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 of brisk exports yet sluggish domestic demand in Korea. The present conjuncture is not easily explained by traditional views that increased export would entail 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 and production of nontradables.

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, especially the services sector, are suggested in order to prevent the tradables sector from impeding the growth of the nontradables sector.

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

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* 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 well-performing export sector, the Korean economy recently faces sluggish domestic demand such as slowdown in consumption and investment. As the economic polarization deepens in Korea, it emerges as a big economic concern because it can be detrimental to Korea's economic growth potential. There are quite a few approaches to explain the economic polarization in Korea. One is economic structural approach which attributes the economic polarization between domestic demand and export to changes in economic environment both domestic and abroad and to weakening of inter-industry relations(The Bank of Korea a 2004, KDIa 2004). Another is exchange rate approach(Buffie and Won 2001, Kim 2003, Yoon 2004, KDIb 2004) in which depreciation of Korean won after the currency crisis leads to price increase of imported capital goods and decrease in real income and consequently dampens domestic demand such as consumption and investment.[1)]

Since Korea liberalized its economy at a quite rapid pace along with changes in exchange rate policies to free floating exchange rate regime, it experienced that, in the post-crisis period, the impact of exchange rate on the economy grew relatively bigger than the pre-crisis period(Chang 2002) and that the impact on the economy is asymmetrical among sectors. Before the currency crisis, since Korea maintained managed floating exchange rate regime with small bands for

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, household debts and increase in uncertainties.

fluctuations, the impact of external shock on the domestic economy was limited.

After the crisis, however, as the extent of fluctuations in exchanges rates widens[2], the impact of external shock on the economy became asymmetrical between tradables sector and nontradables sector. After the crisis, economic liberalization and depreciation of Korean Won worked favorably for tradables sector and helped the sectors to grow continuously. On the other hand, the sector of nontradables such as services industries faced relatively weak domestic demand. In case of Mexico, after it experienced currency crisis in 1994, economic liberalization and depreciation of Peso resulted in the dramatic growth in tradables sector but sluggish demand in nontradables sector(Tornell et al. 2004).

This paper employs the two-sector economy model(a nontradables model) to empirically and theoretically examine the asymmetrical impact of increase in exchange rate on both tradables and nontradables sector after the currency crisis. The model divides one national economy into two sectors. One is the sector of tradables which are highly influenced by external economies and the other is the sector of nontradables which are closely related to domestic demand. From the analyses, policy implications will be suggested.

The structure of this paper is as follows. Section II introduces the general concepts 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 faces brisk export yet sluggish domestic demand. Lastly, in section IV, policy implications will

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

be set out from analyses of the nontradables model.

Ⅱ. A Nontradables Model

1. Usefulness of a nontradables model

A nontradables model[3] divides a small open economy into tradables sector which are closely related to overseas economic environment and nontradables sector which are not influenced as much by global economic situations. As an analytical framework to examine the balance between external and internal economy, the model helps to understand the imbalances between tradables and nontradables sector.[4] The nontradables model illustrates that the imbalance between external

3) Academic worlds have been interested in the nontradables model since Cairnes(1874) because it has an advantage of explaining the price adjustment mechanism, which is related to the balances between external and internal economy in the open macroeconomics(Dornbusch 1990). The nontradables model can be classified as Australian model, Latin American tradition, and Scandinavia model. The Scandinavian model is called Ricardian model because it assumes labor as one and only factors of production. The Australian model is based upon microeconomic theories and it can be used to analyze changes in relative prices and production in the small open economy in consideration of labor and capitals and, etc. This model is sometimes called dependent economy model as it assumes the 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 approaches and empirical researches on the model in Korea.

4) Tradables are literally goods which are exported and imported and nontradables are products which are not traded. In recent papers, two kinds of approaches on the classification for tradables and nontradables are used. One is product approach under which total trade volume (export plus import) in GDP is regarded as tradables and consumption and investment in GDP is as nontradables. The other is industry approach under which manufacturing industries with high export dependency is classified as tradables and services industries with low export dependency is as nontradables(Knight and Johnson 1997).

and internal economy by economic disturbances can be recovered to the equilibrium by adjusting the relative prices of nontradables and by changing expenditure in the sector.

