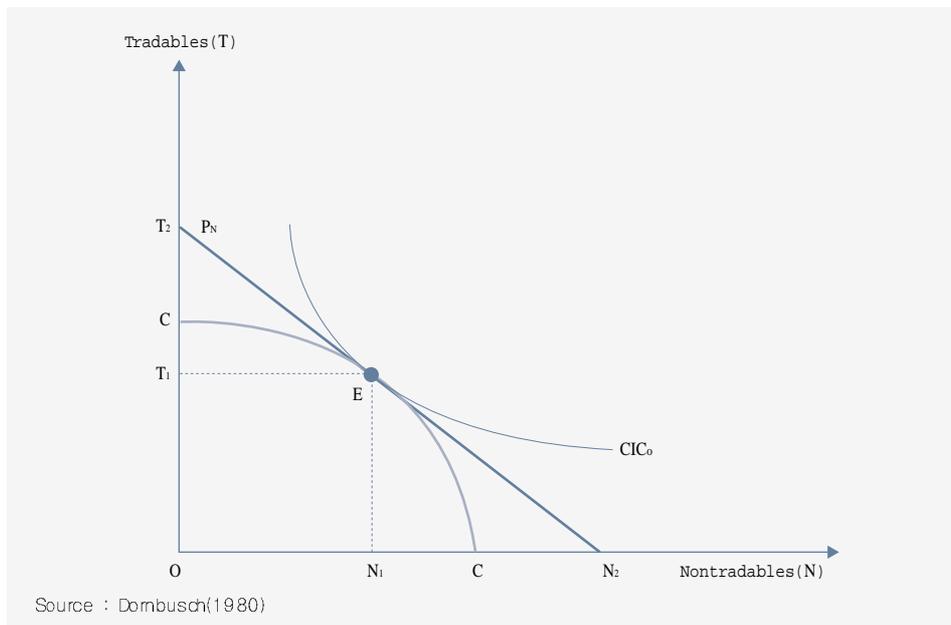
7) For the case in which capital mobility is free between the sectors, the equilibrium relative price and quantity between tradables and nontradables sector, refer to Obstfeld and Rogoff(1997), pp.202~225.

8) The relative price of nontradables is calculated by the price of nontradables divided by the price of tradables. The relative price of tradables is calculated in the opposite way.

of the social indifference curve. At equilibrium, the output of nontradables is ON_1 and that of tradables is OT_1 and total output in terms of nontradables is $ON_2(ON_1(\text{output of nontradables}) + N_1N_2(\text{output of tradables}))$.

Figure 1

Sectoral balances between tradables and nontradables



3. Impact of currency depreciation

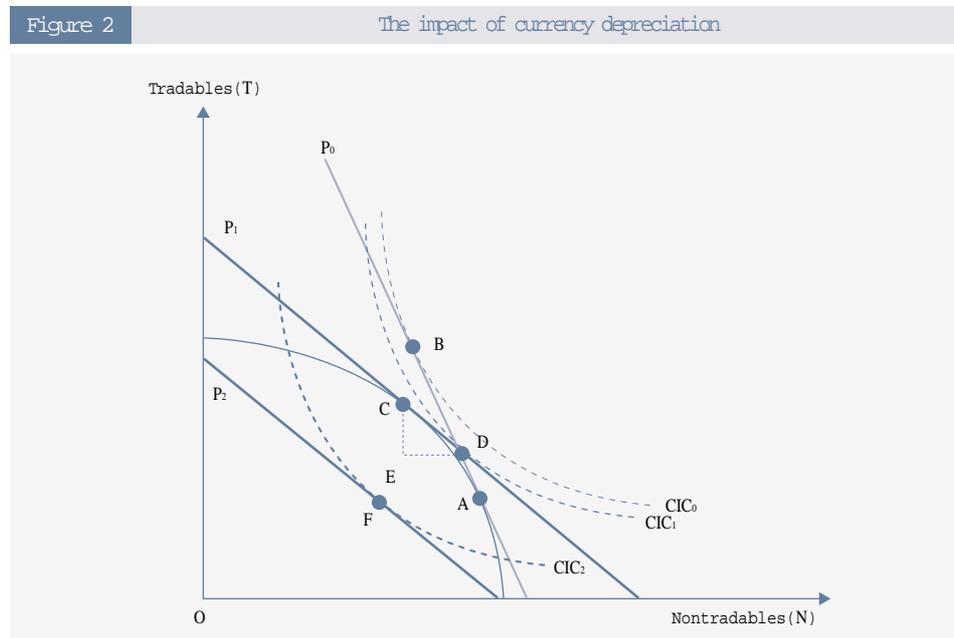
Using the nontradables model, the impact of currency depreciation⁹⁾ can be analyzed with two different impacts: a relative price effect and a real balance effect. Excess demand in the tradables sector(current account deficit) is assumed as the initial point of the model to take into consideration the fact that the Korean economy experienced current account deficits in the early 1990s before the currency crisis. Therefore, [Figure 2] assumes that there is excess demand in the tradables sector and excess supply in the nontradables sector when the relative price of nontradables stays at P_0 , where the output of tradables and nontradables is A and the consumption of them is B.

9) In this paper, it is assumed that the exchange rate is underestimated for a considerable length of time compared to the equilibrium.

A. The impact of currency depreciation on changes in relative prices (Relative price effect)

Output equilibrium is determined by equilibrium conditions in the labor market and labor is assumed as a function of the relative price of nontradables. Therefore, the output of the nontradables sector is positively related to the relative price of nontradables and the output of tradables sector is negatively related to the relative price of nontradables. An increase in the relative price ($P_0 \rightarrow P_1$) of tradables ($1/P$) from currency depreciation induces labor to move to the tradables sector¹⁰⁾ and it causes the output of tradables to rise ($A \rightarrow C$). Since an increase in the relative price of tradables ($1/P$) means a decrease in the relative price of nontradables, real wages in terms of the prices of nontradables rise and output in this sector declines ($A \rightarrow C$).

