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International Trade and Sectoral Specialization: An Assessment of Major Trade Areas

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International Trade and Sectoral Specialization:

An Assessment of Major Trade Areas [1]

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[1] This document has been produced with the financial assistance of the European Union within the context of the FEMISE program. The contents of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the European Union. The research project was initially submitted under the title "Macroeconomic allocations and international factor mobility: A comparative assessment of major trade areas". However, in its approval decision the FEMISE research selection group requested that the focus of the project be on sectoral specialization. This request is reflected in the modified title.

Executive Summary:

We study sectoral specialization as a response to trade liberalization for three major trade areas, the Mediterranean Partner Countries (MPC) as a part of the EuroMed free trade area, the ASEAN countries and the Mercosur countries. In all cases, we analyze trade with the European Union to ensure that our results are not due to different characteristics of the trading partner.

For the MPCs, a very clear pattern emerges from our analysis: First, the production of beverages and tobacco is expanding as a consequence of trade liberalization. Second, the same is true for everything related to the metal manufacturing value added chain, including the production of metals and even of metal working machinery. Third, our results indicate that rubber production and the manufacturing of rubber has also been stimulated by trade liberalization. Since a large part of the manufacturing of rubber is the production of tires, this connects nicely to metal production aimed at manufacturing parts of road vehicles.

On the other hand, trade liberalization in MPCs seems to have hit chemicals and related products. There is clear evidence of negative specialization, i. e. of a comparably smaller role for domestic production of these products. This may be the consequence of a highly price elastic domestic demand which shifted to cheaper imports. Also, with the exception of metal and rubber, other crude materials and their manufacturing seem to have shrunk in relative terms as a response to freer trade. The same is true for food production with the notable exception of fish.

For the ASEAN countries, our analysis has revealed a trade block in a more mature phase of adjusting to world market conditions. While in the MENA states we see broad sectors of the economies moving in the same direction (e. g. an expansion of metal and rubber industries at the expense of chemical and food products), such developments are absent in ASEAN states. It may well be that these have taken place in earlier phases of ASEANs history, i. e. in the twenty years preceding our sample, i. e. in the years pre-1988. As of 1988, ASEAN economies seem to be roughly in line with world market conditions, remaining levels of protection vis-à-vis the EU not withstanding. Consequently, further trade liberalizing measures do not result in more or less uniform reactions across broadly defined industries. Rather, we observe finer adjustments where some specific industries shrink and other, closely related industries expand.

This result has important consequences for labor market policies. Laid-off workers with industry-specific human capital will have great trouble finding a suitable new job at a similar level of compensation if whole industries are affected in the same way by trade liberalization. Hence the surge of unemployment in the shrinking industries may be very protracted, because the unemployment which develops is deeply structural due to factor specificity. Hence, labor market policies are well advised to focus on groups of unemployed with low qualifications or unspecific skills – or offer extensive (and expensive) retraining.

On the other hand, in the response of a mature free-trade area such as ASEAN expanding and shrinking sectors may be in the same broad value added chain. For instance, we find that in ASEAN countries the production of crude cork and wood is expanding while the manufacturing of these crudes is shrinking. Workers laid off in the latter should have less

trouble finding an appropriate new job in the former and labor market policies can actively support the transition of people with specific human capital to a related production sector.

For the Mercosur countries, we find a single industry which seems to be broadly expanding (production of machinery, in particular office machines, data processing, telecommunication, sound recording, electrical machinery). Other responses are heterogenous within a single broad industry. This result is very much in line with our previous interpretation: The Merecosur agreement entered into force in 1999 (roughly ten years earlier than the Association Agreement with the MENA countries), but much later than the ASEAN treaty. Hence, the finding for Mercosur states is the finding one would expect for a trade block which is in the transition between the initial and the mature phase of a free trade area.

This interpretation is good news for the MPCs. If realignments in a country's industry structure and their repercussions on unemployment are the main problem associated with freer trade, then our results indicate that the MPCs have walked a good way of the rough part of the road already. Industries have undergone some broad adjustments and it is fairly clear to identify the winners and the loosers. Future developments – as far as they are related to trade liberalization – should be easier to manage in terms of domestic policies than what the MENA countries have already gone through. In particular, deeply rooted structural unemployment due to the competitive pressures of the world market are less likely to occur in the future and labor markets should, in principle, find it easier to clear than they may have done in recent years.

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1. Introduction

This report presents an analysis of specialization in foreign trade and, indirectly, domestic production for three major trade areas (Euromed, ASEAN, Mercosur). Specialization is studied on the two-digit level of the SITC classification and occurs since the countries under study gradually reduce their rates of external protection vis à vis the European Union. This policy has well-known macroeconomic effects, which were partially the subject of previous rounds of FEMISE research.

In this project, however, we focus on a disaggregate approach. From standard trade theory it is common knowledge that trade liberalization sets off sectoral specialization effects. These may be due to Ricardian comparative advantages in certain technologies or to Heckscher-Ohlin-type responses to relative factor abundances. As a consequence, the export-import structure of a liberalizing country changes – and so does the underlying structure of domestic production.

Little is known about these specialization effects for the MENA countries, although FEMISE (2010) provides some insights. The state of our knowledge is partially due to the fact that changes in the structure of foreign trade may have a multitude of causes unrelated to trade liberalization: Changes in relative prices, changes in exchange rates, technological advances for certain products, product innovations etc. We use econometric methods (pooled time series – cross section regressions) to identify which part of observable changes in export and import shares can be attributed to changes in the rates of external production.

Specifically, we distinguish between each sector's own rate of protection (i. e. the tariff rate applicable to this particular two-digit SITC classification) and the aggregate rate of protection, i. e. the average tariff rate of all sectors of the economy. Clearly, specialization can occur in a given sector even if its own tariff rate stays unchanged. For instance, if the tariff rates of other sectors change, reallocations of factor inputs take place across many sectors of the economy. Hence, factor prices will change and this implies changes in factor usage and production in all sectors of the economy – even in those which have not experienced changes in their rates of external protection.

Identifying the sectoral specialization effects of trade liberalization naturally opens up the question of winners and losers. Which sectors have benefited from trade specialization in the sense that the exports share of this type of good has increased? Is this matched by a decrease in the import share, suggesting growth of domestic production? Or have imports also grown, possibly due to increases in real income or because of relative price effects?

Conversely, are there sectors where the export share is shrinking (and the import share possibly growing)? There must be if specialization is to be meaningful. Identifying these sectors is of prime importance for political economy and economic policy reasons. Shrinking economic activity in certain sectors may jeopardize the liberalization efforts of the government since pressure groups will ask for higher protection. But what is called for are measures to facilitate structural adjustment, not policy reversals.

Governments tend to support sectors in distress if they think the problematic situation is only temporary or simply unwarranted. Both is not the case if a sector shrinks because of

tariff liberalization. Thus it is very important for a government to know precisely why a sector is shrinking. If the reason is related to trade liberalization, i. e. to comparative advantages and/or relative factor abundance, the government should be prepared to counter the demands of pressure groups by appropriate measures of economic policy. For instance, in a segmented labor market with specific labor requirements in each sector, programs should be developed to facilitate the relocation of labor from a shrinking to an expanding sector. Similarly, incentives for startup enterprises should be focused on sectors which benefit from trade liberalization. It would clearly be false to preserve structures knowing that ongoing changes truely reflect productivity, technology or factor availability, i. e. market characteristics which are persistent and basically beyond government control.

The pertinent problem is, of course, identification. We have to trace the effects of trade liberalization while controlling for unrelated developments. A wilderness of different approaches in terms of specifications and methodologies to tackle this problem exists. We follow the path of our previous FEMISE research (Lucke and Nathanson (2007), Cagatay, Degirmen and Lucke (2012)) by using modern econometric approaches from the literature on dynamic panels. But while in the previous research our main workhorse was the well-known estimator of Arellano and Bond (1991), we now use the more sophisticated (and more reliable) system estimator of Blundell and Bond (1998) to decompose the economic environment into free trade policy-related dynamics and unrelated noise. See Habibullah and Eng (2007) for another dynamic panel data approach in a similar context.

For the Euromed block we confine our attention to the Mediterranean Partner Countries (MPCs). Specialization effects in the EU 27 would certainly be negligible. But we also study

other trade blocks which have liberalized their trade with the European Union. In the body of our work, we study each trade block in isolation and identify the patterns of specialization during the path of trade liberalization. The conclusions aim at a comparison of developments across the three trade blocks.

2. Conceptual Framework

We assess changes in imports and exports in industrial sectors caused by trade liberalization. We study three trade areas which have significantly reduced their external protection in the last decades: MPCs, ASEAN and Mercosur countries. For each of these, we focus on trade with European Union countries since the EU trade data are of relatively good quality and trade covers a broad range of different commodities. There is data on imports and exports for all SITC Rev. 3 sectors. Using panel data econometric techniques we identify specialization effects in foreign trade. We will then argue that these are indicative of similar changes in domestic production.

To adjust the data for aggregate growth effects we study import and export shares, i. e. the import and export values for a specific pair of countries and a specific commodity relative to an aggregate value.

Import shares are defined as follows: The numerators are the values of of each SITC Rev.3 sectoral import from each EU27 country to each MPC, ASEAN or Mercosur country. The denominators are the values of all industrial imports from the EU27 to the importing MPC, ASEAN or Mercosur country.

We distinguish between effects of reduced import tariffs in this specific sector and effects of a generally lower level of tariff rates, represented by an (unweighted) average tariff rate of the importing country.

The reduction of import tariffs in a specific sector is likely to increase demand for imported goods of this sector because of substitution and income effects. For dependent variables expressed as import *shares*, the situation is not much different: Assuming that each two-digit sector's imports are small relative to total imports from the European Union the denominator will basically stay unchanged and thus the import share will rise. This result is preserved in a growth context, i. e. if all imports follow a broad, unspecific growth trend due to e. g. income effects. Beyond this growth trend, the numerator of a specific import share will increase in response to decreases of the corresponding specific import tariff and will hence rise by more than the denominator. Therefore, the share increases.

The aggregate import tariff is an unweighted average over all sectoral import tariffs the importing country imposes on the countries of origin. The import share of a specific sector will be affected by changes in the aggregate tariff through income and substitution effects. As these are fairly protracted, we will give a discussion of these effects here. In doing so, we will neglect the relatively rare case of a Giffen good, i. e. the case of a commodity which experiences a rise in demand due to a rise of its own relative price.

1. Suppose good *i* is a substitute for most other goods, i. e. it is a substitute for the aggregate commodity bundle of all other goods.

   In this case a decrease in the average tariff rate (while holding the specific tariff rate constant) is tantamount to a rise in the relative price of good *i* along with an increase in disposable income which arises as less money has to be spent on the imported goods of all other sectors. Given that the good is not a Giffen good, the substitution effect will outweigh this income effect so that demand for the good of sector *i* will

decrease. The denominator of the import share (all imports from EU 27 to each of the MPC, ASEAN or Mercosur countries) will increase in response to a general reduction of import tariffs. Hence, the effects in the numerator and the denominator will cause the import share to go down.

2. Now suppose good *i* is a complement for most other goods, i. e. it is a complement for the aggregate commodity bundle of all other goods.

Again, a decrease in the aggregate tariff rate (while holding the specific tariff rate constant) is tantamount to a rise in the relative price of good *i* along with an increase in disposable income. The decrease in the aggregate import tariff causes import demand for all other goods to increase and now as the imported goods of sector *i* are complementary the demand for them will increase as well. Thus, in this case the income effect will be the dominant effect. The denominator of the import share will also rise due to the income effect of generally lower tariff rates. Thus the income effect for good *i* and the income effect for all other goods tend to offset each other and the total effect is unclear. The import share will rise, if the increase in the numerator is stronger than that in the denominator and will go down if the reverse is true.

The analysis of the import demand function of each sector can reveal how the lower import tariffs versus the EU have changed the sectoral import pattern of the MPCs, AEAN and Mercosur countries. We define positive import specialization of a sector as an increase of this sector's. Consequently, negative import specialization of a sector is defined as a

decrease of a sector's import share in response to a decrease in the sector specific or the average import tariff.

In order to capture these effects we have to estimate an import demand function. However, as the data just reports equilibrium prices and quantities there is a well-known identification problem which can be solved as follows, see e. g. Lin (2004):

The structural model for the import market of each sector is given by

demand: $$q_i^d(\bullet) = \beta_{pi}^d \cdot p_i^d + x' \cdot \beta_{xi}^d + \varepsilon_i^d .$$

supply: $$q_i^s(\bullet) = \beta_{pi}^s \cdot p_i^s + x' \cdot \beta_{xi}^s + \varepsilon_i^s$$

and the market clearing condition

$$q_i^d(\bullet) = q_i^s(\bullet) = q_i$$

in each time period which simplifies to

$$q_i = \beta_{pi}^d \cdot p_i + x' \cdot \beta_{xi}^d + \varepsilon_i^d$$

and

$$q_i = \beta_{pi}^s \cdot p_i + x' \cdot \beta_{xi}^s + \varepsilon_i^s$$

q_i is the share of sector *i* in total imports and p_i is the import price level of sector *i*'s goods relative to the import price level of all imports. Because of defining q_i as a share β_{pi}^d and β_{pi}^s can be positive or negative depending on whether the price elasticity of import demand and import supply in sector *i* is smaller or larger than for the average of the industrial sector.

x' is a vector of covariates characterizing the market. Analogously to Lin (2004) we decompose it into three components $x = (x^d, x^s, x^c)$.

The demand shifters x^d are exogenous covariates which shift the demand but not the supply curve while the supply shifters x^s are exogenous covariates which shift the supply but not the demand curve. The market controls x^c are exogenous covariates which affect demand *and* supply. These covariates could be sector specific but in our case they will be macroeconomic variables. (We assume that the disaggregated data, i. e. imports of commodity *k* from country *i* to country *j*, to have only negligible effects on macroeconomic variables, so that the latter are approximately exogenous.)

Substituting x into the structural equations for demand and supply, respectively, we get

demand: $$q_i = \beta^d_{pi} \cdot p_i + x^{d\,\prime} \cdot \beta^d_{xi,d} + x^{s\,\prime} \cdot \beta^d_{xi,s} + x^{c\,\prime} \cdot \beta^d_{xi,c} + \varepsilon^d_i$$

and supply: $$q_i = \beta^s_{pi} \cdot p_i + x^{d\,\prime} \cdot \beta^s_{xi,d} + x^{s\,\prime} \cdot \beta^s_{xi,s} + x^{c\,\prime} \cdot \beta^s_{xi,c} + \varepsilon^s_i$$

By construction we have $\beta^d_{xi,s} \equiv 0$ and $\beta^s_{xi,d} \equiv 0$.