The traditional views can not explain recent brisk export yet sluggish domestic demand because they indicate that currency depreciation would help boost export with increased price competitiveness and bolster domestic consumption and investment with increased income. However, the nontradables model, which is based on the microeconomic theory, explains the asymmetrical impact of currency depreciation on tradables and nontradables sector, which are mainly caused by changes in relative prices and real income.[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 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 Production Possibility Curve(PPC) of tradables and nontradables under the resources endowed and another is $P_{N,}$ representing marginal rate of transformation between tradables and nontradables. Lastly, CIC_0 refers to 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

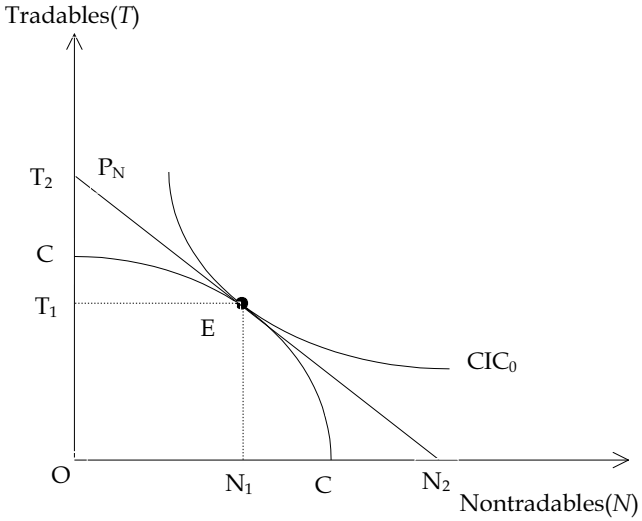
5) The nontradables model assumes that the relative price of tradables and nontradables depends only on changes in exchange rate.

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

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 nontradables[8)] equals marginal rate of transformation, which is the slope of production possibility curve(CC) and the relative price of nontradables is equal to the marginal rate of substitution of social indifference curve. At the equilibrium, 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(output of nontradables)+N_1N_2(outputoftradables)).

<Figure 1> Sectoral balances between tradables and nontradables



Source: Dornbusch(1980)

7) As for the case in which capital mobility is free between the sectors, the equilibrium relative price and quantity between tradables and nontradables sector can be referred 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 opposit way.

3. Impact of currency depreciation

Using the nontradables model, the impact of currency depreciation[9] can be analyzed with two different impacts: relative price effect and real balance effect. Excess demand in tradables sector(current account deficit) is assumed as the initial point of the model to take into consideration 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 tradables sector and excess supply in nontradables sector when the relative price of nontradables stays at Po, where output of tradables and nontradables is A and consumption of those is B.

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

Output equilibrium is determined by equilibrium conditions in labor market and labor is assumed as a function of the relative price of nontradables. Therefore, output of nontradables sector is positively related to relative price of nontradables and output of tradables sector is negatively related to the relative price of nontradables. Increase in relative price($P_0 \rightarrow P_1$) of tradables(1/P) from currency depreciation induces labor to move to tradables sector[10] and it makes the output of tradables to rise(A→C). Since increase in the relative price of

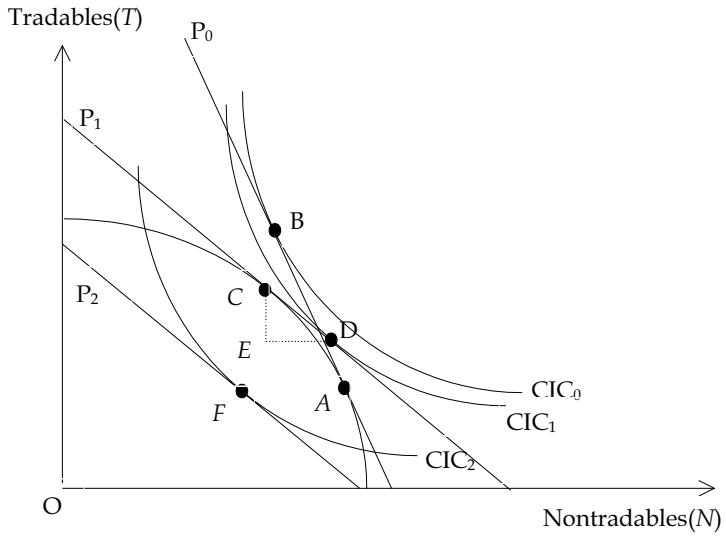
9) In this paper, it is assumed that the exchange rate is underestimated for a considerably long time compared to the equilibrium.

