Estimation of Elasticities of Substitution / Transformation Between Domestic and Imported / Exported Commodities

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1. Introduction

This paper has two parts. First, it provides estimates of the *elasticities of substitution in demand* between imported commodities and domestically produced commodities corresponding to the major traded goods producing sectors of the Thai economy. These so-called Armington elasticities (after Armington, 1969) are based on the differentiation of products with respect to their origin and the imperfect substitution between imports and domestic supply.[1] The values of these parameters play an important role within computable general equilibrium (CGE) models like PARA because they affect the degree to which changes in the prices of imported commodities - resulting, say, from changes in international prices or from changes in rates of protection within Thailand - will be transmitted to changes in the prices of their domestically produced import substitutes. The traditional analysis of import demand, founded on the assumption of perfect substitution between domestic and imported goods, is unable to explain the observed presence of goods from the two sources despite changes over time in their relative prices.

The second part of the paper provides estimates of the *elasiticities of transformation in production* between domestically produced commodities destined for sale on the home

[1] See also Johnson, Grennes and Thursby (1979) for a discussion of product differentiation and its impact on modelling international commodity trade.

market, on the one hand, and the export market, on the other. Although the standard version of PARA does not make use of these elasticities, treating exports in the manner described in the paper dealing with model structure, it is intended that they will be used in subsequent versions of the model. Since obtaining a sensible set of estimates is a prerequisite for amending the model structure to incorporate these elasticities, it is appropriate that their estimation be presented here. These elasticities are based on the observation that the part of the output of an industry that is sold domestically versus the part sold for export may be quite different in quality. Recognising this fact, several previous studies have used these elasticities in general equilibrium models and the resulting structure has important effects on the response of exports to economic shocks. But the elasticities used have usually lacked any empirical foundation. We are unaware of any previous published attempt to estimate these elasticities econometrically, for any country.

The remainder of the paper has two main sections. Section 2 describes tha estimation of (Armington) elasticities of demand between domestically produced and imported commodities and Section 3 does the same for the estimation of the elasticities of transformation in production between domestically sold goods and exports. In each of these two cases we discuss first the interpretation of the elasticity concerned, then describe the data used in estimation, followed by the methodology used and finally the results. Some concluding comments are provided in Section 4.

2. Elasticities of Substitution Between Domestically Produced and Imported Commodities (Armington Elasticities)

2.1 Interpretation

In an open economy, each commodity sold domestically can be differentiated according to its source of production: domestic and foreign (imports). All supplies of a particular good originating domestically are assumed to regarded as identical by purchasers of the good and all foreign sources of that good are also regarded as identical to one another; but domestic goods and imports are considered different. Thus, domestic absorption consists of the demand for an aggregate of the domestic and imported product with the actual mix of the two commodities in the market place being determined by the degree of substitutability (or differentiation) between them. The degree of similarity between these two sources of supply is captured by the Armington elasticity. The higher the value of this parameter, the closer the degree of substitution. In other words, a high value of this parameter means that imports and domestic supplies are considered by purchasers to be virtually identical. If they were exactly identical, the parameter would be infinite. On the other hand, a low value of the parameter means that the two products are dissimilar or, equivalently, they are weak substitutes.

Armington elasticities play an important role in CGE modelling. This is especially true for simulations of the economic effects of changes in trade policies. For example, when the tariff applied to imports of a particular commodity is increased, this change raises the domestic price of the imported commodity (assuming no change in the exchange rate). Nevertheless, the effect of this change on the price of the domestically produced commodity is what determines the resource allocation effects of the tariff policy change. If the imported and domestically produced goods are perfect substitutes, then the domestic price will necessarily change by the same proportion as the price of the imported good. This is the standard assumption of classical international trade theory. However, if the goods are imperfect substitutes, the domestic price may not change by the same amount. Thus, the impact that changes in trade policy have on the structure of domestic production depends very much on the degree of substitutability between domestically produced and imported commodities, and this is what the Armington elasticity captures.

The above discussion assumes that all imported sources of a good are identical. In fact, they may be quite different. Models which differentiate all imports by country of origin have been developed, but these models usually cannot be implemented empirically because data on the quantities and prices of imported goods seldom identify them consistently and comprehensively by country of origin. The empirical literature has, thus, concentrated on the differentiation between domestic supplies and imports, rather than on the differentiation among imported supplies. An oversimplification is obviously involved in such an approach, but it would seem of second order of importance in most cases. The difference between domestic goods and imported goods seems likely to be greater than the differences among imports derived from different source countries.

The discussion also treats all domestic purchasers of particular goods as being identical in their demands and, in particular, in their assessment of the substitutability of imported and domestic supplies. The categories of domestic demand include final consumers, intermediate good purchasers, investment food purchasers, the government, etc. These diverse domestic users of the good may all have different perceptions as to the degree to which domestic and imported supplies substitute for one another. Armington parameters could, in principle, be estimated separately for each of these levels of demand, but available data can seldom sustain such an attempt. Empirical studies have, thus, normally had to rely on aggregate data relating to the demand for imports and domestic goods, without distinguishing among the various levels of domestic demand.

There have been very few empirical estimates of the Armington elasticities. Attempts at estimation were undertaken for various countries by Stern, Francis and Schumacher (1976). The resulting estimates varied widely, but centred around unity. Alaouze, Marsden and Zeitsch (1977) produced estimates for a few commodities for Australia. These estimates centred around 2.0. Most CGE modelling studies have not undertaken direct estimation of the Armington elasticities but have instead drawn heavily on these few very rough estimates. Default values, usually 2.0, have thus been used in these models (see, for example, Dixon, Parmenter, Sutton and Vincent 1982; Dee 1989; Martin 1989). Empirical estimation of the Armington parameter is recognised to be difficult (Abbott 1988; Goldstein and Khan 1985). Nevertheless, in view of the importance of the Armington parameter for the functioning of such models (Pagan and Shannon 1987), the lack of an adequate empirical basis for the parameters actually used in the models is unsatisfactory.

2.2. Data

To estimate Armington elasticities of substitution between imported and domestically produced goods, we need time series data on prices and quantities of these goods. The import price and quantity series used in this exercise were extracted from data tapes from the Customs Department of Thailand. These CCCN codes were then concorded with the 60 sectors of the PARA model and aggregation for each sector was done as follows: A price index was constructed for each sector j as a value weighted average of the prices of the imported commodities belonging to this sector. That is,

$$P_j = \left(\frac{W_{jkt} Q_{jkt}}{\sum_k W_{jkt} Q_{jkt}} \right) W_{jkt}$$

where: W_{jkt} is the price of imported commodity k in sector j at time t;

Q_{jkt} is the quantity of imported commodity k in sector j at time t;

and P_j is the price index for sector j at time t.

