VISITING RESEARCHERS SERIES NO. 2(2002)

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March 2002

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August-November 2001

ISSN 0219-3582

WHY TRENDS OF PROTECTION CHANGED OVER TIME IN INDONESIA?

Abstract

The years of the 1980s witnessed a declining trend of trade protection in many countries in the world, including Indonesia. In contrast to the cycle of trade protection approach which argue that protectionism is likely to be strongest when a country's economic position is weak, major trade reforms in Indonesia took place after the mid 1980s economic crisis. This invites question: What factors determine the change of protection over time? Using Indonesia as a case study, this paper argues that trends of import protection were influenced by changes in real oil prices and real exchange rate. Using a Vector Autoregression model, this paper showed a positive significant relationship between the real oil prices and the average tariff. The Granger causality test and Impulse Response Function (IRF) provides further evidence that pressure for import protection actually increased during the oil boom period. The econometric results also show there was a significant negative relationship between the real exchange rate and the average tariff, suggesting that depreciation in the real exchange rate led to a lessening in pressure for import protection.

1. Introduction

The years of the 1980s witnessed a declining trend of trade protection in many countries in the world, including Indonesia. In Indonesia, the trade protection levels were relatively high from the 1970s up to the mid 1980s, before being reduced substantially as a result of the various trade reforms. Indonesia provides an interesting case study of trade protection because it defies the conventional cycle of trade protection which postulates that protectionismis likely to be strongest when a country's economic position is weak (Frey, 1985). In fact, major trade reforms in Indonesia took place after the mid 1980s economic crisis. So what are the factors that determine the change of protection over time? There are no previous studies available on this topic for Indonesia, making this a new area of study. Most studies on Indonesia focused on the inter-industry variations in protection (Pangestu and Boediono, 1986; Pack, 1994; Basri and Hill, 1996), and ignore the determinants of trade protection over time.

This paper attempts to fill the gap by examining the determinants of trade protection over time. More specifically, this paper observes the relationship between import protection, the real oil price and the real exchange rate (RER). The export side is not examined because the database is rather poor, and restrictions on exports are generally lower than import barriers.

The paper is organised in the following sections:

i. a literature review of determinants of trade protection over time;
ii. a review of theoretical framework and the hypothesis of the relationship between the demand for import protection, an oil boom and the exchange rate;
iii. econometric techniques;
iv. econometrics modelling results of the determinants of trade protection; and
v. qualitative analysis of other determinants of trade protection overtime.

2. Time series analysis

Differing from cross section analysis,[1] the time series analysis of protection focuses on the changes in protection over time. Studies are available for developed countries,[2] but only a few studies using cross-section analysis are available for the developing countries, for example Terdudomtham (1994) on Thailand, Edwards and Lederman (1998)on Chile, Rajapatirana and Yatawara (1997) on Latin America Fane (1996) and Corden and Warr (1981) briefly outlined the relationship between the Dutch Disease and the demand for import protection in Indonesia, but only Basri (2001) focused on this issue using time series analysis.

Most of these studies examine the relationship between some macroeconomic variables (e.g. Gross National Product (GNP), inflation, terms of trade and balance of payments) with average tariff. Empirical case studies for developed countries postulate that tariffs tend to increase during a recession. Cheh (1974), for example, shows that tariff rates in the U.S. negatively correlated to growth rates. Lavergne (1983) found that growth rates (in U.S. employment) had a negative relationship to protection. This implies that the level of protection tends to increase during a recession (often indicated by higher unemployment).

Table 1 shows the case studies for the United States, Japan and Thailand. By using the Granger causality test, Bohara and Kaempfer (1991) observe that unemployment, real GNP and price levels influenced the change in tariffs over time in the U.S. In addition, they show that tariffs did influence the price level and trade balance. The relationship was negative, meaning that an increase in tariffs resulted in lower price levels. Bohara and Kaempfer themselves (1991) admit that this result is problematic, because, an increase in tariffs is expected to lead to an increase in domestic price level. Bohara and Kaempfer (1991, p.958) argue that the unexpected result could be attributed to the unexplored relationships in the data. Bohara and Kaempfer (1991) also observed that the relationship between real GNP and tariffs was negative initially but it became positive after four years. They argue that there existed a compensation effect in the short run in which tariffs could be justified to help import competing sectors. However, in the long run, the type of redistribution generated by trade protection was less affordable after recessionary shocks. This is because during recessions, protectionist interest groups tend to gain more political power as they attribute rising unemployment to "unfair foreign competition" (Bohara and Kaempfer, 1991, p.953). Another possible reason was the Keynesian motive of switching demand to home products Rodrik (1995).

For Thailand, Terdudomtham (1994) found that inflation and balance of payments influenced tariff rates, but the reverse is not true (Table 1). This result is rather puzzling because Thailand faced current account deficit for many years and tariffs were increased to improve the deficit. In addition, he points out that increased inflation resulted in a decrease in average tariffs after four months. Terdudomtham (1994) thus concludes that the 1974 tariff reduction in Thailand was related to the Thai's government's effort to contain inflation in order to stabilise the economy and domestic politics, and to maintain minimum political support. He also observes that an improvement in the balance of payments resulted in a decrease in average tariffs after two quarters. A balance of payments deficit has potential to destabilise the economy, and with it the domestic political situation.

Table 1: Relationship between protection and macroeconomic variables, some comparative studies

Country	Causality directions	Sign [a]
U.S.A.	Tariffs influenced price level	-
	Tariffs influenced trade balance	-
	Unemployment influenced tariffs	+,-
	Real GNP influenced tariffs	- ,+
Japan	Terms of trade influenced tariffs	+
	Trade balance influenced tariffs	-
	Δ GNP influenced tariffs [b]	-
	Δ GNP influenced tariffs [c]	+
Thailand	Inflation influenced tariffs	-
	Balanced of payments influenced tariffs	-

Sources: Bohara and Kampfer (1991) for U.S.A; Krol (1996) for Japan.
Terdudomtham, (1994) for Thailand.
Notes: GNP : Gross National Product,
Δ GNP: GNP growth
[a] Sign shows the relationship between variables based the on impulse response function results.
[b] During pre-war
[c] After war

Krol (1996) shows that tariff changes did influence GNP growth and inflation in pre-war Japan (Table 1). However, the reverse was true during the post-war, when GNP growth and terms of trade influenced tariff changes. Similar to Bohara and Kaempfer (1991), Krol (1996) argues that slower GNP growth in pre-war Japan resulted in high tariffs. However, the reverse was true after the war, where increased GNP resulted in an increase in average tariffs. This result contradicts the tariff cycle hypothesis or the argument that protection tends to increase during a recession.

To sum up, these studies show the relationship between some macroeconomic variables and tariffs. In general, the empirical studies for developed countries support the view that tariffs tend to increase during a recession.

