The J-Curve at Industry Level: Evidence from Malaysia-China Trade

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Abstract

To investigate the response of real depreciation of ringgit on trade balance of Malaysia, researchers either employed trade data between Malaysia and the rest of the world or between Malaysia and each of her trading partners. Nevertheless, these studies did not provide a conclusive evidence of the effects of currency depreciation on the trade balance, particularly in the case of Malaysia with China. This paper considers 53 industries and investigates the short-run (J-curve pattern) and the long-run effects of the real depreciation of ringgit/yuan on the trade balance of each industry. We use quarterly data over the period of 1993Q1- 2009Q4. The results from bounds testing approach and error-correction modelling indicate that whilst depreciation of ringgit has short-run significant effects on the trade balance in majority of the industries, the short-run effects translate into the favorable long-run effects only in 11 of the 53 industries. The results also reveal that J-Curve phenomenon exists only in 10 industries.

Keywords: J-curve, Bounds testing approach, Industry data, Malaysia-China

JEL Classification: F31, F14, F32

1. Introduction

After the advent of the floating exchange rate system in 1973, governments have tried to manage the effects of exchange rate uncertainty on macroeconomic variables by implementing suitable monetary policies. Some important variables influenced by the exchange rate are inflation, trade flows, foreign direct investment and capital flows, international reserve and remittance of an economy. In small open economies, specifically in emerging economies, the effect of exchange rate fluctuations on trade balance is an important issue as it has a significant effect on the economic growth. However, according to international economic theories a small open economy can improves its trade balance by depreciating her currency. Since experience with currency depreciation has been different between countries, researchers have tried to develop theoretical models that are sensitive to their underlying assumptions.

In recent years, there is a surge in the number of empirical studies to assess the impact of currency depreciation on the trade balance. Earlier studies have followed the indirect approach, Marshall–Lerner condition (ML, hereafter) by estimating price elasticities of imports and exports to induct the effects of devaluation on the trade balance. In an attempt to distinguish the short-run response of currency depreciation from its long-run response on trade balance, researchers moved away from the traditional way, ML condition which is considered as a long-run condition, and tried to formulate a model which relates the trade balance to the exchange rate directly along with other variables. Indeed, this occurred when researchers tried to assess the validity of the J-curve hypothesis.

The J-curve phenomenon which was introduced by Magee (1973) describes that in the short-run the effect on the trade balance of a devaluation or currency depreciation is due to time lags in the adjustment process; it first deteriorates the trade balance and then improves it later, resembling a J-curve pattern. Initially, due to the price effect, the increased value of imports would dominate the increased volume of exports but in the long-run gradually the volume effect takes over and outweighs the effect of price resulting in an improvement in balance of trade.

The common characteristics among related studies to the J-curve phenomenon could be classified into two groups. The first group employs aggregate trade data. Empirical studies such as Karunaratne (1988), Bahmani-Oskooee and Alse (1994) and Demirden and Pastine (1995) used aggregate data and provided mixed results. The aggregation approach was criticized by Rose and Yellen (1989). They employed bilateral trade data between the United States (US) and her six major trading partners and argued that the results from aggregation approach could suffer from aggregation bias. To avoid the aggregation bias problem studies in the second category relied upon disaggregated trade data between one country and each of her trading partners separately at the bilateral level. (Note1) Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Hegerty (2010) provided a comprehensive review of the literature and covered both groups of studies. Since this paper is about Malaysia, we will concentrate on the literature that have tested the J-curve phenomenon on Malaysia.

Bahmani-Oskooee and Alse (1994) tested the J-curve phenomenon by employing cointegration and error-correction modelling on two groups of countries (19 developed and 22 less developed countries) including Malaysia. Lal and Lowinger (2002) also included Malaysia in their study. The results show that only in the study by Lal and Lowinger (2002) that there is a long-run impact of real effective exchange rate on the trade balance in the case of Malaysia. Since, both studies used aggregate data they suffer from the aggregation bias problem. To account for this deficiency, Baharumshah (2001) and Onafowora (2003) relied on a cointegrating vector error correction model (VECM) and disaggregated data at a bilateral level. Contrary to Baharumshah (2001) who found no J-curve effect of the bilateral trade balances of Malaysia and Thailand with the US and Japan, Onafowora (2003) supported the J-curve effect for Malaysia's trade balance with Japan and the US. Wilson (2001) also used disaggregated data to examine the relationship between real exchange rate and real trade balance for bilateral trade between Singapore, Korea, and Malaysia with the US and Japan. Employing general Autoregressive Distributed Lag model, he found no persuasive evidence for J-curve in the case of Malaysia.

Recent empirical studies have employed Autoregressive Distributed Lag (ARDL) approach to cointegration analysis which was introduced by Pesaran et al. (2001). Bahmani-Oskooee and Cheema (2009) and Bahmani-Oskooee and Harvey (2009) included Malaysia as one of their major trading partners. In order to investigate the short-run and long-run effects of currency depreciation on trade balance, both studies used bilateral disaggregated data and bounds testing approach to cointegration. While Bahmani-Oskooee and Harvey (2009) reported the existence of the J-curve phenomena, Bahmani-Oskooee and Cheema (2009) showed that the real depreciation of the Pakistani rupee against Malaysian ringgit had no short-run (J-curve) and long-run effects on Pakistan-Malaysia bilateral trade balance. Bahmani-Oskooee and Harvey (2010) also applied bounds testing approach to cointegration and error-correction modelling and used bilateral disaggregated data. They examined the short-run and long-run effects of currency devaluation on trade balance with her 14 largest trading partners (including China). The results showed that J-curve emerges only in the case of Malaysia versus Germany.

Concentrating on Malaysia and China trade, the number of studies that examine the impact of currency depreciation on trade balance is limited. In addition, there is not much support for a successful depreciation or devaluation on bilateral trade between the two countries. This may be due to the lack of significant relation between Malaysia-China bilateral trade balance and the real depreciation ringgit/yuan in a number of industries but not all industries. To identify which industries respond to currency depreciation, in this paper we disaggregated the trade data between Malaysia and China by industries. More precisely, we considered 53 industries and tried to assess the short-run and the long-run effects of the real depreciation of ringgit/yuan on the trade balance of each industry over the period of 1993Q1- 2009Q4. The rest of the article is organized as follows: Section 2 introduces the models and the estimation method. Empirical results are presented in Section 3 and a summary and conclusion are given in Section 4. Data definitions and sources are cited in the Appendix.

