

# Value-Added Tax and Balance of Trade

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## Introduction

Adoption of a value-added tax (VAT) is seriously being considered in the United States and in many developing countries, a trend no doubt initiated by successful use of the tax in western European countries.<sup>1</sup> In those countries, VAT is generally used as a replacement for taxes which present significant problems. Sweden, Norway, Italy, Denmark, and Belgium substituted VAT for a general sales tax. West Germany, Luxemburg, and Netherlands adopted it in place of a turnover tax, while the United Kingdom used it in place of a "purchase" tax and a selective employment tax.

In western Europe, VAT is accepted because of its broad general uniformity, its great revenue sharing potential, and its ability to improve a nation's competitive position in foreign markets. It also has a capacity for preventing tax evasion and for providing an effective tax exemption for purchases of capital goods. In Japan, VAT is considered to be preferable to a retail sales tax because there are too many small retailers for adequate enforcement of such a tax. Likewise, they consider it preferable to a turnover tax because of favoritism given to integrated companies by the turnover tax.<sup>2</sup> However, the income redistributive issue must have carried the heaviest weight in Japan since it was repealed because of its regressivity. In the United States, proponents of VAT argue that it will provide

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1 Not all countries have been successful with the tax, however. Japan repealed it subsequently after the VAT was enacted in 1950 because labor unions believed the tax to be regressive. Also the State of Michigan imposed the VAT in 1958. The tax was always subject to criticism and was repealed in 1967. For Japanese and Michigan experiences, see Martin Bronfenbrenner (1950) and C. W. Lock, D. J. Rau and H. D. Hamilton (1955), respectively.

2 Martin Bronfenbrenner and Kiichiro Kogiku (1957).

relief by helping to finance education via revenue sharing. This argument has become more significant due to recent state supreme court decisions holding that finance of public school by local property taxes is unconstitutional.

Reviewing literature in this field, it appears that the followings are general points of consideration in supporting or disapproving tax reform involving VAT:

- (1) Income redistributional effect
- (2) Effects on private investment and economic growth
- (3) Effects on the competitive position in foreign markets and balance of trade
- (4) Effects on allocation of resources
- (5) Impact on the finance of local government via revenue sharing

In underdeveloped and developing countries where domestic capital formation and securing foreign exchange to be used to import machinery and other growth-oriented material are of prime concern, (2) and (3) are more important considerations than others in contemplating adoption of VAT. In this paper, an attempt is made to examine a possible effect on a nation's balance of payment and competitive position in international markets. This is done based on the hypothetical assumption that VAT is substituted for a corporate profit tax (CPT) in an equal revenue yield. The examination will be within the framework of a developing country, Korea.

### Method and Assumptions

The effects of substituting VAT for CPT on the balance of trade<sup>3</sup> may be determined by examining the change in exports due to the price change of export goods caused by the elimination of CPT and the difference in imports when VAT is levied on import goods. The magnitude of this effect depends on (1) elasticities of demand for imports and exports and (2) "differential-tax price" effects<sup>4</sup> which substituting VAT for CPT would bring.

Prior to discussing the price effect and elasticities of demand for imports and exports, the following assumptions are necessary to accommodate our analysis:

First, VAT will be administered according to the "destination" principle, rather than the "origin" principle.<sup>5</sup> Under the former, imports are subject to VAT while the domestic components of exported goods are not taxed. Under the latter, imports are not taxable while

3 For a study in this field, see Maurice D. Weinrobe (1971).

4 A model to estimate price effects of substituting VAT for CPT is fully developed using an input-output model by Henry Aaron. For details, see Henry Aaron (1968).

5 For further details on other variations in VAT, see C. K. Sullivan (1965).

exports are. Accordingly, a zero VAT rate is applied on export goods or all VAT paid by an exporter and those preceeding him are credited or refunded. But an equal VAT rate (as with all other domestically produced goods) is levied on imports.<sup>6</sup>

Second, elasticities of the supply of exports and imports are assumed to be infinite.