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

tradables(1/P) means decrease in the relative price of nontradables, real wages in terms of prices of nontradables rise and output in this sector declines(A→C).

On the other hand, consumption between tradables and nontradables is determined at the point D on which new relative price (P_1) is tangent to social indifference curve. At the new equilibrium, consumption in tradables sector decreases while that in nontradables sector increases(B→D). In sum, changes in relative prices from currency depreciation result in increase in output and decrease in domestic demand in tradables sector(i.e. excess supply(CE)) but decrease in output and increase in domestic demand in nontradables sector(i.e. excess demand(DE)).

<Figure 2> The impact of currency depreciation



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

The real balance effect means that currency depreciation[11] 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→ P_2).[14] Especially, consumption of nontradables increases in the early

11) There are two kinds of currency depreciation. If currency depreciation increases price competitiveness of export goods, then it will lead to 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 reduction in real income, consumption and investment. In this paper, currency depreciation refers to contractionary currency depreciation and it creates negative wealth effect(Burstein et al. 2004).

12) When dependency of intermediate goods such as raw materials on overseas market is high, currency depreciation increases domestic prices of intermediate goods but cannot reduce domestic demand for the goods and it causes a upward pressure on domestic price and stagnation of domestic demand. Especially when facilities investment depends highly on overseas, currency depreciation will cause decrease in facilities investment. In addition, as the Korean economy relies more on overseas for industrial parts and materials, dependency of raw materials on overseas market increases gradually. 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 export, it may dampen investment demand and consumption and may eventually slow down economic growth by increasing price of imported capital goods and burden of external debt redemption(Kim 2003, Yoon 2004).

14) After the currency crisis, the relative price of nontradables(deflator in services sector/deflator

stage by relative price effect but later decrease by real balance effect(B→ D→F).

C. Overall impact of currency depreciation

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

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in manufacturing sector) dramatically decreased and after that it has gradually increased. This increase seems to happen not because currency depreciation affects prices of tradables and nontradables but because low interest rate policy increases prices of real estate and public utility charges. If this kind of factor are taken into consideration, which induces price increase of nontradables, 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 tradables sector and nontradables sector. In general, it is analyzed that the degree of exchange rate pass-through is smaller in nontradables sector than in 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-term analysis.

demand since extent of decreased consumption exceeds that of reduced production. Theoretically, the imbalances between external and internal economy from currency depreciation can be adjusted because consumption of nontradables jumps up as price of nontradables falls and because production of nontradables expands as the currency appreciates due to current account surplus. In reality, however, because of price rigidities in nontradables sector, the imbalances from currency depreciation can be persistent.[15)]

<Table 1> 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)

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).

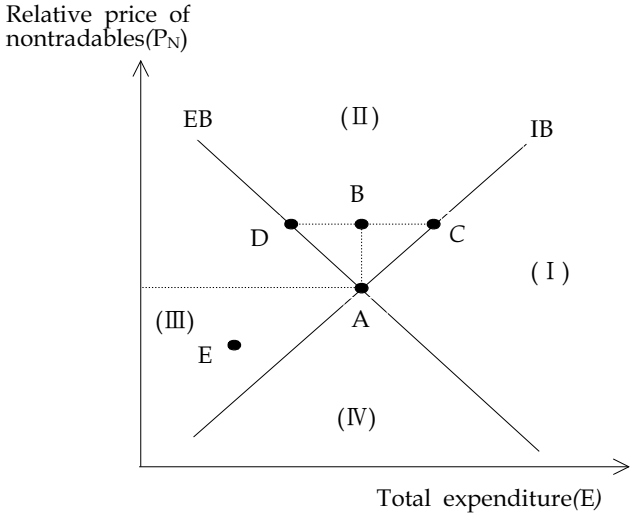
III. Analysis of Korea's recent economic situation using the nontradables model

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 a upward curve to the right and it represents combination of total expenditure and the relative price of the nontradables, which makes nontradables sector in balance.

