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HOW HAS SPECIALIZATION IN TURKISH EXPORTS EVOLVED OVER TIME? A STUDY BASED ON GALTONIAN REGRESSIONS

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1. Introduction

In two earlier papers we investigated the comparative advantage of Turkish exports vis-à-vis the European Union for the period 1990-2000 (Erlat and Erlat, 2005) and the pattern of Turkish trade for the period 1969-2001 (Erlat and Erlat, 2006). The first paper was a descriptive study that focused on identifying 3-digit SITC classified sectors that showed increase in comparative advantage over time, using the Balassa (1995) index of revealed comparative advantage (RCA). The second paper, on the other hand, considered both exports and imports and tried to establish if the pattern of Turkish trade, for the longer period of 1969-2001, remained essentially the same (i.e., if the pattern was persistent) or if it showed appreciable change (i.e., if the pattern was dynamic), using a contingency-table approach due, initially, to Gagnon and Rose (1995).

The present paper attempts to combine the notions underlying these two papers to investigate how persistent the specialization in Turkish exports is over time. We use two measures for specialization; one is the RCA index and the other is the Lafay index (Lafay, 1992). A study similar to ours, using Markov Chain methods and the RCA index, was done recently by Filiztekin (2006). Ours differs from this paper in using (i) in addition to the RCA index, the Lafay index that takes imports also into account in measuring specialization and is argued, by Caselli and Zaghini (2005), to be superior to the RCA index since it allows to control for intra-industry trade and for distortions induced by macroeconomic fluctuations, and (ii) in considering the mean and the variance of the distributions of the measures over time instead of the whole distribution. This is done by implementing Galtonian regressions (see, e.g., Hart and Prais, 1956) that involve regressing the cross-section of index values at period t_2 on the cross-section at the beginning period, t_1. The sign of the slope coefficient and its relation with the correlation coefficient provide us with the information as to how the pattern and degree of specialization of Turkish exports evolve.

Hence, in the next section we shall describe our two measures of specialization and in the following section explain how Galtonian regressions work. We describe our data and the technological classification of the sectors that we use in this paper in Section 4. Section 5 has our empirical results and our conclusions are in Section 6.

2. Measures of Comparative Advantage

We shall be using two measures of comparative advantage. The first one is due to Balassa (1965) and is entirely based on the performance of exports. It is named the index of Revealed Comparative Advantage (RCA) and is obtained as the ratio of the share of exports of a particular good in the total exports of a given country to that of a group of countries that also includes the country in question. Hence, if we denote Turkey's exports of good *i* by X_i and the exports of good *i* for the group of countries by X_{iw} , then the RCA index may be written as,

$$RCA_i = \frac{X_i / \sum_{i=1}^{N} X_i}{X_{iw} / \sum_{i=1}^{N} X_{iw}}, \quad i = 1, \ldots, N \tag{1}$$

When this index is greater than unity, it will indicate that Turkey has comparative advantage in the exports of good *i*.

As we will be using the RCA index values in regression analysis, it would be desirable if their distribution, at a given *t*, be normal. To ensure that this distribution is, at least, symmetric, we shall transform RCA_i as

$$RSCA_i = \frac{RCA_i - 1}{RCA_i + 1}, \quad i = 1, \ldots, N \tag{2}$$

where $RSCA_i$ stands for the Revealed Symmetric Comparative Advantage of good *i*. This measure takes on values between -1 and 1.

However, simply using exports to measure comparative advantage, in view of the increasing importance of intra-industry trade, not only in developed countries but also in developing countries like Turkey (see Erlat and Erlat, 2003) may lead to erroneous conclusions. This, of course, depends on the aggregation level used. At the 3-digit level, intra-industry trade may very well indicate the imports of intermediate goods used in the manufacture of final goods in that category. Hence, in addition to the RCA index, we also calculated a measure, due to Lafay (1992) as slightly modified by Corelli and Zaghini (2005), where imports, *M*, are also taken into account:

$$LFI_i = \left(\frac{X_i - M_i}{X_i + M_i} - \frac{\sum_{i=1}^{N} (X_i - M_i)}{\sum_{i=1}^{N} (X_i + M_i)} \right) \frac{X_i + M_i}{\sum_{i=1}^{N} (X_i + M_i)}, \quad i = 1, \ldots, N \tag{3}$$

In other words, LFI_i measures the comparative advantage of Turkey in good *i* by comparing the (normalized) trade balance ($X_i - M_i$) of the i^{th} good to the overall (normalized) trade balance ($\sum_{i=1}^{N}(X_i - M_i)$) and weighting it by the share of trade in the i^{th} good in total trade. Hence, LFI_i does not measure specialization with respect to other countries, as $RSCA_i$ does, but with respect to the total structure of trade of a given country. Hence, positive values of LFI_i indicate comparative advantage in the sense that they point to the level of specialization in the good in question. Negative values will, of course, indicate despecialization. Also note that $\sum_{i}^{N} LFI_i = 0$.

A further advantage of LFI_i is that, by considering the difference between $X_i - M_i$ and $\sum_{i=1}^{N} X_i - M_i$, it controls for the effects of cyclical factors on trade flows in the short run, implicitly assuming, of course, that "... cyclical factors influence aggregate and disaggregate trade flows in the same way." (Caselli and Zaghini, 2005: 11).

3. Galtonian Regression

Suppose we have N cross-section observations on a variable, Y, in two points in time, t_1 and t_2. Further assume that Y_{t_1} and Y_{t_2} have a bivariate normal distribution. Then, the regression of $y_{i,t_2} = Y_{i,t_2} - \overline{Y}_{i,t_2}$ on $y_{i,t_1} = Y_{i,t_1} - \overline{Y}_{i,t_1}$ is linear:

$$y_{i,t_2} = \beta y_{i,t_1} + u_{i,t_2}, \quad i = 1,..., N \tag{4}$$

where $u_{i,t}$ is N $(0, \sigma^2)$ and is independent of y_{i,t_1}. Now, if $\beta = 1$, then the distribution of the Y_i at t_1 will have remained the same at t_2. If $\beta > 1$, then the inequality in the distribution of the Y_i observed at t_1 would have increased in t_2. If $0 < \beta < 1$, then the inequality observed at t_1 would diminish in t_2 in the sense that there would be a movement towards the center of the distribution. Finally, if $\beta < 0$, then this would indicate that the structure of the unequal distribution of the Y_i in t_1 has been reversed in t_2.

Letting $\sigma_{t_2}^2 = E(y_{i,t_2}^2)$ and $\sigma_{t_1}^2 = E(y_{i,t_1}^2)$ and noting that $E(y_{i,t_1} u_{i,t_2}) = 0$, we obtain

$$\sigma_{t_2}^2 = \beta^2 \sigma_{t_1}^2 + \sigma^2 \tag{5}$$

Following Hart and Prais (1976), we find the correlation between the y_{i,t_1} and y_{i,t_2}, to be $\rho = 1-(\sigma^2/\sigma_{t_2}^2)$ from which we obtain $\sigma^2 = \sigma_{t_2}^2(1-\rho^2)$. Substituting in (5) yields,

$$\frac{\sigma_{t_2}^2}{\sigma_{t_1}^2} = \frac{\beta^2}{\rho^2} \tag{6}$$

In other words, the change in the dispersion of the Y_i between the two periods depends on the relationship between $|\beta|$ and $|\rho|$. If $|\beta| > |\rho|$, then the dispersion, and, of course, inequality will increase. This, of course, may take place even when β lies between 0 and 1, so that even when there is a movement towards the centre of the distribution, there may be an increase in dispersion. Hence $\beta > 1$ is not a necessary condition for the dispersion to increase.