2. The model and the method

The trade balance model employed in this paper is adopted from Bahmani-Oskooee and Bolhasani (2008). The long-run model takes the following form:

$$\ln TB_{i,t} = \alpha + \beta \ln Y_{M,t} + \gamma \ln Y_{C,t} + \varphi \ln REX_{i,t} + \upsilon_t \quad (1)$$

where TB_i is a measure of the trade balance of commodity i defined as the ratio of Malaysia's exports of commodity i to China over her imports of the same commodity from China. Y_M is the real income of Malaysia and since an increase in Malaysian economy growth is expected to increase Malaysia's imports of commodity i, an estimate of β is expected to be negative. In the same way, an estimate of γ is expected to be positive if an increase in the real income of China denoted by Y_C encourages an increase in Malaysia's export of commodity i to China. However, if the increase in real income is due to an increase in production of import substitute goods, the coefficient of real income of Malaysia could be positive and the coefficient of real income of China could be negative (Bahmani-Oskooee, 1986). Finally, REX is the real ringgit-yuan rate and as indicated in the Appendix, it is defined in a way that an increase reflects an appreciation of the yuan or a depreciation of ringgit. If real depreciation of ringgit is to increase the Malaysia's export of commodity i, hence improve the trade balance of industry i, an estimate of φ is expected to be positive. The equation (1) basically estimates the long-run relationship among the variables. In order to infer the J-curve effect which occurs in the short-run, it is necessary to include the short-run dynamics into equation (1). To this end, following Pesaran et al. (2001) we express equation (1) in an error-correction modelling format as in equation (2):

$$\Delta \ln TB_{i,t} = \alpha + \sum_{k=1}^{n_1} \eta_k \Delta \ln TB_{i,t-k} + \sum_{k=0}^{n_2} \beta_k \Delta \ln Y_{M,t-k} + \sum_{k=0}^{n_3} \gamma_k \Delta \ln Y_{C,t-k} + \sum_{k=0}^{n_4} \varphi_k \Delta \ln REX_{i,t-k} + \delta_1 \ln TB_{i,t-1} + \delta_2 \ln Y_{M,t-1} + \delta_3 \ln Y_{C,t-1} + \delta_4 \ln REX_{i,t-1} + \upsilon_{i,t} \quad (2)$$

The error correction model (2) without lagged level variables is a standard VAR model. The model includes linear combination of lagged level variables as a proxy for lagged error-correction term. This specification provides a direct way to test cointegration among the variables of equation (1). Lagged level variables in equation (2) imply cointegration between variables. To justify retention of lagged level variables in the ARDL model, Pesaran et al. (2001) proposed using the standard *F*-test to determine joint significance of lagged level variables with new critical values. They tabulated the critical values for lower and upper bounds. The lower bound critical values assumes that all the variables are integrated of order zero, I(0), while the upper bound critical values assumes that all the variables are integrated of order one, I(1). Therefore, if the computed *F* statistic is higher than the upper-bound critical value the null hypothesis of no cointegration is rejected. According to the ARDL procedures, it is apparent that examining the non-stationarity property (unit-root test) is not necessary. While this is the main advantage of this approach over alternative cointegration methods, the other two strong points of the bounds testing approach are; avoiding failure to test hypothesis on the estimated coefficients in the long-run due to endogeneity problems in the Engle and Granger (1987) method and assessing the short-run as well as the long-run effects of the independent variables on the dependent variable at the same time. Specifically, the short and long-run effects of currency depreciation in equation (2) are inferred by the sign and significance of φ_k and the size of δ_4 which is normalized on δ_1 respectively.

3. Empirical results

Quarterly data over the period 1993Q1–2009Q4 were used to estimate the basic model outlined by equation (2) for the trade balance of 53 industries between Malaysia and China. Data definition and sources of variables are provided in the Appendix. To follow the procedure of ARDL bounds test, we set different order of lags for the variables of equation (2) because evidence of previous research reveals that the results of the F-test are sensitive to the lag imposed on each of the first differenced variable. (Note 2) We confirm this by imposing 2 lags on all first differenced variables and then changing the order of lags to 4, 6, 8 and 10. The results are as reported in Table 1 along with the critical values at the bottom of the table.

The results indicate that F-test is sensitive to the lag lengths. Moving from 2 lags to 10 lags, given the upper bound critical value of 3.52 the number of significant industries drops from 28 to 10. The evidence of no cointegration in most of the industries was attributed to the fact that the same numbers of lags were imposed on each of the first-differenced variable arbitrarily (Bahmani-Oskooee & Kantipong, 2001). Following Bahmani-Oskooee and Gelan (2006) we estimate equation (2) by imposing a maximum of eight lags on each first differenced variable and using Akaike's Information Criterion (AIC) to select the optimum lags. F-test results and number of optimal lags for the models are presented in Table 2. As can be seen from the results we gather that the F statistic is greater than its upper bound critical value of 3.52 in 32 industries.

Insert Table 1 Here

Insert Table 2 Here

We then proceed with the short and long-run results. For brevity, we report only the short-run effects of the real exchange rate in Table 3. From the short-run coefficient estimates there are a total of 46 industries with at least one significant short-run coefficient at the 5% level of significance for the real exchange rate variable, implying that the real depreciation of ringgit has short-run effects in most of the industries. (Note 3) These short-run effects subscribe to the traditional definition of the J-curve in 9 industries where initially the real exchange rate coefficients are negative but revert to positive subsequently. These industries are coded 48, 621, 651, 653, 743, 745, 762, 785 and

931. However, following Rose and Yellen (1989) we rely on the new definition of the J-curve and define it as a negative short-run effect combined with a positive long-run effect. From the long-run estimates in Table 4, we gather that the real exchange rate carries a positive and significant coefficient in 11 industries. In 10 out of these 11 industries that are coded 513, 582, 652, 744, 747, 749, 764, 874, 881 and 899 there is at least one negative short-run coefficient attached to the exchange rate. Comparing with old definition of the J-curve, the newer ones receive more support. So, using disaggregated trade data by industries we are able to identify at least 11 industries which benefited from real depreciation of the ringgit. The majority of these 11 industries are durable goods and this is in line with Burda and Gerlach (1992) who argued that durable goods are relatively more sensitive to exchange rate changes than nondurable goods. Also among all the 11 industries there is only one large industry, telecommunications equipment (5.25%) based on its share in Malaysia-China total trade in 2009. (Note 4) Concentrating on the long-run results, it is clear that the real exchange rate carries a significant coefficient in 18 industries. From Table 4, it also appears that the income coefficient for Malaysia is significant in 15 industries while for China it is significant in 16 industries.