The model can then be rewritten as

demand: $$q_i = \beta^d_{pi} \cdot p_i + x^{d\,\prime} \cdot \beta^d_{xi,d} + x^{c\,\prime} \cdot \beta^d_{xi,c} + \varepsilon^d_i$$

and supply: $$q_i = \beta^s_{pi} \cdot p_i + x^{s\,\prime} \cdot \beta^s_{xi,s} + x^{c\,\prime} \cdot \beta^s_{xi,c} + \varepsilon^s_i$$

We are still left with the simultaneity between p_i and $\varepsilon^d_i, \varepsilon^s_i$. To obtain consistent estimates of the demand equation we have to instrument p_i with variables uncorrelated with ε^d_i. Clearly, the appropriate instruments are x^s. (The exogenous supply shifters x^s do not affect demand except by their influence on the price. Thus they can be used as instruments for the

price in the demand function.) Thus, we identify each equation by the zero restrictions $\beta^{d}_{xi,s} \equiv 0$, $\beta^{s}_{xi,d} \equiv 0$ and by using the exogenous variables excluded in that equation as instruments.

For a complete picture on the specialization in trade which is caused by a reduction in import tariffs it is necessary to also look at the export shares.

The reduction of import tariffs by MPCs, ASEAN and Mercosur countries can influence the **export** share in two ways. On the one hand, the lower import tariffs are, the cheaper are imported intermediate inputs. Sectors dependent on imported intermediate goods would thus increase their production and likely exports by more than sectors which do not benefit from cheaper intermediate inputs.

On the other hand, lowering the import tariffs could lead to an influx of foreign goods and thus threaten the competitive position of some sectors. If the reaction of a sector and the reaction of the aggregate have different signs the total effect is unambiguous: The export share of the sector will increase when its exports go up and the average exports decrease. It will fall when the sectoral exports fall while industrial exports altogether increase. If the sectoral and the aggregate reaction show the same signs the total effect depends on the relative strength of the sectoral and the aggregate effect. We define positive (negative) export specialization as increase (decrease) of the export share in response to a falling average import tariff.

In order to capture these effects we have to estimate the export supply function for each sector. However, as the data just reports equilibrium prices and quantities there is the same identification problem as when estimating the import demand functions. Consequently, we solve it by the same method.

Using the econometric methods described above, we can identify the changing sectoral import and export patterns which come with trade liberalization. These are interesting in their own light, but we will go one step further by interpreting the results with respect to their effects on sectoral production as follows:

Case 1: If a sector exhibits positive export specialization and negative import specialization there is a strong case for concluding that domestic production is specializing production on this sector.

Case 2: On the other hand, negative export specialization and positive import specialization of a sector signal that domestic production has shifted away from this sector.

Case 3: A finding of positive export and positive import specialization is more difficult to interpret with respect to specialization effects in domestic production.

a Consider first the case in which the positive import specialization occurs in response to a decrease in the aggregate tariff rate. An increase of the import share for a specific good i occurs only if the good is on balance complementary to all other industrial goods. Thus, the fall in the

b Consider now the case where the positive import specialization in a sector occurs in response to a falling sectoral import tariff. Then, the total effect on production is unclear. The positive export specialization is a signal for specialization of production on that sector's goods while the positive import specialization rather signals a shrinking domestic production. Hence the interpretation depends on whether the econometric results single out the specific or the aggregate tariff rate as the main determinant of import shares.

Case 4: Finally, a sector which exhibits negative ex- and import specialization will most likely experience a shrinking production share among all industrial sectors. There are two scenarios which imply shrinking export and import shares. First, this sector's goods may simply be outdated. Consumers both at home and

abroad shift to other commodities, so that foreign trade shares fall and so would, undoubtedly, production.

Second, a country may, for whatever reasons, isolate itself from the world market, for instance due to an import substitution policy. In this case, domestic production may survive and even expand. But the case of import substitution policy is incompatible with trade liberalization and our finding that the export and import shares shrink in response to lower tariffs. Thus only the first scenario seems relevant and therefore shrinking export and import shares should be interpreted as evidence of shrinking production. After describing the changing sectoral import and export pattern that comes with trade liberalization we then will try to interpret the results with respect to their effects on sectoral production.

3. Data and Econometric Analysis

To evaluate the sectoral effects of trade liberalization we use annual trade data from 1988 to 2010 for all available SITC Rev.3 categories. However, this set of trade data is very incomplete. For many commodity categories and trading partners trading data is only available for a few years in the time span from 1988 to 2010. Thus it would be impossible to find statistically significant results for structural changes for each Mediterranean Partner (or ASEAN or Mercosur) country separately.

Therefore, we resort to panel data analysis. We run separate regressions for each available two-digit SITC commodity over a cross section of country pairs. For instance, the cross section for a single commodity are all possible pairs of the Mediterranean Partner countries Algeria, Egypt, Israel, Jordan, Lebanon, Marocco, Syria, Tunesia, Turkey with all 27 member countries of the European Union. To increase the cross section even further we checked whether it would make sense to define a country ROW comprising all the trading partners of each MPC country outside the EU. However, there are serious concerns about the reliability of macroeconomic data for a thus defined rest of the world. Moreover, even if the data were sound, it is only available until 2009. The increase in the panel dimension would be offset by the loss in the time dimension so that we decided to refrain from including ROW. Thus, for the panel analysis on structural effects on MPCs we have a cross section dimension of $9 \times 27 = 243$. We use all available data for the analysis, i.e. we work with unbalanced panels. However, we exclude trade with fuels, since the countries are very heterogenous in terms of natural oil resources.

In the same way we deal with the ASEAN and the Mercosur trade block.

The trade data of the MPC, ASEAN and Mercosur countries with each EU 27 member country for all SITC Rev.3 categories is provided by EUROSTAT. Macroeconomic data is provided by the World Bank as is the data on average (weighted and unweighted) applied tariff rates. Sectoral tariff rates are from Eurostat.

There is data on the value and the quantity of imports and exports for each sector. However, the implied sectoral import (export) prices which result by dividing the import (export) values by the import (export) quantities sometimes exhibit implausibly large year to year variations. Therefore, we calculated the import (export) price of a sector as the average of all import (export) prices between each MPC with each EU country in that sector. This method is justified as it can be assumed that in market economies of a geographically similar region import (export) goods are traded at similar prices.

We estimate separately an import demand function as well as an export supply function for each sector. In these regression equations lags of the dependent variable appear as regressors. They are correlated with the unobserved panel-level effects. Therefore, standard fixed or random effects estimators are inconsistent. However, the Arellano-Bover (1995) estimator is consistent.

Estimation of import demand functions

We estimate the import (share) demand function dependent on lagged values of the import share, on sector specific demand variables, on macroeconomic demand variables and on country dummies.

As a sector specific demand variable we use its import price. But since the dependent variable is expressed as a share (relative to total EU imports), the appropriate price variable is the import price level of each sector divided by the price level of all imports. As import price changes in this sector probably are correlated with changes in the price level of all imports, we cannot assume that the denominator of the sectoral import shares stays constant when the relative import price of a sector is changing. Depending on how strong the correlation is, the effects altering the numerator will also change the denominator and the total effect will depend on whether the reaction of the specific sector is stronger or weaker than the reaction of the aggregate.

A decrease in the relative import price of a sector should immediately decrease the value of the imports of this specific sector. Depending on whether the total import value of all sectors decreases by less or by more than the specific imports the total effect on the import share is positive or negative.

Besides the mere value effect the quantity of imported goods will change: Not considering Giffen goods, the sectoral import demand and in the case of correlation also aggregate import demand should increase in reaction to a relative import price decrease. The total effect depends on whether the price elasticity of sectoral import demand is larger than that of aggregate demand. In this case the numerator increases by more than the denominator and the import share rises.

The value and the quantity effect can take place within one period or they can be distributed over several periods. In our estimation equations we look at the reaction to relative price changes in period t and t-1.

Another sector specific demand variable is the sector specific import tariff rate .We explained how it is working above. The lower it is the cheaper are imports and the higher is demand for imports in general. As treaties on tariffs usually fix the development of tariffs for a larger time span, the development of tariffs can be anticipated by economic agents, for example the negotiated tariff for period *t+1* can cause a reaction by economic agents in period t. Therefore, we include the tariff rate also with a one period lead.. [2]

As macroeconomic demand variables we introduce GDP (lgdpr_p) or GDP/capita and the exchange rate. These regressors have an impact on the numerator and the denominator of the import share. The sign of the total effect depends on whether the numerator or the denominator is more strongly affected. Rising GDP in the MPCs will strengthen their demand for imports. A negative sign for the regressor GDP implies that rising GDP in the MPCs will increase their demand for aggregate imports from the EU by more than it increases the import demand for the the specific good considered in the numerator. The same is basically true for GDP/capita.

The exchange rate between the Euro and the currencies of the MPCs influences imports because an appreciation of the currencies of the MPCs (increase in e) makes imports from the EU cheaper and so demand for them will increase.

[2] We refrain from including the sector specific tariff rate with a two period lead in order not to loose further observations as the sector specific tariff data is very incomplete.

Furthermore, the (unweighted) average import tariff rate (trf_op) and its one (trf_oplead1) and two (trf_oplead2) period lead variables are regressors. A declining aggregate import tariff rate influences import demand of a sector i depending on whether sector i's goods are in a substitutional or complementary relationship to the imports of all other goods. If sector i's goods are in a substitutional relationship to all other imported goods import demand for sector i's goods will go down. As aggregate import demand will rise with a declining average tariff the sector's import share will go down, the coefficient of the average import tariff rate will be positive. If sector i's goods are rather complements to all other imported goods import demand for sector i's goods will rise in the case of a sinking average import tariff rate. The import share of sector i however will only rise if this effect is stronger than the increase of aggregate import demand in response to the falling average import tariff. Only in this case the coefficient of the average import tariff is negative.

As exogenous supply shifters we use GDP of the EU countries (lgdpr_d). Besides, export supply is dependent on the cost of production. A variable capturing the cost of labor in an economy is the adjusted wage share (wagequ_d). It is defined as the compensation per employee as percentage of GDP at factor cost per person employed. The long term interest rate (intl_d) represents the cost of capital in the EU countries.

In order to capture unobserved specific effects of the MPC (Asean, Mercosur) countries with each EU country, fixed effects dummies for each (*i,j*)-pair might be appropriate, However, the large number of dummies results in a considerable loss of degrees of freedom. To specify the regression more parsimoniously, we therefore restricted the specification to include merely a dummy for each EU country (26 dummies plus the constant).

Moreover, we included the geographical distance between each (*i,j*) pair of countries. The distance variable (ldistw) is just one additional variable, yet distance is specific to each (*i,j*)-pair. As such, distance functions very much like a variable which captures unobserved (*i,j*)-variance rather than the concept of "gravity". Hence, its regression coefficient (likely being due to the mixture of several effects) is not interpretable and we therefore do not report its magnitude.

Estimation of export supply functions

The export (share) supply function is specified analogously: We estimate it as a function of lagged values of the export share, of sector specific supply variables, of macroeconomic supply variables and of country dummies. As sector specific supply variable we use its export price level. But since the dependent variable is expressed as a share (relative to total exports), the appropriate price variable is the export price level of each sector divided by the price level of all exports.

As the relative export price level of a sector probably is correlated with the price level of all exports the denominator of the export share of a sector can change as well.

An increase in the relative price of the exported goods in a sector will immediately increase that sector's export supply value. The share will increase if the relative export price change has a smaller influence on the denominator. Besides, as now more firms are able to enter the export market, the quantity of export supply in that sector will increase. Again, only if

this effect has a stronger influence on the sectoral exports than on the aggregate exports will this share increase.

As macroeconomic supply variables we have the interest rate representing the cost of capital. However, for the MPC countries data on interest rates is largely incomplete, so that the interest rate cannot be used as regressor. The consumer price inflation rate (cpiinfl_p) is also an appropriate supply variable because an unexpected increase lowers real wages, the cost of labor. As an indicator for aggregate labor productivity (larbprod_p) a nation's GDP divided by its population can be used. The ratio of the price level of consumer goods and investment goods (lpconinv_p) captures technical progress. The exchange rate (lexc_dp) is a supply variable as a revaluation of the own currency changes the prices of imported primary inputs. An appreciation for example (increase of lexc_dp) lowers the prices of imported primary inputs.

The aggregate import tariff rate (trf_op) is a supply variable with two possible effects. On the one hand, the lower it is the cheaper are imported intermediates. Sectors dependent on imported intermediate products would thus increase their production and exports by more than sectors which do not profit from cheaper primary products. On the other hand, lowering the import tariffs could lead to an influx of foreign goods and thus threaten the competitive position of some sectors. In those sectors production and exports would shrink by more than on average, so that their share of exports would go down. For the same reason as we explained in the section on the import demand equation we now include the tariff rate also with a one (trf_oplead1) and with a two period lead (trf_oplead2).

As exogenous demand shifters we use data on consumption or investment of the EU countries if a sector is producing consumption or investment goods, respectively. If usage of the traded good is ambiguous, we sometimes prefer GDP. Depending on what gives the best fit, we also express these variables in per capita terms or use the gross ratios consumption or investment over GDP. Also the long term interest rates of the EU countries (intl_d) are used as exogenous demand shifters.

As in the import demand functions we capture unobserved specific effects of the MPC (Asean, Mercosur) countries with each EU country by including merely a dummy for each EU country (26 dummies plus the constant). Moreover, we include the geographical distance between each (*i,j*) pair of countries. The same restriction to its interpretability is valid as in the import demand function so that we do not report its magnitude.

The results are presented first for the MPCs and then ASEAN and Mercosur countries. We slightly modify the standard one-digit groups of SITC Rev.3 sectors to discuss the specialization effects.

4. Specialization Effects for the Mediterranean Partner Countries[3]

4.1. Specialization Effects in "Food, Beverages and Tobacco"

a) Import Specialization, cf. Table 4.1a

The dependent variable in the panel estimation of the sectoral import demand functions is the import share. It is defined as the import from each EU country to a particular MPC in a particular sector divided by the imports from all EU countries to this particular MPC. The denominator, summing up upon all sectors and all EU countries thus is a very broadly defined variable. The imports in the numerator, being a tiny part of total trade, have almost no influence on the denominator.

Since each particular two-digit SITC category is small relative to total imports, we can assume that the import tariff of a single sector has only a negligible influence on the aggregate imports from the EU. Thus, a change of the sectoral import translates into a proportional change in the import share. In the case of a decreasing sectoral import tariff (as it is to be expected under trade liberalization) substitution and income effects should cause the sectoral imports to increase, i. e. the estimated regression coefficient should be negative.

The results in Table 4.1a show that the coefficients of the sectoral import tariffs have the expected negative sign whenever they are significant. It is interesting to note that in all three cases the sectoral tariff rate with a one period lead is the significant one. It means that the economic agents anticipate the tariff rate decrease and change their behavior one period before it actually takes place.