Now, if Y_i refers to the comparative advantage measures described above, then, following Laursen (2000), we may obtain the following characteristizations of specialization:

i. If, $\beta = 1$, the specialization pattern has remained the same in t_2 as it was in t_1

ii. If $\beta > 1$, then the specialization pattern in t_1 is strengthened in t_2. This may be called *β-specialization.* In other words, those sectors that had exhibited high levels of comparative advantage at t_1 will show even higher levels of comparative advantage at t_2, while those sectors with low or no comparative advantage will become more so.

iii. If $0 < \beta < 1$, then high comparative advantage index values will be reduced while low index values will increase. This may be called *β-de-specialization*.

iv. If $\beta < 0$, then the specialization pattern in t_1 would be reversed in t_2.

v. If $\beta = \rho$, then the dispersion in t_2 will be th same as in t_1.

vi. If $\beta > \rho$, the dispersion would increase, indicating that the degree of specialization has increased. This may be named *σ-specialization*.

vii. If $\beta < \rho$, the dispersion would decrease and the degree of specialization would decrease. Hence, we would have *σ-de-specialization*.

4. The Data and The Classification

The data on Turkish exports and imports cover the 1969-2005 period and have been obtained from the Turkish Statistical Institute. The data on the exports by Turkey's trading

partners were obtained from the UNCTAD-ITC and OECD databases. These series cover the 1990-2005 period. Hence, the RSCA computations only cover this period. Turkey's trading partners considered in this paper are the pre-expansion fifteen[1] European Union countries, namely, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and the UK. All data are in $US terms and include 256, 3-digit sectors classified according to SITC Rev.3.

The technological classification of the sectors, which we have also used in previous work (e.g., Erlat and Erlat, 2005, 2006) classifies

SITC 0, 2 (ex. 26), 3 (ex.35), 4, 56 as *Raw material-intensive goods (RMIG)*

SITC 26, 6 (ex. 62, 67, 68), 8 (ex. 87, 88) as *Labour intensive goods (LIG)*

SITC 1, 35, 53, 55, 62, 67, 68, 78 as *Capital-intensive goods (CIG)*

SITC 51, 52, 54 , 58, 59, 75, 76 as *Easy-to-imitate research-intensive goods (EIRG).*

SITC 57, 7(ex.75,76,78),87,88 as *Difficult-to-imitate research-intensive goods (DIRG).*

The details of this classification are given in the Appendix.

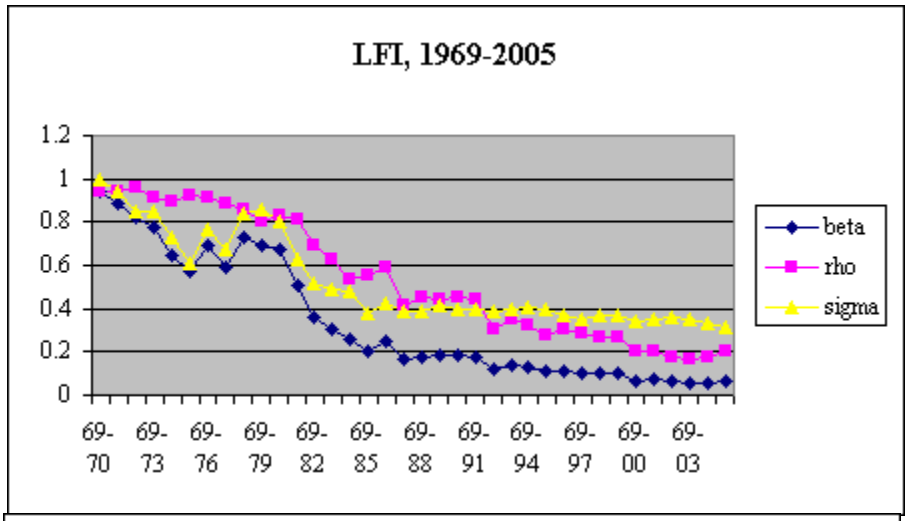
5. Empirical Results

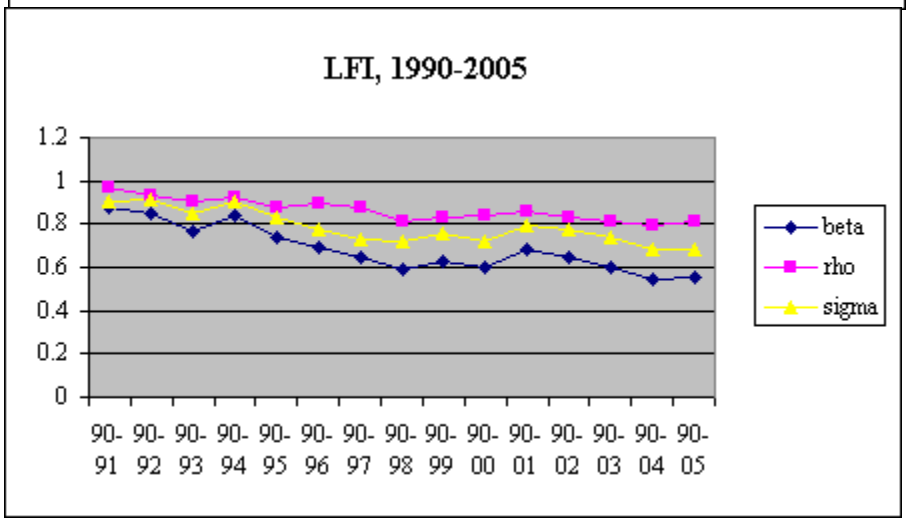
In most applications of Galtonian regressions to the comparative advantage indexes discussed above, the beginning and ending periods, t_1 and t_2, are chosen to contain several periods in between and, even when sub periods are considered, this fact does not change (see, e.g., Dalum, Laursen and Villumsen, 1998 and Laursen, 2000). What we shall do in this study is to take the first period for which data are available as t_1 and perform regressions for t_1+1, t_1+2, $\ldots t_2$, to obtain a sequence of estimates for β and ρ, and their ratios. We shall be able, thereby, to follow the pattern of export specialization over time with respect to t_1.