Third, VAT is fully forward shifted raising the price by the amount of the tax. Despite some controversy, this is a reasonable assumption when tax elements are kept separately on every invoice.

Fourth, we are mainly concerned in this study with VAT of the "gross product" type and our analysis will be limited to this type. In this form of VAT, businessmen may estimate the tax base by deducting purchased intermediate goods from gross receipts. Therefore, as a whole nation the tax base is its GNP. Shoup's two variants, "income" and "consumption" types are different from the "gross product" type in that depreciation on capital goods and gross investment are deducted respectively from value added to arrive at the tax base.

Finally, a uniform VAT rate is applied to all sectors of the economy. Except for Denmark, Norway, the United Kingdom, Brazil and Ecuador, all countries using VAT adopt multirates such as standard rate, reduced rate, luxury rate, intermediate rate, or zero rate for different industries. An assumption of a uniform rate enables us to estimate the VAT rate needed to collect the revenue loss by the elimination of CPT.

### Balance of Trade Effect

#### 1. VAT Rate Needed to Replace CPT Receipts

Since the tax base of the "gross product" type is the GNP and the CPT receipt is relatively small compared to the GNP in Korea (1.21%), we can expect that a small VAT rate will yield enough revenue to fill CPT. When the VAT of the "gross product" type with the destination principle is adopted, the tax base becomes  $(GNP - X + M)$  where X and M refers to export and import respectively. The necessary VAT rate to fill the CPT loss is then  $CPT / (GNP - X + M)$ .<sup>7</sup> According to 1973 data, a VAT rate of 1.10% is needed. Despite the definition, a more realistic formula for Korea may be  $CPT / (GNP - X + M - G)$ , where G is output in the government sector. According

6 All 10 European countries (Belgium, Denmark, France, West Germany, Italy, Luxemburg, Netherland, Norway, Sweden and United Kingdom) and 7 developing countries (Brazil, Ecuador, Ivory Coast, Morocco, Uruguay, Malaguay Republic, and Senegal) who are using VAT levy a zero VAT rate on export goods.

7 This is a rather simplified form. All the tax exempted items, if know them, should be subtracted from GNP. For "income" type  $CPT / (NNP - X + M)$  and for "consumption" type  $CPT / (GNP - X + M - Investment)$  should be used.

to this formula, a VAT rate of 1.30% will make up the CPT.

## 2. Price Elasticity of Demand for Exports

Assuming that the price elasticity of supply of exports is infinite and no trade restrictions on exportation exist, price elasticities of demand for imports in principal trading partners may be regarded as price elasticities of demand for exports to the corresponding trading partners. For example, the elasticity of demand for Korean

exports to Japan is  $\eta_{xk} = \frac{\Delta X_k / X_k}{\Delta P_x / P_x}$ , where  $X_k$  is the real value of

Korean exports to Japan and  $P_x$  is the price index of Korean export goods. This may be approximated by the elasticity of demand for

imports in Japan,  $\eta_{MJ} = \frac{\Delta M_J / M_J}{\Delta P_M / P_M}$ , where  $M_J$  is the real value of

imports in Japan and the  $P_M$  the price index of imports in Japan. In Table 1, a projected increase in Korean exports due to a 1% decrease in the price index of Korean export goods caused by the elimination of CPT is estimated based on the import demand elasticities of Korea's 13 principal export trading partners.

## 3. Price Elasticity of Demand for Imports

Due to a lack of information, we have to use hypothetical values for price elasticity of demand for imports in Korea. Future work can be improved by estimating the elasticity. For this reason, the formula Kreinin used will be discussed here.<sup>8</sup> Based on the proposition that demand for imports is the difference between domestic quantity demanded and domestic quantity supplied at various prices, the equation for price elasticity of demand for imports can be written:

$$\eta_m = \frac{d(Q_d - Q_s)}{Q_d - Q_s} \cdot \frac{dp}{P} = \frac{P}{Q_d - Q_s} \cdot \frac{d(Q_d - Q_s)}{dp} = \frac{P}{Q_d - Q_s} \cdot \left( \frac{dQ_d}{dp} - \frac{P}{Q_d - Q_s} \cdot \left( -\frac{dQ_s}{dp} \right) \right) = \frac{P[dQ_d/dp]}{Q_d - Q_s} + \frac{P[dQ_s/dP]}{Q_d - Q_s}$$

where  $Q_d$  refers to domestic consumption,  $Q_s$  to domestic supply,  $p$  to price. Now multiply and divide the first component by  $Q_d$  and the second component by  $Q_s$ :

$$\begin{aligned} \eta_m &= \frac{P/Q_d \cdot dQ_d/dP \cdot Q_d}{Q_d - Q_s} + \frac{P/Q_s \cdot dQ_s/dP \cdot Q_s}{Q_d - Q_s} \\ &= Q_d/Q_d - Q_s \cdot e_d + Q_s/Q_d - Q_s \cdot e_s = [Q_d/I_m]e_d + [Q_s/I_m]e_s \end{aligned}$$

8 Mordechai E. Kreinin (1967).

Table 1

Projected Increase in Exports due to 1% Decrease  
in Price Caused by Elimination of CPT

Principle Trading Partners Exports	(thousand \$) 1973 Exports	Estimated Import Demand Elasticity*	Projected Increase in Exports due to 1% decrease in Price caused by CPT elimination
Australia	27,101	N.A.*	813.03
Belgium	40,278	3.1	1,248.62
Canada	124,881	2.1	2,022.50
France	23,141	3.1	717.37
Germany, Federal Republic	120,338	3.1	3,730.48
Hong Kong	117,724	N.A.*	3,531.72
Indonesia	32,380	N.A.*	971.40
Japan	1,241,539	3.1	38,487.71
Netherlands	57,207	3.1	1,773.42
Singapore	30,460	N.A.*	913.80
Taiwan	40,942	N.A.*	1,228.26
United Kingdom	74,960	2.7	2,023.92
U.S.A.	1,021,182	4.2	42,889.64
			100,951.87

\*Estimated data on SITC 5-8 from Mordechai E. Kreinin, "Price Elasticities in International Trade," *Review of Economics and Statistics*, November 1987, pp. 510-516.

For those countries with no information on import demand elasticity, the average is used. Necessary data are collected from *The Europa World Year Book*, London, Europa Publication, 1975, and *Yearbook of International Trade Statistics*, New York, United Nations, 1972-1973.

where  $I_m$  refers to import demand,  $e_d$  to price elasticity of demand, and  $e_s$  to price elasticity of supply.

Assuming that the elasticity of the supply of imports is infinite and there are no trade restrictions, projected reductions in imports at various price elasticities of demand for imports are estimated. (See Table 2)

#### 4. Price effect

Price changes caused by the substitution of a VAT for a CPT depend on the assumption we make in regard to tax shifting.

First, if we take a standard assumption that CPT is not shifted forward, while the VAT is fully shifted forward ( $\alpha = 0$  and  $\beta = 1$  where  $\alpha$  and  $\beta$  are fractions of the tax shifted forward), then the price increase will be the same as the VAT rate. Under this assumption, we cannot expect a rise in exports due to the elimination of CPT. But the price of domestic goods as well as that of imports will go up by the VAT rate. There will be no change in the balance of trade.

Second, if  $\alpha = 1$  and  $\beta = 1$ , then the domestic price level will stay put. But under the VAT of the destination principle the price of export goods will go down at the VAT rate whereas the price of imports will rise by the VAT rate. The balance of trade will improve most under this assumption.

Third, if both CPT and VAT shift partially forward, for example, if  $\alpha = 0.5$  and  $\beta = 0.5$ , the domestic price level stays the same but the increase in exports will be half of the increase in the case where  $\alpha = 1$  and  $\beta = 1$  whereas the effect on imports may be the same as in the case where  $\alpha = 1$  and  $\beta = 1$ .