On the other hand, consumption between tradables and nontradables is determined at the point D at which the new relative price (P_1) is tangential to the social indifference curve. At the new equilibrium, consumption in the tradables sector decreases while that in the nontradables sector increases ($B \rightarrow D$). In sum,



10) Currency depreciation, by changing relative prices, improves profitability in the tradables sector, which, in turn, functions as a signal for factors of production such as capital and labor to move from the nontradables sector to the tradables sector (Das 1993).

changes in relative prices from currency depreciation result in increased output and decreased domestic demand in the tradables sector(i.e. excess supply(CE)), but decreased output and increased domestic demand in the nontradables sector(i.e. excess demand(DE)).

B. The impact of currency depreciation on real balances(Real balance effect)

The real balance effect means that currency depreciation¹¹⁾ in developing countries would reduce real income as price increases of tradables put a upward pressure on domestic price and, as a result, it would dampen consumption both in tradables and nontradables sector. In a small open economy, because of structural characteristics,¹²⁾ the currency depreciation policy can rather contract total expenditure by reducing real income than boost domestic economy by promoting export (Cooper 1971).¹³⁾ In other words, price increases of tradables from currency depreciation raise domestic prices and it will contract domestic demand in both sectors(D→F) because of curtailment of real income($P_1 \rightarrow P_2$).¹⁴⁾

11) There are two kinds of currency depreciation. If currency depreciation increases the price competitiveness of export goods, then it will lead to an increase in real income, consumption and investment. This kind of currency depreciation is expansionary currency depreciation. On the other hand, contractionary currency depreciation increases prices of imported intermediate goods and it will lead to a reduction in real income, consumption and investment. In this paper, currency depreciation refers to contractionary currency depreciation and it creates a negative wealth effect(Burstein et al. 2004).

12) When the dependency of intermediate goods such as raw materials on the overseas market is high, currency depreciation increases their domestic prices but cannot reduce domestic demand for them and so it causes upward pressure on domestic prices and the stagnation of domestic demand. Especially when facilities investment depends highly on the overseas sector, currency depreciation will cause a decrease in facilities investment. In addition, as the Korean economy relies more on the rest of the world for industrial parts and materials, the dependency of raw materials on overseas market gradually increases. In manufacturing industries, the import dependency ratio of raw materials increased from 29.7% in 1990 to 34.7% in 2000(The Bank of Korea b 2004).

13) At the economic liberalization stage in which industries mature and trade and investment are liberalized, although currency depreciation promotes exports, it may dampen investment demand and consumption and may eventually slow down economic growth by increasing prices of imported capital goods and the burden of external debt redemption(Kim 2003, Yoon 2004).

14) After the currency crisis, the relative price of nontradables(deflator in services sector/deflator in manufacturing sector) decreased dramatically, since when it has gradually increased. This increase seems to happen not because currency depreciation affects prices of tradables and nontradables but because the low interest rate policy increases the prices of real estate and public utility charges. If these kinds of factors, which induce price increase of nontradables, are taken into consideration, it implies that the slope of the relative price of nontradables becomes steeper(P_2) as the curve of the relative price of nontradables shifts downward. However, it also results in the same situation, i.e. excess supply of tradables and excess supply of nontradables. In terms of exchange rate pass-through, it is known that the impact is asymmetrical between the tradables sector and the nontradables sector. In general, it is analyzed that the degree of exchange rate pass-through is smaller in the nontradables sector than in the tradables sector(Burstein et al. 2004). On the other hand, Obstfeld and Rogoff(1997) argue that the relative price of nontradables increases(Baumol-Bowen effect) since productivity increase of nontradables is lower than that of tradables. However, it should be noted that this is based on long-

Especially, consumption of nontradables increases in the early stage by relative price effect but later decrease by real balance effect(B→D→F).

C. Overall impact of currency depreciation

By both the relative price effect and the real balance effect, increased relative prices of tradables(1/P) from currency depreciation can lead to excess supply in the nontradables sector as well as in the tradables sector. In other words, the increase in production and decrease in consumption generated by the relative price effect together with the decrease in consumption from the real balance effect lead to excess supply in the tradables sector. On the other hand, the decrease in production and increase in consumption generated by the relative price effect along with the decrease in consumption brought about by the real balance effect, especially when the extent of the decrease in consumption is bigger than that in production from the real balance effect, results in excess supply in the nontradables sector.

Excess supply in tradables sector is resolved by demand in foreign countries and it leads to current account surplus. However, excess supply in nontradables sector ends up with sluggish domestic demand since the scale of decreased consumption exceeds that of reduced production. Theoretically, the imbalances between the global and domestic economies from currency depreciation can be adjusted because consumption of nontradables rises as their prices fall whereas their production of nontradables expands as the currency appreciates due to a current account surplus. In reality, however, because of price rigidities in the nontradables sector, imbalances from currency depreciation can be persistent.¹⁵⁾

Overall impact of currency depreciation			
Tradables sector		Nontradables sector	
Production	Consumption	Production	Consumption
Increase (A→C)	Decrease (B→D→F)	Decrease (A→C)	Decrease after increase (B→D→F)

term analysis.

