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May 5, 1988

To: Members of the Executive Board

From: The Secretary

Subject: Korea - Staff Report for the 1988 Article IV Consultation

The attached supplement to the staff report for the 1988 Article IV consultation with Korea has been prepared on the basis of additional information.

Ms. Tseng (ext. 7308) is available to answer technical or factual questions relating to this paper prior to the Board discussion.

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KOREA

# Staff Report for the 1988 Article IV Consultation--Supplementary Information

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## Korea--A Medium-Term Adjustment Scenario

Contents



Text Tables

## Korea--A Medium-Term Adjustment Scenario

This supplement describes the framework and assumptions used in the medium-term adjustment scenario discussed in "Korea--Staff Report for the 1988 Article IV Consultation," (SM/88/88, 4/20/88). The scenario takes as an objective an external current account surplus of 2-3 percent of GNP over the medium term and looks at the adjustments that would be needed to achieve this objective. The current account projections consistent with this target incorporate assumptions about external and domestic developments, the stance of policies, and estimated relationships for trade and services.

### 1. Framework

In the absence of further adjustment measures after 1988, projections derived on the basis of the assumptions about external and domestic developments and the relationships for trade and services described below indicate that the current account surplus will exceed the medium-term current account objective. To achieve this objective, a further reduction in the surplus of $2-3 billion in 1989-90 would be required, and this would need to be brought about by further market opening and real appreciation of the won. A "normative" adjustment path is derived where the surplus reduction is achieved through additional imports in 1989-90 resulting from further market opening. Additional imports would result from market opening because of both the substitution effect, as the relative price of imports declines, and the income effect, as absorption is increased due to higher real income brought about by declining import prices. To quantify the impact of market opening, the scenario relies on a rough estimate which suggests that market opening in recent years yielded additional imports of $2-3 billion annually. 1/ If it turns out that the required increase in imports is not feasible, and if the medium-term current account objective is to be maintained, additional real appreciation would be needed to reduce the surplus, mainly through a further slowdown in export growth. 2/ Further liberalization of invisibles transactions could also contribute to lowering the current account surplus.

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1/ See "Korea--Staff Report for the 1988 Article IV Consultation," (SM/88/88, 4/21/88), p. 17.

2/ Imports are relatively insensitive to changes in the exchange rate. This is partly because the import content of exports is relatively high (estimated at 35 percent in 1987); an appreciation which reduces export growth also reduces imports used in export production. The estimated price elasticity of non-oil import demand is 0.7.

## 2. Assumptions

The April 1988 World Economic Outlook projections for the external environment are used: foreign demand grows by about 3 percent per year; world oil prices remain constant in real terms; LIBOR is about 8 percent; and the increase in dollar export unit values of competitors and partner suppliers decelerate from 10 percent in 1988 to 3-5 percent in 1989-91.

For the domestic economy, real GNP growth decelerates from 10 percent in 1988 to the assumed long-term potential rate of about 8 percent in 1989-92, domestic demand expands at a slightly higher rate, and inflation is maintained at 4 percent (Table 1).

Table 1. Korea: Assumptions for Medium-Term Scenario, 1988-92

| | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|
| Foreign demand 1/ | 2.7 | 2.8 | 2.9 | 2.9 | 2.9 |
| Oil price ($/barrel) | 17 | 17 | 18 | 19 | 19 |
| LIBOR | 8 | 8 | 8 | 8 | 8 |
| Real GNP | 10 | 8 | 8 | 8 | 8 |
| Aggregate domestic demand | 11 | 11 | 9 | 8 | 8 |
| GNP deflator | 4 | 4 | 4 | 4 | 4 |
| Export unit value for non-oil trade of competitor countries 2/ | 9.6 | 5.3 | 3.4 | 3.4 | 3.3 |
| Export unit value for non-oil trade of partner suppliers 3/ | 9.7 | 5.4 | 3.4 | 3.3 | 3.2 |

Sources: World Economic Outlook, April 1988; and staff projections.

1/ Total domestic demand in partner countries (export-weighted).
2/ Export-weighted.
3/ Import-weighted.