A quantity index for sector j was then constructed by dividing the total value of imports in this sector at time t by the computed price index. That is,

$$X_j = \frac{\left(\sum_k W_{jkt} Q_{jkt}\right)}{P_j}$$

Data on domestic production was obtained from the National Income Accounts of Thailand. Gross domestic product originating from each of the 60 sectors of PARA was used as proxy for domestic production of the industry and producer price indices were also used as proxy for prices of domestic goods. The data obtained from the National Income Accounts was at a 180-sector level of aggregation corresponding to the 180-sector input-output table of Thailand. This was aggregated to the 60 sectors of PARA. Laspeyres price indices were computed for each sector with 1972 as the base period. The time series data used in this exercise covered 17 years, starting from 1970 to 1987, excluding 1971 since there was no data on imports corresponding to this year.

Additional information on import restrictions was also used. It was obtained from the following sources: *Quarterly Bulletin* and *Annual Report* of the Bank of Thailand (various issues), Ministry of Commerce, and GATT(1991). These data however, only indicated the presence or absence of import control during the period covered in this study by industry classified as in the input-output table and did not indicate the kind of trade policy imposed.

The characteristics of the various industries are summarised in Table 1. The table shows, in the first column, value addeed in each industry as a share of total value added across all industries, imports of the commodity corresponding to each industry as a share of total imports of all commodities; and finally the corresponding computation for exports.

2.3. Methodology

The following three models were estimated:[2]

a. Ordinary Least Squares:

$$ln(X_{jt}^{i} / X_{j}^{d}) = \alpha_0 + \sigma_j ln(P_j^d / P_j^i) + u_t$$

b. Partial Adjustment Model:

$$ln(X_{jt}^{i} / X_{j}^{d}) = \beta_0 + \beta_1 ln(P_j^d / P_j^i) + \beta_2 ln(X_{j(t-1)}^{i} / X_{jt-1)}^{d}) + u_t$$

c. Error Correction Model:

$$\Delta ln(X_j^i / X_j^d) = \beta_0 + \beta_1 \Delta ln(P_j^d / P_j^i) +$$

$$\beta_2 [ln(X_{j(t-1)}^{i} / X_{j(t-1)}^{d}) - \delta ln(P_{j(t-1)}^{d} / P_{j(t-1)}^{i})] + u_t$$

where X_j^i is the quantity of imported commodity j at time t;

X_j^d is the quantity of domestic commodity j at time t;

P_j^i is the price of imported commodity j at time t; and

P_j^d is the price of domestic commodity j at time t.

Several other variables were also added to the basic formulation of each of the above three models. These include lags of the dependent variable and a dummy variable indicating the presence or absence of import control for the corresponding sector at each

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[2] The methodology closely follows Kapuscinski and Warr(1992) which estimates the Armington elasticities used in the APEX CGE model of the Philippine Economy.

time period. All three models were estimated using SHAZAM and an iterative Cochrane-Orcutt procedure was used to correct for autocorrelation. In the Error Correction Model, the long-run parameter δ was estimated and tested. If it turned out to be significantly different from 1.0, then the lag of errors in the regression was used as the error correction term.

2.4. Results

The results of the OLS and PAM estimations are presented in Tables 2, and 3. Tests for cointegration, a prerequisite for applying the error correction model (ECM), are applied in Table 4 and the results using the ECM are presented in Table 5. For each of the three models, of the 60 sectors of PARA, only 45 sectors were estimated. The other 15 sectors had either no import data at all or had insufficient data for estimation.

The Ordinary Least Squares model resulted in two sectors (8 and 19) with the wrong sign (negative) for the estimated Armington elasticities, one of which (sector 8) was significant at the five per cent level. This sector though, had a low R-square of only 0.38. Among the 43 sectors which had the correct sign for σ_j, 37 were significantly different from zero and six were non-significant. The R-squares in the OLS estimates ranged from -0.01 to 0.99 , with 8 per cent falling below 0.30.

The Partial Adjustment model had four sectors which had the wrong sign for σ_j, three of which were not significant at the five per cent level. Among the 41 sectors which had the correct sign for σ_j, four had non-significant estimates. Under the PAM procedure, 14 sectors (31 per cent) did not have the expected sign for the partial adjustment coefficient(positive) , although only one of these was significant (sector 38) which may be due to the presence of autocorrelation in this sector as indicated by the Durbin Watson statistic. The remaining 69 per cent of the sectors had the partial adjustment coefficient in the expected range (i.e. between 0 and 1). The PAM R-squares ranged form -0.15 to 0.99, with 13 per cent falling below 0.30,

When a long run relationship exists among the relevant variables the error correction mechanism may be the appropriate procedure for estimation. A test for co-integration of the price and quantity ratios is therefore required. The results of this test are presented in Table 6. It can be observed that in most of the sectors, the price and quantity ratios achieve stationarity after first order differencing, and that based on the Dickey -Fuller test the price and quantity ratio variables are significantly co-integrated at the ten per cent level of significance in 38 of the 45 cases (85 per cent of the estimated sectors). These results imply that application of the Error Correction Model to these data is appropriate.

The results of applying the Error Correction Model are presented in Table 5. The wrong sign for σ_j was obtained in sectors 8 and 19 (similar to OLS), but both were insignificant at the 5 per cent level. Among the 43 sectors with positive estimates, 39 were significantly different from zero and four sectors with positive but non-significant estimates. All sectors estimated had the correct sign for the error correction term (negative) in the Error Correction Model except for sector 59 which had a positive but non-significant ECM term. The ECM R-squares ranged from 0.19 to 0.99 , with only 2 per cent falling below 0.30.

Table 6 summarises the estimates obtained with the three models. The estimated values were centered around 1.0. It is notable that the estimates are highly correlated across the three models, with correlation coefficients well in excess of 0.9 (footnote to Table 6). Because of the co-integration of the price and quantity variables, the Error Correction Model results were preferred. For those estimates satisfying the non-negativity condition for the elasticity estimates, these were the estimates included in the

PARA elasticity file The estimated value was negative for two commodities, but not significantly different from zero and a zero value was used. For the 15 sectors for which estimates could not be produced, as indicated above, the value estimated for some seemingly similar commodity was used in its place. For example, the value used for the paddy industry (sector 1) was set equal to the estimated bvalue for maize (sector 2), and so forth.[3]

3. Elasiticities of Transformation Between Domestically Sold and Exported Commodities

3.1. Interpretation

Applied general equilibrium models have typically made one of one of the following two sets of assumption regarding the determination of the level of exports from domestic industries. Versions of PARA have been constructed based on each of these two sets of assumptions. The first, and most common, treats the exported versions of a good and the domestically sold version as being identical. Most economists would recognise this to be an oversimplification, but would say (without supporting empirical evidence) that at least for the major exporting sectors the error is likely to be small. An implication of this treatment is that the price of the domstically produced version of a good will be equal to the price of the exported version, since the two commodities are identical. The latter is determined by internatinal prices, the nominal exchange rate and any export taxes that may be present.