[3] Prepared by Dorothea Lucke and Bernd Lucke.

Table 4.1a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Specific sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
00	Life animals	-0.075 (0.035)								--		--
01	Meat, meat production		-0.127 (0.052)		**+0.154** (0.055)					--		
02	Dairy products, birds eggs			+0.111 (0.052)				**-3.059** (0.916)			-	--
03	Fish			**+0.027** (0.006)							-	--
04	Cereals, cereal preparations						**-0.320** (0.040)	+4.480 (1.766)			--	
05	Vegetables, fruit						**-0.031** (0.007)	**+1.947** (0.416)				--
06	Sugars, honey		**+0.305** (0.060)						+3.651 (1.467)			
07	Coffee, tea, cocoa, spices			**-0.019** (0.005)				**-0.834** (0.175)	**+0.552** (0.208)		++	--
08	Feeding stuff for animals		**+0.074** (0.025)				**-0.042** (0.015)	-1.150 (0.564)		--		++
09	Miscellaneous edible products		**-0.047** (0.013)						-0.666 (0.278)	--		--
11	Beverages		**-0.072** (0.013)	**-0.038** (0.014)				+0.361 (0.166)		--		-
12	Tobacco			-0.068 (0.027)					+1.447 (0.693)	--		

* The regressor used is the first difference of the indicated variable.
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

In many sectors, however, the sectoral import tariff has no significant impact on the import share. This may be due to a low price elasticity of demand, i. e. habit persistence, at least in the short run. It may also be the case that there is insufficient variance in some specific sectoral tariff rates between 1988 and 2010. This is probably the case in sectors 01 “meat and meat preparations” or 06 “sugars and honey”.

The reactions to a declining unweighted average of import tariffs are very different among sectors. A positive coefficient for the average import tariff means that the import share of sector *i* decreases with a declining average import tariff. While holding the specific tariff rate of sector *i* constant, a declining average import tariff is equivalent to an increase in the relative price of the products of sector *i*. If the goods of sector *i* are easily substitutable by goods of other sectors the economic agents can avoid the rise in the relative price by shifting their demand away from sector *i* to all the other sectors.

In sectors 02, 03, 06, 08 the estimated coefficients are positive so that we can presume that there will be substitution away from these sectors to the goods of other sectors. In sector 08 “Feeding stuff for animals” the import share increases when the sectoral import tariff goes down but decreases when the average import tariff falls. In terms of magnitude, the effect of the unweighted average tariff rate is greater than the effect of the sector’s own rate.

A negative coefficient for the unweighted average import tariff means that the import share of sector *i* goes up when the aggregate import tariff is declining. This reaction of the import share is likely if the products of sector *i* are on average complementary to the other industrial products. The economic agent will then use the increased disposable income, which is caused by the generally decreasing external protection to import more products of sector *i* as well as to increase his imports from all other industrial sectors. The reaction of the import shares of sectors 00, 07, 09, 11 and 12 reveals the complementary relationship of their products to all other industrial products. In sector 11 “beverages”, the process starts already one period ahead of the general decline in import tariffs and continues in the subsequent year.

In sector 01 “meat, meat production” we observe a decrease of the import share two periods ahead of the decline in aggregate import tariffs, i. e.an anticipation effect indicative of rational inaction. When aggregate tariffs actually fall, the import share of sector 01 is increasing. Combining the effects leaves the import share basically unchanged.

Most of the reactions in this group of sectors take place with a one period lead or are simultaneous to the reduction of the import tariffs.

Let us now turn to price effects. In the sectors 06 “sugars and honey” and 12 “tobacco” the import shares decrease in period t, in sector 04 “cereals, cereal preparations”, 05 “vegetables and fruits” and 11 “beverages” the import shares

decrease with a one period lag in response to a fall of the relative import price. This result is most likely if demand for those goods is price inelastic compared to demand for imports from the EU altogether.

In sector 07 “Coffee, tea, cocoa, spices” the import share falls in the period of the relative price decrease and increases above its initial level in t-1. This estimation result suggests that the demand for the goods of sector 07 is more price elastic than the demand for the aggregate imports from the EU. The same is true for the products of sector 08 “Feeding stuff for animals”, sector 09 “miscellaneous edible products” and even more so for those of sector 02 “dairy products, birds eggs”.

The other explanatory variables, GDP, GDP/capita and the exchange rate are all macroeconomic variables which have an impact on the numerator and the denominator of the import share. The sign of the total effect then depends on whether the numerator or the denominator is more strongly affected. Rising GDP in the MPCs will strengthen their demand for imports. The negative signs for the regressor GDP imply that rising GDP in the MPCs will increase their demand for aggregate imports from the EU by more than it increases the import demand for the the specific good considered in the numerator. The same is basically true for GDP/capita. There is only one exception. In sector 07 “Coffee, tea, cocoa, spices” an increase in GDP/capita stimulates import demand for these goods by more than it increases import demand in general.

The exchange rate between the Euro and the currencies of the MPCs influences imports because an appreciation of the currencies of the MPCs (increase in e) makes imports from the EU cheaper and so demand for them will increase. In all but one sector belonging to the group “Food, beverages, tobacco” an appreciation of the currency of an MPC against the Euro increases demand for imports from the EU by more than it increases the import demand in a specific sector. The exception is sector 08 “Feeding stuff for animals.

Summing up Table 4.1b, we have the following results: In sectors 04, 05, 08 import shares are increasing if their sector specific tariff rates go down. Besides, we have rising import shares in sectors 00, 07, 09, 11, 12 in response to falling average import tariffs. Thus, trade liberalization has led the MPCs to a positive import specialization in sectors 00, 04, 05, 07, 08, 09, 11 and 12. In sectors 02, 03, 06, 08 the import shares are shrinking when the average import tariffs go down, so that we deal with negative import specialization in these sectors. We will now look at the corresponding results of the export share equations before putting both sets of results in perspective.

b) Export Specialization

The dependent variable in the panel estimation of the sectoral export supply functions is the export share. It is defined as the export from a certain MPC to a certain EU member in a particular sector divided by the sum of industrial exports of this MPC to the EU member. Thus, the denominator is less broadly defined as in the import share analysis.

Table 4.1b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
00	Life animals					**+0.025** (0.006)					--
01	Meat, meat production	+0.003 (0.001)						++	--	++	
02	Diary products, birds eggs				+0.003 (0.001)				--		-
03	Fish		-0.050 (0.025)				-0.744 (0.299)	--		--	+
04	Cereals, cereal preparations	**-0.011** (0.004)		+0.011 (0.005)		**+0.189** (0.058)				--	
05	Vegetables, fruit						-0.721 (0.356)		+	--	
06	Sugars, honey						**+0.551*** (0.148)				
07	Coffee, tea, cocoa, spices		+0.007 (0.003)					-			
08	Feeding stuff for animals	**+0.057** (0.009)					**+0.390** (0.128)		--	++	
09	Miscellaneous edible products			**+0.010** (0.004)			**+0.137** (0.043)			++	
11	Beverages				**-0.042** (0.014)			--		--	
12	Tobacco			-0.053 (0.024)			-1.033 (0.471)	--	++		-

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

The estimation results confirm that the sectoral exports of a country can be positively or negatively influenced by the (unweighted) average import tariff. A negative coefficient means that the export share is increasing when the aggregate import tariffs fall. This reaction of exports will result if firstly the general reduction of import tariffs cheapens primary inputs in a sector in such a way that the sector gains international competitiveness and can increase its exports and secondly if this effect is stronger than on the average of all industrial sectors in this country. This is what we defined as positive export specialization in our theoretical outlay.

According to our estimation results the sectors 03 “fish”, 11 “beverages” and 12 “tobacco” fall into this category. The reactions happen with different lags. As the enactment of the reduction in tariffs is ratified years ahead of the actual reduction industries can adapt early to the foreseeable changes. The export shares of sectors 11 and 12 react with a lead of two years and one year, respectively. The export share of sector 03 reacts in the period of the tariff change.

A positive coefficient expresses that the export share is shrinking in response to lower average import tariffs. In this case it may be the availability of cheap imports which threatens the competitive position of domestic production in a sector. Domestic production suffers and as a consequence exports will decrease. This is what we defined as negative export specialization before. We observe such a reaction in sectors 01, 02, 07, 08, 09. The reaction times again are very different. The reaction may appear with a lead of two years or with a one year lag.

In some sectors belonging to the group “Food, beverages, tobacco” the unweighted import tariff has no significant influence on the export share. The export share of sector 04 decreases in period t+1 and returns to its original level in period t-1, so that the total effect is zero.

The estimation results show an increase of the export share in response to an increase in the relative export price in the sectors 04, 05, 06, 11, 12. The negative signs in sectors 02, 07, 08, 09 suggest that the correlation between the sectoral and the aggregate export price is strong and that the reaction of the aggregate export to a change in the relative export price is stronger than that of the sectoral exports.

Now consider the estimation results for the macroeconomic variables: The estimation results show that only in sector 01 “meat, meat production” the export share increases with an appreciation of the MPC currencies. In all other sectors where the exchange rate is significant it seems that its influence on aggregate export supply is stronger so that the export shares decrease.

An unexpectedly rising CPI inflation rate lowers labor costs, thereby increases domestic production and the export supply. Only in sectors 05 “vegetables, fruits” and 12 “tobacco” this effect is stronger than on the aggregate level so that we have rising export supply shares.

Rising labor productivity, measured by GDP/capita, also increases the domestic production and the export supply. In sectors 01, 08, 09 this effect is stronger than on the aggregate level so that their export shares go up.

The ratio of the price level of consumer goods and investment goods p_{con}/p_{inv} captures technical progress. This enhances domestic production and the export supply. This effect can rarely be detected, perhaps because the price index of investment goods does not properly take quality change into account. Only in sector 03 “fish” this regressor has a stronger influence on the sectoral than on the aggregate level so that the export share increases.

c) Implications for Production

We will now put together the results for export and import specialization. In chapter 2 we analyzed the implications of the different combinations of export and import specialization for production and we singled out four main cases. We discuss the estimation results against this background with respect to implications for sectoral specialization of production.

There is positive export specialization in sectors 03, 11 and 12. In sector 03 this comes along with negative import specialization. The implications for production are likely to be the following: The fall in the average import tariff increases the availability of cheap intermediate inputs and increases the competitiveness of a sector on the world market so that we perceive an increasing export share. If the

import share is shrinking at the same time there is strong evidence that the increased export share really is backed by higher domestic production and is not only based on an increased import share (case 1).

In sectors 11 and 12 the positive export specialization is combined with positive import specialization. In both sectors the import specialization is based on the increase in the import share in response to a falling average import tariff. The increase in the import share in turn is caused by the complementarity of these sectors' goods to all other industrial goods. Hence, the income effects of the falling average import tariff also increase demand for the goods of sector 11 and 12.

Part of this additional demand will fall on imported goods, while other parts will fall on domestically produced goods belonging to sectors 11 and 12, an imperfect substitute. Hence, there is more demand for the domestically produced goods of sectors 11 and 12 inside and outside the MPCs. It is thus very likely that domestic production has increased (case 3.a.) This view gets further support as in all three sectors import demand reacts relatively inelastic to relative price changes or exchange rate changes.

Table 4.1b shows that there is negative export specialization in sectors 01, 02, 07, 08, 09 in response to a decreasing average import tariff. The reason could be that cheaper imports threaten the competitive position of domestic production which then contracts. Our estimation results indicate that there is positive import specialization in sectors 07 and 09 so that in these sectors the crowding out of

domestic production is very likely (case 2). This hypothesis is further supported by the results for the import demand equation. The negative coefficients for the relative price signal that import demand for these sectors is relatively more price elastic than import demand for EU imports in general.

In sectors 01, 02 and 08 negative export specialization is combined with negative import specialization. This means that domestic and foreign demand shift away from commodities belonging to these sectors. This is strong evidence of shrinking production in sectors 01, 02, 08 (case 4).

4.2. Specialization Effects in "Crude Materials and Manufactured Goods Produced Thereof"

In this group of sectors we include crude materials and manufactured goods produced thereof. The conjecture is that import demand and supply for a certain material and the products made out of it are intricately related.

a) Import Specialization

Table 4.2a shows that the coefficients of the sectoral import tariffs are negative in sectors 26 "textile fibres", 27 "crude fertilizers", 28 "metalliferous ores", 64 "paper, paperboard, products thereof" and 68 "non-ferrous metals". The sectoral specific import tariff is partly significant with a one period lag, partly with no lag but most often it is significant with a one period lead.

Table 4.2a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff			Relative price (logs)		Other variables (logs)	
		t-1	t	t+1	t+2	t-1	t	t+1	t-1	t	GDP	e
21	Hides, skins, furskins, raw		-0.036 (0.014)							**+0.453** (0.152)		++
22	Oil-seeds, oleaginous fruits							**+0.095*** (0.031)	**-1.145** (0.441)			
23	Crude rubber					**+0.011** (0.003)					++	++
24	Cork and wood											
25	Pulp and waste paper			**+0.041* (0.013)**							--	++
26	Textile fibres		**-0.043** (0.012)					**-0.050*** (0.019)		**+0.372** (0.139		
27	Crude fertilizers							-0.028 (0.012)		+0.122 (0.051)	--	
28	Metalliferous ores			+0.180 (0.075)			**-0.262** (0.083)			**-3.337** (0.932)	++	
29	Crude animal, vegetable materials							+0.014 (0.006)	+0.426 (0.172)			
61	Leather, leather manufactures								**-0.918** (0.249)			
62	Rubber manufactures	**-0.030** (0.007)									--	
63	Cork and wood manufactures			**-0.019** (0.005)								--
64	Paper, paperboard , products thereof						**-0.038** (0.010)			**+1.029** (0.330)	--	

Table 4.2a continued

65	Textile yarn, fabrics			**-0.387** (0.140)				**+0.362*** (0.079)	**+10.140** (2.938)			
66	Non-metallic, mineral manufactures											
67	Iron and Steel									-1.463 (0.727)		
68	Non-ferrous metals						**-0.069** (0.026)			**+2.687** (0.701)		++
69	Manufactures of metals	**-0.046** (0.017)							**-1.526** (0.322)		--	-

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

In sectors 22 “oil-seeds, oleaginous fruits”, 23 “crude rubber”, 29 “crude animal, vegetable materials” and 65 ”textile yarn, fabrics” the import share goes down in response to a decreasing sectoral import tariff. The relevant coefficient in the first three of these sectors is rather small and in sector29 it is only significant at the 5 % level. Besides, in sectors 22 and 65 this is only a short run effect which is totally offset in the next period. The positive coefficients for the specific tariff rate probably occur because along with changes of sectoral tariff rates other, unobserved policy changes took place. These may be correlated with the tariff rate and thus affect the size and sign of its coefficient. For example, a policy that promotes competitiveness in the domestic country enhances domestic production and the competitiveness of domestic products relative to imports so that imports may decrease.