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

<Figure 3> External and internal balances using a nontradables model



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 goods 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 results 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 Internal balance curve and External balance 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

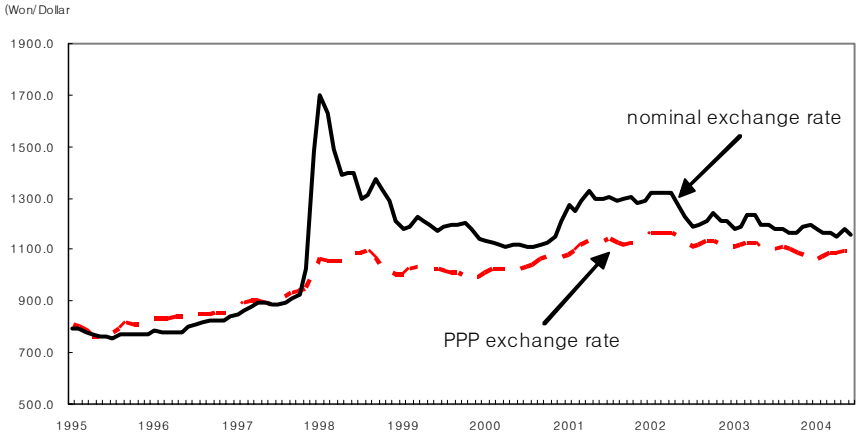
The imbalance between the external and internal economy can be adjusted to the equilibrium when the price is flexibly adjusted through changes in exchange rate. For example, when the economy is put in the quadrant of III(point E in <Figure 3>) in which tradables sector is in excess supply and nontradables 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. The Korea's recent economic imbalances

The Korean economy has recently faced with the imbalances between external and internal economy such as current account surplus and sluggish domestic demand. This is because currency depreciation affects asymmetrically between tradables and nontradables sector. <Figure 4> illustrates that exchange rate of Won against Dollar, when it is compared with PPP(Purchasing Power Parity exchange rate), has been continuously undervalued after the currency crisis.[16)]

<Figure 4> Nominal exchange rate[1)] and PPP exchange rate



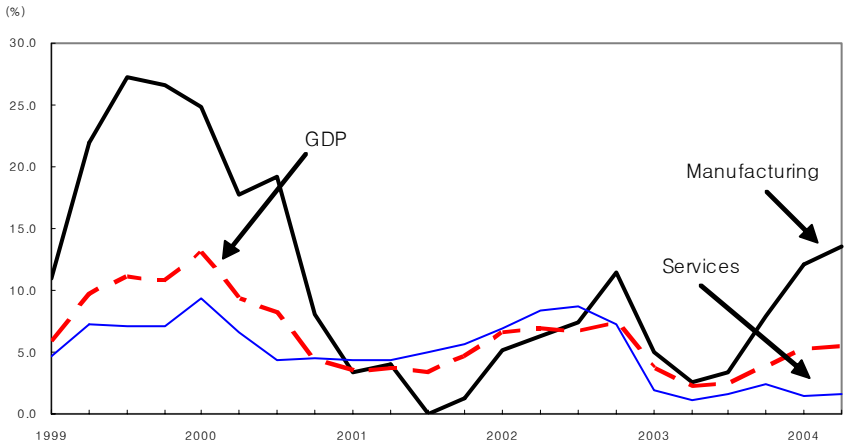
Note: 1) Closing price
Source: ECOS, The Bank of Korea

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

(Production side)

The industry approach[17] classifies production of manufacturing industries as that of tradables and production of services industries as that of nontradables. After the currency crisis, as won-dollar exchange rate has substantially depreciated, the relative price of tradables has increased and economic conditions have been more favorable to tradables sector. Therefore, production in tradables sector has substantially increased while that in nontradables sector has been in doldrums. In other words, from the first quarter in year 1999 to the second quarter in year 2004, average growth rate of 10.9% in manufacturing industries was recorded while the average growth rate in services industries was 5.1%. <Figure 5> shows that tradables sector

<Figure 5> Growth rate[1] of manufacturing and services industries



Note: 1) Real GDP(2000)
Source: National Accounts, the Bank of Korea

17) In Korea, the proportion of export of manufacturing industries in GDP is 31% on average from the first quarter of 1980 to the third quarter of 2003, while that of export of services industries in GDP occupies 4% during the same period. After 1998, the proportion of export of manufacturing industries has registered over 45% while that in services industries has not shown much change.

grew more than two times than nontradables sector.[18]

Under the product approach(for our reference), export and import[19] are regarded as tradables while the sum of consumption and investment is as nontradables, <Table 3> shows that growth rate of export and import(tradables) have been favorable while that of domestic demand has been in doldrums.