For the exporting sectors of the economy this may or may not be a problem, but for the import competing sectors a particular problem arises form this treatment. If the

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[3] The set of commodities for which Armington elasticities could not be estimated and the commodities whose estimated values were used instead (with the latter shown in parentheses) were as follows: 1 (2); 3 (8); 5 (8); 7 (6); 13 (17); 15 (17); 16 (17); 23 (59); 51 (59); and 53 (52). For the services and utilities sectors 54 to 58 the armington elasticity was set at zero.

domestically produced and exported commodities are the same, the price of the former will by determined by the latter, as with exports industries. This means that the Armington structure of substitution between domestically produced and imported commodities, as described above, can play no role in determining the prices of the former. Models adopting this treatment generlly cope with this problem by holdinging the level of exports from import competing industries exogenously constant and allowing the prices of these exports to be determined endogenously. This treatment allows the Armington structure to operate by the transparent artificiality of the treatment reveals that the economics underlying this approach is flawed.

The second set of assumptions regarding the treatment of exports from domestic industries recognises that the commodities produced for domestic sale and the those exported may be of different quality and therefore not necessarily receiving the same price. This fact is consistent with the fact that the same industry may be producing for both the domestic and export market and also importing some quantity of the domestic good. A further important component of the explanation for these facts is an aggergation problem. The individual industries defined in the input-output table are not internally homogeneous but instead they are aggregates of several non-identical forms of production, some producing primarily for export, some producing solely for domestic sale, and so forth. When these industries are aggregated into a single input-output category, the result is that the commodity produced by each industry for domestic sale and the commodity exported are not identical, but are imperfect substitutes on both the demand side and the production side.

When the exported and domestically sold version of the good are imperfect substitutes in production, the composition of the output of the domestis industry between these two forms of output will respond to their relative profitability. This suggest the incorporation of elasticities of transformation between the two forms of output. Many studies have indeed used such a structure, but ordinarily with no empirical foundation for the elasticities used. The elasticities used are normally based upon those used in another study for some other country which themselves turn out to lack any empirical basis. In this study we attempt to estimate the values of these elasticities transformation, using Thai data.

3.2. Data[4]

Agricultural Sectors

The *Thailand Statistical Yearbook* was the main source of production data for crops. STARS was also used as the source of production data for those crops whose production was not reported in the yearbook. The quantity of domestic supply was obtained by subtracting the quantity of exports from the quantity of domestic production. The producer price index for each agricultural sector was used as proxy for domestic prices. Export prices were obtained by dividing the value of exports by the quantity of exports and deflating this to constant 1972 prices.

Estimation was plssible only for the following sectors within agriculture -- maize (2), cassava (3), soybean (4), groundnut (5) and sorghum (8). It should be noted that rice exports occur almost exclusively in milled form and milled rice is covered within the manufacturing sectors discussed below. There was a problem in the data for sorghum in that in some years the quantity for exports reported in the *Yearbook* exceeded the quantity produced. This was probably because the method of measurement for the exported product is not the same as that for the produced product or the exported product may have gone through some stage of processing. In fact, the data also reported in the *Yearbook* as exports for the cassava sector is for tapioca products and production was reported for cassava roots.

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[4] See the Appendix for a detailed listing of data sources.

Manufacturing Sectors

a) Rice Milling

For milled rice, domestic supply was obtained by subtracting the quantity of exported rice from the quantity of domestic production which are both available from the *Statistical Yearbook*. Export prices were obtained from the *International Financial Statistics* yearbook. Domestic prices, on the other hand, were obtained as follows:

$$\tilde{P}_i = (V_i^X - V_i^E)/(Q_i^X - Q_i^E)$$

where $\tilde{P}_i$ denotes the estimated price of domestic rice, V_i^X denotes the reported value of rice production, V_i^E denotes the reported value of rice exports, Q_i^X denotes the reported quantity of rice production and Q_i^E denotes the reported quantity of rice exports.

Since no data on the value of milled rice production could be found, this was estimated as 0.85(value added in paddy production + value added in rice milling. Note that in 1985, 85 percent of the output of the paddy sector was used as an intermediate input in rice milling. This proportion was assumed constant throughout the period covered in the analysis. While total output of the paddy sector would have been more appropriate in the above formula than value added in paddy, value added accounts for around 80 per cent of the total production of the paddy sector (based on 1985 data). Hence, instead of estimating the value of total production of paddy sector by assuming a fixed share of value added in total production for the period covered, value added was used to avoid further complication. Also, paddy accounted for around 90 per cent of the total intermediate inputs in the rice milling sector.

b) Sugar Refining

Both quantity annd price of exported sugar were obtained form the *IFS* Yearbook. Domestic sugar sales were obtained by again subtracting the quantity of exported sugar from the production of sugar, which are both available from the Statistical Yearbook. The producer price index, using the above formula, was used for domestic prices.

c) Other manufacturing sectors

The following two major problems were encountered in assembling the data for the other manufaturing sectors:

(i). No data were available on the value of domestic production (only value added was available)

(ii). Although export price and quantity data were available, there was an indexation problem. To compute a price and quantity index for a given set of commodities, price and quantity data should be available for all these commodities for at least the base year. This is not true with our export data since some commodities were exported only for some years and there is no year which has export price and quantity data for all commodities produced in a sector.

The first problem was solved by assuming a fixed share of value added in the value of gross ouput of an industry for the period covered in the analysis. This share of value added was obtained form the 1985 I/O table. Hence, the value of gross output was estimated as value added divided by the share of value added. the qsuantity of domestic supply was obtained as: (value of gross output - value of exports) / producer price index, where the producer price index was estimated as in the above formula.

The second problem was addressed by finding the year in which the greatest number of commodities was exported. This was made the base year. Only those commodities which were exported in the base year were included in the data set. However, the value of those commodities that were exported but were not included in the data set was computed and was found out to be less than 2 per cent of the total value of exports in each year for textiles (36), and rubber and plastics (43). The same was true for animal feeds (32) for the years beginning from 1977. Thus, in the animal feeds sector, only the years starting from 1977 were included in the estimation.

A Laspeyres price and quantity index was then generated for exports using this reduced data set.