Insert Table 3 Here

Insert Table 4 Here

Reported in Table 5 are lagged error-correction model ECMt-1 and other diagnostic statistics. First, following Kremers et al. (1992) who argued that the significant ECMt-1 is a more efficient way of establishing cointegration, concentrating on those industries in which the cointegration is not supported by the F-test, there is a strong support of cointegration in almost all cases based on a negative and significant coefficient obtained for ECMt-1. Second, the Lagrange Multiplier (LM) statistic which tests for serial correlation and has a $\chi 2$ distribution with four degree of freedom is also reported in Table 5. Given the critical value of 9.49, it is clear that the residuals in most optimum models are autocorrelation free. Third, the misspecification is checked by the Ramsey's RESET test which is also distributed as $\chi 2$ with one degree of freedom. Since in majority of industries the RESET statistic is less than its critical value of 3.84, most optimal models are correctly specified. Fourth, to establish the stability of short and long-run coefficient estimates we apply the CUSUM and CUSUMSQ tests for the residuals of each optimal model (Bahmani-Oskooee & Bolhasani 2008). Stable coefficients are identified by ''S'' and unstable ones by ''U''. Even though, all the industries have experience the shift from fixed to floating exchange rate on July 21, 2005, most of the estimated models are stable except for 8 industries (coded 582, 634, 642, 652, 663, 724, 742 and 752). Finally, the size of the adjusted R squared indicates an appropriate fit in most models.

Insert Table 5 Here

4. Summary and conclusion

Economic theory suggests that a small economy can expect to eliminate its deficit of trade balance by devaluating her currency. To this end, a few studies tried to investigate the effects of real depreciation on trade balance in a small open economy like Malaysia. Previous studies that tested the short-run and the long-run effects of real depreciation of ringgit on trade balance of Malaysia, employed trade data either between Malaysia and the rest of the world or between Malaysia and each of her trading partners. Nevertheless, most of these studies found no significant effect in the short and long-run particularly in the case of Malaysia-China.

The lack of a significant relationship between two variables could be due to aggregation bias. In order to eliminate this problem, in this study, we considered 53 industries and tried to investigate the short-run (J-curve pattern) and the long-run effects of the real depreciation of ringgit/yuan on the trade balance of each industry. We use quarterly import and export data over the period of 1993Q1- 2009Q4 and the bounds testing approach to cointegration and error-correction modelling. The empirical results indicate that whilst depreciation of ringgit has short-run significant effects on the trade balance in majority of the industries, the short-run effects translate into the favorable long-run effects only in 11 of the 53 industries. Furthermore, among these 11 industries most of them are durable goods producers which support Burda and Gerlach (1992) findings, who argued that durable goods are relatively more sensitive to exchange rate changes than nondurable goods. There is only one large industry, telecommunications equipment (5.25%) based on its share in Malaysian-China total trade in 2009. Finally, the results reveal the existence of J-Curve phenomenon in only 10 industries.

Appendix

Data Definition and Sources

Quarterly data over the 1993Q1- 2009Q4 period are used to carry out the empirical analysis.

The data are obtained from the following sources:

a) Department of Statistics, Malaysia.
b) *International Financial Statistics*, International Monetary Fund (IMF).
c) National Bureau of Statistics of China.
d) Organization for Economic Co-operation and Development.

TB_i It is a measure of the trade balance of commodity i defined as the ratio of Malaysia's exports of commodity i to China over her imports of the same commodity from China. The exports and imports data in terms of Malaysian ringgit are from source (a).

Y_M The real GDP of Malaysia, from source (b).

Y_C The real GDP of China, nominal GDP is deflated by CPI, from source (c).

REX_i Real bilateral exchange rate defined as $(P_C * NEX_i)/P_M$, where NEX is the nominal bilateral exchange rate (end of period) defined as the number of Malaysian ringgit per China's yuan (from source b). P_C is the China's price level measured by CPI (from source d) and P_M is the Malaysia's price level, also measured by CPI, from source (b).

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Notes

Note 1. The recent examples of the J-curve studies include Arora et al. (2003), Bahmani-Oskooee et al. (2005), Bahmani-Oskooee and Ardalani (2007), Bahmani-Oskooee and Bolhasani (2008), Halicioglu (2008), Bahmani-Oskooee and Wang (2008), and Bahmani-Oskooee and Hajilee (2009)

Note 2. See Bahmani-Oskooee and Brooks(1999) and Bahmani-Oskooee and Ardalani (2007)

Note 3. Industries 554, 785 and 881 are significant at the 10% level

Note 4. Trade share is calculated for each of 53 industries as sum of exports and imports by that industry as a percentage of total trade in 2009. Trade share of each industry is reported in the last column of Table 5.

Table 1. The results of *F*-test for cointegration among the variables for trade balance models.