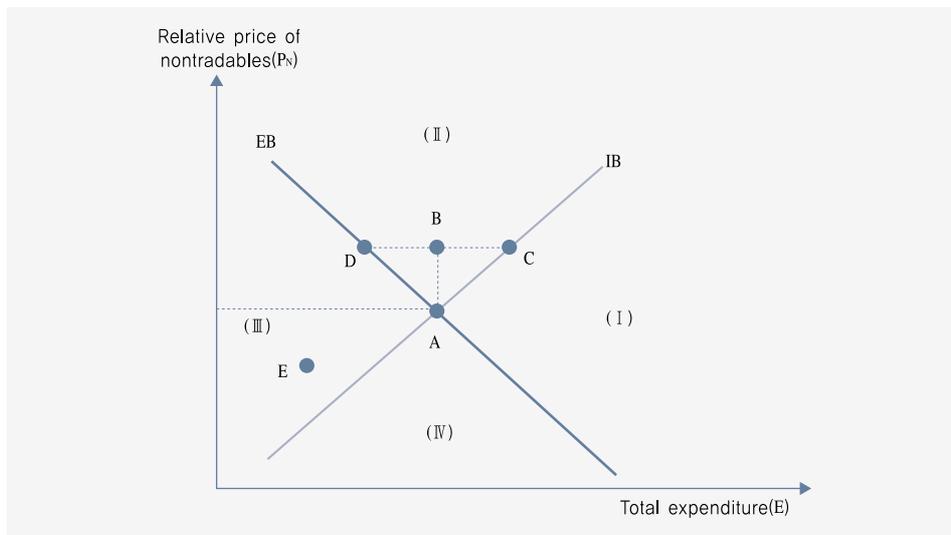
15) It can be said that producers in nontradables sector are in monopolistic competition because they do not compete with companies overseas. These companies determine price by marking-up a profit margin on marginal cost, which is proportional to nominal wage. However, because of downward price rigidities of nominal wage, price of nontradables does not go down despite currency depreciation(Burstein et al. 2004).

III. Analysis of Korea's recent economic situation using the nontradables model

1. Adjustment of imbalances between external and internal economy using the nontradables model

[Figure 3] illustrates external and internal balances of tradables and nontradables sectors. The vertical axis refers to the relative price of nontradables(P_N) and the horizontal axis represents total expenditure(E). The IB(Internal Balance) is an upward curve to the right and it represents combination of total expenditure and the relative price of the nontradables, which makes the nontradables sector in balance.

Figure 3 External and internal balances using a nontradables model



The point A demonstrates that nontradables sector is in balance but the point B means that nontradables sector is in excess supply since the relative price of nontradables at the point B is higher than that at the point A although the extent of total expenditure is the same at both points. Because the relative price of nontradables is higher at the point B, labor moves from tradables sector to nontradables sector and production in nontradables sector increases and, as a result, it places the sector in excess supply. To make nontradables sector in

balance, demand for nontradables should increase. In other words, since the total expenditure of nontradables should go up, the point B should move to the right until it reaches the point C. Thus, the line connecting A and C becomes the upward IB curve.

EB(External Balance) is a downward curve to the right and is a combination of total expenditure and relative price of nontradables which makes tradables sector in balance. The point A represents the equilibrium in tradables sector but the point B shows that the relative price of tradables is lower than the point A although the total expenditure is the same at both points. Therefore, tradables sector is in excess demand at the point B. Because the relative price of tradables is low, the labor moves from tradables sector to nontradables sector and it resulted in decrease in production and excess demand in tradables sector. Therefore, to make tradables sector in balance, demand for tradables should decline and total expenditure of tradables should go down(B→D) and, thus, the line connecting D and A becomes the downward EB curve.

Therefore, each quadrant between the IB curve and EB curve represents imbalances between external and internal economy. The left side of IB curve means excess supply in nontradables and the right side of IB curve means excess demand in nontradables. For EB curve, right side of it represents excess demand in tradables sector(current account deficit) and left side of it means excess supply in the sector(current account surplus).

Table 2 The imbalances between external and internal economy in each quadrant

	I	II	III	IV
Tradables sector	Excess demand (Current account deficit)	Excess demand (Current account deficit)	Excess supply (Current account surplus)	Excess supply (Current account surplus)
Nontradables sector	Excess demand	Excess supply	Excess supply	Excess demand

The imbalance between the external and internal economy can be adjusted to the equilibrium when the price is flexibly adjusted through changes in exchange rate. For example, when the economy is put in the quadrant of III(point E in [Figure 3]) in which tradables sector is in excess supply and nontradables sector is also in excess supply, currency appreciation increases the relative price of nontradables and then the economy shifts toward the EB curve on the one hand. Excess supply in tradables sector, i.e. current account surplus, on the other hand,

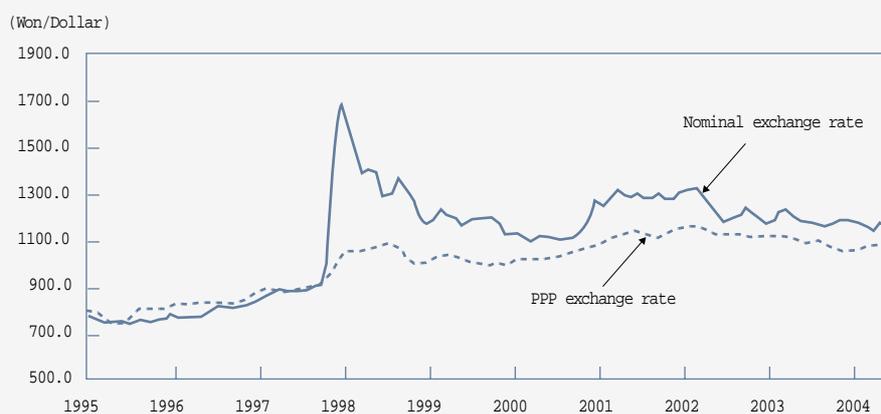
causes increase in money supply and it induces expansion of total expenditure and the economy moves along the EB curve, shifting toward the point A on the IB curve, the equilibrium between external and internal economy. However, if the exchange rate does not appreciate when the nontradables sector is in excess supply, the imbalance between the external and internal economy can persist and it can lead to long-run economic recession such as increase in inventory stock, contraction of production, and increase in unemployment.