<Table 3> Growth rates of GDP, Export & Import, Consumption & Investment[1]

(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
Export	12.0	14.6	19.1	-2.7	13.3	15.7	26.9	27.2	17.7	9.8
Import	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

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

(Consumption side)

On the consumption side[20], consumption in tradables sector decreased and consumption in nontradables sector first increased and later decreased because of the effect of reduced real income on

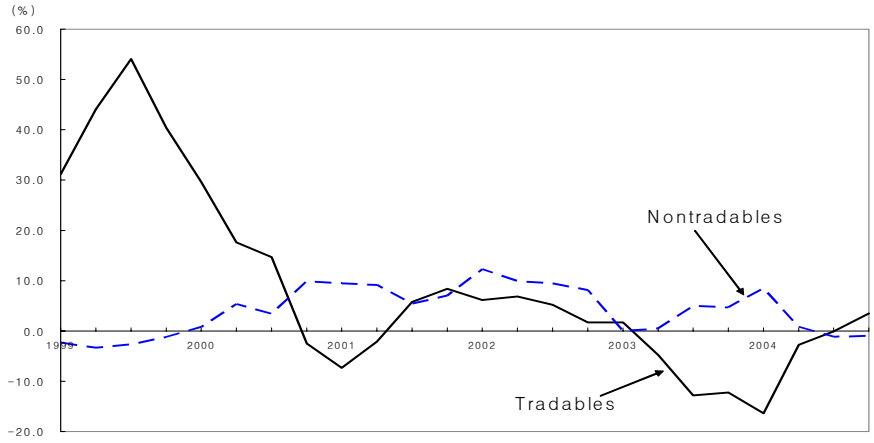
18) According to the Input-Output Table(2000), 62% of manufacturing industries are export-oriented industries while 91% of service industries are based upon the domestic market. Therefore, increase in production of manufacturing industries can be looked upon as good export performance while lethargic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

19) The production in import substitution industries can be categorized as a kind of production of tradables. However, it is hard to estimate the production size of import substitution industries. Therefore, import can be a substitute for import substitution industries and in this case the sum of export and import 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).

consumption(real balance effect). Because of the reflection effect from the dramatic decrease in import of tradables in 1998, consumption of tradables dramatically increased after 1999 and gradually decreased while consumption of nontradables had been increasing after 2000 but recently slowed down. This trend seems to be consistent with the estimation in the model.

<Figure 6> Consumption growth rates of tradables and nontradables[1)]



Note: 1) Real GDP(2000)
Source: National Accounts, the Bank of Korea

The situation of brisk export yet sluggish domestic demand falls on the III quadrant in <figure 3>, in which both tradables and nontradables sector are in excess supply. However, the reason for excess supply in each sector is different. Excess supply in tradables sector resulted from the fact that domestic consumption decreases even though domestic production dramatically increases. However, excess supply in nontradables sector results from the fact that slowdown in consumption is more dramatic than slowdown in production in the sector.[21)] Because

21) It is not obvious whether slowdown in nontradables consumption in <Figure 6> is bigger than slowdown in services production(nontradables) in <Figure 5>. It is not only because there are

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 nontradables sector coupled with contraction of domestic consumption and domestic price rigidities of nontradables is not able to adjust automatically and, as a result, the sluggish domestic demand is persistent.

B. Policy suggestions

To correct the imbalances between external and internal economy, especially the internal imbalances of excess supply in nontradables sector, a policy mix of exchange rate policy such as currency appreciation and 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 to the direction of EB curve and total expenditure(E)[22] should rise to the direction of IB curve in order to return to the equilibrium A. The currency appreciation causes price of tradables to fall and production of tradables to decrease and eventually it makes the economy in balance, i.e., curtailment of current account surplus.