Code	Industry name	Lag 2	Lag4	Lag6	Lag8	Lag10
048	Cereal preparations and preparation of flour or starch of fruits or vegetables	2.93	2.67	5.39	0.847	3.71
512	Alcohols, phenols, phenol- alcohols, and their derivatives	5.23	2.86	1.42	0.47	1.33
513	Carboxylic acids, anhydrides, halides, peroxides and peroxyacids and derivatives	2.65	7.04	3.93	0.99	3.03
533	Pigments, paints, varnishes and related materials	2.59	0.29	1.17	1.52	1.99
554	Soap, cleansing and polishing preparations	5.53	1.46	4.11	2.2	1.57
575	Other plastics, in primary forms	2.74	2.97	3.25	1.74	6.67
582	Plates, sheets, film, coil and strip of plastics	5.30	5.09	2.79	3.42	1.36
592	Starches, inulin and wheat gluten; albuminoidal substances; glues	4.40	3.30	4.80	4.35	4.46
598	Miscellaneous chemical products, n.e.s.	3.74	3.25	12.19	6.45	10.34
621	Materials of rubber	2.76	5.77	4.37	3.51	1.8
629	Articles of rubber, n.e.s	3.79	1.86	1.28	2.79	1.47
634	Veneers, plywood, particle board, and other wood, worked, n.e.s.	1.24	1.34	5.34	4.46	4.24
641	Paper and paperboard	3.47	2.04	0.63	1.02	1.41
642	Paper and paperboard, cut to size or shape, and articles of paper or paperboard	3.93	1.62	0.9	1.56	2.84
651	Textile yarn	5.20	0.52	0.45	0.98	0.2
652	Cotton fabrics, woven (not including narrow or special fabrics)	1.53	3.96	3.66	2.36	1.2
653	Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)	5.55	2.79	2.13	0.64	1.37
663	Mineral manufactures, n.e.s.	3.77	0.99	1.23	1.70	2.24
676	Iron and steel bars, rods, angles, shapes and sections (including sheet piling)	4.93	2.13	1.19	1.51	1.87
682	Copper (including alloys)	4.85	6.3	3.53	4.2	2.51
694	Nails, screws, nuts, bolts, rivets and the like, of iron, steel,copper or aluminium	1.47	2.52	2.69	7.25	2.54
699	Manufactures of base metal, n.e.s.	4.25	6.33	1.82	1.02	2.68
716	Rotating electric plant and parts thereof, n.e.s.	7.55	5.12	2.57	2.47	2.82
724	Textile and leather machinery, and parts thereof, n.e.s.	3.2	3.51	2.35	2.08	0.83
727	Food-processing machines(excluding domestic)	2.70	2.44	2.34	1.81	2.13
728	Other machinery and equipment specialized for particular industries, and parts thereof, n.e.s.	2.32	1.6	2.19	4.71	3.06
741	Heating and cooling equipment and parts thereof, n.e.s.	3.52	3.24	4.73	4.79	3.93
742	Pumps for liquids, liquid elevators and parts	5.25	4.33	2.79	1.29	1.41
743	Pumps (other than pumps for liquids) and compressors and fans; centrifuges; filtering or purifying apparatus;	3.93	1.97	1.88	1.33	0.61
744	Mechanical handling equipment, and parts thereof, n.e.s.	2.44	1.87	1.22	1.24	1.51
745	Other non-electrical machinery, tools and mechanical apparatus, and parts thereof, n.e.s.	4.94	6.25	4.54	2.83	1.33
747	Taps, cocks, valves and similar appliances	2.97	2.62	5.6	3.4	4.99
749	Non-electric parts and accessories of machinery, n.e.s.	8.03	4.57	2.12	1.12	4.19
752	Automatic data processing machines and units thereof	2.15	0.72	0.38	0.79	1.05
759	Parts and accessories for use within groups 751 and 752	1.68	2.37	1.55	1.06	4.29
762	Radio-broadcast receivers with sound recorders or reproducers	3.29	3.86	1.71	3.11	1.86
764	Telecommunications equipments, n.e.s.; their parts, and accessories used in division 76	9.12	4.42	2.53	4.82	1.50
772	Electrical apparatus, resistor, other than heating resistors; printed circuits; swithboard and control panels	3.02	2.28	1.08	0.83	1.49
775	Household type, electrical and non-electrical equipment, n.e.s.	6.7	1.93	1.57	2.45	1.56
776	Thermionic valves and tubes; photocells; etc.,and parts thereof, n.e.s.	6.94	2.6	3.21	5.18	1.95
778	Electrical machinery and apparatus, n.e.s.	5.74	1.79	2.45	1.43	4.24
785	Motorcycles, and cycles, motorized and non-motorized; invalid carriages	7.58	3.95	3.75	5.09	9.28
813	lighting fixtures and fittings, n.e.s.	6.75	3.26	3.28	1.27	1.69
821	Furniture and parts thereof	1.92	3.96	2.64	2.32	1.85
848	Accessories of other than textile fabrics, headgear of all materials	3.98	9.50	5.49	4.62	1.03
874	Measuring, checking,analysing and controlling instruments and apparatus n.e.s.	4.58	3.70	2.24	2.79	2.49
881	Photographic apparatus and equipment, n.e.s.	1.95	3.10	2.46	2.31	1.26
892	Printed matter	4.81	2.52	0.73	1.53	0.78
893	Articles, nes of plastics	2.82	1.71	1.07	0.62	0.67
894	Baby carriages, toys, games and sporting goods	2.33	4.00	1.62	2.46	3.25
898	Musical instruments and parts and accessories thereof	3.27	1.55	2.11	0.66	3.16
899	Miscellaneous manufactured articles, n.e.s.	5.74	1.92	1.73	0.79	2.9
931	Special transactions and commodities	3.21	1.86	1.77	0.41	0.39

The upper bound critical value of the *F*-test for cointegration is 3.52 at the 10% level of significance (Pesaran et al., 2001, Table CI, p. 300). The term n.e.s. means not elsewhere specified.

Table 2. The results of the F-test when lags are selected by the AIC

Industry name	optimal lag[a]	F-stat.	Industry name	optimal lag	F-stat.
048. Cereal preparations and preparation of flour or starch of fruits or vegetables	(4,5,1,8)	1.72	742. Pumps for liquids, liquid elevators and parts	(0,0,0,0)	11.17
512. Alcohols, phenols, phenol- alcohols, and their derivatives	(6,0,0,7)	0.91	743. Pumps (other than pumps for liquids) and compressors and fans; Centrifuges; filtering or purifying apparatus;	(7,0,0,8)	2.23
513. Carboxylic acids, anhydrides, halides, peroxides and peroxyacids and derivatives	(6,6,4,6)	4.66	744. Mechanical handling equipment, and parts thereof, n.e.s.	(1,0,0,3)	2.59
533. Pigments, paints, varnishes and related materials	(5,5,0,0)	4.98	745. Other non-electrical machinery, tools and mechanical apparatus, and parts thereof, n.e.s.	(8,0,1,2)	5.01
554. Soap, cleansing and polishing preparations	(8,7,7,7)	2.48	747. Taps, cocks, valves and similar appliances	(4,2,0,8)	6.76
575. Other plastics, in primary forms	(6,8,8,8)	1.91	749. Non-electric parts and accessories of machinery, n.e.s.	(4,8,2,0)	4.54
582. Plates, sheets, film, coil and strip of plastics	(7,8,3,0)	4.52	752. Automatic data processing machines and units thereof	(5,5,0,8)	1.71
592. Starches, inulin and wheat gluten; albuminoidal substances; glues	(7,8,8,7)	3.73	759. Parts and accessories for use within groups 751 and 752	(7,2,0,8)	2.36
598. Miscellaneous chemical products, n.e.s.	(6,8,8,7)	6.6	762. Radio-broadcast receivers with sound recorders or reproducers	(1,0,0,2)	5.90
621. Materials of rubber	(0,1,2,8)	8.62	764. Telecommunications equipments, n.e.s.; their parts	(2,4,0,4)	7.69
629. Articles of rubber, n.e.s	(8,8,7,4)	2.36	772. Electrical apparatus, resistor, other than heating resistors; printed circuits; swithboard and control panels	(1,0,0,0)	3.05
634. Veneers, plywood, particle board, and other wood, worked, n.e.s.	(3,8,5,8)	6.43	775. Household type, electrical and non-electrical equipment, n.e.s.	(8,2,3,2)	2.41
641. Paper and paperboard	(3,8,0,5)	1.56	776. Thermionic valves and tubes; photocells; etc.,and parts thereof, n.e.s.	(1,7,8,5)	6.89
642. Paper and paperboard, cut to size or shape, and articles of paper or paperboard	(0,2,1,0)	13.36	778. Electrical machinery and apparatus, n.e.s.	(7,8,8,7)	1.75
651. Textile yarn	(1,8,0,3)	1.12	785. Motorcycles, and cycles, motorized and non-motorized	(3,8,8,5)	7.58
652. Cotton fabrics, woven (not including narrow or special fabrics)	(0,8,5,7)	6.06	813. Lighting fixtures and fittings, n.e.s.	(1,2,6,3)	4.19
653. Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)	(1,2,5,5)	4.99	821. Furniture and parts thereof	(2,6,8,8)	3.67
663. Mineral manufactures, n.e.s.	(7,4,7,7)	1.46	848. Accessories of other than textile fabrics, headgear of all materials	(8,1,6,3)	7.65
676. Iron and steel bars, rods, angles, shapes and sections (including sheet piling)	(1,0,4,0)	3.36	874. Measuring, checking,analysing and controlling instruments and apparatus n.e.s.	(6,8,7,5)	4.02
682. Copper (including alloys)	(5,5,4,2)	3.24	881. Photographic apparatus and equipment, n.e.s.	(2,0,0,4)	4.11
694. Nails, screws, nuts, bolts, rivets and the like, of iron, steel, copper or aluminium	(3,8,5,7)	7.18	892. Printed matter	(0,0,0,7)	10.07
699. Manufactures of base metal, n.e.s.	(0,8,2,1)	5.57	893. Articles, nes of plastics	(1,1,0,2)	3.62
716. Rotating electric plant and parts thereof, n.e.s.	(0,5,6,2)	7.19	894. Baby carriages, toys, games and sporting goods	(1,0,3,4)	5.71
724. Textile and leather machinery, and parts thereof, n.e.s.	(6,4,0,8)	3.00	898. Musical instruments and parts and accessories thereof	(1,0,1,0)	3.35
727. Food-processing machines(excluding domestic)	(1,0,2,0)	4.23	899. Miscellaneous manufactured articles, n.e.s.	(1,0,0,0)	6.35
728. Other machinery and equipment specialized for particular industries,	(2,1,0,0)	2.73	931. Special transactions and commodities	(5,6,8,6)	1.32
741. Heating and cooling equipment and parts thereof, n.e.s.	(4,8,7,8)	5.52			