2. Analysis of Korea's recent economic situation using the nontradables model

A. Korea's recent economic imbalances

The Korean economy has recently faced imbalances between the external and the internal economy such as a current account surplus and sluggish domestic demand. This is because currency depreciation affects the tradables and nontradables sectors asymmetrically. [Figure 4] illustrates that the exchange rate of the won against the dollar, in terms of PPP (Purchasing Power Parity exchange rate), has been continuously undervalued since the currency crisis.¹⁶⁾

Figure 4

Nominal exchange rate¹⁾ and PPP exchange rate

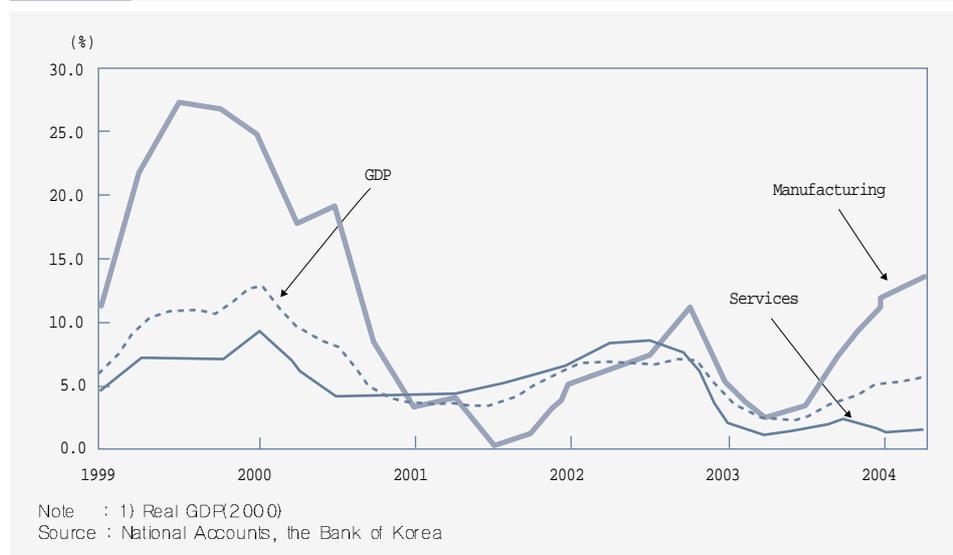
Note : 1) Closing rate
Source : ECONS, the Bank of Korea

¹⁶⁾ The PPP exchange rate can be problematic in that the estimated exchange rate differs depending on the reference time point, but this technique is employed to measure how widely the nominal exchange rate diverges from the PPP exchange rate.

(Production side)

The industry approach¹⁷⁾ classifies the production of manufacturing industries as tradables and that of services industries as nontradables. Since the currency crisis, when the won-dollar exchange rate depreciated substantially, the relative price of tradables has increased and economic conditions have been more favorable to the tradables sector. Therefore, production in the tradables sector has substantially increased while that in the nontradables sector has been in the doldrums. From the first quarter in year 1999 to the second quarter in year 2004, manufacturing industries registered an average growth rate of 10.9% while that in services industries was 5.1%. [Figure 5] shows that the tradables sector grew more than twice as fast as the nontradables sector.¹⁸⁾

Figure 5

Growth rate of manufacturing and services industries¹⁾

17) In Korea, the share of the exports of manufacturing industries in GDP averaged 31% from the first quarter of 1980 to the third quarter of 2003, while that of the exports of services industries in GDP stood at 4% during the same period. Since 1998, the share of the exports of manufacturing industries has registered over 45% while that of services exports has shown little change.

18) According to the Input-Output Tables(2000), 62% of manufacturing industries are export-oriented industries while 91% of service industries are focused upon the domestic market. Therefore, an increase in the production of manufacturing industries can be looked upon as good export performance while lethargic production of service industries testifies the sluggish domestic demand.

Under the product approach(for our reference), exports and imports¹⁹⁾ are regarded as tradables while the sum of consumption and investment is seen as nontradables, [Table 3] shows that the growth rates of both export and import (tradables) have been brisk while that of domestic demand has been in the doldrums.

Table 3 Growth rates of GDP, Exports & Imports, Consumption & Investment¹⁾

	(Unit : %)									
	1999~2003 ²⁾	1999	2000	2001	2002	2003	2004.1/4	2/4	3/4	4/4
Growth rates	6.4	9.5	8.5	3.8	7.0	3.1	5.3	5.5	4.7	3.3
Exports	12.0	14.6	19.1	-2.7	13.3	15.7	26.9	27.2	17.7	9.8
Imports	13.7	27.8	20.1	-4.2	15.2	9.7	11.8	20.6	12.0	11.1
Private consumption	6.2	11.0	8.4	4.9	7.9	-1.4	-1.4	-0.7	-0.8	0.6
Facilities investment	13.5	36.8	33.6	-8.99	7.5	-1.5	-0.3	6.2	6.8	2.5

Notes : 1) Real GDP(2000)
2) Averages for the years from 1999 to 2003
Source: National Accounts, the Bank of Korea

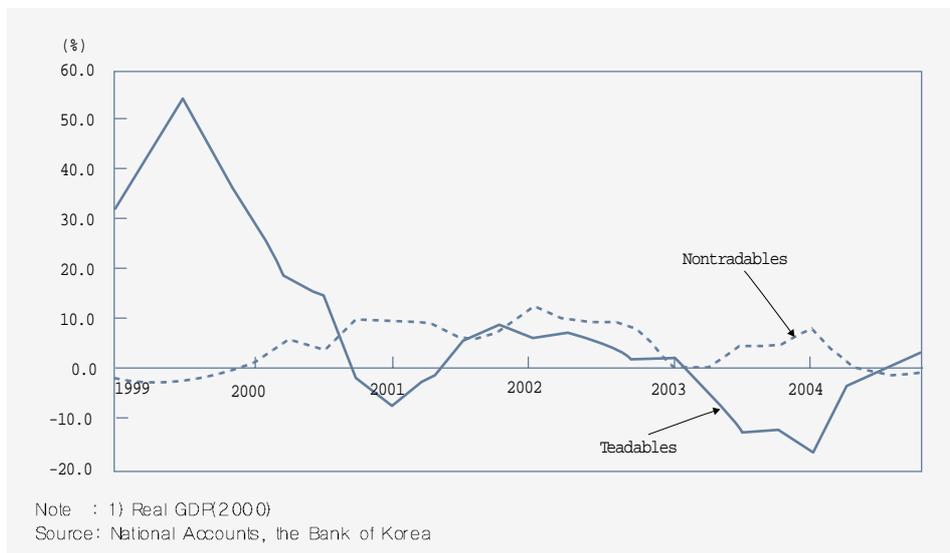
(Consumption)