3.2 Methodology

Let x_j^d = quantity of domestic supply for commodity(sector) j

x_j^e = quantity of exports for sector j

p_j^d = price of domestic good j

p_j^e = price of exported good j

$x_j = x_j^e / x_j^d$

$p_j = p_j^d / p_j^e$

The following models were estimated:

1. Ordinary Least Squares (OLS):

$$\ln x_j(t) = \alpha_{0j} + \alpha_{1j} \ln p_j(t) + u(t)$$

2. Partial Adjustment Model (PAM):

$$\ln x_j(t) = \delta_{0j} + \delta_{1j} \ln p_j(t) + \delta_{2j} \ln x_j(t-1) + u(t)$$

3. Error Correction Model (ECM):

$$\Delta \ln x_j(t) = \beta_{0j} + \beta_{1j}\, \Delta \ln p_j(t) + \beta_{2j}\left[\ln x_j(t-1) - \ln p_j(t-1)\right] + u(t)$$

The transformation elasticities are estimated by the following:

$$\hat{\alpha}_{1j} \text{ (OLS)} \quad \hat{\delta}_{1j} \text{ (PAM)} \quad \hat{\beta}_{1j} \text{ (ECM)}$$

3.3 Results

The estimation results are presented in Tables 6 to 8, which summarise the results for the above three models. The expected sign for the elasticity estimate is negative. All estimates satisfy this constraint except three. Two for agriculture and one for non-agriculture, consisting of one OLS estimate and one PAM estimate, none of which are significantly different from zero.

For six of the 10 sectors estimated (maize, sorghum, rice milling, sugar milling, animal feeds, and textitles), the ECM method was found to give better results than either the OLS or PAM methods. In five of these sectors (all except sorghum), the Dickey-Fuller test for cointegration showed that the variables modelled were cointegrated, and for four the estimated elasticities using the ECM method were significant at the 5 per cent level (all except rice milling). Except for one of these five sectors, the ECM term was also significant. The ECM elasticity was used in these six cases.

For both cassava and soybeans, the PAM method was used since in each of these sectors, the partial adjustment coefficient had the correct sign and was significant, and the R-squares were relatively high at 0.7 and 0.9, respectively. For groundnuts, OLS gave better results than the other two methods. Lastly, for rubber and plastic, OLS was used since the results from the other two methods were not found to be any better than those using this method.

The standard treatment of export industries within applied general equilibrium models is that the commodities exported from these industries and the commodities sold domestically are perfect substitites in production. That is, it is assumed that the elasiicities of transformation estimated in this section are infinite. Table 7 reports tests of this hypothesis. It is tested by asking whether the inverse of the elasticity is significantly greater than zero. The null hypothesis of an infinite elasticity is rejected at the five per cent level of significance for six of the nine commodities estimated and is rejected at the ten per cent level for eight of the nine commodities.

4. Conclusions

This paper has estimated the elasticities of substitution / transformation between domestically produced / sold goods and imports / exports. Although many applied general equilibrium models use these elasticities and their values have important effects on the operation of the models, empirical estimation of them is very rare. We have shown that estimation of these parameters is possible, even when the data available for this exercise are relatively poor, as in the Thai case. The common practice of choosing these important parameters arbitrarily would seem to be unjustified.

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APPENDIX: SOURCES OF DATA FOR EXPORT TRANSFORMATION ELASTICITY ESTIMATES:

1. From *Thailand Statistical Yearbook*

   - quantity of production for crops
   - quantity of exports for crops
   - value of exports for crops

2. IEDB Trade and Production Data and United Nations Trade Data (STARS)

   - quantity of production for crops
   - quantity of exports for crops
   - value of exports for crops

3. From the Thailand Bureau of Customs

   - value of exports
   - quantity of exports

4. From National Economic and Social Development Board

   - GDP originating from each of the 60 sectors of PARA
   - producer price index for each of the 60 sectors of PARA

5. From International Monetary Fund, *International Financial Statistics Yearbook*

- quantity and price of exports for some crops

6. Bank of Thailand *Quarterly Bulletin* and *Annual Report*, various issues, Ministry of Commerce and GATT(1991):

- data on export control

7. From National Economic and Social Development Board, *National Income of Thailand*

- price deflator for both agricultural and manufacturing sectors. (Price deflator was obtained by dividing the GDP originating from each sector by the corresponding value of GDP in current prices).

Table 1. Sector Shares in Total Imports, Exports and Value Added

Sector	Average share in total imports	Average share in total value added	Average share in total exports
1. Paddy	0.00	11.94	0.01
2. Maize	0.01	1.58	6.52
4. Soybean	0.01	0.21	0.06
6. Mungbean	0.00	0.24	1.13
8. Sorghum	0.00	0.10	0.54
9. Kenaf & jute	0.04	0.25	1.06
10. Cotton	1.95	0.16	0.16
11. Vegetables & fruits	0.12	3.39	0.47
12. Coconut	0.03	0.57	0.02
14. Coffee bean	0.03	0.13	0.19
17. Other Crops	0.55	1.98	1.43
18. Cattle & Buffalo	0.01	1.75	0.19
19. Swine	0.01	0.91	0.00
20. Poultry	0.05	1.06	4.45
21. Other livestock	0.03	0.05	0.04
22. Silk worm	0.00	0.08	0.00
24. Forestry	0.22	2.81	0.43
25. Ocean fishing	0.01	2.56	0.08
26. Inland fishing	0.00	0.73	0.00
27. Mining	14.70	6.60	1.71
28. Meat processing	0.07	0.70	0.93
29. Food processing	3.35	2.13	8.09
30. Rice milling	0.00	1.31	14.17
31. Sugar refinery	0.07	0.94	5.85
32. Animal feed	0.13	0.75	10.07
33. Beverage	0.43	2.68	0.09
34. Cigarettes	0.74	1.94	1.08
35. Spinning	2.43	2.59	3.68
36. Textiles & garment	0.70	4.47	5.44
37. Leather & footwear	0.08	1.20	0.92
38. Wood paper	2.62	3.45	1.95
39. Printing & publishing	0.19	0.50	0.40
40. Chemical	11.44	1.02	0.73
41. Fertilizers & pesticides	2.55	0.05	0.02
42. Petroleum refinery	5.87	3.10	0.40
43. Rubber & plastic	0.89	1.11	9.68
44. Cement & non-metallic	0.93	1.71	0.73
45. Basic metal	9.61	0.92	6.30
46. Metal product	5.61	1.44	0.84
47. Agricultural machinery	0.46	0.10	0.01
48. Other machinery	12.28	0.79	0.55
49. Electrical equipments	6.99	0.98	3.43
50. Motor vehicles	6.74	2.60	0.13
52. Other manufacturing	4.37	1.79	4.13
59. Other services	0.11	21.59	0.00
60. Other sectors	3.64	3.03	1.93