Meanwhile, 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 the

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some statistical errors to classify production and consumption of nontradables but because such consumption boosting policies partially contribute to easing dampened nontradables consumption as reduction in income taxes of credit card spending(1999. 7), reduction in special sales tax(1998. 7, 1999.12, 2001.11, 2002. 7).

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.

balances between external and internal economy, the expansionary aggregate demand policy needs to be in place, which helps to improve real income and increase consumption in 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, exchange rate should be determined by demand and supply in the market to overcome slowdown in production of nontradables. On the other hand, to complement drastic dampening of consumption in nontradables sector, expansionary aggregate demand policy is essential. However, both policies need to be gradually implemented in consideration of economic conditions, because both currency appreciation and expansionary aggregate demand policy curtail 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

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 these are empirically tested. However, when the relative price of nontradables are included to the equation for the relationship between currency depreciation and production and consumption, the number of available data becomes limited and it makes the estimation impossible. Therefore, it is separately estimated how exchange rates affect the relative price of nontradables.

analysis, the relative price of nontradables is used as the dependent variable while exchange rate and oil price as independent variables. The oil price is added as an independent variable to examine whether 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 affects significantly both tradables and nontradables.[24)]

Real effective exchange rate is used for exchange rate and deflator of manufacturing industries in the National Accounts(1995)[25)] is for price of tradables and services industries deflator for price of nontradables. The spot price of Dubai in US dollar is used for the oil price. From the second quarter of 1990 to 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, ERS[27)] but they appear to be nonstationary time-series. Moreover, the cointegrated relationship among variables is not found through Johansen cointegration test and, thus, variables are first-differenced.

The empirical study by OLS(Ordinary Least Square) shows that currency depreciation leads to the statistically significant decrease in the relative price of nontradables and this result is the same as the theory

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24) When the oil price rises, the price of tradables which use relatively more oil will jump more than that of nontradables which do not depend on the oil as much. Therefore, it is expected that the relative price of nontradables would 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 lack of time- series data after the free floating exchange rate regime in Dec. 1997, it is assumed that Korea's market mechanism of exchange rate is somewhat recovered after 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 revised version of D-F τ test and it shows considerably improved power of test when there are unknown mean or trend in time-series data.

implies.[28] As the price of tradables increases by currency depreciation, the price of nontradables in terms of price of tradables falls. Moreover, the oil price is negatively related with price of nontradables.

<Table 4> The impact of exchange rate on the price of nontradables[1)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

Note: 1) Values in ( ) denote t-value.
2) general-to-specific method was used for variables' time lag

B. Currency depreciation and employment and production in each sector

Based on the discussion with nontradables model, it is empirically tested with VECM(Vector Error Correction Model) whether currency depreciation increases employment and production in tradables sector while decreases employment and production in nontradables sector.[29]

A VAR model, which consists of 4 variables, employment, production, wage and exchange rate in both tradables and nontradables sector, is employed.[30] Manufacturing industries which are highly

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 variables(constant, exchange rate and oil price(-1)) are significant and signs of coefficients are the same as the model without the dummy variable but the t-value of the dummy variable is not significant, 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 variable to estimate long-term cointegrated relationship for employment is employment, production, wage and exchange rate while, for production, order is production,

export-oriented are chosen as tradables sector while services industries which are not dependent upon export as much are chosen as nontradables sector. Services industries include wholesale and retail trade, restaurants and hotels, transport, storage and communication, 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 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.

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

	Constant	Production	Wage	Exchange rate	Time lag (AIC)
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-value.

employment, wage and exchange rate.

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

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

The empirical study shows that currency depreciation leads to increase in employment and production of tradables and decrease in those of nontradables, whose result is 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 force to move from services industries to manufacturing industries.

On the production side, the result is also the same as the theory implies. Currency depreciation significantly increases production in manufacturing industries while production in 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 number of people employed in manufacturing industries changes from -1.2% during 1991~2000 to -0.01% and that in services industries changes from 4.4% to 2.9%. It can be seen that the extent of decrease in employment in manufacturing industries is reduced and the extent of increase in employment in services industries is also reduced. Thus, as is addressed in this paper, it seems that currency depreciation moves labor force from services sector to manufacturing sector.