On the consumption side,²⁰⁾ the consumption of tradables decreased whereas that of nontradables sector initially increased and later decreased because of the effect of reduced real incomes on consumption(real balances effect). Because of the base-period effect from the dramatic decrease in the import of tradables in 1998, the consumption of tradables increased dramatically after 1999 and then went into a gradual decline while that of nontradables had been increasing after 2000 but has recently slowed down. This trend seems to be consistent with the estimation in the model.

The situation of brisk exports yet sluggish domestic demand falls on the III quadrant in [Figure 3], in which both the tradables and nontradables sector have

19) The production of import substitution industries can be categorized as a kind of production of tradables. However, it is hard to estimate the production scale of import substitution industries. Therefore, imports can be a proxy for import substitution industries and in this case the sum of exports and imports can be considered tradables(Knight and Johnson 1997).

20) Consumption of tradables is calculated as "production of manufacturing industries - export of goods + import of goods" in National Accounts(2000) and consumption of nontradables is calculated as "private consumption - consumption of tradables"(Mollick 2003).

Figure 6 Consumption growth rates of tradables and nontradables²¹⁾

excess supply. However, the reasons for excess supply in the two sectors are different. Excess supply in the tradables sector results from the fact that domestic consumption is decreasing even though domestic production has been increasing dramatically. However, excess supply in the nontradables sector results from the fact that the slowdown in consumption is more pronounced than the slowdown in production in the sector.²¹⁾ Because excess supply in tradables sector is resolved by demand in foreign countries, the sector maintains current account surplus over the long-time period. However, excess supply in the nontradables sector, coupled with the contraction of domestic consumption and the domestic price rigidities of nontradables, is not able to adjust automatically and, as a result, the sluggishness of domestic demand remains persistent.

B. Policy suggestions

To correct the imbalances between the external and internal economy, especially the internal imbalances of excess supply in the nontradables sector, a policy mix of exchange rate policy such as currency appreciation and

21) It is not obvious whether the slowdown in nontradables consumption in [Figure 6] is bigger than slowdown in services production(nontradables) in [Figure 5]. This is not only because there are some statistical errors in classifying production and consumption of nontradables but because such policies to boost consumption contribute partially to the easing of dampened nontradables consumption including reduction of income taxes on credit card spending(July 1999), the reduction in special sales tax(July 1998, Dec. 1999, Nov. 2001, July 2002).

expansionary aggregate demand policy is necessary. When the economy is at the point of E in the III quadrant in [Figure 3], the relative price of nontradables (P_N) should increase in the direction of EB curve and total expenditure (E)²²⁾ should rise in the direction of IB curve in order to return to the equilibrium A. Currency appreciation causes the price of tradables to fall and the production of tradables to decrease and eventually it brings the economy into balance, i.e., narrowing of the current account surplus.

Meanwhile, the increase in the relative price of nontradables from currency appreciation helps to expand production of nontradables but it does not boost consumption of nontradables. Therefore, to achieve balances between external and internal economy, an expansionary aggregate demand policy needs to be in place, which helps to improve real income and increase consumption in the nontradables sector.

Consequently, the nontradables model suggests that both exchange rate policy and expansionary aggregate demand policy are needed to correct the imbalances between the two sectors in Korea. On the one hand, the exchange rate should be determined by demand and supply in the market to overcome the slowdown in production of nontradables. On the other hand, to complement the severe slowing of consumption in the nontradables sector, an expansionary aggregate demand policy is essential. However, both policies need to be gradually implemented in consideration of economic conditions, because both currency appreciation and an expansionary aggregate demand policy act to narrow the current account surplus.

3. Empirical Analysis

A. Currency depreciation and the relative price of nontradables

We carry out a regression analysis to examine whether the impact of currency depreciation on the relative price of nontradables is negative as the nontradables model suggests.²³⁾ For the purpose of this analysis, the relative price of nontradables is used as the dependent variable while the exchange rate and oil

22) After the currency crisis, as the relative price of tradables increases because of currency depreciation, the relative price of nontradables would be located at E, which is lower than A.

23) In theory, currency depreciation affects not only the price of nontradables but also production and consumption in both sectors. Therefore, interaction among these variables should be considered when they are empirically tested. However, when the relative price of nontradables is included to the equation for the relationship between currency depreciation and production and consumption, the quantity of available data becomes limited, which makes the estimation impossible. Therefore, how exchange rates affect the relative price of nontradables is separately estimated.

price are independent variables. The oil price is added as an independent variable to examine whether the exchange rate still has an effect on the relative price of nontradables as the theory suggests even after considering the fact that the oil price significantly affects both tradables and nontradables.²⁴⁾

The real effective exchange rate is used for the exchange rate, the deflator of manufacturing industries in the National Accounts(1995)²⁵⁾ is employed for the price of tradables, and the services industries deflator for the price of nontradables. The spot price of Dubai light in US dollars is used for the oil price. From the second quarter of 1990 to the third quarter of 2003,²⁶⁾ seasonally adjusted data are adopted and the variables are quarterly data which are transformed in natural logarithms. Unit roots of each variable are tested by ADF, Phillips-Perron, and ERS²⁷⁾ but they appear to be nonstationary time-series. Moreover, no cointegrated relationship among variables is found through the Johansen cointegration test and, thus, variables are first-differenced.