Table 2. Ordinary Least Squares Results

SECTOR	NOBS	Elast	t_Elast	Restriction	t_Restriction	Intercept	t_Intercept	R-square (Adjusted)	DW
2. Maize	17	1.0694	5.14			-6.6707	-7.90	0.56	2.20
4. Soybean	17	2.1434	4.27			-9.3282	-5.32	0.70	1.89
6. Mungbean	15	1.6761	5.47			-11.2930	-10.82	0.64	1.86
8. Sorghum	11	-1.1816	-2.67			1.7817	1.38	0.38	1.80
9. Kenaf & jute	11	0.7804	0.63	4.3816	6.59	-6.0882	-1.59	0.81	1.83
10. Cotton	17	1.3960	4.56			1.0299	1.42	0.56	1.94
11. Vegetables & fruits	17	1.6296	8.74			-5.2506	-19.62	0.80	1.64
12. Coconut	17	1.7805	3.98	-2.7528	-2.40	-6.5894	-6.99	0.52	1.78
14. Coffee bean	12	5.5200	5.16			-12.0400	5.56	0.84	1.79
17. Other Crops	17	0.6954	3.56	-0.7046	-0.81	-2.0882	-5.61	0.98	1.94
18. Cattle & Buffalo	16	0.3798	2.51			-8.5239	-16.08	0.34	1.81
19. Swine	17	-0.3925	-0.90			-11.7390	-6.33	0.22	1.53
20. Poultry	17	0.2294	1.47			-3.8209	-24.18	0.20	1.42
21. Other livestock	17	1.0746	14.66			-0.8657	-2.12	0.95	1.47
22. Silk worm	15	1.3511	9.23			-5.9467	-13.51	0.81	1.85
24. Forestry	17	0.3643	2.00			-4.5511	-9.34	0.42	1.46
25. Ocean fishing	17	1.0962	11.44			-6.3223	-61.31	0.89	1.86
26. Inland fishing	17	2.2483	5.36			-10.8270	-14.74	0.63	2.17
27. Mining	17	0.1151	0.61			0.1846	0.69	0.46	2.01
28. Meat processing	17	1.6388	8.23			-4.2604	-9.17	0.93	1.62
29. Food processing	17	1.6171	11.64	6.4908	6.43	-1.6289	-6.83	0.99	1.73
30. Rice milling	12	1.1037	3.29	-2.9725	-1.11	-9.4016	-4.94	0.89	1.88
31. Sugar refinery	17	2.1040	2.91			0.0263	0.02	0.48	1.74
32. Animal feed	17	0.8626	13.86			0.2506	0.11	0.92	1.91
33. Beverage	17	0.8980	2.40			-2.8735	-10.00	0.43	1.85
34. Cigarettes	17	3.4621	6.60			-3.3677	-11.27	0.73	2.01
35. Spinning	17	0.0765	0.23			-2.4200	-4.27	0.35	1.62
36. Textiles & garment	17	1.4630	9.36			-2.0551	-6.22	0.95	1.62
37. Leather & footwear	17	1.0979	5.25			-3.2252	-15.07	0.62	2.16
38. Wood paper	17	0.9432	22.68			-0.7702	-19.68	0.97	1.86
39. Printing & publishing	17	1.0182	19.66			-1.8932	-12.93	0.96	1.64
40. Chemical	17	1.0339	39.27	-0.1676	-2.04	1.5188	30.49	0.99	1.94
41. Fertilizers & pesticides	17	1.0730	10.89	0.6367	3.34	2.7209	12.49	0.92	1.81
42. Petroleum refinery	17	0.2339	0.95			-0.0846	-0.82	-0.01	1.74
43. Rubber & plastic	17	1.2299	9.00			-0.8430	-8.31	0.85	2.04
44. Cement & non-metallic	17	0.5172	4.55	0.8832	5.02	-1.5034	-17.27	0.87	2.13
45. Basic metal	17	0.8888	5.24	0.4415	2.32	1.9621	4.33	0.71	1.80
46. Metal product	17	0.7604	53.71			0.3333	7.62	0.99	1.82
47. Agricultural machinery	17	0.7359	2.91			-0.8441	-0.56	0.33	1.94
48. Other machinery	17	1.2713	9.19			3.6853	3.74	0.77	1.95
49. Electrical equipments	17	0.9953	18.50			1.2067	4.69	0.96	2.08
50. Motor vehicles	17	0.5759	1.88			-1.9670	-1.12	0.36	2.10
52. Other manufacturing	17	0.9692	23.61			0.0350	0.07	0.96	2.06
59. Other services	17	0.8486	5.33			-6.0362	-11.81	0.94	1.62
60. Other sectors	17	0.5120	0.96			-0.2567	-0.85	0.09	1.65