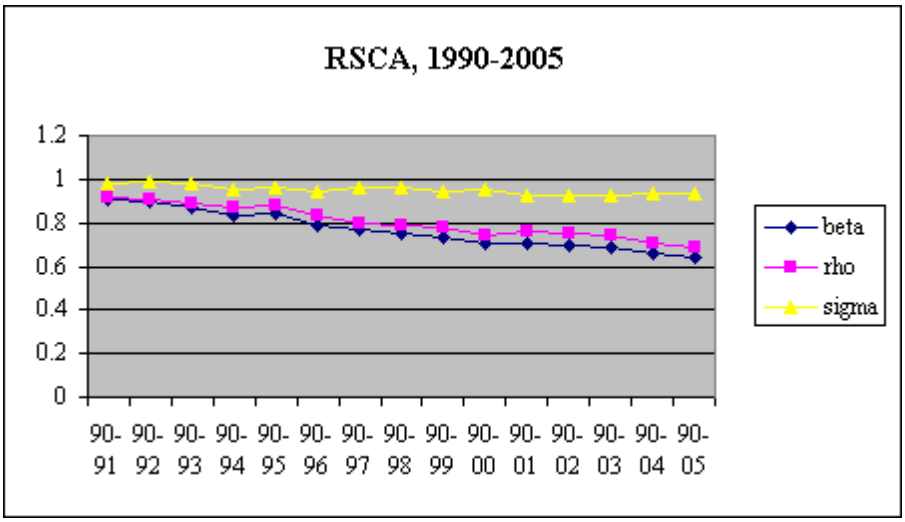
In our case we have two choices for t_1, 1969 and 1990. Since the LFI index uses only the trade flows for Turkey, it can be calculated for the 1969-2005 period, while the RSCA index requires data on the trade flows of the EU15 countries and that is only available for the 1990-2005 period. Hence, we were able to run regressions using the LFI index for both 1969 and 1990 as the base years, while we were able to do this for RSCA with only 1990 as the base year.

[1] The actual number of countries considered is fourteen since the data for Belgium also contains the data for Luxemburg.

Figure 1: Total Trade







We shall present our results in six sets of diagrams that include the plots of $\hat{\beta}, \hat{\rho}$ and the absolute value of their ratio. These sets will include the plots for Total Trade, RMIG, LIG, CIG, EIRG and DIRG, and will contain three diagrams in each set; namely, 1969-2005, 1990-2005 for LFI and 1990-2005 for RSCA. The plots are based on the three tables given in the Appendix.

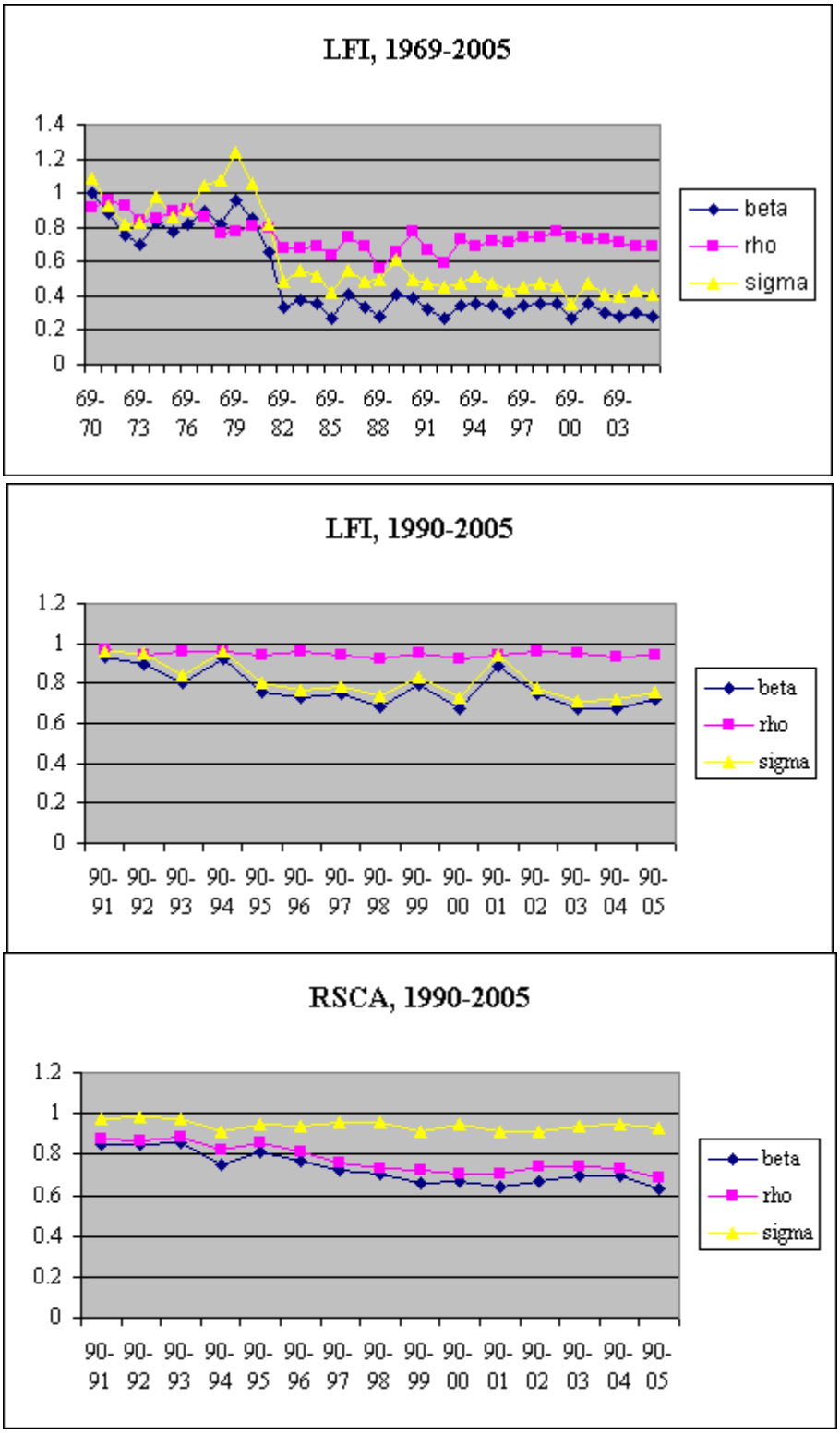
The results for *total trade* are given in Figure 1. For the 1969-2005 period, the $\hat{\beta}$ obtained for LFI declines to about 0.70 by 1980, then shows a sharp decrease to about 0.17 by 1987 and continues declining to 0.07 by 2005. The decline in the variance ratio is quite similar but $\hat{\rho}$ is above $\hat{\beta}$ at all points. Thus, there appears to be both β- and σ-despecialization of total exports with respect to 1969. When we look at the results for the 1990-2005 period we find a similar increase in β and σ-despecialization with respect to 1990 but at a milder pace, which is not surprising given the nearness of t_1 to t_2 in this case. This picture does not change when we look at the RSCA results for the same period. Thus, we may conclude that, both in terms of the specialization of exports with respect to Turkey's total trade with the world, given by the LFI results and in terms of exports to the 15 EU countries, given the RSCA results, there is a decline both in the pattern of specialization indicated by the values of $\hat{\beta}$, which lies between 0 and 1 throughout both periods, and in the degree of specialization given by the standard deviation ratios.

When we turn to the results for the technological groupings of the three-digit sectors, we find, for the *Raw Material Intensive Goods* sector in Figure 2, that during the 1969-2005 period, $\hat{\beta}$, based on the LFI index, declines until 1973 and then increases to a value close to unity by 1979, after which there is a sharp decrease until 1981 to a value around 0.30 after which a more stable pattern is observed until the end of the period. The pattern for the standard deviation ratio is quite similar except that $\hat{\beta}$ exceeds $\hat{\rho}$ during the 1973-1979 period. Thus, β and σ-despecialization are again the dominant patterns but, for a six-year sub period, even though the pattern of specialization decreases, its degree increases. For the 1990-2005 period we observe a milder but less steady increase in β and σ-despecialization. Decrease in the pattern and the degree of specialization is also observed for the RSCA results.