3. Theoretical framework and hypothesis

Before we proceed to the empirical test of the relationship between trade protection, real exchange rate and real oil price, it is useful to review the Dutch disease framework, as well as the impact of depreciation on the demand for trade protection.

3.1 The real effect of Dutch disease on specific factors in non-oil tradeables

As pointed out by Corden and Neary (1982), an increase in the oil price has two impacts on the economy of the oil exporting country. First it increases oil revenues. Second, it harms the non-oil traded sectors. This phenomenon is known as *Dutch disease* or de-industrialisation. Corden and Neary (1982) labelled the first effect, the resource movement effect, where the boom in the extractive (oil) sector causes the marginal productivity of general factors to grow and be attracted away from other sectors. The second effect is the spending effect, where greater real income from the boom increases expenditure on various goods, subsequently increasing the price of non-traded goods (without affecting the price of traded goods which is determined by the international market). This results in an increase in the price of non-traded relative to traded goods. To reduce the demand for non-traded goods, the relative price of traded to non-traded goods must fall. This is referred to as real appreciation, or appreciation of the real exchange rate. When the exchange rate is fixed, adjustment takes place via a rise in the price of non-traded goods. If the exchange rate is flexible, adjustment occurs through a combination of nominal exchange rate appreciation and increases in the price of non-traded goods. The real appreciation of the exchange rate attracts resources from the non-oil-traded sector into the non-traded sector. Consequently, production falls in the non-oil-traded sector, while production in the non-traded sector rises as the factor shifts. This squeeze in the non-oil traded sector is called "Dutch disease" or de-industrialisation.

What is the effect on specific factor income in the non-oil traded sector? Borrowing from Corden and Neary (1982) and Vousden (1990), this section examines the impact on specific factor income. Let L_N, L_T, L_M, represent the various functions of the demand for labour in the initial situation. L_N is the labour demand for non-traded; L_T is the labour demand for two traded goods (oil and non oil traded); L_M is the labour demand for the non-oil traded sector. Laterally adding to the initial labour demand for the oil sector obtains L_T, making this the labour demand schedule for the two traded sectors combined. The wage rate (in terms of non-oil traded (M)) is measured on the vertical axis, while total labour in the economy is given on the horizontal axis $O_N O_T$. Labour input is measured by the distance from O_N for non-traded and the distance from O_T for traded. Other things being equal, labour demand is a decreasing function of the wage relative to the price of outputs in that sector.

Let VMP $_M$ be the value or marginal product of labour in sector M, and VMP $_N$ in sector N. The labour demand schedule represents the value of the marginal product of labour (VMP). Both VMP can be presented in terms of price M (PM), which reflects the real VMP in terms of PM. This can be written as:

(1) $$\frac{VMP_N}{P_M} = \left(\frac{P_N}{P_M}\right) MP_N = pMP_N$$

(2) $$\frac{VMP_M}{P_M} = \left(\frac{P_M}{P_M}\right) MP_M = MP_M$$

Where p= P_N/P_M

VMP_N=Value of marginal product in sector N

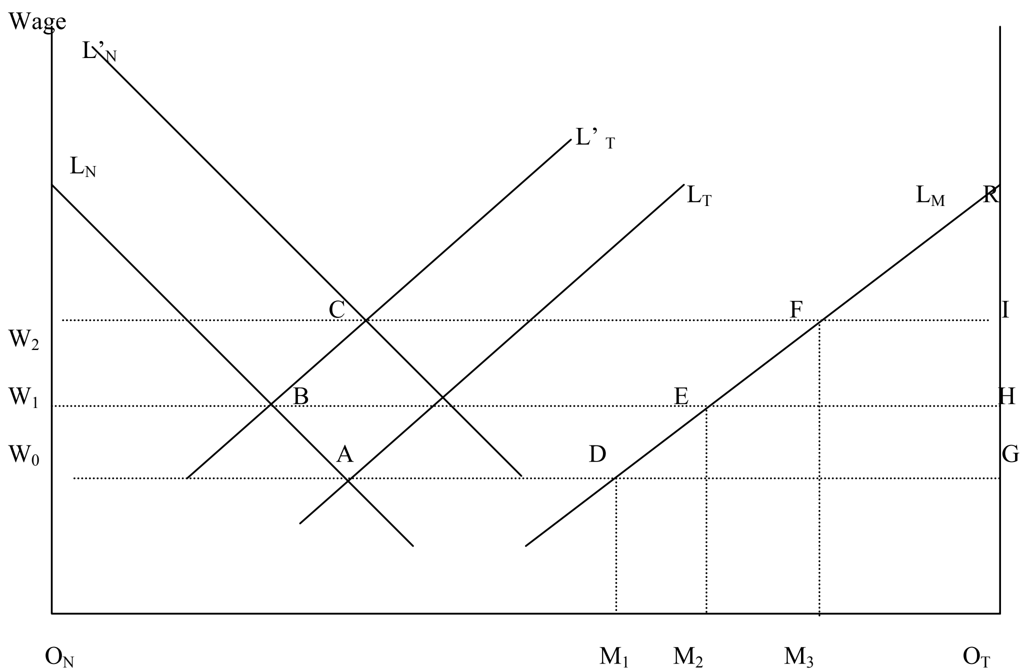
VMP_M=Value of marginal product in sector M

P_N= price of non traded goods

P_M= price of non oil traded goods

Figure 1 helps to analyse the effect of Dutch disease on specific factor income. Initial equilibrium occurs at A where L_N intersects L_T at wage rate W_0.

Figure 1
Effects of the oil boom on the labour market



The boom in the oil sector is equivalent to an increase in the productivity of labour for that sector. This shift is from L_T to L'_T. The new equilibrium is now at point B where the wage is W_1. However, the spending effect will increase the price on non-traded relative to the traded sector, thus labour demand shifts from L_N to L'_N. The final equilibrium is at point C where the wage is equal to W_2.[3]

The impact on the return in specific factor M can be explained using the specific factor hypothesis. The explanation is as follows: The shift of L_N to L'_N reflects the increase of $pMP_{N.}$ This is consistent with the fact that p will increase due to the increase in P_N at a given level of P_M.