## 3. Projections

Export volume is estimated using the following equation; 1/ all variables are expressed as logarithms.

$$X = -7.7 + 0.1 * K - 0.5 * DDT +$$

$$\Sigma_i(a_i * YW(i)) + \Sigma_j(b_j * (PF_{(j)} - PX_{(j)}))$$

Where:

$i = 0 \ldots 3$ lagged quarters

$j = 0 \ldots 8$ lagged quarters

X = export volume

K = real value of tangible fixed assets in manufacturing (a capacity variable)

DDT = gap between actual and trend domestic demand

YW = real foreign demand

PF = export-weighted export unit value for non-oil trade of industrial countries in U.S. dollars

PX = Korea's export unit value in U.S. dollars.

According to the above equation, the cumulative elasticity of export volume with respect to foreign demand is 2.4, with lagged effects over three quarters. The cumulative elasticity with respect to relative prices is 2.5, with lagged effects over eight quarters. The projected export volume for 1988 includes the actual outcome for the first quarter of 1987 by applying projected growth rates for the last three quarters of the year to the first quarter base.

Import relationships are derived separately for oil, non-oil for domestic use, and non-oil for export production as follows 2/ with all variables expressed as logarithms:

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1/ The equation was estimated using quarterly data from the first quarter of 1978 to the first quarter of 1986.

2/ These equations were derived from historical relationships with annual data from 1980-87. The elasticity of non-oil imports for domestic use with respect to domestic demand is assumed to increase from 1 in 1988 to 1.1 in 1989-92 to take into account the effect of the implemented liberalization measures.

$$M_o = 0.7 * GNP$$

$$M_d = 1.1 * DD + 0.7(P/P_m)$$

$$M_x = 1.3 * X$$

Where:

$M_o$ = volume of crude petroleum imports

$M_d$ = volume of non-oil imports for domestic use

$M_x$ = volume of non-oil imports for export production

GNP = real gross national product

DD = aggregate domestic demand

P = consumer price index in U.S. dollars

$P_m$ = import unit value in U.S. dollars

X = volume of exports

Imports projected on the basis of the above equations are modified in order to achieve the current account target. The additional imports needed to attain this target amounted to $2-3 billion in 1989-90; these are assumed to be brought about by additional market-opening measures and are added to imports for domestic use (Table 2). The import projections for 1988 include the effects of measures affecting imports that have already been implemented, including import liberalization, tariff reductions, and the import financing scheme.

Many items in services are directly related to other projections in the balance of payments--freight, insurance, and transportation to trade flows, investment income receipts to the level of reserves, interest payments to the level of debt. Other major categories in service receipts include travel, overseas construction, and other services (mainly other transportation, port charges, branch expenditures, and commissions). Projections for service receipts in 1988 take into account increased receipts of about $500 million on account of travel and broadcast rights related to the Olympic Games in September. Overseas construction receipts are projected to remain constant largely due to stagnant construction activity in the Middle East. Travel and other service payments are assumed to increase significantly, by about 20 percent annually, owing to the liberalization measures implemented during 1987-88.