In the case of *Labour Intensive Goods* in Figure 3, for the 1969-2005 period based on the LFI results, $\hat{\beta}$ shows a steady decline until 1986, at which point it turns negative,

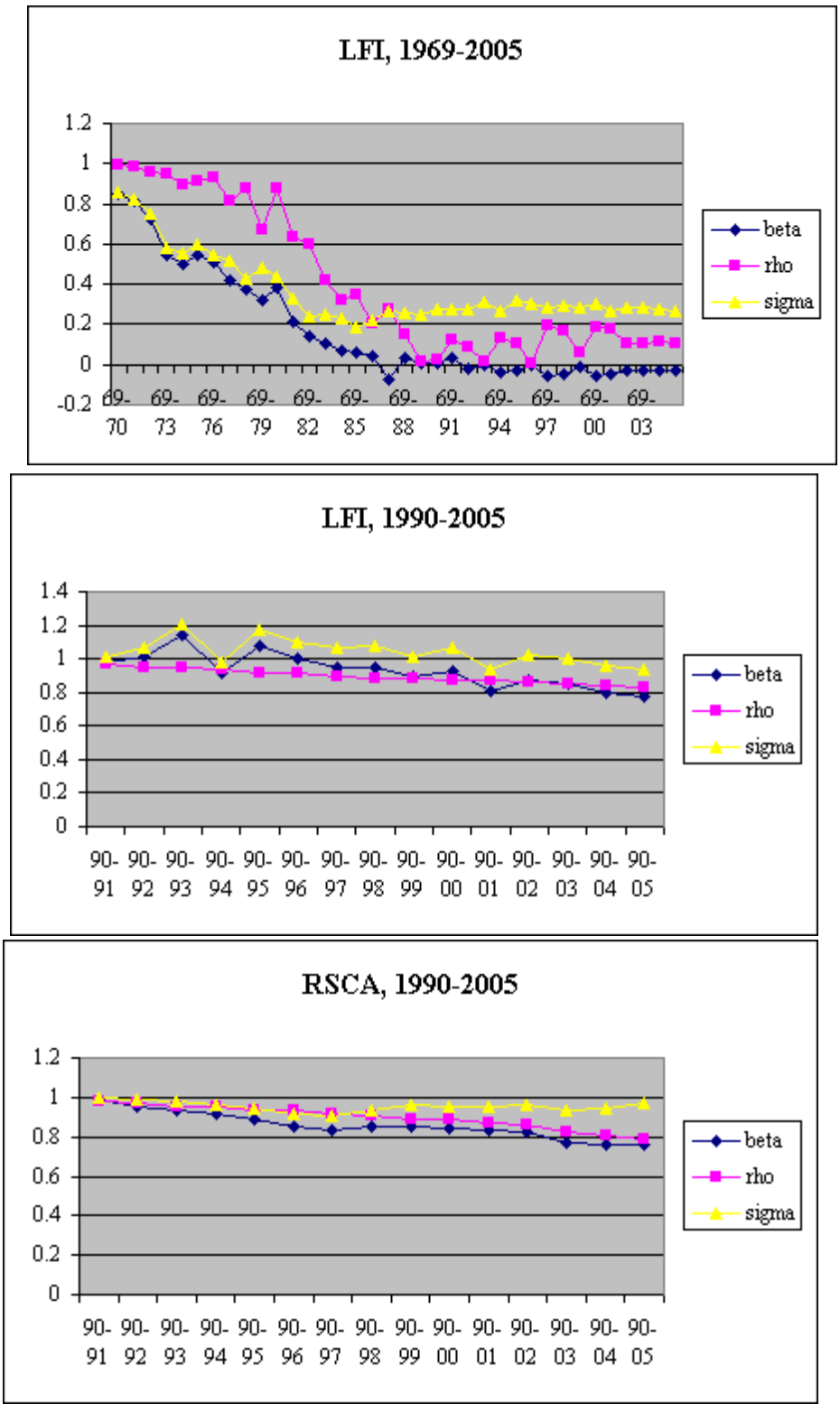
indicating a reversal in the specialization pattern of exports. This reversal becomes a steady pattern after 1990. The decline in the standard deviation ratio also continues until 1986 after which we observe a steady path of σ-despecialization. For the shorter period, 1990-2005, the specialization pattern that had been reversed in 1990 with respect to 1969, is strengthened

Figure 2: Raw-Material Intensive Goods



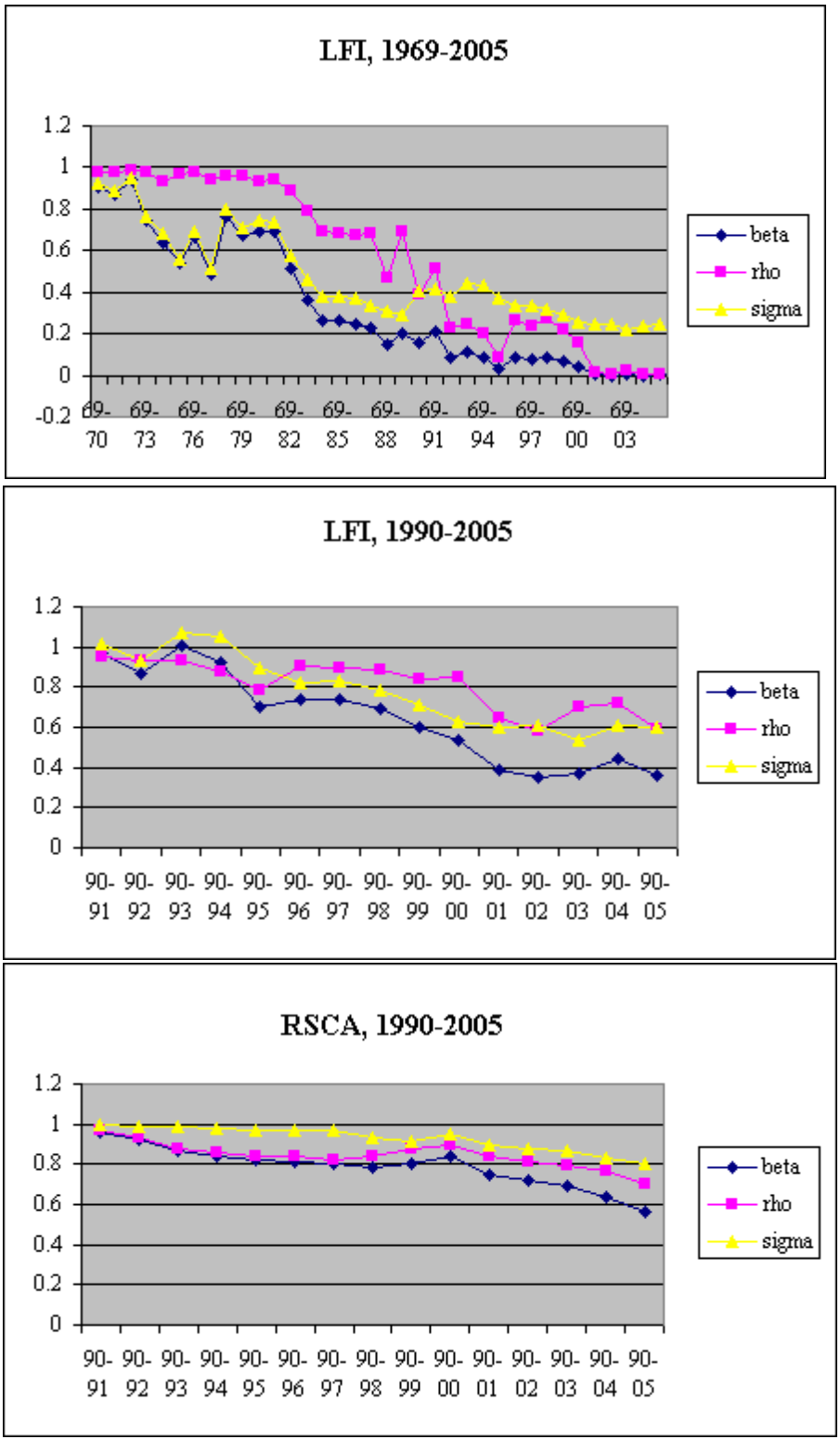
until 1996, since $\hat{\beta}$ takes on values greater than unity, but a mild level of β-despecialization is observed for the rest of the period. Interestingly, we find that, since $|\beta| > \sigma$ throughout the period, there is σ-specialization even when there is β-despecialization. When we use the