This study assumes that the quantities of the specific factor are fixed in both the non-oil traded (K_M) and non-traded (K_N). Hence the direction in the change in the aggregate return indicates the direction of the change in the return per unit of the factor (Vousden, 1990, p.17). The assumption of constant return to scale in the specific factor hypothesis implies that the total factor reward in each sector just uses up the value of output, where the value of output is given by the area under the relevant VMP curve up to the labour employed in the sector. Subtracting the sector's wage bill (wage multiplied by quantity of labour employed) yields the return to the specific factor. The initial return to the specific factor K_M (denoted by r_M) is RDG (RDM_1O_T-GDM_1O_T). The final equilibrium is at C, where the wage is equal to W_2. The total payment to K_M in terms of M falls from area RDG to RFI. Thus r_M / P_M falls. It is known from the previous discussion that P_M/P_N also falls. Since both r_M/P_M and P_M/P_N fall, r_M/P_N must also fall (see equation 3).

$$(3) \quad \frac{r_M}{P_N} = \left(\frac{r_M}{P_M}\right)\left(\frac{P_M}{P_N}\right)$$

Therefore the real return of the specific factor K_M falls unambiguously. This is consistent with Corden and Neary's (1982) findings. The decrease of profitability or specific factor return on sector M will induce demand for import protection. Thus, it can be expected that an increase in oil revenue due to an increase in the oil price will induce demand for import protection for non-oil traded goods (M).

3.2 Depreciation and trade liberalisation

The demand for protection is also closely associated with the real exchange rate. Corden (1997) and Rodrik (1998) argue that the macroeconomics effect cannot be ignored when a country with a wide-ranging system of tariffs and non-tariff barriers implements trade liberalisation. Corden (1997, p. 264) also argues that, if the real exchange rate does not change and total real expenditure stays constant, the reduction in import protection will shift demand towards imports while the output of import competing industries will decline and the current account will deteriorate. These effects will create pressure for the rejection of trade liberalisation. In other words, the exchange rate must either be devalued, or allowed to depreciate sufficiently. The implication is that trade liberalisation should normally be a part of a policy package which includes adequate depreciation. This argument can be formally explained as follows.

Assume a small country with three categories of goods, i.e., exportables (X), importables (M) and non tradables (N). X and M combined are described as tradable goods. Let Pm* be the price of imports, and Px* the price of exports. Under small country assumption both are taken to be givens. The price of N is P_N. The nominal exchange rate is denoted by e, which is defined as domestic currency per unit of foreign currency. For simplicity, assume a single tariff applied to M. The rate is t and there are no export taxes or subsidies. Thus, the price of imports can be defined as:

(4) $Pm=e\ Pm^*(1+t)$

And the domestic price of exports as:

(5) $Px=e\ Px^*$

The switching ratio, S, is defined as a ratio of the relative domestic price of tradables to non-tradables. Where the price of tradables is a weighted average of Pm and Px, the weight is given as α and $(1-\alpha)$, respectively. Amongst other things, the weights depend on the shares of M and X in domestic consumption and production. Here the switching ratio determines the current account and the excess demand-supply situation in the market for non-tradables. The switching ratio can be written as:

(6) $S=[\alpha\ e\ Pm^*(1+t)+(1-\alpha)\ e\ Px^*]\ /\ P_N$

In a more realistic world, some given rates of inflation abroad, can be assumed causing Pm* and Px* to continuously increase and some level of rate of inflation in P_N. As Corden (1997) suggests, it is therefore more useful to introduce a real exchange rate (R). Defining R as the real exchange rate, holds the terms of trade constant, so that Pm* and Px* always rise to the same extent, and p* can be written as the foreign price level. Thus obtaining:

(7) $R=e\ p^*/P_N$

Substituting equation (8) into (6) obtains:

(8) $S= R(\alpha t+1)$

Taking derivative and holding S constant obtains:

$$(9)\ \frac{\partial t}{\partial R} < 0$$

Therefore, in order to keep S constant — a reduction in t (tariffs) require a real depreciation (rise in R), where as the change in R not only depends on e but also on the changes in p* and P_N. In other words, a rise in R (real depreciation) enables t to decline. Thus, real depreciation reduces the pressure for import protection.

3.3 Hypotheses in the case of Indonesia

The Dutch disease framework has been widely used in explaining the oil boom phenomenon in Indonesia by Corden and Warr (1981), Pangestu (1986) and Warr (1992) amongst others. These studies argue that Dutch disease occurred in Indonesia in the late 1970s, when the oil boom resulted in the squeezing of the non-oil traded sector. Although these studies provided evidence of Dutch disease, they did not explicitly focus on the effects of Dutch disease on the demand for import protection.

As previously discussed, the impact of Dutch disease on factor incomes can be explained using the specific factor hypothesis. Prior to the *era reformasi* (political and economic reform era) in 1998, Indonesia's trade unions did not possess strong bargaining power so that it is assumed that the protectionist pressure would come from capitalists with more bargaining power. Therefore, the specific factor in the previous theoretical framework refers to capitalists in the non-oil traded sector.

The hypotheses are developed as follows (the full hypotheses and the causality test are presented in Table 4).

3.3.1 Change in real oil price and change in average tariff

There are two possible causalities between the change in real oil price and the change in average tariff.

a. As suggested by the theoretical framework of the impact of Dutch disease on specific factor income, a positive relationship can be expected between the increase in real oil price and the average tariff. In addition, the oil boom in 1973-1981 enabled the Indonesian government to finance a number of highly subsidised projects and adopt an import substitution strategy through high levels of tariff protection.[4] However, the subsequent plunge in both the oil price and oil revenue in the mid 1980's forced the government to begin liberalising the economy. This is consistent with the hypothesis that a positive correlation can be expected between a change in the real oil price and a change in the average tariff.

b. Considering that the real oil price is exogenous, it can be expected that a change in the average tariff will not cause a change in the real oil price.

To summarise, this study hypothesises that an increase in the real oil price will lead to an increase in average tariff (rejecting the hypothesis that a change in real oil price does not cause a change in the average tariff) (H1). The reverse is however not true. That is , an increase in the average tariff will not have a significant impact on the oil price (accepting the hypothesis that a change in average tariff does not cause a change in real oil price) (H2).

3.3.2 Change in RER and change in average tariff

There are two possibilities of causality between the change in average tariff and the change in the RER.

a. As discussed in the theoretical framework, trade liberalisation should normally be part of a policy package which includes adequate exchange rate depreciation. Depreciation of the real exchange rate (RER) will increase exports and indirectly protect domestic goods from imports, leading to less pressure for average tariff. So, a negative relationship can be expected between a change in the RER and a change in the average tariff.

b. An increase in the average tariff could improve the trade balance, which, in turn, appreciate the RER. Here a negative relationship can be expected between the change in average tariff and the change in the RER. In other words, depreciation in the RER will reduce the demand for tariffs.

Therefore, this study hypothesises that an increase in the RER (depreciation) reduces the average tariff (rejecting the hypothesis that a change in the RER does not cause a change in the average tariffs) (H3). In addition, an increase in the average tariff reduces the RER (rejecting the hypothesis that a change in the average tariff does not cause a change in the RER) (H4)).

Since this study only focuses on the relationship between the real oil price, RER and the average tariff, the relationship between the oil price and RER (H5 and H6) is not discussed here.