The empirical study by OLS(Ordinary Least Square) shows that currency depreciation leads to a statistically significant decrease in the relative price of nontradables, as the theory implies.²⁸⁾ As the price of tradables increases with currency depreciation, the price of nontradables falls in terms of the price of tradables. Moreover, the oil price is negatively related with the price of nontradables.

Table 4 The impact of the exchange rate on the price of nontradables¹⁾²⁾

	Constant	Exchange rate	Oil price(-1)	
The relative price of nontradables	0.025 (3.479)	-1.338 (-4.921)	-0.096 (-2.080)	R ² : 0.325 D.W.: 2.09

Notes : 1) Values in () denote t-values.

2) The general-to-specific method is used for variables' time lags.

24) When the oil price rises, the price of tradables, which use relatively more oil, will climb more than that of nontradables, which do not depend on oil so heavily. Therefore, it is to be expected that the relative price of nontradables will fall.

25) The GDP data in 2000 are available from the year 1995 and thus data with the base year of 1995 are used instead.

26) Because of a lack of time-series data after the free-floating exchange rate regime was introduced in Dec. 1997, it is assumed that the market mechanism of Korean exchange rate has been working since introduction of market average exchange rate regime in March 1990. Thus, it is analyzed from the second quarter of 1990.

27) ERS test(1996) is a revised version of D-F test and it shows considerably improved testing power when there are unknown means or trends in time-series data.

28) In addition, a currency crisis(1997.10~1999. 2)(Hong and Kang 2004) dummy variable is added to the model to capture the currency crisis effect(fourth quarter of 1997~ first quarter of 1999). The t-values of the

B Currency depreciation and employment and production in each sector

Based on the discussion with the nontradables model, an empirical test is made using VECM(Vector Error Correction Model) on whether currency depreciation increases employment and production in the tradables sector while decreasing employment and production in nontradables sector.²⁹⁾

A VAR model is employed, which consists of four variables - employment, production, wage and exchange rate - in both the tradables and nontradables sectors.³⁰⁾ Manufacturing industries that are highly export-oriented are chosen as the tradables sector while services industries which are not so heavily dependent upon exports are chosen as the nontradables sector. Services industries include wholesale and retail trade, restaurants and hotels; transport, storage and communications; and finance, insurance, real estate and business services.³¹⁾

From the first quarter of 1993 to the third quarter of 2003, seasonally adjusted quarterly data are adopted after being transformed in natural logarithms and, when quarterly data are not available, arithmetic mean of monthly data are used.

³²⁾ Industry-level GDP(1995) is used for production, industry-level real

Table 5 The impact of the exchange rate on employment in each sector

	Constant	Production	Wages	Exchange rate	Time lag (AC)
Employment in manufacturing industries	-17.834	1.006 (4.557)	-0.224 (-2.025)	0.560 (3.085)	1
Employment in services industries	0.501	0.255 (2.479)	-0.786 (-0.850)	-0.248 (-4.543)	1

Note: Values in () denote t-values.

variables(constant, exchange rate and oil price(-1)) are significant and signs of coefficients are the same as those without the dummy variable but the t-value of the dummy variable is not significant, being recorded as -0.59.

29) The currency crisis dummy variable is again added to the model to take into account the currency crisis effect, but the result is not statistically significant.

30) The order of variables to estimate long-term cointegrated relationship for employment is employment, production, wages and exchange rate. For production, it runs production, employment, wages and exchange rate.

31) Construction; electricity, gas and water; health and social welfare, and other public and business services are conventionally included in the nontradables sector. However, they are excluded in this paper because construction is very sensitive to the economic cycle and most other industries have the characteristics of public companies since they are not operated on the basis of the market mechanism.

32) The period of analysis is adjusted because the data for industry-level wages are available from the year 1993.

wage(monthly average wage) for wage, industry-specific employment for employment, and real effective exchange rate for exchange rate. All the variables in each sector turn out to be first-integrated time-series through unit root tests of ADF, Phillips-Perron and ERS. Johansen cointegration test shows that a stationary cointegrated relationship exists among nonstationary variables.

The empirical study shows that currency depreciation leads to an increase in employment and the production of tradables but a decrease in those of nontradables. The results of the study are consistent with the theory(See [Table 5] and [Table 7]). Currency depreciation is positively related with employment in manufacturing industries while it is negatively related with employment in services industries.³³⁾ As the nontradables model predicts, currency depreciation induces labor resources to move from services industries to manufacturing industries.

On the production side, the result is also the same as the theory predicts. Currency depreciation significantly increases production in manufacturing industries while production in services industries decreases with currency depreciation. This is because production in manufacturing industries increases as labor resources move to manufacturing industries from services industries.

33) Since 1990, the ratio of employment in manufacturing industries has been decreasing while that in services industries has been on the rise. [Table 6] shows that the growth rate of the number of people employed in manufacturing industries changed from -1.2% during 1991~2000 to -0.01% during 2001~2004 and that in services industries from 4.4% to 2.9% during the same period. It can be seen that the scale of the decrease in employment in manufacturing industries was reduced and the scale of increase in employment in services industries was also reduced. Thus, as is addressed in this paper, it seems that currency depreciation moves labor resources from the services sector to manufacturing sector.