Figure 3: Labour Intensive Goods



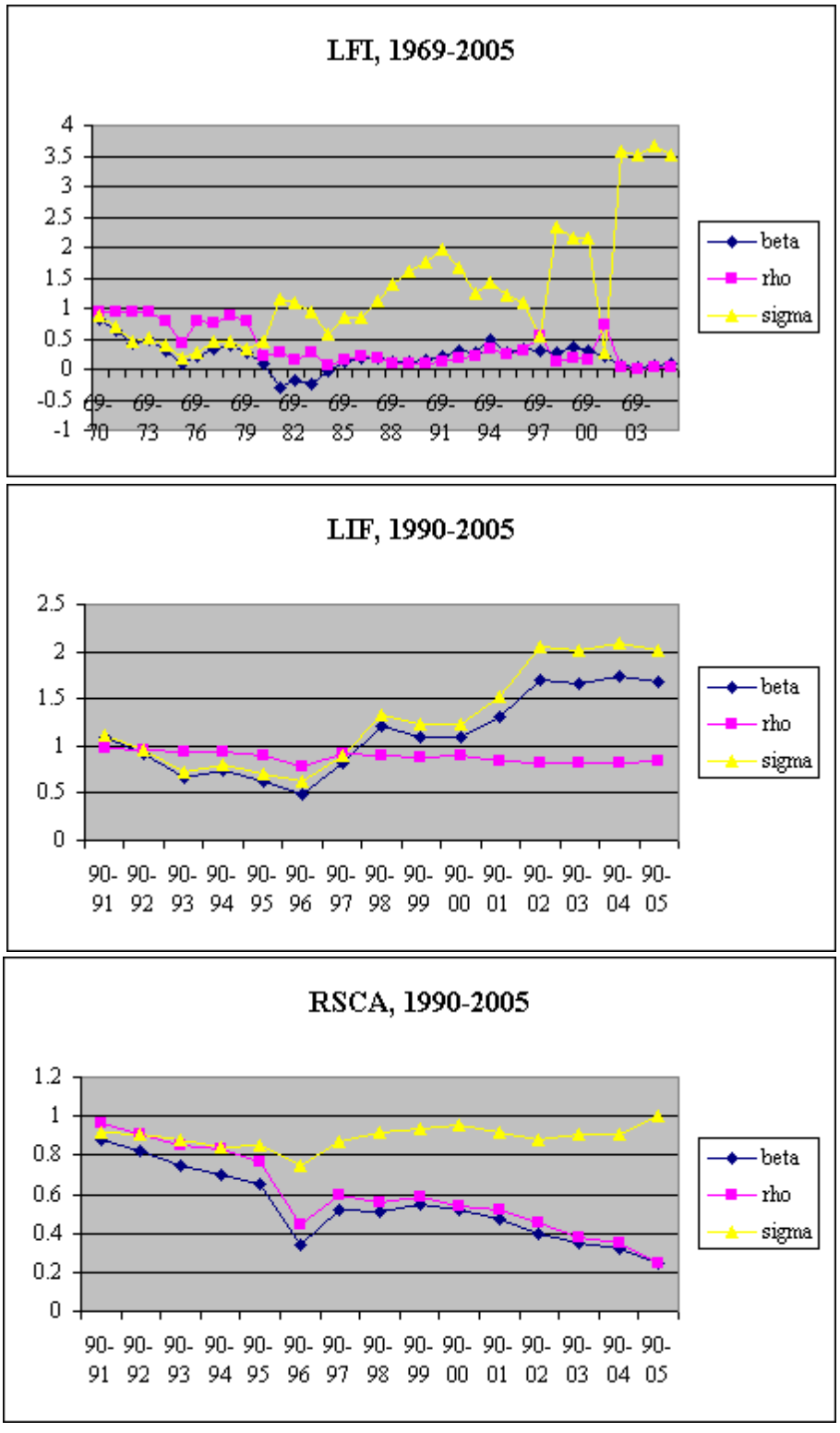
RSCA results, the picture we obtain is not the same for the 1990-2005 period. There is a very mild increase in both β and σ-despecialization, the latter despecialization showing a