4. Econometric Results

The econometric techniques and data sources are presented in the Appendix. The empirical results are as follows:

4.1 Unit root tests

Table 2 presents the unit root test of all variables. The table shows that there is no reason to reject that there is unit root at order zero (I_0). However, the first difference test shows that the unit root null hypothesis is rejected for all variables at the first difference. Therefore, following Krol (1996) and Bohara and Kaempfer (1991), this test suggests that the VAR should be specified in the first difference.

Table 2: Unit root tests for various variables

Variables	ADF test*)	ADF *) (first difference)
LAVT	-2.27	- 9.55**
LRER	-0.719	- 4.67**
LPOIL	- 1.93	- 6.45**

90% critical value for ADF = -2.58
*) include constant but not trend
**) significant at 5%

4.2 Determining the lag order

Table 3 presents the calculation of AIC and SBC values. The order p is chosen based on the smallest AIC or SBC value. This table shows that lag 2 provides the smallest AIC and SBC.

Table 3: Calculation of AIC and SBC value

	1 Lag	2 Lags	3 Lags	4 Lags	5 Lags	6 Lags
AIC	-909.04	-1184.63	-885.59	-807.79	-716.91	-620.96
SBC	-894.52	-1160.44	-851.73	-764.25	-663.69	-558.07

4.3 Unrestricted VAR model

Based on the unit root tests and the AIC and SBC tests, this study defines the form of the trivariate VAR model:

$$\begin{bmatrix} DLAVT \\ DLPOIL \\ DLRER \end{bmatrix} = \begin{bmatrix} \alpha_0 \\ \beta_0 \\ \delta_0 \end{bmatrix} + \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 & \alpha_4 & \alpha_5 & \alpha_6 \\ \beta_1 & \beta_2 & \beta_3 & \beta_4 & \beta_5 & \beta_6 \\ \delta_1 & \delta_2 & \delta_3 & \delta_4 & \delta_5 & \delta_6 \end{bmatrix} \begin{bmatrix} DLAVT_{t-1} \\ DLAVT_{t-2} \\ DLPOIL_{t-1} \\ DLPOIL_{t-2} \\ DLRER_{t-1} \\ DLRER_{t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix}$$

Where : DLAVT : change in average tariff
DLPOIIL : change in real oil price
DLER : change in real exchange rate

4.5 Granger causality tests

Based on the AIC and SBC results, the appropriate lag order for the Ganger Causality test is employed. Table 4 presents the full hypotheses and the Granger causality test. The Granger Causality test is calculated based on the Wald test. Since this study focuses on the relationship between tariffs, and the real exchange rate and the oil price, it only focuses on the hypothesis H1 to H4.

H1-H2 shows that a change in the real oil price does cause a change in the average tariff, while a change in the average tariff does not cause a change in the real oil price. This result supports the hypothesis that there is causality between a change in the real oil price and a change in the average tariff.

H3-H4 shows that a change in the real exchange rate does cause a change in the average tariff, while a change in the average tariff does not cause a change in the real exchange rate. Therefore H3-H4 supports the hypothesis that there is causality between a change in the RER and a change in the average tariff.

Hypotheses H5-H6 shows there is causality between a change in the real exchange rate and a change in the real oil price and vice versa.

Table 4
Summary of the results: Chi-square statistics for various hypotheses

	Hypothesis	$\chi^{2*)}$	Remarks
H1	Change in the real oil price does not cause a change in average tariff.	19.50	Rejected [a]
H2	Change in average tariff does not cause a change in the real oil price.	0.025	Not rejected
H3	Change in real exchange rate does not cause a change in average tariff.	4.66	Rejected [b]
H4	Change in average tariff does not cause a change in the real exchange rate.	0.001	Not rejected
H5	Change in the real oil price does not cause a change in the real exchange rate.	5.32	Rejected [b]
H6	Change in the real exchange rate does not cause a change in the real oil price.	9.05	Rejected [a]

[a]) Significant at 5%
[b]) Significant at 10%
*) Calculated based on Wald test.

4.6 Restricted VAR and impulse response function

4.6.1 Restricted VAR

Given the result of the Granger causality test, this study can impose linear restrictions on the model. The Restricted VAR is:

$$\begin{bmatrix} DLAVT \\ DLPOIL \\ DLRER \end{bmatrix} = \begin{bmatrix} \alpha_0 \\ \beta_0 \\ \delta_0 \end{bmatrix} + \begin{bmatrix} \alpha_1 & \alpha_2 & \alpha_3 & \alpha_4 & \alpha_5 & \alpha_6 \\ 0 & 0 & \beta_3 & \beta_4 & \beta_5 & \beta_6 \\ 0 & 0 & \delta_3 & \delta_4 & \delta_5 & \delta_6 \end{bmatrix} \begin{bmatrix} DLAVT_{t-1} \\ DLAVT_{t-2} \\ DLPOIL_{t-1} \\ DLPOIL_{t-2} \\ DLRER_{t-1} \\ DLRER_{t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_2 \end{bmatrix}$$

Since the right hand side variables were no longer identical, the equation can be re-estimated with seemingly unrelated estimation (SURE) Enders (1995). The regression result is presented in Table 5. It shows that the coefficient of the regression results is significant for $DLPOIL_{t-1}$ and $DLPOIL_{t-2}$ and the sign is consistent with the hypothesis (positive). Furthermore, the coefficient of $DLRER_{t-1}$ is also consistent with the hypothesis (negative). Nevertheless, since the individual coefficients in the estimated VAR models are often difficult to interpret, IRF could be used to interpret the results (Gujarati, 1995).

Since the SURE estimation is appropriate under non-diagonal error covariance, it is important to test the hypothesis that the covariance matrix is diagonal. A likelihood ratio (LR) test and Breusch Pagan Lagrange multiplier (LM) are employed. The LR test is 26.5 with 3 degrees of freedom (DF), while LM test is 22.97 with 3 DF. These two tests show that the null hypothesis that the covariance matrix is diagonal is rejected at the 5% level. Thus, both the LR and LM tests support the employment of SURE to estimate the above equations.