Table [illegible] Partial Adjustment Model

SECTOR	NOBS	Elast	t_Elast	lag	t_lag	Restriction	t_Restriction	Intercept	t_Intercept	R-square (Adjusted)	DW
2. Maize	17	0.9734	7.82	-0.1289	-1.27			-8.2006	-5.78	0.77	1.95
4. Soybean	17	2.1605	3.8	-0.0472	-0.23			-9.8285	-4.14	0.68	1.94
6. Mungbean	15	1.7963	0.38	0.4341	2.43			-9.2389	-6.01	0.64	1.77
8. Sorghum	11	-1.2354	-2.36	0.2613	0.83			2.3357	1.59	0.38	2.3
9. Kenaf & jute	11	0.6492	0.34	0.0405	0.15	4.0249	3.28	-5.333	-0.82	0.7	1.59
10. Cotton	17	1.2087	2.91	0.3587	1.66			-0.0246	-0.0198	0.37	1.73
11. Vegetables & fruits	17	1.3067	5.99	-0.1229	-1.2			-5.1936	-13.57	0.82	1.24
12. Coconut	17	1.3121	2.79	-0.1495	-0.79			-6.5811	-3.9	0.51	1.82
14. Coffee bean	12	4.0619	3.13	0.652	2.53			-8.962	-3.52	0.86	2.25
17. Other Crops	17	0.761	4.1	-0.1075	-1.82	-0.8184	-1.02	-2.2546	-5.92	0.98	1.93
18. Cattle & Buffalo	17	0.3571	1.92	-0.2426	-1.01			-10.917	-4.3	0.2	1.97
19. Swine	16	-0.4621	-1.14	0.8115	3.95			-3.7988	-1.39	0.34	1.87
20. Poultry	17	0.2499	1.51	0.2619	1.06			-2.8299	-2.99	0.14	1.59
21. Other livestock	17	1.1138	10.62	0.1703	2.2			0.0472	0.12	0.92	1.23
22. Silk worm	15	1.4169	8.03	0.1086	0.9			-5.4683	-6.36	0.82	2.06
24. Forestry	17	-0.1537	-0.81	0.5085	2.12			-2.884	-2	0.27	1.46
25. Ocean fishing	17	1.0148	9.85	0.1632	1.96			-5.3049	-9.86	0.89	1.9
26. Inland fishing	17	2.1933	4.03	-0.0319	-0.17			-11.146	-5.52	0.56	2.19
27. Mining	17	0.3107	2.34	0.6002	3.18			0.0799	0.88	0.52	2.46
28. Meat processing	17	1.9308	12.15	0.3414	4.04			-3.6551	-11.52	0.96	2.32
29. Food processing	17	1.5456	12.03	0.041	2.26	5.9787	6.4	-1.55	-7.13	0.96	2.08
30. Rice milling	12	1.3895	8.54	-0.0209	-0.18			-11.9	-9.41	0.9	1.63
31. Sugar refinery	17	2.1082	2.8	-0.0152	-0.08			-0.0237	-0.01	0.43	1.72
32. Animal feed	17	0.8866	11.56	0.1123	1.24			-2.3079	-7.99	0.9	1.58
33. Beverage	17	1.0942	2.73	0.6364	3.26			-0.8516	-1.9	0.46	2.09
34. Cigarettes	17	3.7756	6.74	0.1588	0.91			-3.2957	-8.08	0.75	2.15
35. Spinning	17	0.4936	1.57	0.4392	2.36			-0.7212	-1.27	0.41	1.93
36. Textiles & garment	17	1.4626	8.9	0.0182	0.22			-1.9769	-4.22	0.95	1.66
37. Leather & footwear	17	0.9334	4.02	0.3798	2.31			-2.0551	-3.57	0.58	1.87
38. Wood paper	17	1.037	18.24	-0.1532	-2.76			-0.8939	-17.9	0.98	1.51
39. Printing & publishing	17	0.9988	20.68	0.094	1.55			-1.7378	-9.5	0.97	1.97
40. Chemical	17	1.0159	35.87	0.0464	1.54	-0.1534	-1.62	1.479	26.79	0.99	1.99
41. Fertilizers & pesticide	17	1.0204	9.28	0.0693	0.81	0.7492	3.29	2.4777	6.34	0.93	1.93
42. Petroleum refinery	17	-0.0279	-0.09	0.008	0.03			-0.1516	-1.38	-0.15	1.22
43. Rubber & plastic	17	1.2572	9.27	0.1794	2.15			-0.5444	-3.6	0.87	2.16
44. Cement & non-metallic	17	0.5076	3.63	0.0537	0.25	0.7348	2.17	-1.4273	-4.41	0.81	1.46
45. Basic metal	17	0.7601	3.23	0.3593	2.19	0.5508	2.32	0.7766	0.86	0.51	1.64
46. Metal product	17	0.7595	53.68	-0.0079	-0.0424			0.3175	7.05	0.99	2.07
47. Agricultural machinery	17	0.6041	2.03	-0.0796	-0.33			-2.0679	-0.92	0.19	1.5
48. Other machinery	17	1.0571	5.04	-0.0388	-0.25			1.9409	1.13	0.61	1.16
49. Electrical equipments	17	1.0021	18.21	0.0183	0.33			1.2872	4.74	0.96	2.34
50. Motor vehicles	17	0.6037	1.97	0.5584	2.93			1.0154	0.47	0.36	1.9
52. Other manufacturing	17	0.9354	30.7	-0.0178	-0.54			-0.6843	-1.38	0.98	2.01
59. Other services	17	0.8328	3.4	0.4599	2.32			-3.9385	-3.18	0.93	1.72
60. Other sectors	17	0.6742	1.01	0.0423	0.12			-0.1729	-0.41	-0.06	1.27