[a] Numbers in the parenthesis are the selected lags using AIC for $\Delta \ln TB$, $\Delta \ln Y_M$, $\Delta \ln Y_C$ and $\Delta \ln REX$ .respectively. The term n.e.s. means not elsewhere specified.

Table 3. Short-run Coefficient Estimates

Industry name	$\Delta lnREX_t$	$\Delta lnREX_{t-1}$	$\Delta lnREX_{t-2}$	$\Delta lnREX_{t-3}$	$\Delta lnREX_{t-4}$	$\Delta lnREX_{t-5}$	$\Delta lnREX_{t-6}$	$\Delta lnREX_{t-7}$
048. Cereal preparations and preparation of flour or starch of fruits or vegetables	-5.67(-2.36)	9.48(3.34)	13.69(4.96)	8.07(2.56)	4.13(1.36)	10.25(3.62)	8.07(2.98)	4.74(2.37)
512. Alcohols, phenols, phenol- alcohols, and their derivatives	1.72(0.69)	1.4(0.52)	2.26(0.85)	-0.57(-0.23)	2.99(1.63)	-1.54(-0.82)	5.46(2.96)	
513. Carboxylic acids, anhydrides, halides, peroxides and peroxyacids and derivatives	14.86(3.66)	-4.51(-1.22)	-5.03(-1.41)	-5.48(-1.46)	-7.3(-2.82)	-6.00 (-2.73)		
533. Pigments, paints, varnishes and related materials	-0.55(-0.56)							
554. Soap, cleansing and polishing preparations	-1.37(-0.45)	0.2(0.06)	-3.41(-1.19)	1.33(0.48)	4.59(1.59)	-3.1(-1.08)	4.94(1.69)	
575. Other plastics, in primary forms	-1.1(-0.45)	0.27(0.1)	-2.06(-0.76)	-2.13(-0.73)	-0.16(-0.05)	4.27(1.46)	2.63(1.03)	8.99(3.45)
582. Plates, sheets, film, coil and strip of plastics	4.82(3.76)							
592. Starches, inulin and wheat gluten; albuminoidal substances; glues	-10.57(-4.07)	2.77(0.97)	5.16(1.83)	9.10(3.2)	1.2(.43)	-1.83(-0.67)	7.90(2.63)	
598. Miscellaneous chemical products, n.e.s.	1.52(0.77)	5.1(2.24)	4.56(2.09)	-3.16(-1.62)	-2.8(-1.24)	-4.49(-2.02)	-2.32(-1.06)	
621. Materials of rubber	-4.70(-2.4)	8.01(3.85)	8.63(4.52)	9.37(5.48)	5.39(4.01)	2.36(1.79)	2.77(2.17)	2.67(2.11)
629. Articles of rubber, n.e.s	4.56(1.28)	2.9(0.69)	8.76(2.26)	5.45(1.77)				
634. Veneers, plywood, particle board, and other wood, worked, n.e.s.	4.49(2.17)	8.16(4.94)	6.72(3.89)	7.89(3.83)	4.89(2.13)	5.58(5.31)	3.56(2.90)	2.95(2.97)
641. Paper and paperboard	2.82(1.63)	-4.99(-2.68)	-6.18(-2.79)	-0.65(-0.28)	3.84(2.28)			
642. Paper and paperboard, cut to size or shape, and articles of paper or paperboard	-2.3(-2.18)							
651. Textile yarn	-0.93(-1.06)	0.64(0.65)	2.28(2.28)					
652. Cotton fabrics, woven (not including narrow or special fabrics)	6.35(1.59)	-7.19(-2.53)	-4.52(-1.56)	-7.10(-2.26)	-9.73(-2.39)	-3.41(-1.76)	-4.96(-2.66)	
653. Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)	-2.30(-1.09)	-1.45(-1.10)	-0.23(-0.18)	0.66(0.43)	6.06(3.22)			
663. Mineral manufactures, n.e.s.	-6.36(-1.60)	-4.89(-1.29)	4.14(1.13)	-0.10(-0.03)	4.5(1.18)	-9.26(-2.49)	-4.36(-1.07)	
676. Iron and steel bars, rods, angles, shapes and sections (including sheet piling)	-2.29(-0.59)							
682. Copper (including alloys)	1.17(0.85)	3.64(2.83)						
694. Nails, screws, nuts, bolts, rivets and the like, of iron, steel, copper or aluminium	1.15(0.19)	-6.35(-1.41)	-7.87(-1.75)	-11.80(-2.44)	-12.32(-2.13)	-2.79(-0.99)	-7.45(-2.91)	
699. Manufactures of base metal, n.e.s.	-4.85(-4.49)							
716. Rotating electric plant and parts thereof, n.e.s.	6.82(5.36)	4.43(3.33)						
724. Textile and leather machinery, and parts thereof, n.e.s.	1.01(0.32)	1.23(0.40)	3.72(1.11)	11.74(3.53)	14.65(4.37)	5.04(1.58)	5.26(1.99)	7.16(2.99)
727. Food-processing machines(excluding domestic)	0.76(0.32)							
728. Other machinery and equipment specialized for particular industries,	1.3(1.18)							
741. Heating and cooling equipment and parts thereof, n.e.s.	7.87(1.23)	3.35(0.52)	11.8(1.82)	23.2(3.44)	10.99(1.4)	28.71(3.79)	11.58(1.55)	6.44(1.86)
742. Pumps for liquids, liquid elevators and parts	-0.95(-0.55)							
743. Pumps (other than pumps for liquids) and compressors and fans; Centrifuges; filtering or purifying apparatus;	-0.87(-0.37)	-4.47(-2.07)	-1.35(-0.58)	-4.13(-1.75)	-0.43(-0.3)	-1.00 (-0.68)	-1.13(-0.74)	3.33(2.13)
744. Mechanical handling equipment, and parts thereof, n.e.s.	5.46(2.58)	-0.99(-0.51)	-4.85(-2.53)					
745. Other non-electrical machinery, tools and mechanical apparatus, and parts thereof, n.e.s.	-1.29(-0.60)	6.23(3.18)						
747. Taps, cocks, valves and similar appliances	11.08(4.27)	1.92(0.75)	-9.73(-4.1)	-7.71(-3.17)	4.79(2.34)	2.83(1.44)	-6.30(-3.23)	-6.19(-3.56)
749. Non-electric parts and accessories of machinery, n.e.s.	6.72(3.99)							
752. Automatic data processing machines and units thereof	1.01(0.4)	1.3(0.53)	-1.92(-.69)	6.91(2.55)	-0.04(-0.01)	7.23(2.79)	2.17(.93)	3.93(2.06)
759. Parts and accessories for use within groups 751 and 752	0.09(0.06)	1.20(0.92)	-3.1(-2.30)	-0.76(-0.58)	0.31(0.35)	2.71(2.91)	-2.18(-2.13)	-1.59(-1.66)
762. Radio-broadcast receivers with sound recorders or reproducers	-5.37(-2.91)	3.11(1.68)						
764. Telecommunications equipments, n.e.s.; their parts	1.26(1.41)	-2.32(-2.7)	-1.33(-1.5)	-1.73(-1.85)				
772. Electrical apparatus, resistor, other than heating resistors; printed circuits; swithboard and control panels	-0.19(-0.32)							
775. Household type, electrical and non-electrical equipment, n.e.s.	-7.01 (-3.27)	-4.63(-2.2)						
776. Thermionic valves and tubes; photocells; etc.,and	0.85(0.35)	4.23(2.1)	5.55(2.88)	2.75(1.44)	6.32(2.64)			