Finally, if  $\alpha = 0$  and  $\beta = 0$ , there will be no domestic price effect in the product markets. But the price of imports to domestic consumer will be higher, at least in the short run.<sup>9</sup> In this case, there will be no change in exports but imports will decrease.

#### 5. Total Effect on the Balance of Trade

The total effect on the balance of trade with the adoption of "gross product" type VAT of 1.3% in Korea is estimated based on different assumption in regard to import elasticity and tax shifting. The result is reported in Table 3. For example, if we assume that both VAT and CPT shift fully forward and the price elasticity of demand for imports in Korea is 2.0, the balance of trade will increase by \$241 million as a result of substituting VAT for CPT in an equal tax yield. It can be also said that the more VAT and CPT shift forward and the higher the price elasticities of demand for imports and exports are, the greater the increase in balance of trade will be.

#### Other Considerations

In addition to a favorable balance of trade effect, two other important economic effects should not be ignored. It is well known fact that the adoption of "consumption" type stimulates private domestic investment since businessmen are allowed to subtract purchased capital goods from the tax base of VAT. Even if other types of VAT are adopted, the elimination of CPT will definitely give business firms extra funds (the portion which is not reflected in price adjustment) which could be channelled to private investment. This may be an especially important consideration in a developing country like Korea.

On the other hand, it is also well known fact that VAT is regressive in nature. Since the elimination of CPT will no doubt increase the dividend income which is mainly received by high income families, coupled with the regressivity of VAT, the tax reform will no

<sup>9</sup> These assumptions are rather simplified in that they ignore the degree to which price changes differ from industry to industry.

Table 2  
Projected Reduction in Imports

Import Elasticities	Projected Reductions in imports caused by 1% increase in import price due to VAT on imports (\$ million)
0.5%	21.201
1.0%	42.402
1.5%	63.604
2.0%	84.805
2.5%	106.006
3.0%	127.208

\*Estimation is based on 1973 data.

Necessary data are from *Yearbook of International Trade Statistics*, New York, United Nations, 1972-73.

Table 3  
Projected Increase in Balance of Trade Substituting VAT for CPT

Price Elasticity of Demand for Imports in Korea	Assumption on tax shifting	$\alpha = 0$	$\alpha = 1$	$\alpha = 0.5$	$\alpha = 0$
		$\beta = 0$	$\beta = 1$	$\beta = 0.5$	$\beta = 0$
			\$(mil.)	\$(mil.) <sub>2</sub>	\$(mil.) <sub>3</sub>
0.5		0	158.79	93.17	27.56
1.0		0	186.35	120.73	55.12
1.5		0	213.91	148.29	82.68
2.0		0	241.47	175.85	110.24
2.5		0	269.03	203.41	137.80
3.0		0	296.60	230.98	165.37

\*The VAT rate estimated necessary to cover the loss of revenue due to elimination of CPT is 1.30%. With the "origin principle" the imports could go up after the tax reform.

1. Increase in exports + decrease in imports
2. Increase in exports + decrease in imports
3. Decrease in imports

doubt increase the degree of income inequality.<sup>10</sup> In many developing countries which adopt the principle of "growth now equity later", the investment and balance of trade effects outweigh the income redistributive issue.

<sup>10</sup> For a theoretical study of tax incidence effect of substituting VAT for CPT, see W. Oakland (1967).

## Conclusion

Foreign trade takes a substantial weight in the Korean economy evidenced by the fact that the magnitude of exports and imports was 31.17% and 40.98% of the GNP respectively in 1973. Consequently, the balance of trade effect of adopting VAT in place of CPT should receive more attention than the other effects.

In this paper, a possible method of projecting the balance of trade effect in the event that VAT is substituted for CPT in Korea is discussed. Despite deficiency in the method due to a lack of information, the study shows a substantially favorable balance of trade effect. Furthermore, private investment will be stimulated by elimination of CPT. On the other hand, the tax reform will increase the degree of income inequality and VAT may be abused by government because of its invisible nature. For those countries where national priority is for economic growth, substituting VAT for CPT may have more favorable consequences than deficiencies.

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