Import demand for crude materials reacts to a declining average import tariff partly with an increase (sector 21 “hides, skins, furskins, raw”, sector 26 “textile fibres”, partly with a decrease (sector 25 “pulp and waste paper”, sector 28 “metalliferous ores”). Obviously, the import demand for hides and skins and for textile fibres is relatively complementary to the import demand of other goods whereas import demand for pulp and waste paper and metalliferous ores is more easily substituted.

In contrast, import demand for the manufactured goods in this group is increasing with a falling average import tariff wherever the average import tariff is significant. The imported manufactured goods seem to have a rather complementary relationship to all other imported industrial goods.

Like in group 1, most of the reactions in this group of sectors take place with a one period lead.

In the sectors 21, 26, 27, 29, 64, 65, 68 the import shares decrease in response to a decrease in the relative import price. The highest coefficient is estimated for sector 65. This reaction is most likely if import demand for the goods is rather price inelastic and less elastic than the aggregate imports form the EU.

Import demands of sectors 22, 28, 61, 67, 69 increase if the relative import price is going down. This suggests that the demand for the goods of these sectors is rather price elastic and that the elasticity of the aggregate imports to changes in the relative import price is less elastic.

Rising GDP in the MPCs will strengthen their demand for imports. However, we have a positive coefficient of GDP only in sectors 23 and 28. Only in these two sectors an increase in GDP increases the sectoral import demand by more than the aggregate imports from the EU. In all other sectors where GDP is a significant regressor, the influence on the aggregate imports is stronger than on sectoral imports.

The exchange rate between the Euro and the currencies of the MPCs influences imports because an appreciation of the currencies of the MPCs makes imports from the EU cheaper and so demand for them will increase. In sectors 21, 23, 25, 68, an appreciation of the currency of an MPC against the Euro increases import demand for

the sectoral good by more than import demand from the EU on average. Only in sectors 63 and 69 the relationship is reverse.

We can conclude the following from Table 4.2a: In the case of trade liberalization with falling sectoral and average tariff rates import demand specializes on sectors 26, 64, 68. In all three sectors import demand reacts rather inelastic to changes in the relative import prices.

In sector 28 “metalliferous ores” the total effect is unclear. If the sectoral and the average tariff rate decrease by about the same degree the import demand share will increase as the reaction to the sectoral import tariff is much stronger than the reaction to the average tariff. Import demand specialization in favor of sector 28 is the result. If the average tariff rate goes down by more than the sectoral tariff rate it gets more likely that the import share decreases. However, one has to bear in mind that the reaction to the average tariff rate is only significant at the 5 % level. Crude materials like metalliferous ores witness large price changes over time. Table 4.2a tells that import demand for metalliferous ores is strongly price elastic. Thus, the import demand share will show large fluctuations over time which will overlay the reaction to the changing import tariffs.

In sector 65 the overall effect of the reduction in import tariffs is an increase of the import share as only the effect of the average import tariff on the import share is lasting.

Negative import specialization of a sector we have defined earlier as a fall in the sectoral import share in response to a decreasing sectoral import tariff or a falling average import tariff rate. The estimation results show that this is the case only in sectors of crude materials. These are the sectors 22, 23, 25, 29.

b) Export Specialization, cf. Table 4.2b

Among the sectors of crude materials the estimation results reveal positive export specialization in the sectors 23 “crude rubber”, 27 “crude fertilizers”, 28 “metalliferous ores”. Among the sectors of manufactured goods there is positive export specialization in sector 62 “rubber manufactures”, 67 “iron and steel”, 68 “non-ferrous metals” and 69 “manufactures of metals”. Crude rubber is the main intermediary input for “rubber manufactures” and metalliferous ores are the main intermediary inputs for sectors 67 “iron and steel”, 68 “non-ferrous metals” and 69 “manufactures of metals”. In addition, iron and steel and non-ferrous metals are intermediaries for the manufactures of metal. Thus we witness a vertical specialization of exports in the MPCs concurrent to the falling average import tariff rates.

A positive coefficient expresses that the export share is shrinking in response to lower average import tariffs. In this case it may be the availability of cheap imports which threatens the competitive position of domestic production in a sector. Domestic production suffers and as a consequence exports will decrease. We observe such a reaction in sectors of crude materials 21, 22, 24, 26, 29 and in the sectors of manufactured goods 61, 63, 65, 66.

Table 4.2b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
21	Hides, skins, furskins, raw		**+0.078** (0.018)	**-0.046** (0.018)				-			
22	Oil-seeds, oleaginous fruits	+0.006 (0.002)						--		++	
23	Crude rubber				-0.021 (0.009)			--		--	
24	Cork and wood			**+0.030** (0.009)							
25	Pulp and waste paper									--	
26	Textile fibres		**0.096** (0.015)								
27	Crude fertilizers			**-0.109** (0.029)			**-1.019** (0.408)		--	--	--
28	Metalliferous ores		**-0.071** (0.027)					--	-	--	
29	Crude animal, vegetable materials			**+0.076*** (0.021)		-0.786 (0.262)	+0.641 (0.286)	--			
61	Leather, leather manufactures			**+0.012** (0.003)							+
62	Rubber manufactures		**-0.028** (0.008)			-0.299 (0.136)					
63	Cork and wood manufactures		**+0.013** (0.002)			**+0.243** (0.079)		++	--		-
64	Paper, paperboard , products therof						-0.376 (0.187)	--			--

Table 4.2b continued

65	Textile yarn, fabrics		**+0.023** (0.009)				**+0.310** (0.082)		++		--
66	Non-metallic, mineral manufactures		**+0.029** (0.010)			**-0.267** (0.082)		--	++	++	
67	Iron and Steel		**-0.092** (0.035)	-0.071 (0.034)		-0.368 (0.169)		++		--	++
68	Non-ferrous metals				**-0.043** (0.013)			--		--	
69	Manufactures of metals			-0.019 (0.008)				--	--	++	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

The estimation results show an increase of the export share in response to an increase in the relative export price in the sectors 63, 65. The negative signs in sectors 27, 29, 62, 64, 66, 67 suggest that the reaction of the aggregate exports to a change in the relative export price is stronger than that of the sectoral exports.

Now consider the estimation results for the macroeconomic variables: The estimation results show that only in sectors 63 and 67 the export shares increase with an appreciation of the MPC currencies. In all other sectors where the exchange rate is significant it seems that its influence on aggregate export supply is stronger so that the export shares decrease.

An unexpectedly rising CPI inflation rate lowers labor costs, thereby increases domestic production and the export supply. Only in sectors 65, “textile yarn, fabrics” and 66 “non-metallic, mineral manufactures” this effect is stronger than on the aggregate level so that we have rising export supply shares.

Rising labor productivity, measured by GDP/capita, also increases the domestic production and the export supply. In sectors 62, 66, 69 this effect is stronger than on the aggregate level so that their export shares go up.

The ratio of the price level of consumer goods and investment goods p_{con}/p_{inv} captures technical progress. This enhances domestic production and the export supply. Only in sectors 61 and 67 this regressor has a stronger influence on the sectoral than on the aggregate level so that the export share increases.

c) Implications for Production

There is positive export specialization and negative import specialization in sector 23 “crude rubber”. This combination is a strong indicator for specialization of production in favor of sector 23. In sector 62 “rubber manufactures”, there is positive export and import specialization. The positive import specialization is based on the complementary character of rubber manufactures and the other industrial goods. If we assume the same relationship between the domestic production in this sector and domestic production in general, the demand for domestically produced rubber would increase as well. In this case the positive import specialization is compatible with a specialization of production in favor of sector 62.

To the other group of vertically connected sectors which exhibit positive export specialization belong the sectors 28 “metalliferous ores” and the metal manufacturing sectors 67, 68 and 69. If we assume a similar drop in the average and the sectoral tariff rate there is positive import specialization in sector 28. This is also the case in sector 68 because the negative coefficient for the sectoral import tariff and in sector 69 because of the negative coefficient of the average import tariff. In the import share equation of sector 67 the sectoral and the average import tariffs are not significant. For sectors 67 and 69 these results suggest a positive specialization in production. For sectors 28 and 68 the outcome with respect to production is unclear without further evidence (case 3.b.).

However, the unequivocal export specialization in vertically connected sectors is a strong argument that there is a specialization in production in favor of all these sectors. Besides, the specialization of production in vertically connected sectors entails that the MPCs concentrate their domestic production in sectors where they meet very different import demand behavior.

In sector 27, there is positive export and import specialization. The positive import specialization is based on the increase in the import share as a response to a decreasing sectoral import tariff. This combination leaves the effects on production unclear.

There is negative export specialization in sectors 21, 22, 24, 26, 29, 61, 63, 65 and 66. Combined with positive import specialization in sectors 21, 26, 63 and 65 the outcome will most likely be a specialization of production away from these sectors. The combination with negative import specialization in sectors 22, 24 and 29 means that the sectors are retreating from the world market. Under a trade liberalization scenario this is evidence for a shrinking production.

Table 4.3a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
41	Animal oils and fats					**-0.004** (0.001)			0.026* (0.012)			++
42	Fixed vegetable fats and oils		+0.061 (0.027)						**-2.305** (0.491)			
43	Animal or vegetable fats and oils, processed						**-0.015** (0.005)		**1.234** (0.160)			

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

Table 4.3b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
41	Animal oils and fats	not enough observations									
42	Fixed vegetable fats and oils			**-0.053*** (0.011)		**-0.985** (0.102)		--	+	++	++
43	Animal or vegetable fats and oils, processed	**+0.001** (0.000)								--	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

4.3 Specialization Effects in “Animal and Vegetable Oils, Fats and Waxes”

a) Import Specialization

Table 4.3a shows the normal negative reaction to a decrease of the sectoral import tariffs in sectors 41 “animal oils and fats” and 43 “animal or vegetable fats and oils, processed”. In these two sectors the average import tariff has no significant impact on the import shares.

In sector 42, the import share decreases if the average import tariff declines. A drop in the relative import price increases the import share in sector 42 but decreases it in sectors 41 and 42. The exchange rate has a significant influence only in sector 41. The positive sign means that the exchange rate has a stronger impact on sectoral imports than on the total imports from the EU.

Thus, we have positive import specialization in sectors 41 and 43 and negative import specialization in sector 42.

b) Export Specialization

We learn from the estimation results in Table 4.3b that the export share decreases in response to a lower average import tariff in sector 43 but it increases in sector 42. Besides, the export share of sector 42 rises if its relative export price is going down. In addition, the export supply of sector 42 is more sensitive to changes in the CPI inflation rate, the labor productivity and the ratio of the relative price index of

consumer and investment goods than exports are on average. Only the exchange rate has a stronger influence on aggregate exports than on the sectoral ones.

Hence, we have positive export specialization in sector 42 and negative export specialization in sector 43.

c) Implications for Production

The positive export specialization in sector 42 comes along with negative import specialization which is a strong indication for specialization of production in favor of sector 42.

By contrast, the negative export specialization in sector 43 is combined with positive import specialization. This most probably entails a shrinking production share in sector 43.

4.4 Specialization effects in "Chemicals and Related Products, n.e.s."

a) Import Specialization

Table 4.4a shows that the coefficients of the sectoral import tariffs are negative in sectors 54 "medicinal and pharmaceutical products" and 56 "fertilizers". We get a positive coefficient only in sector 52 "inorganic chemicals". The sectoral specific import tariffs are significant either with no lag or with a one period lead.

Table 4.4a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs			Sectoral import tariff			Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t-1	t	t+1	t-1	t	GDP	GDP/Pop	e
51	Organic chemicals	-0.044 (0.018)									++	
52	Inorganic chemicals					-0.042 (0.017)	**+0.055** (0.019)				+	+
53	Dyeing, tanning, colouring materials			**+0.028** (0.008)								++
54	Medicinal and pharmaceutical products					**-0.191** (0.073)						-
55	Essential oils, toilet, polishing preparations			**-0.045** (0.014)				**-0.908** (0.320)		--		
56	Fertilizers						**-0.094** (0.011)		**-0.169** (0.054)		--	
57	Plastics in primary forms			**+0.053** (0.018)				**-1.992** (0.376)		++		++
58	Plastics in non-primary forms			-0.020 (0.008)								++
59	Chemical materials and products, n.e.s.		**+0.046** (0.013)					**-0.397** (0.153)				++

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

The import demand share reacts to a declining average import tariff partly with an increase (sector 51 “organic chemicals”, sector 55 “essential oils, toilet, polishing preparations”, 58, “plastics in non-primary forms”) and partly with a decrease (53 “dyeing, tanning, coloring materials”, 57 “plastics in primary forms”, 59 “chemical materials and products, n.e.s.”).

Like in the other two groups of sectors discussed earlier, most of the reactions to changes in the average tariff rate in this group of sectors take place with a one period lead.

The significant reactions to changes in the relative import price are all negative, so that the import shares increase in response to a decrease in the relative import price. This suggests that chemicals and related products are rather price elastic and more price elastic than aggregate imports from the EU.

Neither GDP nor GDP/capita are important regressors in describing the import demand of chemicals and related products. Only in sectors 51, 52, 57, GDP or GDP/capita have a stronger influence on the sectoral import demand than on the import demand for EU products.

However, the reactions of the sectoral import demands to changes in the exchange rate are remarkable. An appreciation of the domestic currency cheapens the imports compared to domestically produced goods. The positive coefficients in all but one sector reveal that this effect is stronger in “chemicals and related products” than for

the demand for EU products in general. This is another sign of how price elastic import demand for chemicals is. The exception is sector 54 “medicinal and pharmaceutical products”. For this sector we do not find a significant relationship between the import demand share and the relative import price either.

Summing up the results for the import demand, we get:

There is positive import specialization in sectors 51, 54, 55, 56, 58 and negative import specialization in sectors 52, 53, 57, 59. “Chemicals and related products” is a group of sectors where the reaction to price changes seems to be rather strong whatever the reason: If the sectoral import tariff goes down, the demand switches from domestically produced goods to imported chemicals. If the relative import price of chemical products increases import demand shifts to other industrial products and to a larger extent than in industry on average. The reaction of import demand to exchange rate changes is also above average. If the exchange rate rises and cheapens imports, import demand for chemicals rises by more than in industry on average.

b) Export Specialization, cf. Table 4.4b

Among the sectors of chemicals and related products the estimation results are very clear. In none of the sectors the export share rises if the average import tariffs fall. However, at a significance level of 1 % the exports shares of sectors 51, 52, 53, 54, 56, 57, 59 decrease in response to falling average import tariffs. Thus we have mostly negative export specialization.