[Table 6] Growth rate of persons employed by industry

(Unit : annual average, %)

	1971~1980	1981~1990	1991~2000	2001~2004
Manufacturing	9.1	5.3	-1.2	-0.01
Services	5.2	5.3	4.4	2.9
All-industry	3.6	2.8	1.6	1.6

Source : Korea National Statistical Office

On the other hand, it is argued that the ratio of employment in manufacturing industries diminishes while that in services industries increases in the long-term because the increase in productivity in manufacturing industries induces excess labor to move to services industries. Obstfeld and Rogoff(1997) proved through theory and experiences in Japan that, when the consumption of tradables perfectly substitutes that of nontradables, productivity gains in tradables cause increased employment in the tradables sector and decreased employment in the nontradables sector, results that contradict the traditional theory. They proved that productivity gains in manufacturing industries do not necessarily mean a reduction of employment in manufacturing industries and an increase of employment in services industries.

Table 7 The impact of the exchange rate on production in each sector

	Constant	Employment	Wages	Exchange rate	Time lag(AIC)
Production in manufacturing industries	-17,736	0,995 (2,702)	-0,223 (-1,719)	0,557 (3,210)	1
Production in services industries	1,961	3,915 (3,996)	-3,076 (-5,679)	-0,972 (-3,310)	1

Note: Values in () denote t-values.

C. Currency depreciation and consumption in each sector

A VAR model is empirically tested to see if currency depreciation decreases consumption of both tradables and nontradables by a real balances effect. The VAR model is set up consisting of 5 variables; private debt, real income, consumption of nontradables, consumption of tradables and the exchange rate. Impulse response analysis is then performed.³⁴⁾ Private sector debt after the currency crisis is included to examine the robustness of the results since an increase in private sector debt can affect consumption in both sectors.

The classification of the consumption of tradables and nontradables is adopted from Mollick(2003) and, therefore, consumption of tradables is calculated as "production in manufacturing industries-export of commodities+import of commodities" and consumption of nontradables as "consumption in the private sector-consumption of tradables." GDP data(1995) are used for real income, consumption of tradables and nontradables, and real debt is used for private sector debt, which is calculated as private sector debt in the flow of funds table divided by the GDP deflator. Lastly, the real effective exchange rate is used for the exchange rate.

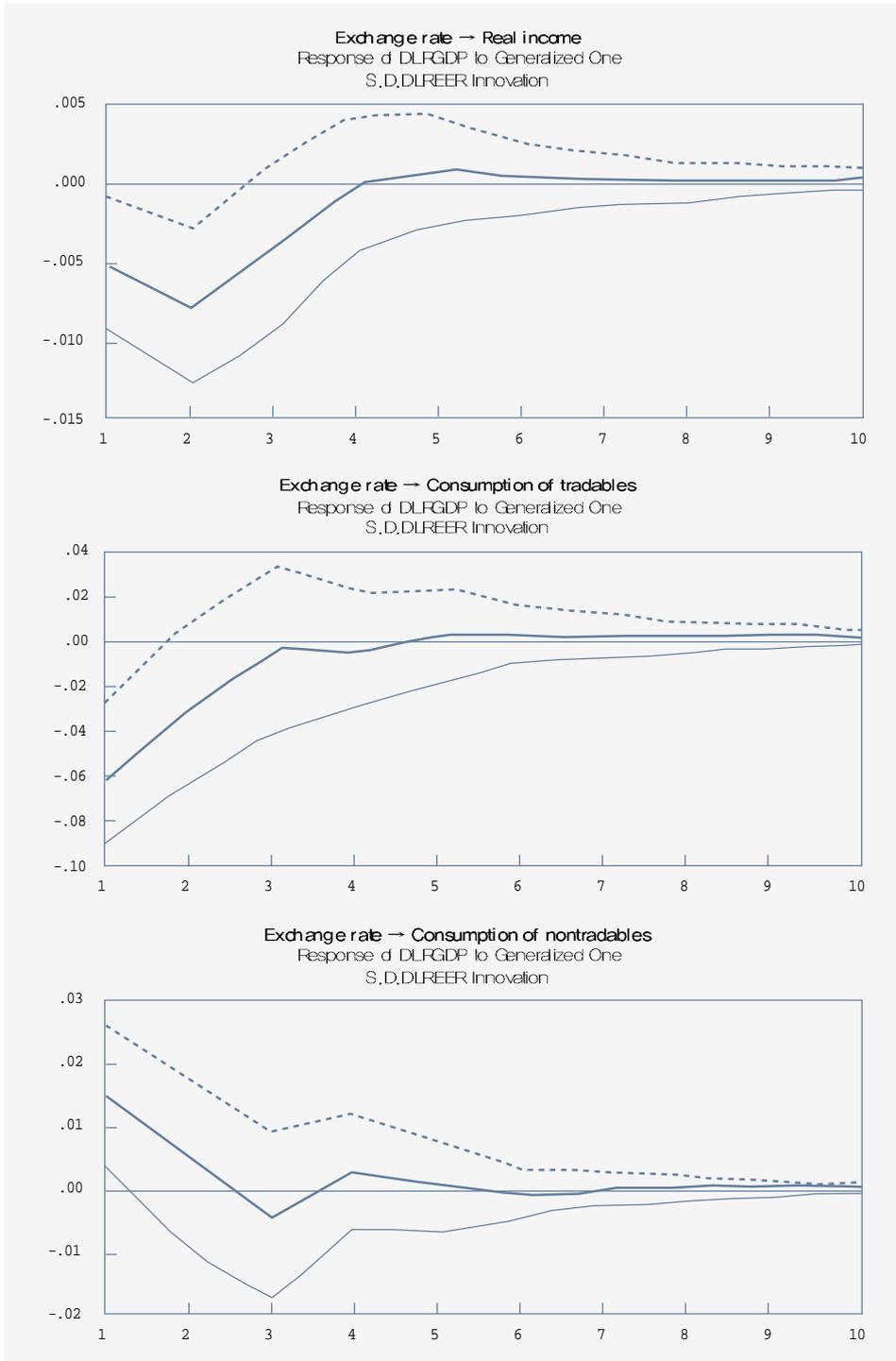
Each variable turns out to be integrated time-series through unit root tests of ADF, Phillips-Perron and ERS but the Johansen cointegration test does not show any stationary cointegrated relationships among variables. Thus, first-differenced variables are adopted for VAR analysis and two time lags of each variable are used on the basis of the AIC. The time period for analysis extends from the second quarter of the year 1990 to the third quarter of the year 2003.