Table 2. Korea: Medium-Term Scenario--Current Account, 1986-92 1/

| | Actual | | Projections | | | | |
|---|---|---|---|---|---|---|---|
| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
| | | | (In billions of U.S. dollars) | | | | |
| Trade balance | 4.2 | 7.7 | 8.3 | 5.7 | 3.8 | 3.5 | 3.1 |
| Exports | 33.9 | 46.2 | 58.2 | 67.2 | 75.7 | 85.2 | 95.8 |
| Imports | -29.7 | -38.5 | -49.8 | -61.5 | -72.0 | -81.7 | -92.8 |
| Oil | -3.3 | -3.7 | -4.2 | -4.6 | -5.0 | -5.4 | -5.9 |
| Non-oil for domestic use | -15.1 | -19.1 | -25.0 | -32.4 | -38.5 | -43.4 | -48.8 |
| Non-oil for export production | -11.4 | -15.8 | -20.6 | -24.6 | -28.5 | -32.9 | -38.0 |
| Net services | -0.6 | 0.9 | 1.9 | 2.0 | 1.9 | 1.6 | 1.0 |
| Receipts | 8.1 | 10.1 | 12.0 | 13.0 | 14.2 | 15.5 | 16.9 |
| Freight and insurance | 1.5 | 1.8 | 2.4 | 2.8 | 3.2 | 3.7 | 4.1 |
| Investment income | 0.8 | 0.8 | 1.0 | 1.2 | 1.5 | 1.7 | 2.0 |
| Overseas construction | 0.6 | 1.0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Travel | 1.5 | 2.3 | 2.9 | 3.0 | 3.1 | 3.4 | 3.8 |
| Transportation | 0.7 | 0.9 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 |
| Other | 2.9 | 3.3 | 4.0 | 3.9 | 4.0 | 4.1 | 4.3 |
| Payments | 8.7 | 9.2 | 10.0 | 11.0 | 12.3 | 13.9 | 16.0 |
| Freight and insurance | 0.7 | 0.8 | 1.1 | 1.3 | 1.5 | 1.7 | 1.9 |
| Investment income | 4.0 | 3.6 | 3.0 | 2.6 | 2.3 | 2.2 | 2.2 |
| Travel | 0.6 | 0.7 | 0.9 | 1.1 | 1.4 | 1.8 | 2.4 |
| Transportation | 1.5 | 2.0 | 2.6 | 3.1 | 3.5 | 4.0 | 4.5 |
| Other | 1.6 | 1.9 | 2.3 | 2.7 | 3.3 | 4.0 | 4.8 |
| Overseas construction | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Transfers | 1.0 | 1.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Current account balance | 4.6 | 9.8 | 11.3 | 8.6 | 6.6 | 6.1 | 5.0 |
| | | | (In percent of GNP) | | | | |
| Current account balance | 4.9 | 8.3 | 7.6 | 5.1 | 3.5 | 2.9 | 2.1 |
| Gross domestic savings | 33.0 | 35.9 | 35.4 | 34.0 | 32.3 | 31.7 | 30.9 |
| Gross domestic investment | 29.8 | 29.8 | 30.0 | 30.3 | 30.1 | 30.0 | 29.9 |
| | | | (Percent change) | | | | |
| Export | 28.3 | 36.2 | 26.0 | 15.5 | 12.7 | 12.5 | 12.5 |
| Volume | 26.4 | 23.7 | 14.5 | 9.8 | 9.0 | 9.0 | 9.0 |
| Unit value | 1.5 | 10.1 | 10.0 | 5.2 | 3.4 | 3.2 | 3.2 |
| Import | 12.3 | 29.7 | 29.3 | 23.4 | 17.0 | 13.5 | 13.5 |
| Volume | 19.9 | 20.7 | 18.8 | 17.3 | 13.1 | 9.9 | 10.0 |
| Unit value | -6.3 | 7.5 | 8.9 | 5.2 | 3.4 | 3.3 | 3.2 |

Sources: Data provided by the Korean authorities; staff estimates and projections.

1/ Components may not add up to totals due to rounding.

### 4. Savings and investment

An assessment of trends in domestic investment and savings is employed as a consistency check on the current account scenario. In recent years, the ratio of nominal domestic investment in GNP has been about 30-31 percent of GNP, as the rising trend of real investment in real GNP has been offset by the declining trend in the price of investment goods relative to the GNP deflator. It is assumed that the relative price trend will continue over the medium term, and that to support output growth of 8 percent, the nominal ratio of investment to GNP will remain at 30 percent. Domestic savings, mainly private savings however, are expected to fall somewhat over the medium term. Part of this decline will occur as consumption adjusts to the recent rapid rise in income. 1/ The increased availability and lower prices of imported consumer goods with market opening, the reductions of taxation on consumption, and the redistribution of income toward those with higher propensities to consume will also tend to reduce the savings rate. It is assumed that these influences will reduce the savings ratio from 36 percent in 1987 to 31 percent in 1992, about the level realized in 1985-86. Nevertheless, there are uncertainties about the extent and speed of the decline in the savings rate, and additional measures may have to be considered to stimulate consumption over the medium term.