Table 4.4b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
51	Organic chemicals			**+0.038** (0.008)						++	+
52	Inorganic chemicals			**+0.110** (0.033)				--		--	
53	Dyeing, tanning, colouring materials			**+0.035** (0.006)			+0.033 (0.014)			++	
54	Medicinal and pharmaceutical products		**+0.053** (0.018)					++	--		
55	Essential oils, toilet, polishing preparations						-0.643 (0.296)				
56	Fertilizers				**+0.138** (0.042)			++	--	--	
57	Plastics in primary forms			**+0.037*** (0.014)						++	
58	Plastics in non-primary forms									++	--
59	Chemical materials and products, n.e.s.		**+0.033** (0.011)							++	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/--mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

The relative export price is only significant in two sectors and only in two sectors an appreciation of the home currency influences the export supply by more than in industry on average. Thus, the export supply of chemicals and related products as a group seems to be rather independent of prices, input as well as output prices.

Unexpected CPI inflation and the ratio of the price level of consumer goods and investment goods are negligible as regressors. In contrast, labor productivity is mostly a significant regressor and the positive coefficients in sectors 51, 53, 57, 58, 59 reveal that higher labor productivity increases the export share of these sectors by more than in industry on average.

c) Implications for Production

Table 4.4b shows that there is negative export specialization in all sectors except for sectors 55 and 58 in which the average import tariff is not significant for export supply. This may mean that the cheaper imports of chemicals threaten the competitiveness of the domestic chemical industry so that production and exports go down.

This conjecture is supported by our result that import demand for chemicals is very price sensitive. The decrease of the sectoral import tariffs causes an influx of imported chemicals. The same is true for an appreciation of the home currency. In addition, a fall of the relative import price causes the import demand for chemicals to go down in favor of other industrial products. If demand for domestically produced

chemicals is as easily distracted in favor of other industrial goods, the competitive position of the domestic chemical industry suffers further.

These results go hand in hand with the import specialization in the sector of chemicals and related products:

Negative export specialization comes together with positive import specialization in sectors 51, 54, 56 and together with negative import specialization in sectors 52, 53, 57, 59. Both cases are evidence for a shrinking domestic production. The positive import specialization in sectors 55 and 58 suggests that also in these sectors domestic production has been replaced by imports.

In the group “chemicals and related products, n.e.s.” the case is strong that trade liberalization has largely caused a crowding out of domestic production.

4.5 Specialization Effects in “Machinery”

a) Import Specialization

Table 4.5a shows a rather inhomogeneous picture. There is the normal negative reaction to a decrease of the sectoral import tariffs in sectors 74 “general machinery”, 75 “office machines” and 76 “telecommunications”. By contrast, in sectors 72 “machinery for particular industries” and 77 “electrical machinery” the import demand shares decrease with a decreasing sectoral import tariff.

Table 4.5a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs			Sectoral import tariff			Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t-1	t	t+1	t-1	t	GDP	GDP/Pop	e
71	Power generating machinery	**-0.149** (0.051)										--
72	Machinery for particular industries				+0.137 (0.060)				-1.812 (0.887)			
73	Metalworking machinery			**+0.109** (0.028)						++		++
74	General industrial machinery					-0.126 (0.060)			**-3.190** (0.736)		-	
75	Office machines		-0.133 (0.066)				-0.176 (0.081)					
76	Telecommunications						**-0.237** (0.083)				-	
77	Electrical machinery					**+0.220** (0.046)					++	
78	Road vehicles	-0.182 (0.084)							**+11.616** (3.146)			
79	Other transport equipment										--	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

In sectors 71 “power generating machinery”, 75 “office machines” and 78 “road vehicles” the import share increases if the average import tariffs goes down. The import share decreases with a decreasing average import tariff in sector 73 “metal working machinery”.

Adjustment times vary from a lead of one period to a lag of one period.

In most of the machinery producing sectors the relative import price and the exchange rate do not play significant roles. However, the relative import price does play a significant role in sector 78 “road vehicles”. There we have a positive sign which signals that import demand for road vehicles is rather price inelastic. In sectors 72 and 74 we have negative signs which reveal a rather price elastic import demand compared to average import demand.

The exchange rate is significant in two cases. In sector 71 “power generating machinery” import demand reacts less strong to an appreciation of the home currency than the average of all EU imports whereas in sector 73 “metalworking machinery” import demand reacts stronger to an appreciation of the home currency than the average of all EU imports.

Let us sum up Table 4.5a with respect to the specialization effects: There is positive import specialization in sectors 71, 74, 75, 76, 78 and negative import specialization in sectors 72, 73, 77.

Table 4.5b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
71	Power generating machinery				+0.038 (0.019)		**-0.937** (0.328)				++
72	Machinery for particular industries	+0.023 (0.010)								++	
73	Metalworking machinery			**-0.018** (0.004)					-	--	
74	General industrial machinery						+0.147 (0.060)	++		++	
75	Office machines	+0.030 (0.012)							--	++	
76	Telecommunications					+0.650 (0.274)	**+1.515** (0.265)	++		++	
77	Electrical machinery			**+0.102** (0.019)			**+0.972** (0.270)	--		++	++
78	Road vehicles		**-0.213** (0.017)					++		--	
79	Other transport equipment						**+1.336** (0.359)			--	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

b) Export Specialization, cf. Table 4.5b

The results show an increase in the export shares of sectors 73 “metalworking machinery” and 78 “road vehicles” if the average import tariff falls. The export shares fall in sectors 71, 72, 75 and 77.

There are some sectors in which the relative export price does not have a significant influence on the sector’s export share. In most cases the influence is, however, positive. This shows that these export shares are rather price elastic compared to aggregate exports or that the correlation between the aggregate export price and the sectoral relative export prices is limited.

Now consider the estimation results for the macroeconomic variables:

The significant estimation results show that in all but one sector the export shares rise with an appreciation of the domestic currency. Obviously in all these cases the effect of cheaper imported primary inputs promotes production and exports by more than in industry on average.

The CPI inflation rate is only significant for the export supply share in two sectors but even in those the negative coefficient tells that e.g. an unexpectedly increasing CPI inflation rate increases industrial exports on average by more than the sectoral exports.

Labor productivity has a strong influence on exports of machinery. In sectors 72, 74, 75, 76, 77 the coefficients are positive. This means that increased labor productivity

rises the export share in those sectors by more than in the industry on average. In sectors 71 and 77 the influence of technical progress is stronger than on average.

c) Implications for Production

There is positive export specialization in sectors 73 and 78. The estimation results show that sector 73 is at the same time characterized by negative import specialization. This is a strong case for a specialization of production in favor of sector 73. In sector 78 the positive export specialization comes along with positive import specialization. The latter may be based on the complementarity of the sectoral goods to other industrial goods. Therefore, domestic production will likely benefit from a decrease in the average tariff rate. Hence, the evidence for a specialization of production in favor of sector 78 is strong.

As both sector 73 and sector 78 have to do with metal products, specialization in these fields complements very well the vertical specialization in metal production and the manufacture of metals, that the estimation results in the group ”crude materials and manufactures thereof” reveal.

Table 4.5b shows that there is negative export specialization in sectors 71, 72, 75, and 77. The negative export specialization we find in sectors 71 and 75 fits well to the positive import specialization in these sectors. More and cheaper imports caused by lowering the import tariffs supposedly threaten the competitive position of the domestic production which then contracts.

In sectors 72 and 77, the negative export specialization is combined with negative import specialization. This withdrawal from the world market will in the long run decrease the production share of these sectors.

4.6 Specialization Effects in "Miscellaneous"

a) Import Specialization

Table 4.6a presents a rather homogenous picture although the goods in this group of sectors are very heterogeneous. It includes consumer and investment goods and a sector "miscellaneous" which is in itself heterogeneous.

The estimation results show the normal negative reaction to a decrease of the sectoral import tariffs in sectors 81 "prefabricated buildings, sanitary, heating fixtures" and 84 "articles of apparel". In the other sectors the sectoral import tariffs are insignificant.

In sectors 82 "furniture, bedding , matrasses", 83 "travel goods, handbags", 85 "footwear", 87 "scientific and controlling instruments", 88 "photographic apparatus" and 89 "miscellaneous manufactured articles" the import demand share increases if the average import tariffs goes down. The import demand share decreases with a decreasing average import tariff only in sector 84 "articles of apparel".

Table 4.6a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
81	Prefabricated buildings, sanitary, heating fixtures					**-0.046** (0.008)				--		
82	Furniture, bedding , matrasses			**-0.029** (0.009)					**-0.773** (0.300)			-
83	Travel goods, handbags			**-0.004** (0.002)								
84	Articles of apparel		**+0.215** (0.058)				**-0.082** (0.032)		-1.358 (0.668)			
85	Footwear			-0.042* (0.016)					**-0.967** (0.326)			
87	Scientific and controlling instruments			**-0.095** (0.023)						--		++
88	Photographic apparatus		**-0.023** (0.006)						-0.311 (0.145)			
89	Miscellaneous manufactured articles		**-0.114** (0.040)						**+0.875** (0.331)	--		+

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

The reactions to the sectoral or the average import tariff take place with either a one period lead or without lead or lag.

In all but one case[4] a decrease of the relative import price causes the import share to go up. Thus import demand for these goods seems to be rather price elastic. The exception is sector 89 “miscellaneous manufactured articles”. There we have a positive sign which signals that import demand is rather price inelastic compared to the average of imports from the EU.

GDP or GDP/capita are insignificant as regressors in most of the sectors and where they are not, the influence on the imports from the EU exceeds the influence on the sectoral imports.

A rise in the exchange rate increases imports of sector 87 by more than all imports from the EU. The reverse is true for sector 82.

Summing up Table 4.6a, we can say, that there is positive import specialization in all sectors but sector 84 “articles of apparel”. In sector 84 the direction of the import specialization depends on the degrees with which the sectoral and the average import tariff are decreasing. If they go down by about the same amount sector 84 will experience negative import specialization.

[4] Only the significant cases are considered.

Table 4.6b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables			
		t-1	t	t+1	t+2	t-1	t	e logs	π	Y/L logs	p_{con}/p_{inv} logs
81	Prefabricated buildings, sanitary, heating fixtures		**-0.019** (0.005)	-0.010 (0.005)			-0.122 (0.054)	++	++	--	++
82	Furniture, bedding , matrasses		**-0.013** (0.004)	**-0.020** (0.004)			**+0.180*** (0.065)		-	--	+
83	Travel goods, handbags					-0.055 (0.023)				--	
84	Articles of apparel		**+0.160** (0.025)			**+0.593** (0.168)		+	++	--	++
85	Footwear		**+0.018** (0.006)	**+0.022** (0.007)			**+0.376** (0.088)	++	-		++
87	Scientific and controlling instruments						**+0.398** (0.091)	++	--	++	
88	Photographic apparatus						+0.144 (0.060)		--		
89	Miscellaneous manufactured articles								--	++	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

b) Export Specialization, cf. Tab le 4.6b

The results show an increase in the export shares of sectors 81 “prefabricated buildings, sanitary, heating fixtures” and 82 “furniture, bedding , matrasses” if the average import tariff falls. The export shares fall in sectors 84 and 85.

In most sectors the coefficient of the relative export price is positive. That signals that these export shares are rather price elastic. The coefficient is negative only in sectors 81 and 83.

Now consider the estimation results for the macroeconomic variables:

The estimation results show that in all sectors in which the exchange rate is a significant regressor the export shares rise with an appreciation of the domestic currency. Obviously in all these cases the effect of cheaper imported primary inputs promotes exports by more than in industry on average.

The CPI inflation rate and labor productivity are relevant regressors. Their influence on the sectoral export shares is in some sectors stronger, in some sectors weaker than in industry on average.

The influence of technical progress, measured by the quotient of the price indices for consumer and investment goods, is stronger than in industry on average in sectors 81, 82, 84, 85.

c) Implications for Production

The positive export specialization in sector 81 is combined with positive import specialization which is based on an increasing import share in response to a declining sectoral import tariff. This combination does not give enough information for a conclusion on the development of domestic production.

In sector 82 there is also positive export and import specialization however the positive import specialization is based on an increasing import share in response to a declining average import tariff. As we have explained earlier this situation is compatible with a specialization of production in favor of sector 82.

Table 4.6b shows that there is negative export specialization in sectors 84 and 85. In sector 84 that coincides with negative import specialization and in sector 85 with positive import specialization. In both cases there is strong evidence that this entails a shrinking domestic production.

4.7 Conclusions for Mediterranean Partner Countries

The analysis of MPC data reveals a fairly clear pattern of specialization in production in the course of trade liberalization.

The main fields of **positive specialization** are:

1. metal production, manufacturing of metals, metal working machinery

   This field of specialization basically includes the whole value added chain from the metal production up to road vehicles, including the machinery to manufacture metal production output.

   So it seems that MPCs enjoy a Ricardian comparative advantage in metal productioin. Trade liberalization seems to have induced the MPCs to specialize on and to create a field of competence around metals and up the value added chain.

2. rubber production and manufacturing of rubber

   A large part of the manufacturing of rubber is the production of tires. This is an intermediate input for the production of road vehicles. Therefore this field of specialization is again vertically related to the first one.

   As we have explained, positive specialization of production is compatible with an increasing import share in response to a declining average import tariff. The

reason is that sectors whose goods are complementary to other industrial goods benefit from the income effect of a lower average tariff. It seems likely that the goods belonging to the “field of competence” are complementary to each other. This is what the estimation results for the import demand equations have suggested for sectors 62, 69, 78.

3. beverages and tobacco

   The production of beverages and tobacco increases under trade liberalization. This stands in marked contrast to the production of most foodstuffs, which tends to decrease, see below.

The main fields of **negative specialization** are:

1. chemicals and related products

   Our results show that trade liberalization has caused a strong influx of chemicals and related products into MPCs and thus suggest that the domestic chemical industry with all its sectors has suffered from crowding out.

   According to our results, the chemical industry in the MPCs was extremely vulnerable to a threat from imports as import demand seems to be very price elastic.

2. crude materials and manufactures thereof

Except for the rubber and metal production as well as the respective manufacturing industries the results indicate a decline in production of crude materials and manufactures thereof.

3. food

   The estimation results suggest a decline in food production except for the production of fish.

Note that an earlier but less detailed FEMISE study (FEMISE (2010), annex 10) has broadly similar results.

5. Specialization Effects for ASEAN Countries[5]

The import share is now defined as imports from each EU country to a particular ASEAN country in a particular sector divided by the imports from all EU countries to this particular ASEAN country.

5.1. Specialization Effects in "Food, Beverages and Tobacco"

a) Import Specialization

The estimation results in Table 5.1a show that the reaction to a change in the sectoral import tariff has the normal negative sign in most of the sectors. These are the sectors 00 "life animals", 01 "meat and meat production", 02 "dairy products, birds' eggs", 06 "sugars, honey", 09 "miscellaneous edible products". By contrast, in sectors 03 "fish" and 08 "feeding stuff for animals" the coefficient for the sectoral import tariff is positive.