Table 4. Error Correction Model Results

SECTOR	NOBS	Elast	t_Elast	ECM	t_ECM	Restriction	t_Restriction	Intercept	t_Intercept	R-square (Adjusted)	DW
2. Maize	17	1.035	17.81	-1.2431	-8.2			-8.4001	-7.32	0.9	1.9
4. Soybean	17	2.2968	3.77	-0.055	-0.33			-0.37	-1.55	0.81	1.89
6. Mungbean	15	1.4487	5.36	-0.4824	-1.88			-0.0764	-0.24	0.7	1.94
8. Sorghum	11	-0.7599	-1.65	-1.0146	-2.61			0.0004	0.01	0.45	1.84
9. Kenaf & jute	11	1.4481	1.01	-1.0181	-4.28	4.1854	3.52	-6.6269	-3.95	0.67	1.8
10. Cotton	17	1.3431	4.75	-0.3813	-1.69			0.6863	1.61	0.64	1.78
11. Vegetables & fruits	17	1.581	9.22	-0.3746	-2.15			0.048	0.67	0.85	1.86
12. Coconut	17	1.3847	4.75	-1.3559	-6.81	-4.4455	-2.52	0.8209	0.58	0.69	1.56
14. Coffee bean	12	4.4296	3.07	-0.3692	-1.19			-0.549	-0.85	0.43	1.97
17. Other Crops	17	1.0038	22.19	-0.661	-3.79			0.0647	1.81	0.97	1.93
18. Cattle & Buffalo	16	0.39	3.03	-1.3664	-4.33			-0.0046	-0.015	0.7	1.86
19. Swine	17	-0.2364	-0.74	-0.2116	-0.97			0.0586	0.38	0.4	1.84
20. Poultry	17	0.906	5.09	-0.3209	-2.09			0.1532	2.56	0.73	1.85
21. Other livestock	17	1.065	15.54	-0.1778	-0.72			0.0832	0.93	0.94	1.95
22. Silk worm	15	1.2252	9.55	-0.574	-2.37			-3.6144	-2.39	0.9	2.03
24. Forestry	17	0.5278	2.39	-0.2735	-1.35			0.1217	1.02	0.41	1.88
25. Ocean fishing	17	0.9119	11.05	-0.753	-2.91			-4.8113	-2.94	0.89	1.92
26. Inland fishing	17	2.1633	4.25	-1.1	-4.05			-0.1092	-0.17	0.67	2.12
27. Mining	17	0.245	1.05	-0.3861	-1.65			0.0099	0.14	0.19	1.88
28. Meat processing	17	2.0554	15.45	-1.0595	-5.6			0.1153	0.63	0.9	2.19
29. Food processing	17	0.6768	28.71	-0.416	-1.81	-0.2561	-1.0591	0.0267	0.62	0.99	1.83
30. Rice milling	12	1.3325	7.49	-0.6685	-2.71			-7.5651	-2.68	0.89	1.65
31. Sugar refinery	17	2.1082	2.8	-1.0152	-5.19			-0.0237	-0.01	0.73	1.72
32. Animal feed	17	0.8482	12.36	-0.3742	-1.34			0.0784	0.8	0.91	2.05
33. Beverage	17	1.1979	3.56	-0.3029	-2.02			-0.8188	-1.9	0.48	2.19
34. Cigarettes	17	3.3542	9.31	-1.3504	-5.97			0.0231	0.19	0.81	1.84
35. Spinning	17	0.4744	1.77	-0.5676	-3.06			-0.6164	-3.03	0.33	1.91
36. Textiles & garment	17	1.4452	10.74	-0.1814	-1.16			-0.0368	-0.91	0.88	2.19
37. Leather & footwear	17	0.9248	4.3	-0.4279	-1.61			-0.0054	-0.06	0.65	1.67
38. Wood paper	17	1.1163	16.77	-0.8023	-3.24			-0.5964	-3.08	0.95	1.88
39. Printing & publishing	17	0.9796	23.54	-0.6284	-2.98			-0.0681	-0.8	0.97	2.16
40. Chemical	17	0.9825	38.2	-0.6684	-2.69			0.9724	2.69	0.99	2.07
41. Fertilizers & pesticides	17	0.9932	11.66	-0.7302	-3.51	0.6832	2.86	2.0849	3.41	0.91	2.38
42. Petroleum refinery	17	0.3742	1.22	-0.9502	-3.68			-0.0306	-0.29	0.46	1.32
43. Rubber & plastic	17	1.0298	8.03	-0.3854	-2.06			-0.3929	-2.1	0.9	1.92
44. Cement & non-metallic	17	0.713	4.8	-0.3034	-1.48			-0.0645	-0.71	0.6	2.23
45. Basic metal	17	0.866	5.69	-0.3185	-1.5	0.4191	2.04	0.561	1.58	0.7	2.08
46. Metal product	17	0.7603	76.33	-0.9857	-3.75			-0.0156	-0.35	0.99	2.09
47. Agricultural machinery	17	0.9176	3.7	-0.4813	-1.96			0.3549	1.72	0.36	1.78
48. Other machinery	17	1.2268	11.49	-0.944	-3.58			-0.0052	-0.0612	0.86	1.73
49. Electrical equipments	17	0.9883	22.15	-1.146	-4.63			1.3916	4.56	0.97	2.09
50. Motor vehicles	17	0.5399	2.07	-0.4441	-2.36			-0.0454	-0.87	0.4	1.83
52. Other manufacturing	17	0.9579	27.87	-0.6963	-3.41			-0.0751	-1.1	0.99	2
59. Other services	17	0.6737	2.74	0.0183	0.06			-0.1069	-1.46	0.51	2.26
60. Other sectors	17	1.9378	3.16	-0.5603	-1.62			0.2535	0.75	0.48	1.75

Table 5 Estimates of Armington Elasticities

SECTOR	NOBS	OLS	PAM	ECM
2. Maize	17	1.0694*	0.9734*	1.035*
4. Soybean	17	2.1434*	2.1605*	2.2968*
6. Mungbean	15	1.6761*	1.7963	1.4487*
8. Sorghum	11	-1.1816*	-1.2354*	-0.7599
9. Kenaf & jute	11	0.7804	0.6492	1.4481
10. Cotton	17	1.396*	1.2087*	1.3431*
11. Vegetables & fruits	17	1.6296*	1.3067*	1.581*
12. Coconut	17	1.7805*	1.3121*	1.3847*
14. Coffee bean	12	5.52*	4.0619*	4.4296*
17. Other Crops	17	0.6954*	0.761*	1.0038*
18. Cattle & Buffalo	16	0.3798*	0.3571	0.39*
19. Swine	17	-0.3925	-0.4621	-0.2364
20. Poultry	17	0.2294	0.2499	0.906*
21. Other livestock	17	1.0746*	1.1138*	1.065*
22. Silk worm	15	1.3511*	1.4169*	1.2252*
24. Forestry	17	0.3643*	-0.1537	0.5278*
25. Ocean fishing	17	1.0962*	1.0148*	0.9119*
26. Inland fishing	17	2.2483*	2.1933*	2.1633*
27. Mining	17	0.1151	0.3107*	0.245
28. Meat processing	17	1.6388*	1.9308*	2.0554*
29. Food processing	17	1.6171*	1.5456*	0.6768*
30. Rice milling	12	1.1037*	1.3895*	1.3325*
31. Sugar refinery	17	2.104*	2.1082*	2.1082*
32. Animal feed	17	0.8626*	0.8866*	0.8482*
33. Beverage	17	0.898*	1.0942*	1.1979*
34. Cigarettes	17	3.4621*	3.7756*	3.3542*
35. Spinning	17	0.0765	0.4936	0.4744
36. Textiles & garment	17	1.463*	1.4626*	1.4452*
37. Leather & footwear	17	1.0979*	0.9334*	0.9248*
38. Wood paper	17	0.9432*	1.037*	1.1163*
39. Printing & publishing	17	1.0182*	0.9988*	0.9796*
40. Chemical	17	1.0339*	1.0159*	0.9825*
41. Fertilizers & pesticides	17	1.073*	1.0204*	0.9932*
42. Petroleum refinery	17	0.2339	-0.0279	0.3742
43. Rubber & plastic	17	1.2299*	1.2572*	1.0298*
44. Cement & non-metallic	17	0.5172*	0.5076*	0.713*
45. Basic metal	17	0.8888*	0.7601*	0.866*
46. Metal product	17	0.7604*	0.7595*	0.7603*
47. Agricultural machinery	17	0.7359*	0.6041*	0.9176*
48. Other machinery	17	1.2713*	1.0571*	1.2268*
49. Electrical equipments	17	0.9953*	1.0021*	0.9883*
50. Motor vehicles	17	0.5759	0.6037*	0.5399*
52. Other manufacturing	17	0.9692*	0.9354*	0.9579*
59. Other services	17	0.8486*	0.8328*	0.6737*
60. Other sectors	17	0.5120	0.6742	1.9378*

Note: All statistics were tested at 5% level of significance.