<Table 6> Growth rate of employed people 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
Whole industries	3.6	2.8	1.6	1.6

Source: Korea National Statistical Office

On the other hand, it is argued that 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 pool to move to services industries. Obstfeld and Rogoff(1997) proved through theories and experiences in Japan that, when consumption of tradables and nontradables are perfect substitutes, productivity increase of tradables causes increase in employment in tradables sector and decrease in employment in nontradables sector, whose result is contradictory to the traditional theories. They proved that increase in productivity in manufacturing industries does not necessarily mean the reduction of employment in manufacturing industries and increase of employment in services industries.

decreases with currency depreciation. This is because production in manufacturing industries increases as labor forces move to manufacturing industries from services industries.

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

	Constant	Employment	Wage	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-value.

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 real balance effect. The VAR model is set up, consisting of 5 variables, private debt, real income, consumption of nontradables, consumption of tradables and exchange rate, and impulse response analysis is performed.[34] The debt in private sector after the currency crisis is included to examine the robustness of the result since the 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 –

34) Generalized impulse analysis is adopted 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 exchange rate. Additionally yet again, the currency crisis dummy variable is added to the model but the result is the same as otherwise.

export of commodities + import of commodities" and consumption of nontradables as "consumption in 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 debt in private sector in flow of funds table divided by GDP deflator. Lastly, real effective exchange rate is used for exchange rate.

Each variable turns out to be integrated time-series through unit root tests of ADF, Phillips-Perron and ERS but Johansen cointegration test does not show any stationary cointegrated relationship among variables. Thus, first-differenced variables are adopted for VAR analysis and 2 time lags of each variable are used on the basis of AIC standard. Time period for analysis ranges from second quarter of the year 1990 to third quarter of the year 2003.

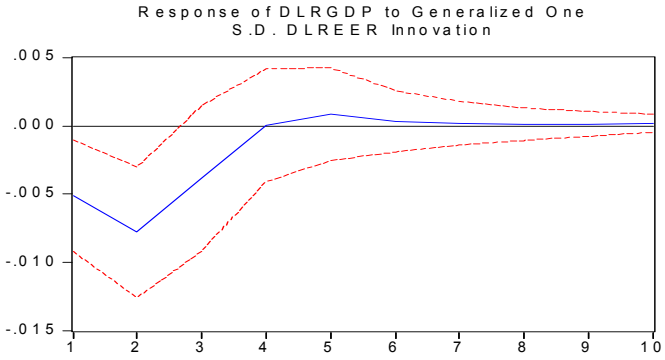
<Figure 7> shows the result of the empirical study. It turns out that consumption of both tradables and nontradables has significantly reduced as real income substantially decreases(real balance effect) even after the effect of private sector debt on consumption is considered. Real income reduces instantaneously when shock of currency depreciation occurs and after four quarters it starts to increase and after that it converges to the equilibrium.

Consumption of tradables reduces somewhat drastically(−6%) by both relative price effect and real balance effect but after 5 quarters it returns to the equilibrium. It appears that currency depreciation directly increases domestic price of tradables and results in substantial reduction in consumption of tradables. It is also shown that consumption of nontradables increases during the first and second quarter by relative price effect but decreases in the third quarter by real balance effect and

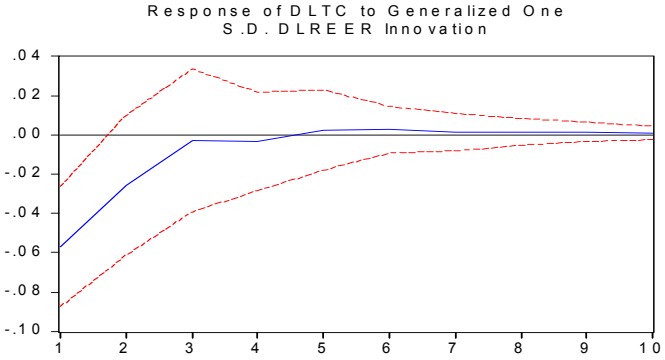
after the fifth quarter it returns to the equilibrium.