The reaction to a fall in the average import tariff is in all but one sector[6] an increase of the sectoral import share. The exception is sector 02 "dairy products, birds' eggs". This signals that the import demand for most food products, beverages or tobacco is rather complementary to all other industrial products. It is interesting to note that the import shares react to the change in the average import tariff mostly with a one period lead.

[5] Prepared by Dorothea Lucke and Bernd Lucke.
[6] Among the sectors for which the average import tariff is a significant regressor.

Table 5.1a: Regression results for sectoral import shares x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Specific sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
00	Life animals			**-0.493*** (0.136)			-0.081* (0.036)	**+0.938** (0.347)		+		-
01	Meat, meat production					-0.048 (0.019)					--	++
02	Dairy products, birds eggs			**+0.711** (0.128)		**-0.316** (0.085)		**-14.474** (2.974)	**+11.113** (2.865)			
03	Fish						0.011 (0.004)					
04	Cereals, cereal preparations			**-0.418** (0.146)					-6.014 (2.671)			--
05	Vegetables, fruit			**-0.036** (0.013)							-	+
06	Sugars, honey						-0.034 (0.016)		-1.185 (0.532)	+		--
07	Coffee, tea, cocoa, spices	-0.031 (0.013)								-		
08	Feeding stuff for animals			**-0.804*** (0.132)			**+0.082** (0.025)	**+1.096** (0.332)		++		
09	Miscellaneous edible products			-1.377* (0.595)			**-0.381** (0.068)			--		--
11	Beverages	-0.193 (0.078)								--		
12	Tobacco									--		--

* The regressor used is the first difference of the indicated variable.
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

Let us now turn to price effects. In the sectors 00 and 08 the import shares decrease in response to a fall of the relative import price. This result is most likely if demand for those goods is price inelastic compared to demand for imports from the EU altogether.

In sector 02 “dairy products, birds’ eggs” the import share falls in the period of the relative price decrease and increases above its initial level in t-1. This estimation result suggests that the demand for the goods of sector 02 is more price elastic than the demand for the aggregate imports from the EU. The same is true for the products of sector 04 “cereals and cereal preparations” and 06 “sugars, honey”.

The other explanatory variables, GDP, GDP/capita and the exchange rate have different effects on the import shares. In some sectors GDP or the exchange rate affect the sectoral import demands by more than the aggregate imports so that the the import share rises. In other sectors it is the other way round and the import share decreases. GDP/capita in all significant cases has a stronger effect on the aggregate than on the sectoral import demand.

Summing up Table 5.1a, we conclude that there is positive import specialization in sectors 00, 01, 04, 05, 06, 07, 09, 11. Negative import specialization is found in sector 03, however the effect is small and only significant at the 5 % level. In sectors 02 and 08 a declining sectoral import tariff and a declining average import tariff cause opposite reactions. In sector 02 the coefficient for the average tariff rate is about twice as large as the one for the sector specific tariff rate and in sector 08 this

relationship is about 10:1. If the fall in the average and the sectoral import tariff have similar magnitudes sector 02 will be characterized by negative and sector 08 will be characterized by positive import specialization.

Thus, the estimation results suggest, that the ASEAN countries have basically followed a positive import specialization on the whole group “food, beverages, tobacco”.

b) Export Specialization

The estimation results in Table 5.1b show that the export share is rising in response to a fall of the average tariff rate in sectors 03 “fish”, 05 “vegetables, fruit” and 07 “coffee, tea, cocoa, spices”. It is shrinking in sectors 01 “meat, meat production”, 06 “sugars, honey”, 08 “feeding stuff for animals” and 12 “tobacco”.

The effects of a change in relative export prices are mixed among the sectors. However, it is very obvious that on the export side the effects are much weaker than on the import side. The reason could be that there is a stronger correlation on the export side between the sectoral and the aggregate price and thus the reactions of the sectoral and the aggregate export supply are more similar.

Table 5.1b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative Price (logs)		Other Variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
00	Life animals										-	
01	Meat, meat production		-0.011 (0.005)	**+0.021** (0.007)		**+0.122** (0.047)			+			
02	Dairy products, birds eggs					-0.002 (0.001)						
03	Fish		+0.077 (0.036)	**-0.125** (0.044)				++		++		--
04	Cereals, cereal preparations					+0.185 (0.082)						++
05	Vegetables, fruit			**-0.163*** (0.025)		**+0.711** (0.217)	**-0.795** (0.224)		++	++	--	
06	Sugars, honey		**+0.008** (0.001)				+0.043 (0.018)	++		++	++	--
07	Coffee, tea, cocoa, spices		**-0.086** (0.011)					++	--	--		
08	Feeding stuff for animals			**+0.070** (0.016)		+0.310 (0.146)		-				
09	Miscellaneous edible products								--			
11	Beverages						-0.024 (0.010**)**					
12	Tobacco		**+0.018** (0.004)									

* The regressor used is the first difference of the indicated variable.
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

For the macroeconomic regressors we have the following results: The long term interest rate is an indicator for the cost of capital. If it increases the costs of production increase and production and export supply will be reduced. Thus, the mostly positive coefficients for the long term interest rate mean that the described effect of the long term interest rate has a stronger influence on the aggregate export supply than on the sectoral export supply. Consequently, the export share will rise in response to an increase of the long term interest rate.

By contrast, sectoral export shares are more strongly affected by changes in the CPI inflation rate than the aggregate export supply. Thus, in most sectors the export share rises after an increase in the CPI inflation rate.

c) Implications for Production

Putting the results of the import and the export share equations together we can conclude the following:

There is positive export and negative import specialization in sector 03 “fish”, which rather clearly signals that the production in this sector has been extended.

In sectors 05 “vegetables, fruit” and 07 “coffee, tea, cocoa, spices” the positive export specialization is combined with positive import specialization. As the positive import specialization is based on the complementarity of these sectors’ products to

all other industrial products this type of positive import specialization is compatible with an increase in domestic production.

There is negative export specialization and positive import specialization in sectors 01 “meat, meat production”, 06 “sugars, honey” and most likely also in sector 08 “feeding stuff for animals”. The results suggest that these sectors have suffered from trade liberalization and the production has shrunk. For sector 12 “tobacco” we find negative export specialization but the import demand does not exhibit any kind of specialization. It is unlikely that a sector can hold up its production in the long run if its export share is shrinking. Thus, a negative specialization in the production of tobacco has to be expected. In sectors 00, 04, 09, 11 the results suggest positive import specialization but trade liberalization has had no significant influence on export supply. This is not enough information for a conclusion on the development of production.

5.2 Specialization Effects in “Crude Materials and Manufactured Goods Produced Thereof”

a) Import Specialization, cf. Table 5.2a

The sectoral import tariffs are not significant in most of the import demand equations for crude materials. The exceptions are sectors 28 “metalliferous ores” with a negative coefficient, and 29 “crude animal, vegetable materials” with a positive coefficient. In both sectors the secotral import tariff is only significant at the 5 % level.

Table 5.2a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs			Sectoral import tariff			Relative price (logs)		Other variables (logs)		
		t	t+1	t+2	t-1	t	t+1	t-1	t	GDP	GDP/pop	e
21	Hides, skins, furskins, raw											--
22	Oil-seeds, oleaginous fruits									++		+
23	Crude rubber		**+0.027** (0.091)					**+0.741** (0.191)		++		-
24	Cork and wood	**-0.036** (0.010)						+0.443 (0.189)				--
25	Pulp and waste paper									++		--
26	Textile fibres								-0.628 (0.257)	-		--
27	Crude fertilizers											--
28	Metalliferous ores		**-2.866*** (0.845)				-0.954 (0.379)					
29	Crude animal, vegetable materials		**-0.089** (0.025)				+0.055 (0.024)			--		--
61	Leather, leather manufactures	**-0.782** (0.276)				+0.718 (0.211)						--
62	Rubber manufactures			**-0.066** (0.024)							+	-
63	Cork and wood manufactures	**-0.034** (0.006)						**+0.446** (0.117)			--	
64	Paper, paperboard , products thereof		**-0.565*** (0.176)			**-0.217** (0.072)					--	
65	Textile yarn, fabrics		+0.313 (0.159)			-0.125 (0.056)					++	--
66	Non-metallic, mineral manufactures		**-0.678** (0.258)								--	

Tab 5.2a continued

67	Iron and Steel	**+1.279** (0.222)									++	--
68	Non-ferrous metals	**+0.215** (0.045)				**-0.269** (0.056)		-0.407 (0.208)		++		++
69	Manufactures of metals		**+0.488** (0.189)			**-0.415** (0.115)			+3.262 (1.497)			+

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficients is presented in brackets below the coefficients.

In the sectors of manufactured goods the sectoral import tariff has a negative coefficient in sectors 64 “paper, paperboard, products thereof”, 65 “textile yarn, fabrics”, 68 “non-ferrous metals” and 69 “manufactures of metals”. By contrast, in sector 61 “leather and leather manufactures” the import share goes down if the sectoral import tariff is decreased.

Import demand for “crude materials and manufactures thereof” reacts to a declining average import tariff partly with an increase (sector 24 “cork and wood”, sector 28 “metalliferous ores”, sector 29 “crude animal, vegetable materials”, 61 “leather, leather manufactures”, 63 “cork and wood manufactures”, 64 “paper, paperboard, products thereof”, 66 “non-metallic mineral manufactures”) partly with a decrease (sector 23 “crude rubber”, 65 “textile yarn, fabrics”, 67 “iron and steel”, 68 “non-ferrous metals”, 69 “manufactures of metals”). The coefficients do not point to a special relationship between a sector producing a crude material and the sector producing manufactures thereof. Also among the sectors of crude materials and among the sectors of manufactures there does not seem to be special relationship as we have seen it in the MPCs.

Like in the MPCs and also group 1 in the ASEAN countries, most of the reactions in this group of sectors take place with a lead.

In the sectors 23, 24, 63, 69 the import shares decrease in response to a decrease in the relative import price. This reaction is most likely if import demand for the goods is rather price inelastic and less elastic than the aggregate imports from the EU.

Import demands of sectors 26 “textile fibres” and 68 “non-ferrous metals” increase if the relative import price is going down. This suggests that the demand for the goods of these sectors is rather price elastic and that the elasticity of the aggregate imports to changes in the relative import price is less elastic.

Rising GDP or GDP/capita in the ASEAN countries will strengthen their demand for imports. We have a positive coefficient of GDP od GDP/capita 22, 23, 25, 62, 65, 67. In these sectors an increase in GDP increases the sectoral import demand by more than the aggregate imports from the EU. In all other sectors where GDP is a significant regressor, the influence on the aggregate imports is stronger than on sectoral imports.

The exchange rate between the Euro and the currencies of the ASEAN countries influences imports because an appreciation of the currencies of the ASEAN countries (increase in e) makes imports from the EU cheaper and so demand for them will increase. However, only in sectors 22, 68, 69, an appreciation of the ASEAN currencies against the Euro increases import demand for the sectoral good by more than import demand from the EU on average. In most of the sectors of this group the relationship is reverse.

We can conclude the following from Table 5.2a: In the case of trade liberalization with falling sectoral and average tariff rates there is positive import specialization in sectors in 24, 28, 62, 63, 64, 66. Negative import specialization will be in sectors 23

and 67. For sectors 29, 61, 65, 68, 69 the result is ambiguous as the coefficients of the sectoral and the average import tariff have opposite signs. If we assume that the sectoral and the average tariff rates are lowered by similar amounts there will be positive specialization in sector 29 and negative specialization in sector 65. In the other sectors the total effect will be around 0.

b) Export Specialization, cf. Table 5.2b

The estimation results show that there is more positive export specialization among sectors producing crude materials and in turn that there is more negative export specialization among the sectors manufacturing the crude materials. We find positive export specialization in sectors 24, 25, 28, 29, 68, 69 and negative export specialization in sectors 22, 23, 61, 63, 64, 65.

The estimation results show a decrease of the export share in response to a decrease in the relative export price in the sectors 23, 24, 63, 69. The negative signs in sectors 26, 68 suggest that the correlation between the sectoral and the aggregate export price is strong and that the reaction of the aggregate exports to a change in the relative export price is stronger than that of the sectoral exports.

Table. 5.2b: Regression results for sectoral export shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
21	Hides, skins, furskins, raw											
22	Oil-seeds, oleaginous fruits	**+0.005** (0.002)						++				-
23	Crude rubber			**+0.054** (0.015)		**-0.651** (0.219)	**+1.035** (0.210)	--		++		--
24	Cork and wood	-0.049 (0.021)						++			++	++
25	Pulp and waste paper				**-0.071** (0.026)			++				--
26	Textile fibres							++	+		++	--
27	Crude fertilizers								--			
28	Metalliferous ores				**-0.086** (0.030)	**+0.464** (0.128)		++	-	--		
29	Crude animal, vegetable materials			-0.011 (0.005)					++		--	
61	Leather, leather manufactures		**+0.008** (0.002)						--			
62	Rubber manufactures								+		-	
63	Cork and wood manufactures		**-0.038** (0.015)	**+0.097** (0.021)				++	--	--	++	++
64	Paper, paperboard , products therof		**+0.012** (0.004)						--		++	

Table 5.2b continued

x 10^{-2}

65	Textile yarn, fabrics			**+0.061** (0.009)			+0.172 (0.074)	++	-		+	
66	Non-metallic, mineral manufactures							++		--		
67	Iron and Steel						**+0.106** (0.041)			++		--
68	Non-ferrous metals	-0.017 (0.007)							+		--	
69	Manufactures of metals		**+0.028** (0.009)		**-0.029** (0.010)		**-0.121** (0.046)	--	--			

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficients is presented in brackets below the coefficients.

The estimation results for the macroeconomic variables show that the long term interest rates representing the cost of capital have a strong influence on export supply. The long term interest rate is in most sectors significant as regressor. Its influence on the sectoral export supply mostly exceeds its influence on the aggregate export supply. The influence of the other macroeconomic variables is heterogeneous and without an obvious pattern.

c) Implications for Production

The positive export specialization we have found in sectors 24, 25, 28, 29, 68 and 69 comes together with positive import specialization in sectors 24, 28 and 29[7]. In these three sectors the positive import specialization is based on the increasing import share in response to a decreasing average import tariff. As we have argued earlier this points to a rather complementary relationship between the goods of these sectors and all other industrial goods. If this feature also applies for domestically produced goods domestic production will increase as well. Therefore, a specialization of production in favor of sectors 24, 28 and 29 is very likely.