Figure 4: Capital Intensive Goods



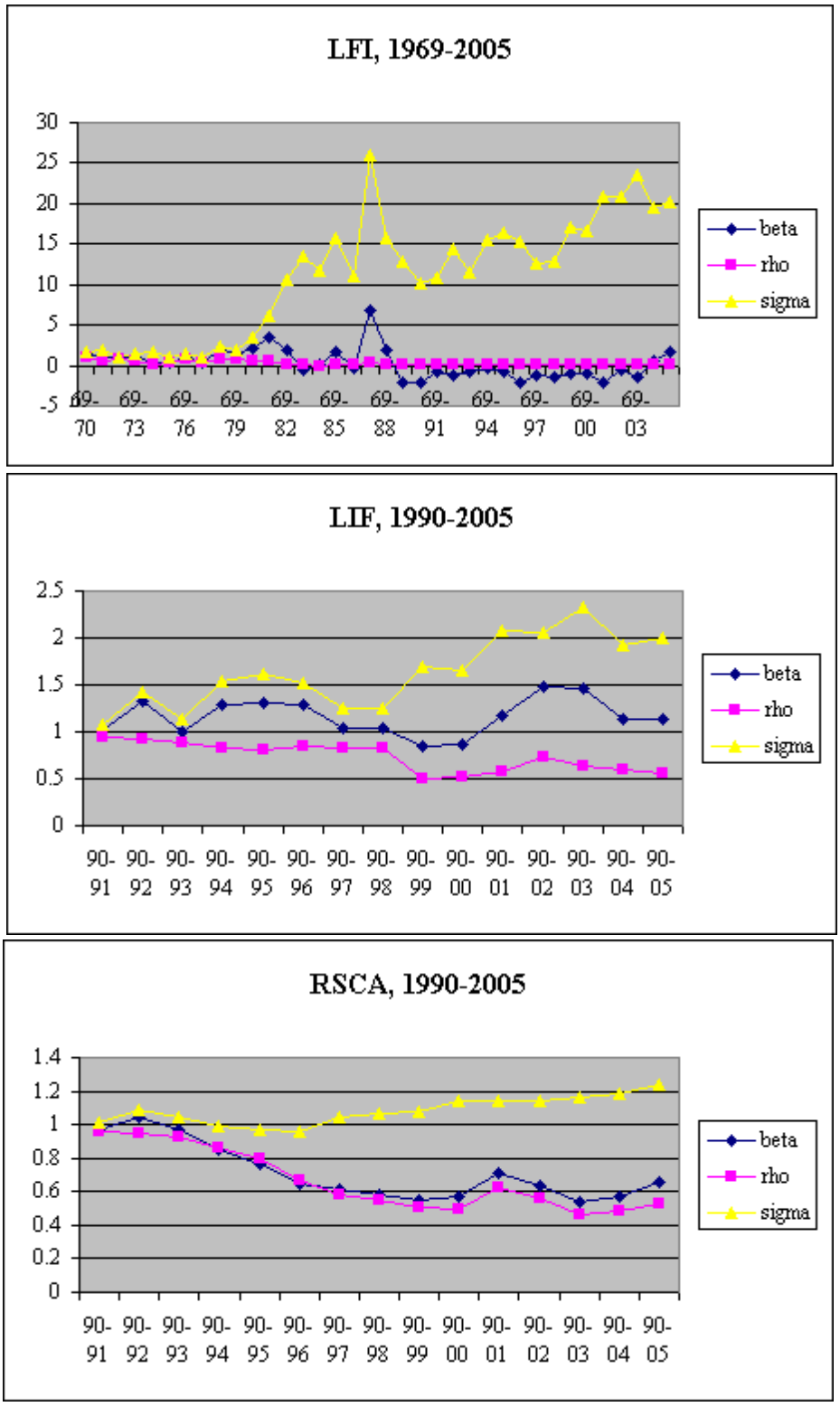
decrease after 1998. Of course, whether this reflects a picture of the specialization pattern with respect to 1969 that may have been reversed in 1990 cannot be determined because of lack of data.

Figure 5: Easy-to-Imitate Research Intesive Goods



For *Capital Intensive Goods* in Figure 4, based on the LFI results and the 1969-2005 period, $\hat{\beta}$ shows a decrease that becomes much more pronounced and steady after 1981, and reaches a value quite close to zero in 1995, again taking on such low values from 2001

Figure 6: Difficult-to-Imitate Research Intensive Goods



onwards. Since $\hat{\rho}$ is never below $\hat{\beta}$, there is σ-despecialization throughout the period. For 1990-2005, there is a steady decline in $\hat{\beta}$ after 1993 that stabilizes after 2001. These pictures are not much different from what we observe for the same period in terms of the 1969-based results; the magnitudes of $\hat{\beta}$ and the standard error ratios are lower for the larger period. The RSCA-based results are similar but the decline in specialization is milder.

Turning to *Easy-to-Imitate Research Intensive Goods* in Figure 5, for the 1969-2005 period, the pattern of $\hat{\beta}$ is a bit erratic, even turning negative for the 1986-1989 subperiod, and then continuing on taking values between 0.5 and 0. Thus, β-despecialization with short periods of specialization reversal, is the pattern. For the standard deviation ratios, their pattern becomes erratic after 1980, exceeding unity in 1986 and again in 1987, remaining at such a level until 1998, after which an erratic pattern of σ-specialization is observed and appears to be stabilized at a very high level (≈ 3.5) for 2002-2005. For the 1990-2005 period, we observe β-despecialization until 1997 after which we observe β-specialization that levels off at a point above 1.5 for the 2002-2005 period. The pattern for the standard deviation ratios is very similar; σ-specialization follows β-specialization. The RSCA results, on the other hand, show no evidence of either type of specialization, with $\hat{\beta}$ rapidly declining to a level below 0.40 in 1996, then jumping to 0.50 in 1997 after which it enters a steady decline that takes it to as low a level as 0.20. σ-despecialization, however, declines, reaching a value of, approximately, unity by 2005. In other words, in the EIRG category, the specialization pattern of exports, in terms of Turkey's trade flows with the world, is quite different from the pattern one observes when measured in comparison with the export performance of the EU15 as a group.

Finally, for *Difficult-to-Imitate Research Intensive Goods*, during the 1969-2005 period, $\hat{\beta}$ takes on values close to zero until 1979, after which it starts taking on values grater than unity but shows an erratic pattern until 1987, settling into a period of reversal in specialization from that point onwards. σ-despecialization is also at a very low level until 1979 after which we observe an erratic pattern of increasing high levels of σ-specialization, particularly in reference to the sub period of specialization reversal. β-specialization is observed for most of the shorter 1990-2005 period (the exceptions being 1999-2000) while σ-specialization exists for the whole period. Again, this is not what is observed from the

RSCA results for the same period; β-despecialization together with σ-specialization is the picture for the period from 1993 onwards. The conclusion reached for EIRG holds also for DIRG.

6. Conclusions

1. For *total trade*, both the LFI and the RSCA results show a decline in both the pattern and the degree of specialization. This holds for both Turkey's trade flows with the world and in terms of the position of its exports vis-à-vis the 15 EU countries.

2. For *raw-material intensive goods*, β-despecialization takes place during both 1969-2005 and 1990-2005 and, while σ-despecialization is dominant, we observe σ-specialization during 1973-1979. This conclusion holds for both the LFI and RSCA results.

3. For *labour-intensive goods*, during the 1969-2005 period and according to the LFI results, we find β-despecialization until 1986 after which the specialization pattern is strengthened.

4. For *capital-intensive goods* all results indicate both β and σ-despecialization.

5. In both categories of *research-intensive goods* the LFI results indicate σ-specialization after 1986. For DIRG, however, one notes a reversal in specialization patterns after 1990, which appears to be strengthened after that year. The RSCA results are quite different in both cases.