parts thereof, n.e.s.								
778. Electrical machinery and apparatus, n.e.s.	2.84(0.91)	3.31(0.99)	-6.31(-1.96)	0.18(.06)	-0.16(-0.05)	0.29(0.09)	6.93(2.20)	
785. Motorcycles, and cycles, motorized and non-motorized	-2.31(-0.93)	-1.33(-0.59)	-0.69(-0.34)	-3.51(-1.85)	3.19(1.24)			
813. Lighting fixtures and fittings, n.e.s.	1.79(0.42)	-19.17(-4.67)	-6.53(-1.98)					
821. Furniture and parts thereof	-6.54(-2.47)	-0.27(-0.1)	-2.67(-1.04)	-1.12(-0.41)	-2.57(-0.88)	-1.90(-0.69)	3.02(1.12)	-4.12(-1.51)
848. Accessories of other than textile fabrics, headgear of all materials	-3.53(-1.47)	-1.87(-0.87)	-4.28(-2.37)					
874. Measuring, checking,analysing and controlling instruments and apparatus n.e.s.	-0.64(-0.19)	-7.91(-2.06)	-7.84(-2.08)	-1.81(-0.58)	-7.33(-2.16)			
881. Photographic apparatus and equipment, n.e.s.	0.74(0.34)	-1.32(-0.64)	-3.59(-1.76)	-3.55(-1.74)				
892. Printed matter	1.45(0.85)	-0.42(-0.26)	0.2(0.12)	0.40(0.25)	3.23(2.78)	-1.01(-.88)	2.85(2.50)	
893. Articles, nes of plastics	0.32(0.29)	-2.53(-2.33)						
894. Baby carriages, toys, games and sporting goods	-1.21(-0.51)	10.23(4.25)	-5.76(-2.57)	-5.09(-2.31)				
898. Musical instruments and parts and accessories thereof	1.01(0.47)							
899. Miscellaneous manufactured articles, n.e.s.	4.13 (3.53)							
931. Special transactions and commodities	-0.62(-0.4)	1.09(0.72)	6.06(4.15)	4.60(2.73)	8.42(5.09)	3.16(1.51)		