In the import demand equations of sectors 68 and 69 the effects of the sectoral and the average tariff rate basically compensate each other. Then, also in these sectors a positive specialization of production would be the likely result. The same is true for 25 where there is positive export specialization but no result on import specialization.

[7] We assume, as said earlier, that the average and the sectoral import tariff go down by similiar amounts.

With the specialization of production in favor of sectors 28, 68 and 69 there is vertical specialization also in the ASEAN countries. However, the vertical specialization is not as comprehensive as in the MPCs. Besides, we have to bear in mind that the result relies on the assumption that the sectoral and the average tariffs go down by about the same amounts.

The negative export specialization in sectors 22, 23, 61, 63, 64, 65 comes together with positive import specialization in sectors 63 and 64, with negative import specialization in sectors 23 and 65 and no import specialization in sectors 22 and 61. A specialization of production away from these sectors is most probable.

Within the group "crude materials and manufactures thereof" the emphasis of positive specialization in production lies on crude materials whereas the sectors suffering from negative specialization are mostly sectors producing manufactured goods.

5.3 Specialization effects in "animal and vegetable oils, fats and waxes"

a) Import Specialization

Table 5.3a shows the normal negative reaction to a decrease of the sectoral import tariffs in sectors 41 "animal oils and fats" and 42 "fixed vegetable fats and oils".

In all three sectors belonging to this group the import share decreases one period ahead of a decline in the average import tariff.

Table 5.3a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
41	Animal oils and fats			**+0.143*** (0.052)		-0.061* (0.029)						
42	Fixed vegetable fats and oils			**+0.056** (0.021)		-0.031 (0.014)				-		
43	Animal or vegetable fats and oils, processed			**+0.019** (0.003)				**-0.090** (0.033)				

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

Table 5.3b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
41	Animal oils and fats			**+0.059*** (0.019)								
42	Fixed vegetable fats and oils		**+0.098** (0.019)				-0.468 (0.214)	--			--	
43	Animal or vegetable fats and oils, processed		**-0.099** (0.038)	**+0.195** (0.040)				--		+	+	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

Thus, we have negative import specialization in sector 43 “animal or vegetable fats and oils, processed”. In sectors 41 and 42 the import specialization will be positive or negative depending on whether the average tariff rate or the sectoral tariff rates decline by more.

b) Export Specialization

We learn from the estimation results in Table 5.3b that in all three sectors the export shares decrease in response to a lower average import tariff. Hence, the whole group is characterized by negative export specialization.

c) Implications for Production

The combination of negative export specialization with positive or negative import specialization most probably translates into a specialization of production away from these sectors. The negative export specialization signals the lack of international competitiveness for the domestic production. Either, it can be cheaply imported – that is the case of positive import specialization – or there is no demand for the good – that is the case of negative import specialization.

Table 5.4a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs			Sectoral import tariff			Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t-1	t	t+1	t-1	t	GDP	GDP/Pop	e
51	Organic chemicals					**+1.692** (0.273)	**-1.066** (0.289)	**+4.619** (0.656)			++	--
52	Inorganic chemicals			**+0.117** (0.023)						++		
53	Dyeing, tanning, colouring materials		**+0.261** (0.066)								++	--
54	Medicinal and pharmaceutical products			+0.257 (0.129)				+5.126 (2.010)	+5.368 (2.175)			
55	Essential oils, toilet, polishing preparations							**+1.990** (0.482)				
56	Fertilizers			**+0.122** (0.028)		**-0.096** (0.026)		+0.251 (0.106)		++		
57	Plastics in primary forms		**+0.338** (0.048)				**-0.184** (0.048)	**+2.553** (0.584)	**-3.107** (0.757)	++		
58	Plastics in non-primary forms					-0.071 (0.029)				++		
59	Chemical materials and products, n.e.s.									++		--

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

5.4 Specialization Effects in "Chemicals and Related Products, n.e.s."

a) Import Specialization

Table 5.4a shows that the reaction of the import shares to a reduction in the sectoral import tariff is negative in sectors 56 "fertilizers", 57 "plastics in primary forms" and 58 "plastics in non-primary forms". In sector 51 "organic chemicals" the import share will increase one period ahead of the reduction but will decrease in the period of the reduction by even more so that the total effect will rather be a shrinking import share.

The results are homogenous with respect to the reaction to a sinking average tariff rate. Whenever this rate is significant the import share will go down. This indicates that chemicals and related products in the ASEAN countries are in a rather substitutional relationship to most other industrial imports.

The reaction to a decrease of the relative import price is also similar among the sectors. With one exception the import shares go down. This indicates that the price elasticity of the import demand for the goods of each sector is relatively price inelastic compared to the aggregate import demand.[8] The exception is sector 57. Here, the import share will go up in the period of the drop in the relative price but will go down to about the initial level in the following period.

[8] By contrast, the estimation results for the MPCs suggested that import demand for chemical products is elastic compared to the other industrial products.

Even the macroeconomic regressors alter the import shares of all sectors in this group in the same direction.

Whenever significant, GDP and GDP/capita increase the import share. This means that the reaction of the sectoral import demand to changes in these exogenous variables is stronger than on the aggregate level.

If the exchange rate of the ASEAN countries appreciates imports become cheaper and therefore import demand will increase. As the coefficents for the exchange rate are all negative the reactions of the sectoral demands to exchange rate changes are obviously less strong than on the aggregate level. This result supports our findings above that import demand for "chemicals and related products" is comparatively price inelastic.[9]

Summing up Table 5.4a with regard to negative or positive import specialization we get:

Sector 58 "plastics in non-primary forms" is the only sector in this group which exhibits an unequivocal positive import specialization but the coefficient which qualifies for that feature is only significant at the 5 % level. In sectors 56 and 57 the direction of import specialization depends on the extent with which the sectoral tariff and the aggregate tariff are decreasing. If they go down by the same amount both sectors are characterized by negative import specialization as are all other sectors in this group[10].

[9] Again, for the MPCs we get the opposite result.
[10] Whereever the tariff rates are significant as regressors.

Table 5.4b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
51	Organic chemicals					**+0.442** (0.096)		++	--	--	++	
52	Inorganic chemicals			-0.002 (0.001)					++		--	
53	Dyeing, tanning, colouring materials						**-0.100** (0.033)					
54	Medicinal and pharmaceutical products								--		++	
55	Essential oils, toilet, polishing preparations											
56	Fertilizers	Not enough observations										
57	Plastics in primary forms			-0.020 (0.010)			**+0.259** (0.061)	++			++	--
58	Plastics in non-primary forms								--		++	
59	Chemical materials and products, n.e.s.							-	++		--	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

b) Export Specialization, cf. Table 5.4b

In the equations for export supply the average tariff rate is significant as a regressor only in the sectors 52 “inorganic chemicals” and 57 “plastics in primary forms”. In both sectors the coefficient for the average tariff rate is negative signaling positive export specialization. Both coefficients are rather small and only significant at the 5 % level.

The relative export price is only significant in three sectors and only in sectors 51 and 57 a decrease in the relative price causes the sectoral import share to go.

The reactions of the sectoral import shares to changes in the macroeconomic variables do not follow a pattern. In some sectors the sectoral import demand reacts more strongly to a change in a macroeconomic variable than the aggregate import demand, in some sectors it is the other way round.

c) Implications for Production

We have strong results for import demand: The group “chemicals and related products” has seen negative import specialization along with genereal trade liberalization (as measured by the average tariff rate) and the usual positive import specialization with respect to the sectoral tariff rate. These two developments partially offset each other. Besides, there is not much response of exports to trade liberalization and import demand is inelastic with respect to changes in the relative import prices and the exchange rate. We thus conjecture that in most sectors -

except for sectors 52 and 57 – trade liberalization has had little impact on production.

In sectors 52 and 57 the negative general import specialization coincides with positive export specialization. This combination may suggest increased production in these sectors. However, we should keep in mind that the results on the export side are not very strong, neither in magnitude nor in power.

5.5 Specialization Effects in "Machinery And Transport Equipment"

a) Import Specialization

Table 5.5a shows that whenever significant the coefficients for the sectoral import tariff are negative. That means that decreasing sectoral tariffs initiate a substitution process in demand away from domestically produced towards imported machinery.

The import demand share increases with a decreasing average import tariff in sectors 77 "electrical machinery" and 78 "road vehicles". In sectors 72 "machinery for particular industries", 76 "telecommunications" and 71 "power generating machinery" the import demand share decreases if the average import tariffs goes down. In sector 71 the immediate strong decrease is partially offset after two periods.

Table 5.5a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
71	Power generating machinery	**-2.039** (0.730)		**+2.749** (0.847)								++
72	Machinery for particular industries			**+1.872** (0.360)			**-1.269** (0.491)					--
73	Metalworking machinery									++		
74	General industrial machinery						-0.881 (0.422)	+13.042 (6.493)				
75	Office machines					-0.237 (0.104)			**+12.437** (1.767)		--	++
76	Telecommunications			**+1.869** (0.701)			**-2.376** (0.649)			--		--
77	Electrical machinery		**-2.331** (0.688)			**-2.331** (0.657)	-1.682 (0.688)					++
78	Road vehicles				**-1.023** (0.330)				**-24.598** (7.521)	--		
79	Other transport equipment					**+11.861** (3.170)	**-16.402** (3.284)		+67.559 (28.374		++	

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

We should note that in this group of sectors the reactions speeds to changes in the regressors are without pattern and reach from a reaction with a lead of two periods to a reaction with a lag of one period. We got the same finding in the group "machinery" in the MPCs

In many of the machinery producing sectors the relative import price does not play a significant role and if it is significant the coefficient for the relative price is positive (except for sector 78). This signals that import demand for machinery is rather price inelastic compared to aggregate import demand. In sector 78 the coefficient is negative and of great magnitude so that we can conclude that import demand for road vehicles in very price elastic.

From Table 5.5a we see, that the macroeconomic variables cause in some sectors an increase and in some a decrease of the import share, depending on whether the reaction of the sectoral import demand is stronger or weaker than the reaction of aggregate import demand.

Summing up Table 5.5a, we can conclude that there is positive import specialization in sectors 74 "general industrial machinery", 75 "office machines", 77 "electrical machinery", 78 "road vehicles", 79 "other transport equipment". In sectors 72 "machinery for particular industries" and 76 "telecommunications" the total effect is unclear and depends on the relative strengths of the decreases in the sectoral and the average import tariffs. Unambiguous negative import specialization we only find in sector 71 "power generating machinery".

Table 5.5b : Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
71	Power generating machinery			+0.026 (0.013)					-		++	
72	Machinery for particular industries						**+0.151** (0.046)				++	
73	Metalworking machinery					**+0.062** (0.013)		+	--		++	
74	General industrial machinery		-0.078 (0.032)	**+0.146** (0.043)		-0.293 (0.148)		--			++	
75	Office machines			**-0.338** (0.045)			**-1.330** (0.457)		++			
76	Telecommunications	**-0.112** (0.028)					**-0.738** (0.151)		++		--	
77	Electrical machinery			**-0.374** (0.042)			**+0.432** (0.114)		++		--	
78	Road vehicles								-		++	+
79	Other transport equipment	-0.085 (0.044)					-0.470 (0.185)	-				

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient

b) Export Specialization, cf. Table 5.5b

The results show an increase in the export shares of sectors 75 “office machines”, 76 “telecommunication”, 77 “electrical machinery” and 79 “other transport equipment” in response to a decrease in the average tariff rate.

The export shares are decreasing in sectors 71 “power generating machinery” and sector 74 “general industrial machinery”.

The response of the export supply to changes in the relative export price in some sectors is positive (sectors 72, 73, 77) which means that the sectoral reaction to the change in the relative price is stronger than the reaction of aggregate imports. If the coefficient is negative (sectors 74, 75, 76, 79) the sectoral export supply is less price elastic than aggregate export supply.

The influence of the macroeconomic variables is mixed among “machinery and transport equipment” and there is no observable pattern.

c) Implications for Production

There is positive export and import specialization in sectors 75, 76, 77, 79.[11] In all these sectors the positive import specialization is caused by the increase of the import share in case of a declining sectoral import tariff rate. Therefore, the impact on production is unclear.

[1111] In order to be able to classify the results we assume that the degrees to which the sectoral and the average tariff rates drop are similar.

Negative export specialization has been revealed in sectors 71 “power generating machinery” and 74 “general industrial machinery”. In sector 71 it is combined with negative import specialization. Power generating machinery is a high technology sector with constant technical progress so that a reduction of the export share is very likely a sign of decreasing international competitiveness. A decline in production capacity in sector 71 would be the consequence.

In sector 74 the negative export specialization comes together with positive import specialization. This combination signals a shift away from domestic production.

5.6 Specialization Effects in “Miscellaneous Manufactured Articles”

a) Import Specialization

Table 5.6a shows that the sectoral import tariff is a very important regressor in this group and that the reaction to changes in it is the normal negative one. The average import tariff is significant only in two sectors. These are sectors 85 “footwear” and sector 87 “scientific and controlling instruments”. In both sectors the import share will go up if the average tariff rate goes down. The relative prices and also the macroeconomic variables are significant only in a few sectors. In all but one case the reaction of the sectoral import demand to a change in the regressor is weaker than the reaction of the average of imports.

Summing up Table 5.6a we can say that in all sectors in which import tariffs play a role as regressors, there is positive import specialization.

Table 5.6a: Regression results for sectoral import shares

x 10^{-4}

SITC Nr.	Description	Unweighted average of import tariffs				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	t	GDP	GDP/Pop	e
81	Prefabricated buildings, sanitary, heating fixtures					**-0.072** (0.015)		**-2.164** (0.529)		--		
82	Furniture, bedding , matrasses						-0.100 (0.042)			--		
83	Travel goods, handbags					-0.012 (0.006)			**+1.220*** (0.308)			
84	Articles of apparel											
85	Footwear			**-0.315*** (0.091)			**-0.038*** (0.014)					
87	Scientific and controlling instruments			**-0.394** (0.122)								
88	Photographic apparatus						**-1.904*** (0.577)					
89	Miscellaneous manufactured articles											

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

Table 5.6b: Regression results for sectoral export shares

x 10^{-2}

SITC Nr.	Description	Unweighted average of import tariffs				Relative price (logs)		Other variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
81	Prefabricated buildings, sanitary, heating fixtures			**-0.008*** (0.002)		**+0.029** (0.010)		++				-
82	Furniture, bedding , matrasses								--	++		
83	Travel goods, handbags								--	--		
84	Articles of apparel		**-0.127** (0.042)				**+1.917** (0.248)	++			++	--
85	Footwear		-0.096 (0.038)	**+0.228** (0.045)			**+0.446** (0.066)	+		--		
87	Scientific and controlling instruments										++	
88	Photographic apparatus								++		--	
89	Miscellaneous manufactured articles			**+0.085** (0.015)		-0.186 (0.089)			++			

* The regressor used is the first difference of the indicated variable
Bold numbers or ++/-- mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.
The standard deviation of the coefficient is presented in brackets below the coefficient.

b) Export Specialization, cf. Table 5.6b

The results show an increase in the export shares of sectors 81 “prefabricated buildings, sanitary, heating fixtures” and 84 “articles of apparel” if the average import tariff falls. The export shares fall in sectors 85 “footwear” and 89 “miscellaneous manufactured articles”.