<Figure 7> The result of Impulse Response Analysis

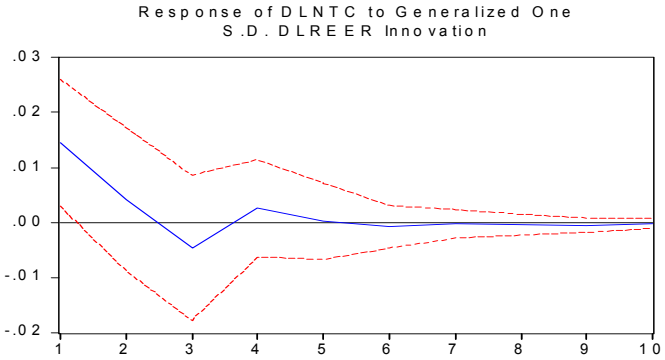
Exchange rate → Real income



Exchange rate → Consumption of tradables



Exchange rate → Consumption of nontradables



Ⅳ. Policy Implications

In this paper, brisk export but sluggish domestic demand in Korea, which is inexplicable with traditional views that increased export would entail increased domestic demand, is analyzed with the nontradables model and policy implications for Korea are derived. Korea's currency depreciation after the currency crisis brought about increase in the relative price of tradables and, along with liberalization, it had more favorable influences on tradables sector. Consequently, it resulted in a dramatic increase in production of tradables but slowdown in production and consumption of nontradables. As a result, the Korean economy is facing imbalances between external and internal economy, which is excess supply in both tradables and nontradables sector.

In the nontradables model, policy makers mainly focus on excess supply in nontradables sector since excess supply in tradables sector is resolved by demand in foreign countries. In other words, policy implications would be firstly that exchange rates be determined by demand and supply in the market so that production of nontradables increase.[35] Secondly expansion policy of aggregate demand should be put in place so that increase in real income may induce demand of nontradables.[36] However, when exchange rate is not converged to the

35) Yoon(2004) argued that, in a more open economy, currency depreciation may contract facilities investment by price hike in imported capitals and dampen domestic demand by reduction in real income. Thus, he argued that gradual currency appreciation may help revitalize domestic demand. Moreover, Cho(2004) empirically estimated that 1% drop in real effective exchange rate leads to boost of private spending by about 1% and of facilities investment by 0.5~0.8% and of construction investment by 0.3~0.4% and concluded that decline of real effective exchange rate has a positive influence on domestic demand.

36) In Korea, except one time increase of the benchmark call rate(uncollateralized overnight rate) to 4.25% from 4.0% in May, 2002, the call rates are on the fall from 5.25% in October, 2000.

equilibrium, which is determined by economic fundamentals, expansionary aggregate demand policy can cause price surges in asset prices by temporarily boosting demand. Therefore, expansionary aggregate demand policy should be used within a limited scope so that it is in harmony with a gradual appreciation based on price mechanism of exchange rate.

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

Moreover, not only short-term policies such as determination of exchange rate by market mechanism and expansion policy of aggregate demand but also long-term policies such as a steady fund supply to and continuous structuring adjustment of nontradables sector are necessary so that growth in tradables sector from liberalization may not crowd out that in nontradables sector.[38] Especially, as Gordon(2002), based on the

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In 2001, there were four times reduction of the call rates from 5.25% to 5.0% to 4.75% to 4.5% to 4.0% and two times in 2003 from 4.25% to 4.0% to 3.75% and two times in 2004 from 3.75% to 3.5% to 3.25%.

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

case study of the US, pointed out, economic growth in the future would be led by the development of nontradables sector such as whole and retail services, whose industries have been successful in lowering inventory cost by taking advantage of information and communication technologies. Therefore, export promotion policies at the expense of the development of nontradables sector will not be the best policy for sustainable economic growth and productivity improvement as Eichengreen(2004) also argued.

38) Tornell et al.(2004) argued that economic slowdown in nontradables sector is due rather to slow structural adjustment in the sector 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"(2001.10.19), "Business services development plan"(2001.11. 3). They also promoted various other policies with a special emphasis on the reorganization of discriminatory policy measures against service industries compared to manufacturing industries.

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