Numbers inside parentheses are the t-ratio

Table 4. Long-run Coefficient Estimates

Industry name	Constant	Ln Ym	Ln Yc	Ln REX
048. Cereal preparations and preparation of flour or starch of fruits or vegetables	105.78(2.77)	-29.17(-3.44)	14.78(4.10)	-26.32(-5.91)
512. Alcohols, phenols, phenol- alcohols, and their derivatives	54.54(1.05)	-8.75(-0.81)	2.53(0.60)	3.15(0.43)
513. Carboxylic acids, anhydrides, halides, peroxides and peroxyacids and derivatives	-204.1(-3.44)	50.67(3.67)	-23.17(-3.78)	37.41(4.39)
533. Pigments, paints, varnishes and related materials	17.15(1.04)	-2.66(-.78)	0.26(0.19)	-1.07(-0.5)
554. Soap, cleansing and polishing preparations	-155.74(-1.42)	34.92(1.44)	-13.99(-1.45)	19.19(1.46)
575. Other plastics, in primary forms	136.95(1.04)	-26.99(-0.97)	10.1(0.91)	-3.76(-0.34)
582. Plates, sheets, film, coil and strip of plastics	7.61(.84)	2.05(1.12)	-3.28(-4.53)	5.92(5.89)
592. Starches, inulin and wheat gluten; albuminoidal substances; glues	-0.45(-0.03)	1.24(0.35)	-2.07(-1.43)	-0.41(-0.18)
598. Miscellaneous chemical products, n.e.s.	269.63(1.87)	-55.88(-1.84)	20.96(1.80)	-17.19(-1.43)
621. Materials of rubber	-20.88(-1.89)	-1.83(-0.77)	5.18(5.11)	-12.69(-8.38)
629. Articles of rubber, n.e.s	51.67(6.00)	-10.84(-5.74)	4.25(5.52)	-2.42(-2.20)
634. Veneers, plywood, particle board, and other wood, worked, n.e.s.	-20.76(-1.49)	7.87(2.64)	-5.74(-4.79)	3.33(2.12)
641. Paper and paperboard	69.88(1.01)	-11.11(-0.78)	1.96(0.36)	3.95(.56)
642. Paper and paperboard, cut to size or shape, and articles of paper or paperboard	3.38(0.41)	-2.44(1.45)	1.99(2.97)	-2.3(-2.18)
651. Textile yarn	-17.89(-0.1)	4.22(1.16)	-1.82(-1.26)	1.67(0.79)
652. Cotton fabrics, woven (not including narrow or special fabrics)	-21.63(-1.21)	6.22(1.61)	-3.17(-2.00)	10.35(4.8)
653. Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)	-34.58(-1.99)	7.09(1.84)	-2.57(-1.62)	3.90(1.53)
663. Mineral manufactures, n.e.s.	102.82(0.56)	-21.31(-0.57)	7.09(0.54)	-10.32(-0.56)
676. Iron and steel bars, rods, angles, shapes and sections (including sheet piling)	63.42(1.54)	-14.08(-1.57)	5.58(1.46)	-3.97(-0.59)
682. Copper (including alloys)	42.12(7.18)	-8.02(-6.39)	2.81(5.46)	-1.11(-1.64)
694. Nails, screws, nuts, bolts, rivets and the like, of iron, steel, copper or aluminium	-41.97(-0.61)	12.02(0.78)	-6.78(-1.01)	14.9(1.49)
699. Manufactures of base metal, n.e.s.	-13.35(-1.99)	2.3(1.68)	-0.87(-1.60)	-0.07(-0.09)
716. Rotating electric plant and parts thereof, n.e.s.	-7.88(-1.08)	1.67(1.05)	-1.04(-1.56)	1.46(1.63)
724. Textile and leather machinery, and parts thereof, n.e.s.	12.93(0.75)	-2.94(-0.78)	0.66(0.04)	-2.94(-1.34)
727. Food-processing machines(excluding domestic)	-58.86(-1.48)	12.05(1.46)	-5.14(-1.54)	1.67(0.31)
728. Other machinery and equipment specialized for particular industries,	37.86(3.38)	-6.21(-2.74)	1.39(1.56)	1.88(1.23)
741. Heating and cooling equipment and parts thereof, n.e.s.	30.17(1.77)	-3.8(-1.01)	-0.45(-0.29)	0.54(0.24)
742. Pumps for liquids, liquid elevators and parts	32.34(2.64)	-6.31(-2.52)	1.81(1.81)	-0.96(-0.55)
743. Pumps (other than pumps for liquids) and compressors and fans; Centrifuges; filtering or purifying apparatus;	84.77(0.9)	-15.33(-.83)	3.68(0.64)	-4.41(-0.54)
744. Mechanical handling equipment, and parts thereof, n.e.s.	30.11(1.49)	-4.53(-1.10)	1.17(0.71)	5.94 (2.15)
745. Other non-electrical machinery, tools and mechanical apparatus, and parts thereof, n.e.s.	13.02(1.14)	-2.07(-.85)	-0.06(-0.07)	0.68(0.44)
747. Taps, cocks, valves and similar appliances	47.79(0.95)	-6.13(-.73)	1.26(0.45)	15.62(1.78)
749. Non-electric parts and accessories of machinery, n.e.s.	18.44(1.46)	-1.1(-.43)	-1.43(-1.46)	5.53(4.2)
752. Automatic data processing machines and units thereof	-67.92(-0.42)	14.47(.44)	-5.24(-0.41)	14.12(.79)
759. Parts and accessories for use within groups 751 and 752	30.19(2.01)	-4.07(-1.30)	0.09(0.08)	3.22(1.43)
762. Radio-broadcast receivers with sound recorders or reproducers	1.57(0.13)	-1.24(-.49)	1.20(1.18)	0.002(0.001)
764. Telecommunications equipments, n.e.s.; their parts	23.52(2.93)	-4.5(-2.64)	1.65(2.35)	1.89(1.82)
772. Electrical apparatus, resistor, other than heating resistors; printed circuits; swithboard and control panels	27.64(1.61)	-5.43 (-1.57)	1.74(1.29)	-0.73(-0.32)
775. Household type, electrical and non-electrical equipment, n.e.s.	-17.06(-0.67)	4.27(.78)	-2.86(-1.21)	-0.28(-0.07)
776. Thermionic valves and tubes; photocells; etc.,and parts thereof, n.e.s.	30.72(2.00)	-6.16(-1.81)	2.5(1.76)	-0.80(-0.41)
778. Electrical machinery and apparatus, n.e.s.	-16.83(-0.72)	3.99(.78)	-1.78(-0.86)	4.15(1.59)
785. Motorcycles, and cycles, motorized and non-motorized	19.45(1.91)	-3.28(-1.45)	0.66(0.71)	0.99(0.74)
813. Lighting fixtures and fittings, n.e.s.	71.25(2.23)	-12.24(-1.75)	2.03(0.7)	-0.51(-0.12)
821. Furniture and parts thereof	125.24(3.11)	-28.6(-3.12)	10.48(2.76)	-22.01(-3.47)
848. Accessories of other than textile fabrics, headgear of all materials	-19.61(-3.42)	2.1(1.64)	0.59(1.10)	-2.57(-3.05)
874. Measuring, checking,analysing and controlling instruments and apparatus n.e.s.	-12.17(-0.51)	3.39(.66)	-1.58(-0.75)	4.97(2.05)
881. Photographic apparatus and equipment, n.e.s.	-56.19(-2.05)	15.02(2.57)	-7.52(-3.08)	15.44(3.75)
892. Printed matter	10.11(1.38)	-0.9(-.59)	-0.73(-1.19)	1.37(1.24)
893. Articles, nes of plastics	26.18(2.01)	-4.5(-1.67)	1.01(0.93)	0.54(0.29)
894. Baby carriages, toys, games and sporting goods	65.54(2.61)	-17.19(-3.23)	8.71(3.97)	-10.38(-3.5)
898. Musical instruments and parts and accessories thereof	-24.66(-0.93)	3.03(.55)	0.75(0.33)	1.74(0.46)
899. Miscellaneous manufactured articles, n.e.s.	-0.15(-0.01)	0.59(.2)	-0.15(-0.13)	6.97(3.28)
931. Special transactions and commodities	47.42(1.35)	-10.09(-1.29)	4.46(1.33)	1.99(.49)