Table 5
Restricted VAR results

	Dependent variables		
Independent Vars.	**DLAVT**	**DLPOIL**	**DLRER**
$DLAVT_{t-1}$	-0.475	-	-
	(-4.42) **		
$DLAVT_{t-2}$	-0.105	-	-
	(-1.07)		
$DLPOIL_{t-1}$	0.85	-0.05	-0.06
	(3.96)**	(0.06)	(1.72)*
$DLPOIL_{t-2}$	0.438	-0.14	-0.05
	(1.85)*	(-1.73)*	(-1.48)
$DLRER_{t-1}$	-1.16	0.37	0.006
	(-1.9)*	(1.61)*	(0.09)
$DLRER_{t-2}$	-0.644	0.63	-0.02
	(-1.04)	(2.8)**	(-0.24)
Constant	0.002	-0.084	0.29
	(0.04)	(-0.51)	(0.27)
System R-2	0.48		
Test for diagonal	Likelihood Ratio (LR) test (χ^2): 26.5 **		
covariance matrix	Breusch-Pagan Lagrange Multiplier (LM) test (χ^2): 22.975 **		

Estimated using SURE
t ratio in parentheses
**) Significant at 5%
*) Significant at 10%

4.2 The IRF results

Shock on the oil price equation

The IRF results support the hypothesis that an increase in the real oil price will increase the average tariff. This result is consistent with the Dutch disease effect discussed earlier, and it confirms that the Indonesian government tend to adopt an import substitution policy during the oil-boom period, by way of increasing the average tariff. The cumulative IRF shows that one unit shock (measured by one standard error) in change in the real oil price increased a change in the average tariff by 0.76 after 1 period, and 0.41 after 4 periods, and, finally, after 8 periods by 0.21 (Table 6). These figures provide evidence that an increase in the real oil price led to an increase in the average tariff, reflecting that the government could afford a higher level of protection during the oil boom.

As noted, this result is contrary to the cycle of trade protection approach, which says the protection tends to increase in a recession period. The protection in Indonesia was higher during the oil boom period and lower when the economy was in crisis as a result of the collapse in the oil price in the mid 1980s. This finding is consistent with Fane's (1996) argument that the 1986 collapse in the oil price raised the profitability of the non-oil traded sector by depressing the price of the non-traded sector, resulting in less demand for the average tariff.

However, these results have to be juxtaposed against the fact that, despite a gradual decline in the oil price after 1982, there was evidence of an increase in NTB's between 1982-1985. Unfortunately, since this model only focuses on the average tariff data, the results cannot capture the NTBs.

Table 6
Cumulative Impulse–Response-Function (IRF) response to one unit standard deviation shocks

Shock To	**Response In**	**Cumulative IRF up to**		
		1 period	4 periods	8 periods
DLPOIL	DLAVT	0.76	0.41	0.21
DLRER	DLAVT	-1.15	-0.51	-0.82

One period is one quarter

Shock on the real exchange rate equation

The IRF provides supporting evidence for the hypothesis that depreciation of the RER (increased in DLRER) decreases the average tariff. This is consistent with the hypothesis that trade liberalisation should normally be part of a policy package which includes adequate real exchange rate depreciation, to increase exports and indirectly protect domestic goods from imports. As a consequence, the lobbying pressure for tariffs will decrease. The cumulative IRF shows that an increase of a one unit shock (measured by one standard error) in the change of RER (means depreciation) decreases the average tariff by 1.15 after 1 period, and by 0.51 after 4 periods (Table 6).

However, this result has to be juxtaposed against the fact that not all of the rupiah devaluations, except for the one in 1986, can be directly associated with trade liberalisation. In fact, the government also undertook devaluation in 1978 that was followed by tariff reforms. However, unlike the 1986 devaluation, the 1978 devaluation failed to provide the push towards sustainable trade reforms (Pangestu and Boediono, 1986). Pangestu and Boediono (1986, p. 29) also observe that trade protection tended to increase in the early 1980s.

The overall VAR results provide support for the hypotheses that there is a positive relationship between the real oil price and the average tariff, and a negative relationship between the real exchange rate and the average tariff. However, these results have to be interpreted carefully, since this model does not capture the NTBs which played an important role in import protection in Indonesia. Fane and Condon (1996) show that in 1986, the NTB coverage of gross output extended to 52% of all tradable sectors and 80% of non-oil manufacturing.

However, the complete story of the political economy of import protection cannot be entirely captured in this model. The determinants of trade protection in Indonesia, including import protection over time, are closely associated with the struggle over trade policy between technocrats, economic nationalists and other contending groups. Therefore, to assess the determinants of import protection over time in a comprehensive fashion, these VAR results should be combined with the institutional analysis of trade reforms (see Soesatro, 1989; Azis, 1994; Pangestu, 1991; Basri (2001)). Subject to these limitations, the VAR results provide a reasonable degree of support for tariff endogeneity and the relationship between tariffs and some macro variables, such as the oil price and RER.

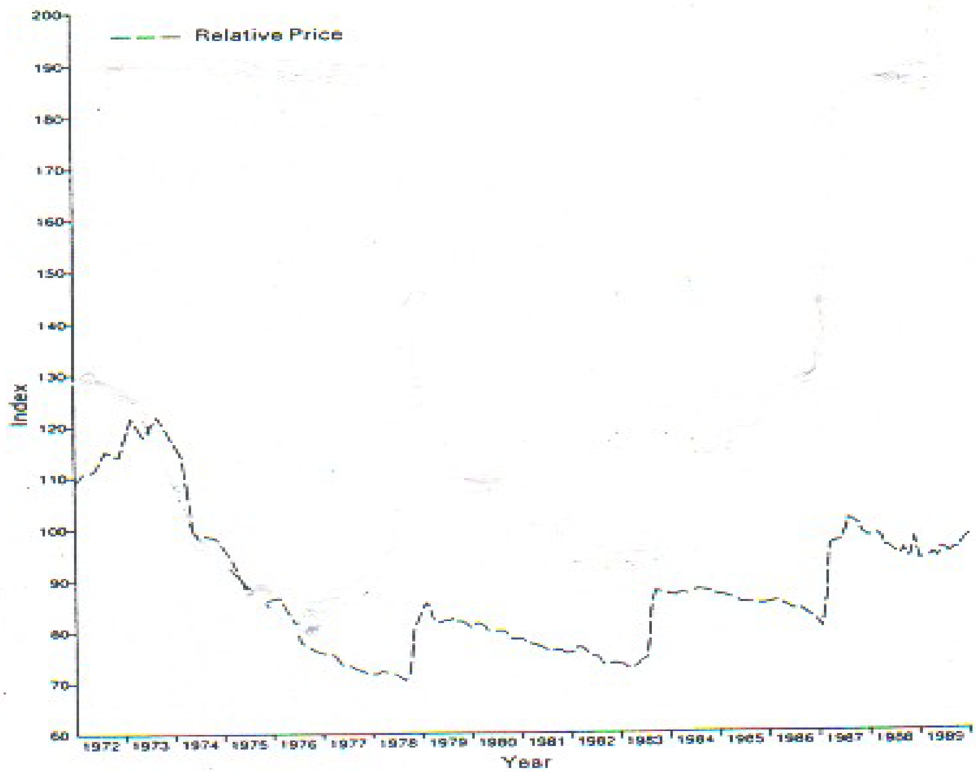
5. Other determinants of trade protection over time

A useful starting point to discuss the relationship between the RER, oil price and trade protection is to look at the trends in the relative price of tradable to non tradable goods.