[Figure 7] shows the results of the empirical study. It turns out that

34) Generalized impulse analysis is adopted not to obtain invariant results by the order of variables. The order of variables in this paper is as follows: real income, private sector debt, nontradables sector consumption, tradables sector consumption, and the exchange rate. Additionally, the currency crisis dummy variable is, once again, added to the model but the results are unaffected.

Figure 7

The Results of Impulse Response Analysis



consumption of both tradables and nontradables is significantly reduced as real income decreases substantially (real balances effect) even after the effect of private sector debt on consumption is considered. Real incomes decline instantaneously when the shock of currency depreciation occurs. After four quarters it starts to increase again and subsequently converges on the equilibrium.

Consumption of tradables shrinks quite dramatically (-6%) through both the relative price effect and the real balance effect but after five quarters it returns to equilibrium. It appears that currency depreciation directly increases the domestic price of tradables and results in a substantial reduction in their consumption. It is also shown that consumption of nontradables increases during the first and second quarters owing to the relative price effect but decreases in the third quarter through the real balance effect and returns to equilibrium after the fifth quarter.

IV. Policy Implications

The policy implications for Korea are derived from our analysis in this paper, using a nontradables model of the conjuncture of brisk exports and sluggish domestic demand in Korea, which is inexplicable from the traditional view that increased exports entail increased domestic demand. Korea's currency depreciation after the currency crisis brought about an increase in the relative price of tradables and, along with liberalization, this had a more favorable influence on the tradables sector. Consequently, it resulted in a dramatic increase in their production but a slowdown in the production and consumption of nontradables. As a result, the Korean economy faces imbalances between the external and internal sectors of the economy, in the form of excess supply in both the tradables and the nontradables sector.

In the nontradables model, policy makers mainly focus on excess supply in the nontradables sector since excess supply in the tradables sector is resolved by foreign demand. In other words, the policy implications are firstly that exchange rates should be determined by demand and supply in the market so that the production of nontradables can increase.³⁵⁾ Secondly a policy of expanding aggregate demand should be put in place so that an increase in real income may

35) Yoon(2004) argues that, in a more open economy, currency depreciation may contract facilities investment by way of price hikes for imported capital and dampen domestic demand by a reduction in real incomes. Thus, he

induce demand for nontradables.³⁶⁾ When exchange rate does not converge to the equilibrium that is determined by economic fundamentals, however, an expansionary aggregate demand policy can cause price surges in asset prices by temporarily boosting demand. Therefore, expansionary aggregate demand policy should be used within limits so that it is in harmony with a gradual appreciation based on the price mechanism of the exchange rate.

It is realistically plausible that the imbalances in the nontradables sector may impede growth in the tradables sector and may slow down the whole economy as the Mexican case clearly shows.³⁷⁾ Therefore, adjustment of the imbalances in the nontradables sector is very important in this context. Notably, the argument should be reconsidered, that exchange rate policies need to be implemented to support export promotion because exports are the only way to revitalize the Korean economy as domestic demand is in the doldrums. Such exchange rate policies may dampen the nontradables sector further and may even impede growth in tradables sector as the nontradables model suggests.

Moreover, not only short-term policies such as the determination of exchange rate by the market mechanism and the policy of expanding aggregate demand but also long-term policies such as a steady fund supply to and continuous structural adjustment of the nontradables sector are necessary so that growth in the tradables sector from liberalization does not crowd out that in the nontradables sector.³⁸⁾ As Gordon(2002), based on the case study of the US, points out, economic growth in the future will be led by the development of the

argues that a gradual currency appreciation may help revitalize domestic demand. Moreover, Cho(2004) empirically estimated that a 1% drop in the real effective exchange rate leads to an increase of private spending by about 1% and of facilities investment by 0.5~0.8% and of construction investment by 0.3~0.4%, concluding that decline of the real effective exchange rate has a positive influence on domestic demand.

36) In Korea, except for a one increase of the benchmark call rate(uncollateralized overnight rate) from 4.0% to 4.25% in May 2002, call rates were progressively lowered from 5.25% in October, 2000. In 2001, there were reductions of the call rates on four occasions from 5.25% to 5.0% to 4.75% to 4.5% to 4.0%. Two reductions in 2003 brought it from 4.25% to 4.0% and then to 3.75%. Two further quarter point reductions in 2004 lowered it from 3.75% to 3.5% and to 3.25%.

37) In Mexico, economic growth slowed down as a persistent economic slump in the nontradables sector resulted in a contraction of production in the tradables sector so that the production of the nontradables, such as energy, transportation, and communications, which are important inputs for production of tradables, shrank and the consequent bottleneck in the tradables sector held back overall economic growth. This suggests that sustainable economic growth can only be achieved when growth in the nontradables sector is accompanied to that in the tradables sector(Tornell et al. 2004).

38) Tornell et al.(2004) claims that economic slowdown in the nontradables sector is due to slow structural adjustment in the sector rather than to liberalization. The Korean government acknowledged the importance of services industries and announced "Financial and Tax Support Plans for the Development of Services Industries"(Oct. 19, 2001) and "Business Services Development Plan"(Nov. 3, 2001). It also promoted various other policies with a special emphasis on the reorganization of policy measures that discriminate against service industries compared to manufacturing industries.

nontradables sector such as wholesale and retail services, industries which have been successful in lowering inventory costs by taking advantage of information and communication technologies. Therefore, as Eichengreen (2004) also argues, export promotion policies at the expense of the development of the nontradables sector are not the best policy for sustainable economic growth and productivity improvement.

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