Numbers inside parentheses are the t-ratio

Table 5. Diagnostic statistics

code	industry name	ECM_{t-1}	Adj. R^2	RESET	LM	CUSUM	CUSUMQ	Trade share %
048	Cereal preparations and preparation of flour or starch of fruits or vegetables	-0.72(-4.99)	0.81	0.54	5.51	S	S	0.06
512	Alcohols, phenols, phenol- alcohols, and their derivatives	-0.27(-1.38)	0.60	19.34	2.34	S	S	0.73
513	Carboxylic acids, anhydrides, halides, peroxides and peroxyacids and derivatives	-0.43(-4.22)	0.87	7.91	10.43	S	S	0.58
533	Pigments, paints, varnishes and related materials	-0.51(-2.37)	0.52	0.07	2.46	S	S	0.13
554	Soap, cleansing and polishing preparations	-0.3(-1.55)	0.77	0.60	12.27	S	S	0.27
575	Other plastics, in primary forms	-0.24(-1.47)	0.78	8.10	4.19	S	S	0.39
582	Plates, sheets, film, coil and strip of plastics	-0.81(-4.89)	0.92	3.39	5.25	U	S	0.28
592	Starches, inulin and wheat gluten; albuminoidal substances; glues	-1.09(-5.78)	0.95	0.27	19.69	S	S	0.07
598	Miscellaneous chemical products, n.e.s.	-0.28(-2.38)	0.86	9.34	10.86	S	S	0.39
621	Materials of rubber	-1.0 (-)	0.88	0.08	2.9	S	S	2.08
629	Articles of rubber, n.e.s	-2.37(-5.11)	0.44	31.73	12.11	S	S	0.09
634	Veneers, plywood, particle board, and other wood, worked, n.e.s.	-.73(-6.28)	0.98	1.30	14.41	U	U	0.22
641	Paper and paperboard	-0.23(-2.01)	0.75	0.002	6.50	S	S	0.32
642	Paper and paperboard, cut to size or shape, and articles of paper or paperboard	-1.0 (-)	0.47	3.79	1.75	S	U	0.17
651	Textile yarn	-0.36(-3.45)	0.63	12.00	2.08	U	U	0.30
652	Cotton fabrics, woven (not including narrow or special fabrics)	-1.0 (-)	0.72	7.89	5.12	S	U	0.11
653	Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)	-0.46(-4.14)	0.68	0.04	0.66	S	S	0.23
663	Mineral manufactures, n.e.s.	-0.17(-0.53)	0.61	4.47	7.99	S	U	0.14
676	Iron and steel bars, rods, angles, shapes and sections (including sheet piling)	-0.58(-4.64)	0.37	0.90	4.12	S	S	0.36
682	Copper (including alloys)	-1.35 (-5.87)	0.67	0.42	6.73	S	S	0.49
694	Nails, screws, nuts, bolts, rivets and the like, of iron, steel,copper or aluminium	-0.35 (-2.47)	0.78	0.76	19.38	S	S	0.27
699	Manufactures of base metal, n.e.s.	-1.0 (-)	0.25	0.24	3.18	S	S	0.80
716	Rotating electric plant and parts thereof, n.e.s.	-1.0 (-)	0.8	0.15	2.85	S	S	0.78
724	Textile and leather machinery, and parts thereof, n.e.s.	-1.35 (-5.08)	0.51	1.6	4.58	U	U	0.09
727	Food-processing machines(excluding domestic)	-0.45(-4.29)	0.43	0.55	4.38	S	S	0.06
728	Other machinery and equipment specialized for particular industries, and parts thereof, n.e.s.	-0.69(-4.8)	0.41	0.22	2.57	S	S	0.81
741	Heating and cooling equipment and parts thereof, n.e.s.	-1.83(-4.86)	0.78	3.61	11.39	S	U	0.80
742	Pumps for liquids, liquid elevators and parts	-1.0 (-)	0.11	1.73	4.03	S	U	0.11
743	Pumps (other than pumps for liquids) and compressors and fans; centrifuges; filtering or purifying apparatus;	-0.27(-0.98)	0.57	0.01	14.46	S	S	0.51
744	Mechanical handling equipment, and parts thereof, n.e.s.	-0.46(-3.98)	0.64	0.38	3.32	S	S	0.70
745	Other non-electrical machinery, tools and mechanical apparatus, and parts thereof, n.e.s.	-0.98(-3.66)	0.56	0.02	8.64	S	U	0.27
747	Taps, cocks, valves and similar appliances	-0.3(-1.95)	0.80	18.98	5.77	S	U	0.29
749	Non-electric parts and accessories of machinery, n.e.s.	-1.21(-5.33)	0.60	0.43	8.25	S	S	0.23
752	Automatic data processing machines and units thereof	-0.15(-.86)	0.51	0.28	2.24	U	U	6.19
759	Parts and accessories for use within groups 751 and 752	-0.41(-2.94)	0.80	0.09	2.57	S	U	10.14
762	Radio-broadcast receivers with sound recorders or reproducers	-0.63(-4.91)	0.51	0.19	3.08	S	S	0.07
764	Telecommunications equipments, n.e.s.; their parts, and accessories used in division 76	-0.68(-5.08)	0.73	1.32	3.02	S	S	5.25
772	Electrical apparatus, resistor, other than heating resistors; printed circuits; swithboard and control panels	-0.26(-2.97)	0.59	1.27	1.62	U	U	2.17
775	Household type, electrical and non-electrical equipment, n.e.s.	-0.45(-1.53)	0.51	2.39	10.34	S	U	0.29
776	Thermionic valves and tubes; photocells; etc.,and parts thereof, n.e.s.	-0.82(-6.15)	0.50	1.02	9.09	S	S	26.01
778	Electrical machinery and apparatus, n.e.s.	-0.83(-2.66)	0.45	4.81	10.09	S	S	1.99
785	Motorcycles, and cycles, motorized and non-motorized; invalid carriages	-1.28(-6.25)	0.72	0.39	1.42	S	S	0.21
813	lighting fixtures and fittings, n.e.s.	-0.67(-4.63)	0.72	0.07	4.49	U	S	0.09
821	Furniture and parts thereof	-0.36(-3.63)	0.89	1.01	8.13	S	S	0.39
848	Accessories of other than textile fabrics, headgear of all materials	-2.27(-7.72)	0.8	8.89	10.67	S	S	0.09

874	Measuring, checking,analysing and controlling instruments and apparatus n.e.s.	-0.83(-3.49)	0.62	1.07	3.66	S	U	1.15
881	Photographic apparatus and equipment, n.e.s.	-0.36(-4.61)	0.74	0.003	0.46	S	S	0.18
892	Printed matter	-1.0 (-)	0.50	0.20	3.82	U	S	0.08
893	Articles, nes of plastics	-0.37(-3.79)	0.61	1.16	1.41	S	S	0.48
894	Baby carriages, toys, games and sporting goods	-0.57(-4.93)	0.71	5.53	2.69	S	S	0.35
898	Musical instruments and parts and accessories thereof	-0.58(-4.75)	0.55	4.4	0.74	S	S	0.13
899	Miscellaneous manufactured articles, n.e.s.	-0.59(-5.15)	0.67	0.59	2.09	S	S	0.13
931	Special transactions and commodities	-0.27(-2.42)	0.81	1.65	9.73	S	S	0.43

LM is the Lagrange multiplier test of residual serial correlation. It is distributed as χ^2 (4). The critical value is 9.49 at the 5% level of significance. RESET is Ramsey's test for function form. It is distributed as χ^2 (1). The critical value is 3.84 at the 5% level of significance. Stable = "S" and unstable = "U". The term n.e.s. means not elsewhere specified.