Figure 2 depicts Warr's (1992) estimation of the price ratio of tradable to non-tradable goods in Indonesia. It shows that following the first oil boom in 1973-74, the price ratio of tradable to non-tradable declined steadily until 1978 — a phenomenon consistent with the Dutch disease. We witnessed increasing levels of protection during this same period. The World Bank (1981) reported that the level of protection unambiguously increased from 1975 to the period prior 1978 devaluation. Furthermore, Warr (1984) states that by late 1978, the profitability of the import competing sector had declined significantly. This is consistent with the hypothesis of Dutch disease that an increase in the oil price will reduce the profitability of the non-oil traded sector, and create more pressure on the demand for trade protection.

In November 1978, the government devalued the rupiah by 50% in order to assist the non-oil traded sector. Pangestu and Boediono (1986) argue that this was part of the protectionist policy. Warr (1984) also supports this argument that a protectionist motive was stronger in the 1978 devaluation compared to the 1983 devaluation. Subsequently, a supplementary policy package for tariff reduction, liberalisation of the import prepayments requirement and an export certificate scheme was launched in 1979. There appeared to have been a reduction in the import substitution bias (Pitt, 1991). In 1979, the domestic tariffs of one thousand goods and services were significantly reduced by as much as 50% for most goods (Pangestu and Boediono, 1986). Pangestu and Boediono (1986) also point out that the 1978 devaluation was an ideal background to reduce tariff barriers, as indicative of the 1979 tariff reductions. The government wanted to reduce the excessive protection by undertaking broad tariff reductions and unifying the structure. This was consistent with the hypothesis that real exchange rate depreciation should normally be part of trade liberalisation.

Figure 2
Indonesia: the tradable/non-tradable price ratio



Source: Warr (1992)

However, this argument is only partly true, because protection tended to increase from the early 1980s (Pangestu and Boediono 1986). Why is this so? After the rupiah's devaluation in November 1978, the relative price of tradable to non-tradable goods surged upwards. However, as can be seen from Figure 2, the relative price increase was quickly eroded, declining to its previous level by 1982. Pangestu (1986) points out that this was due to the inflationary aftermath of the devaluation and the second oil boom in 1979. After the 1978 devaluation, and the second oil boom in 1979-80, money supply grew substantially and, inflation was shot up. The increase in inflation resulted in the increase of the price of non-traded goods, thereby reducing the profitability of the non-oil traded sector. As a result, demand for trade protection began to increase from the early 1980s. This explained why trade protection increased, even after government devalued the rupiah in 1978. It was true that the price of oil gradually began to decline in 1982, yet it could not reverse the declining trend of the price ratio of tradable to non-tradable goods. Hence, the impact of the oil price decline did not fully compensate the fall in profitability in the non-traded sector.

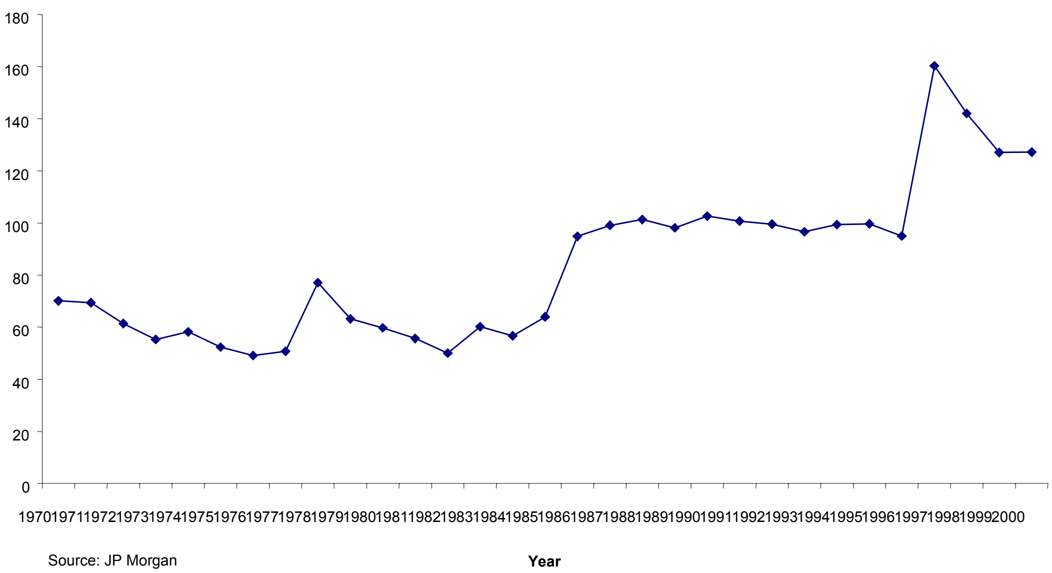
By early 1983, the ratio of traded to non-traded goods had declined to roughly its value prior to the 1978 devaluation (Warr, 1992). This reduced profitability of the non-oil traded sector and induced demand for protection. This is consistent with Pangestu and Boediono (1986) and Hill (1996) observations of increasing trade protection from 1982 to 1985. As noted, in 1982 the government introduced *Tata Niaga Import,* which is basically trade protection in the form of NTBs.

The Indonesian government undertook another rupiah devaluation in March 1983. Warr (1984) argues that a protectionist motive seem to have played a role in both the 1978 and 1983 devaluations, although it would appear to have been stronger in 1978. The key difference between the 1978 and 1983 devaluation was in the impact on the terms of trade.[9] The rupiah's devaluation in 1983 surged the price ratio of traded to non-traded goods upwards. Moreover, the subsequent decline of the price ratio during 1983-1985 was slower than in 1978-83, and its rate was clearly above that observed prior to the 1983 devaluation. This made it possible for the government to introduce the first package of trade liberalisation in 1985. In fact, the oil price continued to decline, dropping abruptly in the first quarter of 1986. The drop in the oil price led Indonesia into a serious current account deficit, forcing the government to undertake another rupiah devaluation in 1986.

The combination of the drop in the oil price and the rupiah's devaluation raised the price ratio of traded to non-traded goods. This raised the profitability of all other non-oil traded sectors by depressing the price of non-tradable relative to the price of these other tradable sectors. The increase in the price ratio of traded to non-traded after 1986 is reaffirmed in Figure 2 which also shows that the price ratio after 1986 was relatively high compared with 1978-1985. These combinations enabled the government to launch further trade liberalisation measures after 1986.

Of course, the trade reforms in the mid 1980s cannot be entirely attributed to the oil price and RER, as other factors, such as the increasing role of the technocrats and the declining political power of economic nationalists, also contributed to the reduction in import protection.[10]

Figure 3
Indonesia real effective exchange rate, 1970-2000
(1990=100)



Source: JP Morgan

Figure 3 shows that the Indonesian government succeeded in maintaining "competitiveness" during the 1990s. "Competitiveness" in Figure 3 is based on JP Morgan real effective exchange rates adjusted for inflation rates with 1990=100.[11] This figure provides an indication that the ability to maintain "competitiveness" enabled the government to reduce the levels of trade protection.