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Appendix

Raw Material Intensive Goods

SITC 0 Food and Live Animals
SITC 2 Crude Material, Inedible, Except Fuels (excluding 26)
SITC 3 Mineral Fuels, Lubricants and Related Materials (excluding 35)
SITC 4 Animal and Vegetable Oils, Fats and Waxes
SITC 56 Fertilizers (Other Than Those of Group 272)

Labour-Intensive Goods

SITC 26 Textile Fibres (Other Than Wool Tops and Other Combed Wool) and Their Wastes (Not Manufactured Into Yarn or Fabric)
SITC 6 Manufactured Goods Classified Chiefly by Material (excluding 62, 67, 68)
SITC 8 Miscellaneous Manufactured Articles (excluding 88, 87)

Capital-Intensive Goods

SITC 1 Beverages and Tobacco
SITC 35 Electric Current
SITC 53 Dyeing, Tanning and Colouring Materials
SITC 55 Essential Oils and Resinoids and Perfume Materials; Toilet, Polishing and Cleansing Preparations
SITC 62 Rubber Manufactures, n.e.s.
SITC 67 Iron and Steel
SITC 68 Non-Ferrous Metals
SITC 78 Road Vehicles (Including Air-Cushion Vehicles)

Easy-to-Imitate Research-Intensive Goods

SITC 51 Organic Chemicals
SITC 52 Inorganic Chemicals
SITC 54 Medicinal and Pharmaceutical Products
SITC 58 Plastics in Non-Primary Forms
SITC 59 Chemical Materials and Products, n.e.s.
SITC 75 Office Machines and Automatic Data-Processing Machines
SITC 76 Telecommunications and Sound-Recording and Reproducing Apparatus and Equipment

Difficult-to-Imitate Research-Intensive Goods

SITC 57 Plastics in Primary Forms
SITC 7 Machinery and Transport Equipment (excluding 75, 76, 78)
SITC 87 Professional, Scientific and Controlling Instruments and Apparatus, n.e.s.
SITC 88 Photographic Apparatus, Equipment and Supplies and Optical Goods, n.e.s.; Watches and Clocks

Table 1: Regression Results Based on LFI, 1969-2005

	Total Trade			**RMIG**			**LIG**			**CIG**			**EIRG**			**DIRG**		
	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$
69-70	0.94	0.94	1.00	1.00	0.92	1.09	0.85	0.99	0.86	0.91	0.98	0.92	0.82	0.95	0.87	1.51	0.94	1.61
69-71	0.88	0.94	0.94	0.89	0.95	0.93	0.81	0.99	0.82	0.87	0.98	0.89	0.64	0.93	0.68	0.94	0.51	1.83
69-72	0.82	0.96	0.85	0.75	0.93	0.81	0.72	0.96	0.75	0.94	0.99	0.95	0.41	0.92	0.45	0.91	0.86	1.07
69-73	0.78	0.91	0.85	0.70	0.84	0.83	0.55	0.95	0.58	0.75	0.98	0.76	0.49	0.94	0.52	0.92	0.61	1.51
69-74	0.65	0.89	0.73	0.83	0.85	0.97	0.50	0.90	0.56	0.64	0.94	0.68	0.31	0.80	0.38	0.38	0.24	1.58
69-75	0.57	0.93	0.61	0.77	0.89	0.86	0.54	0.91	0.60	0.54	0.97	0.56	0.08	0.43	0.20	0.40	0.40	0.98
69-76	0.70	0.91	0.76	0.82	0.91	0.90	0.51	0.93	0.55	0.67	0.97	0.69	0.22	0.78	0.28	1.02	0.72	1.41
69-77	0.59	0.89	0.67	0.89	0.86	1.04	0.42	0.81	0.52	0.49	0.94	0.52	0.35	0.77	0.45	0.35	0.33	1.06
69-78	0.73	0.86	0.84	0.82	0.76	1.08	0.38	0.88	0.43	0.77	0.96	0.80	0.39	0.87	0.45	1.96	0.80	2.46
69-79	0.69	0.80	0.86	0.96	0.77	1.24	0.32	0.67	0.48	0.68	0.96	0.71	0.26	0.78	0.34	1.53	0.76	2.01
69-80	0.67	0.83	0.80	0.85	0.80	1.06	0.39	0.88	0.44	0.69	0.93	0.74	0.10	0.21	0.47	2.11	0.62	3.38
69-81	0.51	0.81	0.63	0.65	0.80	0.82	0.21	0.64	0.33	0.69	0.94	0.74	-0.31	0.27	1.15	3.54	0.57	6.21
69-82	0.36	0.69	0.52	0.33	0.68	0.49	0.14	0.60	0.24	0.51	0.89	0.58	-0.17	0.16	1.08	1.96	0.19	10.52
69-83	0.31	0.62	0.49	0.38	0.68	0.55	0.10	0.42	0.25	0.36	0.79	0.46	-0.26	0.28	0.93	-0.49	0.04	13.59
69-84	0.25	0.53	0.48	0.36	0.69	0.51	0.07	0.32	0.23	0.26	0.69	0.38	-0.04	0.07	0.57	0.10	0.01	11.79
69-85	0.21	0.55	0.37	0.27	0.64	0.42	0.06	0.35	0.18	0.26	0.68	0.38	0.13	0.15	0.85	1.74	0.11	15.74
69-86	0.25	0.59	0.43	0.40	0.74	0.55	0.04	0.20	0.22	0.25	0.67	0.37	0.18	0.22	0.84	-0.38	0.03	11.15
69-87	0.16	0.42	0.39	0.34	0.69	0.49	-0.07	0.27	0.27	0.23	0.68	0.34	0.19	0.17	1.12	6.86	0.26	26.07
69-88	0.18	0.45	0.39	0.28	0.56	0.50	0.04	0.15	0.25	0.15	0.47	0.31	0.11	0.08	1.40	1.88	0.12	15.75
69-89	0.18	0.44	0.41	0.40	0.66	0.61	0.00	0.02	0.25	0.20	0.69	0.29	0.13	0.08	1.59	-2.11	0.16	12.90

Table 1: Regression Results Based on LFI, 1969-2005 (cont.)

	Total Trade			RMIG			LIG			CIG			EIRG			DIRG		
	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$	$\hat{\beta}$	$\hat{\rho}$	$\|\hat{\beta}/\hat{\rho}\|$
69-90	0.18	0.46	0.40	0.38	0.77	0.50	0.01	0.03	0.28	0.16	0.39	0.41	0.14	0.08	1.75	-2.16	0.21	10.08
69-91	0.18	0.44	0.40	0.32	0.67	0.48	0.03	0.12	0.27	0.21	0.51	0.41	0.22	0.11	1.96	-0.70	0.06	10.91
69-92	0.12	0.31	0.39	0.27	0.59	0.46	-0.02	0.09	0.28	0.09	0.23	0.38	0.31	0.18	1.67	-1.24	0.09	14.49
69-93	0.14	0.35	0.39	0.35	0.73	0.47	-0.01	0.02	0.32	0.11	0.25	0.44	0.28	0.22	1.25	-0.78	0.07	11.51
69-94	0.13	0.32	0.41	0.36	0.69	0.52	-0.04	0.14	0.26	0.09	0.20	0.43	0.47	0.34	1.41	-0.33	0.02	15.58
69-95	0.11	0.28	0.39	0.34	0.72	0.48	-0.03	0.10	0.32	0.03	0.08	0.37	0.28	0.23	1.22	-0.79	0.05	16.44
69-96	0.11	0.31	0.37	0.31	0.71	0.43	0.00	0.00	0.30	0.09	0.26	0.33	0.34	0.31	1.10	-2.18	0.14	15.37
69-97	0.10	0.29	0.35	0.34	0.74	0.46	-0.05	0.19	0.29	0.08	0.24	0.34	0.30	0.55	0.55	-1.21	0.10	12.71
69-98	0.10	0.27	0.36	0.36	0.74	0.48	-0.05	0.17	0.30	0.09	0.27	0.32	0.28	0.12	2.34	-1.47	0.12	12.73
69-99	0.10	0.27	0.37	0.36	0.77	0.47	-0.02	0.06	0.28	0.06	0.22	0.29	0.36	0.17	2.15	-1.01	0.06	17.09
69-00	0.07	0.20	0.34	0.27	0.75	0.36	-0.06	0.19	0.30	0.04	0.16	0.25	0.30	0.14	2.14	-1.04	0.06	16.73
69-01	0.07	0.20	0.35	0.35	0.74	0.48	-0.05	0.18	0.26	0.00	0.02	0.24	0.20	0.73	0.28	-2.11	0.10	20.87
69-02	0.06	0.17	0.36	0.30	0.73	0.41	-0.03	0.11	0.29	0.00	0.01	0.25	0.07	0.02	3.59	-0.65	0.03	20.75
69-03	0.06	0.17	0.35	0.28	0.71	0.40	-0.03	0.11	0.28	0.00	0.02	0.22	0.04	0.01	3.53	-1.34	0.06	23.62
69-04	0.06	0.18	0.33	0.30	0.69	0.43	-0.03	0.12	0.27	0.00	0.00	0.24	0.07	0.02	3.65	0.68	0.04	19.41
69-05	0.06	0.20	0.32	0.28	0.68	0.41	-0.03	0.11	0.27	0.00	0.00	0.25	0.10	0.03	3.51	1.64	0.08	20.19