CORRELATIONS		
OLS & PAM		0.96223
OLS & ECM		0.93096
PAM & ECM		0.92901

Table 6. Estimation of Transformation Elasticities

AGRICULTURE SECTORS													
I. OLS													
SECTOR	N	ELAS	T_ELAS	EXP CONTROL	T_EXP CONTROI	LAG OF PRICE	T_LAG OF PRIC	CONST	T_CONST	R_SQUARE	DW		
2. MAIZE	20	-0.9615	-1.584	0.2993	0.527			5.7296	1.7614	0.17	1.97		
3. CASSAVA	21	0.0592	0.0867			-0.0269	-0.0494	-1.3646	-1.6682	0.68	1.6		
4. SOYBEAN	21	-2.9518	-3.614					-3.9596	-1.5734	0.91	1.93		
5. GROUNDNUT	21	-1.8587	-3.3832					-2.9517	-4.5088	0.61	2		
8. SORGHUM	21	-0.0765	-0.1613	-3.5144	-4.575			1.0855	2.3937	0.53	2.35		
11. VEG & FRUITS													
12. COCONUT													
13. OIL PALM													
16. RUBBER													
18. CATTLE													
II. PAM													
SECTOR	N	ELAS	T_ELAS	X1	T_X1	EXP CONTROL	T_EXP CONTROI	LAG OF PRICE	T_LAG OF PRIC	CONST	T_CONST	R_SQUARE	DW
2. MAIZE	19	-1.0229	-1.6672	0.2693	1.1321	0.3979	0.8337			5.8059	1.7549	0.17	2.13
3. CASSAVA	20	-0.3319	-0.3953	0.8653	6.1616			-0.8906	-1.1742	0.7162	0.8825	0.7	2.08
4. SOYBEAN	20	-2.7708	-3.27	0.7271	6.7815					0.0734	0.1342	0.9	1.99
5. GROUNDNUT	20	-1.9236	-3.0656	0.0522	0.2582					-2.6695	-2.4465	0.58	1.92
8. SORGHUM	20	0.4374	0.7296	-0.0347	-0.1108					0.5717	0.8341	-0.091	1.84
11. VEG & FRUITS													
12. COCONUT													
13. OIL PALM													
16. RUBBER													
18. CATTLE													
III. ECM													
SECTOR	N	ELAS	T_ELAS	ECM	T_ECM	EXP CONTROL	T_EXP CONTROI	LAG OF PRICE	T_LAG OF PRIC	CONST	T_CONST	R_SQUARE	DW
2. MAIZE	19	-0.9777	-1.8086	-0.5133	-2.0642	0.4575	1.2557			-0.2384	-0.9218	0.35	2.09
3. CASSAVA	20	-0.5107	-0.6338	-0.2374	-0.843			-1.6483	-1.5553	1.1355	1.7265	0.04	1.79
4. SOYBEAN	20	-2.9081	-3.461	0.0187	0.0861					-0.2517	-1.2263	0.35	1.94
5. GROUNDNUT	20	-1.7784	-2.8445	-0.3559	-1.4048					0.0241	0.1012	0.36	1.91
8. SORGHUM	20	-0.4319	-0.4694	-0.8711	-2.8159	-3.8869	-2.3741			0.2571	0.6677	0.32	2.28
11. VEG & FRUITS													
12. COCONUT													
13. OIL PALM													
16. RUBBER													
18. CATTLE													

Table 6. Estimation of Transformation Elasticities (continued)

NON-AGRICULTURE SECTORS

I. OLS

SECTOR	N	ELAS	T_ELAS	EXP CNTRL	T_EXP CNTRL	LAG OF PRICES	T_LAG OF PRIC	CONST	T_CONST	R_SQUARE	DW
29. FOOF PROCESSING											
30. RICE MILLING	16	-0.4641	-0.8642			-0.6361	-1.6976	-15.014	-1.6009	0.33	2.11
31. SUGAR MILLING	19	-0.5728	-1.2647					-12.815	-14.541	0.63	2.12
32. ANIMAL FEEDS	11	-1.7291	-2.4422	-0.3891	-1.5015			2.5645	5.5055	0.45	1.95
36. TEXTILES	17	-0.9469	-3.034	3.02	5.5526			-3.9211	-10.321	0.72	1.7
37. LEATHER											
43. RUBBER & PLASTIC	17	-1.5579	-2.4796					4.1512	6.05	0.36	1.97

II. PAM

SECTOR	N	ELAS	T_ELAS	X1	T_X1	EXP CNTRL	T_EXP CNTRL	CONST	T_CONST	R_SQUARE	DW
29. FOOF PROCESSING											
30. RICE MILLING	17	-0.4341	-0.9597	0.5701	2.4947			-6.0093	-1.0724	0.25	1.91
31. SUGAR MILLING	18	0.3277	1.38	0.5196	4.49			-6.1147	-4.04	0.65	2.32
32. ANIMAL FEEDS	10	-1.9375	-1.9043	-0.6169	-0.6267	-0.4585	-2.1145	3.5194	3.1751	0.63	1.88
36. TEXTILES	16	-0.9643	-2.9965	0.1463	0.9294			-0.6175	-1.439	0.35	1.77
37. LEATHER											
43. RUBBER & PLASTIC	16	-1.8871	-2.6849	0.237	1.0004			3.8634	4.6269	0.34	1.88

III. ECM

SECTOR	N	ELAS	T_ELAS	ECM	T_ECM	EXP CNTRL	T_EXP CNTRL	LAG OF PRICES	T_LAG OF PRIC	CONST	T_CONST	R_SQUARE	DW
29. FOOF PROCESSING													
30. RICE MILLING	16	-0.5858	-1.7908	-0.6052	-3.3965			-0.8089	-2.9908	-9.8012	-2.9555	0.6	2.09
31. SUGAR MILLING	18	-0.753	-3.5487	-0.4316	-4.4968					0.1383	3.8703	0.63	2.02
32. ANIMAL FEEDS	10	-2.766	-5.2509	-0.8097	-4.215					-0.1665	-3.4012	0.87	1.82
36. TEXTILES	16	-1.2653	-3.8543	-0.5762	-1.4516			-0.2596	-0.9226	0.2704	1.1284	0.37	1.71
37. LEATHER													
43. RUBBER & PLASTIC	16	-1.4808	-3.4977	-0.7228	-3.6383					-0.0264	-0.1612	0.55	2.07

Table 7. Significance Test for Export Transformaion Elasticities

	t-value	signif prob
1. MAIZE	-1.8086	0.0906
2. CASSAVA	-0.3953	0.6982
3. SOYBEAN	-3.2714	0.0045
4. GROUNDNUT	-3.3832	0.0031
5. RICE MILLING	-1.7908	0.0986
6. SUGAR REFINERY	-3.5487	0.0029
7. ANIMAL FEEDS	-5.2509	0.0012
8. TEXTILES	-3.0340	0.0089
9. RUBBER, PLASTIC	-3.7955	0.0022

Notes: The table reports a test of the hypothesis that the inverse of the export transformation elasticity is zero (elasticity of transformation is near infinity).

Decision rule: At 5% level of significance, reject hypothesis if signif prob < 0.05.