To sum up, this qualitative analysis reinforces the previous VAR results, suggesting that given the limitations, the VAR model still provides a reasonable degree of support for the relationship between the average tariff, the RER and the oil price.

6. Summary

In the light of the determinants of import protection over time, the econometric results support the hypothesis that an increase in the oil price in the 1970s enabled the Indonesian government to adopt an import substitution strategy through high levels of protection. The results also support the hypotheses that pressure for import protection tends to increase during an oil boom period. As for the real exchange rate, the econometric results suggest that trade liberalisation should normally be part of a policy package which includes adequate real exchange rate depreciation. Adequate depreciation of the real exchange rate will increase exports and indirectly protect domestic goods from imports, leading to less pressure for import protection.

These findings imply that the huge depreciation of the real exchange rate after the economic crisis of 1997-98 would help the Indonesian government liberalise the economy, and it is unlikely that there will be any major reversion to protectionism in the future. Owing to the WTO and particularly IMF agreements following the economic crisis in 1997, much trade protection has been phased out in Indonesia. Under these circumstances, the Indonesian government does not have the luxury to be choosy. Furthermore, the trade reform of the last decade has successfully created many proponents of openness, including exporters, academics, media and government officers.

Nevertheless, it would be imprudent to conclude that this binding to trade liberalisation will automatically lead to less pressure for trade protection. The resistance to market reforms from protectionist policy groups cannot be underestimated. These groups are still prevalent and many of them hold some key positions both in the government and in the business sector. They could create difficulties for any future trade liberalisation. For example, pressure for trade protection for sugar increased in 2000, and there is already pressure to delay commitment to the AFTA agreement for trade reforms by the year 2003.

Although the econometric results from this paper provide satisfactory findings, they have some limitations, such as the restriction of the average tariff in capturing the NTBs which played an important role in import protection in Indonesia. Moreover, the time series analysis of the average tariff cannot provide an explanation for the changing pattern of the inter-industry variation of protection. As such, this study has to be complemented with cross section analysis within the manufacturing sector, possibly selected industry case studies. It could also be combined with a detailed study on the institutional aspects (i.e. the role of crony capitalists, the technocrats and economic nationalists) of economic policy making in Indonesia.

NOTES

1. See for example Anderson (1980); Anderson and Baldwin (1987); Goldberg and Maggi (1999).
2. Examples include Cheh (1974), Lavergne (1983), Magee, Brock and Young (1989), Gardner and Kimbrough (1989) and Bohara and Kaempfer (1991) for the U.S., and Krol (1996) for Japan.
3. In this graph it is assumed that C is to the right of A, so that employment and also production in sector N increases, but point C could also be to the left of A, so that employment and also production of N decreases. Regardless, the important finding is that employment (and so output) in sector M decreases.
4. See Hill, 1996; Azis, 1994; Basri (2001).
5. For further technical explanation see Enders (1995), Maddala (1992).
6. For further technical explanation see, Enders, 1995.
7. In time series analysis, the estimator tends to be consistent as the sample size increases (Madala, 1992). This implies that time series analysis needs a long span of data, which is usually not available for ERP, NRP or NTB.
8. Various alternatives estimates of the RER, including the Morgan Guarantee Trust Company series, were attempted in this model, although the results were less convincing than the above RER definition.
9. This issue is beyond the scope of this paper. For further explanations, please see Hill (1996).
10. For details, see Basri (2001).
11. In fact, the "competitiveness" index should be interpreted with caution, as critically argued by Warr (1984) in pointing out that when the law of one price does not hold, the "competitiveness" index could give a distorted picture of the pattern of the relative price effects of devaluation. Nevertheless, considering that from 1990-1995, there was no devaluation and Indonesian inflation was relatively stable, this "competitiveness" index could provide a guide for Indonesian "competitiveness". Discussion on "competitiveness" itself is beyond this paper. An excellent review is available from Warr (1984).
12. For further technical explanation see Enders (1995), Maddala (1992).
13. For further technical explanation see, Enders, 1995.
14. In time series analysis, the estimator tends to be consistent as the sample size increases (Madala, 1992). This implies that time series analysis needs a long span of data, which is usually not available for ERP, NRP or NTB.
15. Various alternatives estimates of the RER, including the Morgan Guarantee Trust Company series, were attempted in this model, although the results were less convincing than the above RER definition.

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APPENDIX

Econometrics techniques and data

Tariff endogeneity suggests that tariffs are a result of the interaction of demand for and supply of tariffs. The Vector Autoregression Model (VAR) is particularly suited for this type of application. Krol (1996) argues that the VAR can determine whether a macroeconomic condition, such as slower growth in GDP, influences tariff change. And, if the reverse is true, whether tariffs promote economic growth or have a macroeconomic effect, the VAR enables the causality test of this alternative view to be set up. However, it would be unrealistic to conclude that this model can capture all determinants of import protection. While the complexity of the political economy cannot be entirely captured in this model, it can at least provide valuable insights into the political economy dynamics behind the relationship among these variables.

Bohara and Kaempfer (1991, p.952) suggest using the VAR to examine data for two reasons: First, the level of protection could be both endogenous and exogenous, as such a structural regression model with pre-established causality may be mis-specified. Second, the political process is sometimes slow to respond to pressure, implying an uncertain lag structure lies behind relationship among time series variables. The VAR model allows flexibility in selecting the lag structure and deals with causality. Furthermore, simulation of the VAR, and the impulse response function (IRF) calculation could provide more insights on the sign of the causality effects.

In standard form, the VAR is considered a system of dynamic, linear equations driven by the error terms as:

(11) $Z_t = B_0 + \sum_{i=1}^{p} B_i Z_{t-i} + U_t \;,\; U_t \sim NIID\,(0,\Omega)\,,\, t \in \mathrm{T}$

Where Z_t is a k x 1 stochastic vector,

B_0 is k x 1 vector of constant coefficients,

B_i is a k x k matrix of constant coefficients and

U_t is a k x 1 stochastic vector, normal, independent and identically distributed (NIID) error with a zero mean and Ω variance-covariance matrix

This dynamic VAR model is called an unrestricted VAR, since no linear restrictions are imposed. As this study focuses on the relationship between both the real oil price and real exchange rate and the average tariff, the linear restriction will be imposed on the grounds of the previous theoretical framework prediction. In addition, the statistical basis for imposing the restrictions is validated by the Granger causality test. Once restrictions are imposed, they are tested by the Wald test to ensure their validity. If evidence is found of some causality between those variables, then the variables which are statistically not caused (statistically not Granger caused) by the rest of the variables can be eliminated. Therefore, the unrestricted dynamic VAR can be reduced into restricted VAR which contains less variables. In such a case, the equation system cannot be estimated separately and needs to be estimated by the seemingly unrelated regressions (SURE) method (Spanos, Andreou, Syrichas, 1997). In fact, the restricted VAR helps avoid the problem of over parameterisation, which is likely to occur in the unrestricted VAR (Spanos, Andreou, Syrichas, 1997).