### 5. Capital flows and external debt

With the implementation of adjustment policies, including further market opening, an active exchange policy, and appropriate demand management policy, the current account target would be reached during 1991-92 (Table 3). Current account surpluses of 2-3 percent of GNP, together with projected net inflows of foreign direct investment of about $1 billion would permit a reduction in external debt (mainly

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1/ A private savings function was estimated as follows:

$$\underset{(4.10)}{PSY = 11.91} + \underset{(3.44)}{12.22}\ PRYP + \underset{(5.81)}{73.62}\ TRYP - \underset{(-2.16)}{10.47}\ FY - \underset{(-0.49)}{0.08}\ RP$$

Adj. $R^2$ = 0.88 S.E. = 1.68 D.W. = 1.32

where PSY = ratio of private savings to GNP; PRYP = permanent real per capita income as proxied by a moving three-year average of real per capita income; TRYP = transitory real per capita income derived as the difference between actual real per capita income and PRYP; FY = ratio of private financial assets to GNP; RP = real interest rate, proxied by the difference between the unregulated money market rate and the increase in CPI; and figures in parenthesis are t-statistics. Estimated with annual data for the period 1973-87, this equation suggests that the bulk of the increase in domestic savings during 1986-87 was due to higher transitory income.

Table 3. Korea: Medium-Term Scenario--Capital Account, International Reserves, and External Debt, 1986-92 1/

| | Actual | | Projections | | | | |
|---|---|---|---|---|---|---|---|
| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
| | | | (In billions of U.S. dollars) | | | | |
| Current account balance | 4.6 | 9.8 | 11.3 | 8.6 | 6.6 | 6.1 | 5.0 |
| Debt-related capital flows | -0.7 | -4.8 | -3.9 | -2.1 | -1.2 | -0.7 | -0.2 |
| Nondebt-related capital flows | -1.3 | 1.9 | -0.6 | -0.4 | -0.5 | -0.7 | -0.9 |
| Foreign direct investment | 0.4 | 0.6 | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 |
| Overseas investment | -0.1 | -0.2 | -0.5 | -0.5 | -0.6 | -0.8 | -1.0 |
| Export suppliers credit | -0.4 | 0.4 | -0.5 | -0.6 | -0.7 | -0.7 | -0.8 |
| Others | -1.3 | 1.0 | -0.2 | -- | -- | -- | -- |
| Overall balance | 2.6 | 6.8 | 6.9 | 6.2 | 5.0 | 4.7 | 3.9 |
| Financing | -2.6 | -6.8 | -6.9 | -6.2 | -5.0 | -4.7 | -3.9 |
| Assets | -0.2 | -1.2 | -5.1 | -4.1 | -3.8 | -3.9 | -3.7 |
| Liabilities | -2.4 | -5.6 | -1.8 | -2.1 | -1.2 | -0.8 | -0.2 |
| Gross reserves | 8.6 | 10.2 | 15.3 | 19.4 | 23.2 | 27.1 | 30.8 |
| External debt | 44.5 | 35.6 | 29.9 | 25.7 | 23.2 | 21.9 | 21.4 |
| Debt service | 10.4 | 18.2 | 11.0 | 9.5 | 7.3 | 6.3 | 5.2 |
| | | | (In percent) | | | | |
| Gross reserves 2/ | 2.7 | 2.6 | 3.1 | 3.2 | 3.3 | 3.4 | 3.4 |
| External debt 3/ | 46.8 | 30.0 | 20.1 | 15.2 | 12.3 | 10.3 | 9.0 |
| Debt service ratio 4/ | 24.7 | 32.3 | 15.7 | 11.9 | 8.1 | 6.2 | 4.6 |

Sources: Data provided by the Korean authorities; staff estimates and projections.

1/ Components may not add up to totals due to rounding.
2/ In months of imports of goods and services.
3/ In percent of GNP.
4/ In percent of exports of goods and services.

through prepayment of medium- and long-term debt) to about $20 billion (10 percent of GNP), an increase in international reserves to cover 3 1/2 months of imports, and financing for overseas investment and export suppliers' credit of about $2 billion by 1992. Alternatively, if external debt reduction were less (e.g., to $30 billion, 13 percent of GNP by 1992), international reserves could increase to cover 4 1/2 months of imports.