Table 2: Regression Results Based on LFI, 1990-2005

	Total Trade			**RMIG**			**LIG**			**CIG**			**EIRG**			**DIRG**		
	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$
90-91	0.88	0.97	0.91	0.93	0.97	0.96	0.98	0.97	1.01	0.97	0.95	1.02	1.09	0.97	1.12	1.03	0.95	1.08
90-92	0.85	0.93	0.91	0.90	0.95	0.95	1.01	0.95	1.07	0.86	0.93	0.93	0.91	0.95	0.96	1.33	0.93	1.43
90-93	0.76	0.90	0.85	0.81	0.96	0.84	1.14	0.94	1.20	1.00	0.93	1.07	0.66	0.93	0.72	1.00	0.88	1.14
90-94	0.84	0.93	0.91	0.92	0.96	0.96	0.92	0.93	0.98	0.92	0.87	1.06	0.75	0.93	0.81	1.29	0.84	1.54
90-95	0.74	0.88	0.83	0.76	0.94	0.80	1.08	0.92	1.17	0.70	0.78	0.90	0.63	0.90	0.70	1.31	0.80	1.62
90-96	0.69	0.89	0.77	0.73	0.96	0.77	1.00	0.91	1.10	0.74	0.90	0.82	0.49	0.78	0.63	1.28	0.84	1.52
90-97	0.64	0.88	0.73	0.74	0.94	0.79	0.95	0.89	1.06	0.74	0.89	0.83	0.82	0.91	0.90	1.04	0.83	1.26
90-98	0.59	0.81	0.72	0.68	0.92	0.74	0.95	0.88	1.07	0.69	0.89	0.78	1.21	0.90	1.34	1.03	0.82	1.26
90-99	0.63	0.83	0.76	0.79	0.95	0.83	0.89	0.88	1.01	0.60	0.84	0.71	1.09	0.89	1.23	0.84	0.50	1.69
90-00	0.60	0.84	0.72	0.67	0.93	0.73	0.93	0.87	1.06	0.53	0.85	0.63	1.09	0.89	1.23	0.86	0.52	1.65
90-01	0.68	0.86	0.79	0.89	0.95	0.94	0.81	0.87	0.93	0.39	0.65	0.60	1.30	0.85	1.53	1.18	0.57	2.07
90-02	0.64	0.83	0.78	0.75	0.96	0.78	0.88	0.86	1.02	0.36	0.58	0.61	1.70	0.83	2.05	1.48	0.72	2.05
90-03	0.60	0.81	0.73	0.67	0.95	0.71	0.85	0.85	1.00	0.37	0.70	0.53	1.66	0.82	2.02	1.47	0.63	2.33
90-04	0.54	0.80	0.68	0.67	0.93	0.72	0.80	0.84	0.95	0.44	0.72	0.61	1.73	0.83	2.09	1.14	0.59	1.92
90-05	0.55	0.81	0.68	0.72	0.94	0.76	0.77	0.82	0.94	0.36	0.60	0.60	1.67	0.84	2.00	1.13	0.56	2.00

Table 3: Regression Results Based on RSCA, 1990-2005

	Total Trade			**RMIG**			**LIG**			**CIG**			**EIRG**			**DIRG**		
	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$	$\hat{\beta}$	$\hat{\rho}$	$\lvert\hat{\beta}/\hat{\rho}\rvert$
90-91	0.90	0.92	0.98	0.85	0.87	0.98	0.99	0.98	1.00	0.96	0.97	1.00	0.88	0.97	0.91	0.97	0.96	1.01
90-92	0.90	0.90	0.99	0.84	0.86	0.98	0.95	0.97	0.99	0.93	0.94	0.99	0.82	0.90	0.91	1.04	0.95	1.09
90-93	0.87	0.89	0.98	0.86	0.88	0.98	0.93	0.95	0.98	0.86	0.88	0.99	0.75	0.85	0.88	0.97	0.93	1.05
90-94	0.83	0.87	0.96	0.75	0.82	0.91	0.92	0.95	0.97	0.84	0.86	0.98	0.70	0.83	0.84	0.85	0.86	0.99
90-95	0.84	0.88	0.96	0.81	0.85	0.95	0.89	0.94	0.95	0.82	0.84	0.97	0.65	0.77	0.85	0.77	0.80	0.97
90-96	0.79	0.83	0.95	0.77	0.81	0.94	0.86	0.94	0.91	0.81	0.84	0.97	0.34	0.45	0.75	0.65	0.67	0.96
90-97	0.77	0.80	0.96	0.73	0.76	0.96	0.83	0.92	0.91	0.80	0.82	0.97	0.52	0.59	0.87	0.61	0.58	1.05
90-98	0.76	0.79	0.96	0.70	0.73	0.96	0.85	0.91	0.94	0.78	0.84	0.93	0.51	0.56	0.92	0.59	0.55	1.07
90-99	0.73	0.77	0.95	0.66	0.72	0.91	0.85	0.89	0.96	0.81	0.88	0.92	0.55	0.58	0.93	0.55	0.51	1.08
90-00	0.71	0.74	0.95	0.66	0.70	0.94	0.85	0.89	0.96	0.84	0.89	0.95	0.52	0.54	0.96	0.57	0.50	1.14
90-01	0.71	0.76	0.93	0.64	0.70	0.91	0.83	0.87	0.96	0.75	0.84	0.89	0.47	0.52	0.92	0.71	0.62	1.14
90-02	0.70	0.75	0.92	0.67	0.74	0.91	0.82	0.86	0.96	0.72	0.82	0.88	0.40	0.45	0.88	0.64	0.56	1.14
90-03	0.69	0.74	0.93	0.69	0.74	0.93	0.77	0.82	0.93	0.69	0.80	0.87	0.35	0.38	0.91	0.54	0.46	1.17
90-04	0.66	0.71	0.93	0.69	0.73	0.95	0.76	0.80	0.94	0.64	0.76	0.83	0.32	0.35	0.91	0.57	0.48	1.18
90-05	0.64	0.69	0.93	0.64	0.68	0.93	0.76	0.79	0.97	0.56	0.70	0.80	0.24	0.24	1.00	0.65	0.53	1.24