Once the causality test is established, the causality direction can be traced using the IRF. Since the objective of paper is to see the causality directions between the average tariff and some macroeconomic variables, it will focus only on the unit root test, the Granger causality and the IRF.

Unit root tests

The unit root tests are used in this study to ensure that the time series data are stationary. Employing the unit root tests is an interesting subject in econometrics, because a unit root tests carries major implications in macroeconomic data. If the structural variables have unit roots, it can be expected that the shocks on those variables will be permanent. For example, consider the model (Maddala, 1992, p. 581).

(12) $Y_t = Y_{t-1} + \varepsilon_t$, where ε_t is a zero mean stationary process.

If there is a shock C in ε_t in time period Y_T, then Y_{T+1}, Y_{T+2},… all increase by C, so the effect is permanent. In this case, the model has unit roots. However with the model:

(13) $Y_t = \alpha Y_{t-1} + \varepsilon_t$,where $\alpha < 1$

the effects of the shock fade away over time. In this case the model does not have unit roots. Therefore it is very important to test whether the series has $\alpha=1$ or $\alpha<1$, or whether or not there is a unit root.

The unit root tests can be examined by both Dickey Fuller and the Augmented Dickey Fuller tests (ADF).[12]

The specification for the Dickey Fuller unit root test is:

(14) $Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 \Delta Y_{t-1} + u_t$

In the ADF test, the unit root test can be presented as:

(15) $\Delta Y_t = \alpha_i Y_{t-1} + \sum_{j=1}^{k} \alpha_j \Delta Y_{t-j} + u_t$, where j=1,2,…k

If α_1 from equation 15 is significantly different from zero then it can be said that Y_t is stationary or does not have unit roots.

The Granger causality test

Maddala (1992) points out that the Granger causality test departs from the premise that the future cannot cause the present. If A takes place after B, it can be concluded that A cannot cause B. Whereas, if A takes place after B, it does not necessarily imply that B causes A.

Granger develops some tests for causality. For an empirical test for causal direction, let y_t and x_t be a stationary time series with zero means. This simple model can be presented as:

(16) $x_t = \sum_{i=1}^{k} \alpha\, x_{t-1} + \sum_{i=1}^{k} \beta\, y_{t-1} + u_t$

(17) $y_t = \sum_{i=1}^{k} \delta \, y_{t-1} + \sum_{i=1}^{k} \phi \, x_{t-1} + v_t$

Where u_t and v_t are two uncorrelated white noise series. The null hypothesis that x_t does not cause y_t corresponds to $\phi i = 0$ (for $i=1,2,..,k$).

In order to determine the order of lag (p) of the approximating autoregression, Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC) are used.[13]

(18) $AIC(p) = T \log |\Sigma| + 2N$

(19) $SBC(p) = T \log |\Sigma| + N \log(T)$

Where: T = number of observations

$|\Sigma|$= determinant of the variance/covariance matrix of residuals

N = total number of parameters estimated in all equations

The order p is chosen so that both the AIC or SBC criteria is minimised.

The IRF

To acquire understanding about the direction of the relationship between x_t and y_t, the IRF method is employed. The IRF is a methodology introduced by Sims (1980), which allows the time path of the various shocks on the variables in the VAR systems to be traced out (Enders, 1995).

Equations (20) and (21) can be used for illustration. If the Granger causality test produces a result that y_t does not Granger cause z_t, while z_t does Granger cause y_t, then β_1 in equation (21) will not differ from 0, while α_2 in equation (20) will be different from 0. Therefore, a shock in ε_{zt} will have an effect on e_{2t} (equation 23) while the effect on e_{1t} is transmitted via b_{12} which is a correlation coefficient between e_{1t} and e_{2t}. The effect on e_{1t} will then be transmitted to $y_{t.}$ (equation 20).

(20) $y_t = \alpha_0 + \alpha_1 y_{t-} + \alpha_2 z_{t-1} + e_{1t}$

(21) $z_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 z_{t-1} + e_{2t}$

The error terms can be decomposed as follows:

(22) $e_{1t} = \varepsilon_{yt} + b_{12}\varepsilon_{zt}$

(23) $e_{2t} = \varepsilon_{zt}$

Data and period of estimation

The theory of trade protection recognises several measurement methods, namely average tariffs, Nominal Rate of Protection (NRP), Effective Rate of Protection (ERP).

The simplest measurement of trade protection is average tariff. This method infers tariff rates from duty collections and c.i.f. imports. This measure is widely used in time series econometrics analysis of trade protection, which usually focuses on the aggregate picture, i.e. observing the relationship between trade protection and some macroeconomic variables, such as inflation and GDP. Another advantage of using average tariff is that such data are usually available for a long line span.[14] This paper focuses on the aggregate picture, thus it is more appropriate to employ aggregate data such as the average tariff, whereas NRP, ERP and are more appropriate for cross — section analysis for intra-industry of protection.

The average tariff (AVT) is defined as total import duty divided by total import c.i.f. The total import duty data are drawn from quarterly realisation of the government budget (unpublished), from the Department of Finance, while import c.i.f are taken from International Financial Statistics (IFS) data tape).

It is worth noting that, unlike the ERP and NRP, the average tariff cannot capture the Non Tariff Barriers (NTB), which plays an important part in trade protection in Indonesia. Unfortunately, the ERP, NRP and NTB for Indonesia are not available in a time series form. Given this limitation, it is almost impossible to have a consistent time series in the econometrics estimate.

Without incorporating NTBs, the average tariff can only be a partial explanation of the determinants of trade protection. Thus, to have a holistic understanding of the determinants of trade protection in Indonesia from 1970-1995, the econometric analysis will be supplemented with a qualitative assessment.

Besides AVT, the other variables are:

- Real oil price is defined as: POIL=(CPOIL*e)/CPII

Where: CPOIL= Crude petroleum price in (in $) drawn from the IFS data.

  - e = nominal exchange rate (Rp/$)
  - CPII= Consumer price index of Indonesia

- The real exchange rate is calculated as:

RER=e*(CPIUS/CPII)[15]

Where: CPIUS = consumer price index of US

In fact, the theory is silent on the form of these variables. However, to guarantee the stationary condition, and to capture the impact of the change of the variables, they are transformed into log form.

Thus the data are transformed into LAVT, LPOIL, LRER

Where:

LAVT = Log average tariff (in %)

LPOIL= Log real oil price (in Rp)

LRER = Log Real exchange rate (Rp/US$)

In order to gain some insight about Indonesia's tariffs policy from the oil boom period to the years of economic reform, the period of estimation selected is from quarter two in 1974 to quarter four in 1993. All data are quarterly.

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