In all but one sector the coefficient of the relative export price is positive. That signals that these export supplies are relatively price inelastic compared to aggregate export supply. The coefficient is negative only in sector 89.

Different from the import demand equations the macroeconomic variables are important for the specification of the export supply functions in this group. The reactions of the sectoral export supplies to changes in the macroeconomic variables are partly stronger, partly weaker than on average.

b) Implications for Production

The positive export specialization of sector 81 “prefabricated buildings, sanitary, heating fixtures” comes together with positive import specialization, which is caused by the negative reaction to a change in the sectoral import tariff. Therefore, the effect of trade liberalization on production is unclear.

By contrast, in sector 84 “articles of apparel” there is positive export specialization and no results on import specialization so that there is a strong case for an increase in domestic production.

In sector 85 “footwear” the estimation results show negative export and positive import specialization so that we can suppose that the production in the sector has gone down with trade liberalization. In sector 89 “miscellaneous manufactured articles” the import share does not significantly depend on the import tariffs. However, as sector 89 exhibits negative export specialization it is very likely that the domestic production shifts away from it.

5.7 Conclusions for ASEAN countries

Compared to the Mediterranean Partner Countries the estimation results for the ASEAN countries yield a less clear specialization pattern with respect to production. For most one-digit SITC groups, there is evidence of some two-digit group experiencing positive specialization while another two-digit group experiences negative specialization. Also, the relationship among the sectors of positive specialization (negative specialization) is not as strong as our estimation results suggest for the MPCs.

This finding can be interpreted quite intuitively. The ASEAN trade block exists for 45 years and production units in its countries have responded to trade liberalization ever since. The MPC countries, however, have a much shorter history of trade

liberalization. It is quite conceivable that a first response to trade liberalization affects economic sectors rather broadly, as previously distorted relative prices realign to reflect world market conditions more closely. This first, rather comprehensive adjustment may easily take a decade or more and it is probably what we witness in MPC's.

After this broad initial response to trade liberalization we may expect some more of what we call fine-steering. This is probably what happened in the ASEAN states. Our sample begins in 1988, i. e. ASEAN countries had liberalized their foreign trade already for twenty years at the begin of out sample. While tariff rates continued to fall substantially during the sample period, the course of trade liberalization had been set much earlier and economic agents had had plenty of time for big and important decisions. Hence, what is probably observed in our sample of ASEAN states are probably finer and subtler reactions to changes in tariff rates than in the MPCs.

This said, we note that there is still quite a bit of interesting developments revealed by our results. For instance, we find **positive specialization** of production

1. in the group "food, beverages, tobacco" in sectors 03 "fish", 05 "vegetables, fruit" and 07 "coffee, tea, cocoa, spices".

2. in the group "crude materials and manufactured articles thereof" among most sectors which produce crude materials. These are the sectors 24 "cork and wood", 25 "pulp and waste paper", 28 "metalliferous ores", 29 "crude animal and vegetable materials".

3. in non-ferrous metals (68) and manufactures of metals (69). Sector 28 and sectors 68 and 69 are vertically related.

4. in the group “chemicals and related products” in sectors 52 “inorganic chemicals” and 57 “plastics in primary forms”.

5. in the group “miscellaneous manufactured articles” in sector 84 “articles of apparel”.

There is **negative specialization** of production

1. in the group “food, beverages, tobacco” in sectors 01 “meat, meat production”, 06 “sugar, honey”, 08 “feeding stuff for animals” and 12 “tobacco”.

2. in the group “crude materials and manufactured articles thereof” among two sectors producing crude materials. These are the sectors 22 “oil seeds, oleaginous seeds”, and 23 “crude rubber”. As mentioned above, most other crude material producers show evidence of positive specialization.

3. in the group “crude materials and manufactured articles thereof” among many of the manufacturing sectors. These are the sectors 61 “leather, leather manufactures”, 63 “cork and wood manufactures”, 64 “paper, paperboard, products thereof, 65 “textile yarn, fabrics”.

4. in the whole group “animal and vegetable oils, fats and waxes”

5. in sectors 71 “power generating machinery” and 74 “general industrial machinery”.

6. in the group “miscellaneous manufactured articles” in sector 85 “footwear” and 89 “miscellaneous manufactured articles”.

6. Specialization Results for Mercosur Countries[12]

6. 1 Import specialization results for the Mercosur countries

In all panel estimations of the sectoral import demand functions for the group of Mercosur countries, our dependent variable is the import share, which is defined as the share of a particular sector's imports of a certain Mercosur country from a certain EU member in total industrial imports of this Mercosur country from that EU member.

We employ different sector-specific and macroeconomic variables, as well as a number of exogenous shifters. Table 1 reports our main results, especially for variables of interest (i.e., unweighted average import tariff, sector-specific import tariff, relative import price, GDP, GDP per capita and exchange rate). All these reported variables may affect sectoral import shares positively or negatively and in different lags. This table excluded the sectors if 1) neither of the estimated coefficients of tariff or relative import price variable were found to be statistically significant, 2) if only estimated coefficients of macro and lagged dependent variables were found to be statistically significant.

If there is strong substitution among imported goods, then a general decrease in the aggregate import tariff rate --- increasing the relative price of imported good i (holding the specific tariff fixed) --- increases imports in general (the income effect) --- so both the denominator and the nominator are increasing --- and decreases imports of good i and increases imports of other goods (the substitution effect) --- so the nominator is decreasing, and the denominator is increasing --- with which the import share of good i decreases, that is, a positive coefficient. If there is strong complementarity among imported goods, then a

[12] Prepared by Selim Cagatay and Murat Genc.

general decrease in the aggregate import tariff --- increasing the relative price of imported good i (holding the specific tariff fixed) --- increases imports in general (the income effect) --- so both the denominator and the nominator are increasing --- and, due to good i being complement to other imported goods, slightly increases imports of good i along with an increase in imports of other goods (the substitution effect) --- so the nominator is increasing further --- with which the import share of good i may increase or decrease. If the increase in the denominator is larger than the increase in the nominator, then the import share decreases, that is, again, a positive coefficient. If, however, the increase in the nominator is larger than the denominator, then the import share increases, that is, a negative coefficient. In case of a reduction in sector-specific tariffs --- decreasing the relative price of imported good i --- there is an increase in imports in general (the income effect) --- so both the denominator (less in magnitude) and the nominator are increasing --- and if there is strong substitution among imported goods, then imports of good i increase, whereas imports of other goods decrease (the substitution effect) --- increasing the nominator further, and decreasing the denominator --- with which the import share of good i increases, that is, a negative coefficient. If, however, there is strong complementarity among imported goods, then a reduction in sector-specific tariffs --- decreasing the relative price of imported good i --- increases imports in general (the income effect) --- so both the denominator (less in magnitude) and the nominator are increasing --- and, due to good i being complement to other imported goods, an increase in imports of good i also slightly increases imports of other goods --- increasing the denominator further --- with which the import share of good i may increase or decrease. If the increase in the denominator is larger than the increase in the nominator, then the import share decreases, that is, a positive coefficient. If the increase

in the nominator is larger than the denominator, then the import share increases, that is, a negative coefficient.

An increase in the import share of a sector with an increase in the relative import price implies demand for that sector's goods is price inelastic and the correlation between the relative import price of that sector and the aggregate import price is low.

As for the macroeconomic variables of interest, a negative coefficient on GDP and per capita GDP in the destination country means that the demand impact for that particular sector is less than the overall demand impact in the destination country, therefore domestic absorption of that particular sector in the destination country increases less than overall domestic absorption. Those sectors in concern, in the destination country, are probably less income elastic. Similarly, a positive coefficient on the exchange rate (defined as currency in the destination country over in the partner country) means an appreciation of Mercosur countries' currencies (a decrease in the exchange rate) decreases the import share of a sector. The intuition is that imports get cheaper and the increase in aggregate imports is probably more than the increase in the sectoral imports, with which the import share decreases.

In the next 10 short sections, technical interpretation of the sector-wise estimations in Table 6.1 will be written, then concluding remarks and overall evaluation will be presented in the last section.

Specialization effects in "food, live animals, beverages and tobacco"

(sectors #00-12, SITC-Rev 3, [see Table 6.1]):

An expected general reduction in unweighted average tariffs increases the share of sectors 00, 02, 03, 04, 05 and 06 in total imports. The effect of a general reduction in unweighted average tariffs, especially in the current year, is mixed. While it decreases the share of sectors 00 and 12 in total imports, the opposite is true for sector 03. An expected decrease in sector-specific tariffs, however, decreases sectoral shares (01, 03, 04, 05, 09) except for sector 11. This mixed impact is also observed for sector-specific tariff effects and for relative import price effects in the current year. A decrease in the sector-specific tariff in the current year increases the import share of sectors 00, 02, whereas decreases the import share of sectors 05, and 08. Similarly, a lagged relative price affects the shares of sectors 04, 06 and 12 positively, whereas the relative price in the current year affects sector 00 positively, and sectors 01, 02, 04, 08 and 12 negatively. The negative change in response to the relative import price in one year might be due to an elastic demand relationship that exists for these sectors. An appreciation of Mercosur countries' currencies (a decrease in the exchange rate) is observed to increase sectoral imports less than the increase in aggregate imports, so the import shares decrease, especially for sectors 01, 02, 04, 05 and 11. GDP impacts are mixed.

S*pecialization effects in "crude materials, inedible, except fuels"*

(sectors #21-29, SITC-Rev 3, [see Table 6.1]):

In this group the only sector that is affected by the unweighted average tariff is 26. An expected decrease in average tariffs seems to cause an increase in the share of imports of 26 in total. An increase in the relative import price in the current year, however, decreases its import share. We may say that sector 26 is relatively price sensitive compared to rest of the economy. A decrease in sector-specific tariffs increases sector 22's import share, whereas an expected decrease in sector-specific tariffs decreases sector 23's import share. Impacts of the relative import price is mixed. A rise in one-year lagged import price creates a fall in the import share of sector 23 but an increase in the current relative import price creates an increase in the same sector's import share. Time adjustment might be a reason behind this change.

S*pecialization effects in "mineral fuels, lubricants and related materials"*

(sectors #32-35, SITC-Rev 3, [see Table 6.1]):

Statistically significant and some consistent outcomes are found for sectors 32, 33 and 34. While unweighted average tariffs in the current year and import shares of sector 32 and 34 move in the same direction, sector-specific tariffs and sector 33's import share moves in the same direction. These findings suggest that overall impacts of both aggregate and sector-specific tariffs are larger than sector-specific impacts. Another consistency is observed in the estimated coefficients of the relative import price. A rise in the current and one-year lagged relative import price creates a fall in the import shares of sector 32-33, and 34, respectively. All three sectors might be relatively price sensitive. The positive coefficient on GDP in the destination country means that the demand impact for that particular sector is less than the

overall demand impact in the destination country, therefore domestic absorption of sectors 32, 33, 34 in the destination country increases less than overall domestic absorption, leading to an increase in the import shares of these sectors in the partner countries.

S*pecialization effects in "animal and vegetable oils, fats and waxes"*

(sectors #41-43, SITC-Rev 3, [see Table 6.1]):

In this group, statistically significant evidence is found for sectors 41, 42 and 43, however, there is not much consistency among variables that explain the change in sectoral import shares. Tariff expectations are seemed to influence current imports of sector 41 and 42. While a reduction in one-year lead unweighted average tariff causes an increase in the import share of sector 41, it causes a decrease in the import share of 42. The import share of sector 43 in total seems to increase with a decrease in the current unweighted average tariff, although a decrease in the one-year lead sector-specific tariff seems to decrease sector 43's import share in total imports. A rise in the relative import price is found to decrease the import share of sector 41 in total. Opposite effect arises in case of sector 42 when the impact of an increase in the one-year lagged relative import price is considered. An increase in GDP in the destination country increases the share of sector 41's imports in total. This shows that sector 41 is more sensitive to income in the destination country when compared to total demand. Opposite income effect occurs for sector 42 stating that domestic absorption effect on sector 42 in the destination country is less than the total absorption effect. An appreciation of Mercosur countries' currencies (a decrease in the exchange rate) decreases the import share of sector 41.

S*pecialization effects in "chemicals and related products, n.e.s."*

(sectors #51-59, SITC-Rev 3, [see Table 6.1]):

Findings regarding sectors in this group are quite consistent such that the estimated coefficient signs for variables do not change among sectors. An expected decrease in unweighted average tariffs are found to decrease the import shares of sectors 51, 53, 54 and 55 suggesting that these tariffs have lesser impacts on specific sectors than on aggregate imports, that is, sector-specific imports increase less than the increase in aggregate imports. The only opposite impact occurs in sector 54, especially for current unweighted average tariff reductions. Sector-specific tariff rates in the current year affects sectoral imports less than the total, therefore reduction of these tariffs causes a decrease in the import shares of 54, 55 and 59. For sectors 51 and 56, an expected decrease in sector-specific tariffs are found to increase import shares. Relative import prices were observed to have significant impact only on import shares of sectors 52 and 53. While an increase in the one-year lagged relative price results in a fall in the share of 52, a current rise in the relative price results in an increase in import shares of both sectors. An appreciation of Mercosur countries' currencies causes an increase in the import share of sectors 51, 53, 54, 55, and 59, which might be due to the fact that aggregate imports increase less than the increase in sectoral imports.

S*pecialization effects in "manufactured goods classified chiefly by material"*

(sectors #61-69, SITC-Rev 3, [see Table 6.1]):

A decrease in the expected and current unweighted average tariffs are found to decrease import shares of sectors 63, 65 and 66. That is, the impact of a decrease in general tariffs increases sectoral-imports less than the increase in aggregate imports. In contrast, a

decrease in sectoral import tariffs (both the current and the lead) has mixed effects on import shares. While it decreases import shares of sectors 62, 63, and 64, it increases import shares of sectors 65, 66, 67 and 68. Expected outcomes are observed in case of a change in the relative import price. An increase in the relative import price decreases the import shares of sectors 66 and 67, but increases the import share of 68. In the former case, in sectors 66 and 67, demand is probably relatively price elastic, whereas in the latter case, demand is probably price inelastic, as well as a complementarity relationship between sector 68 and the rest can be thought. The GDP and exchange rate effects are mixed.

S*pecialization effects in "machinery and transport equipment"*

(sectors #71-79, SITC-Rev 3, [see Table 6.1]):

Another set of consistent findings are observed in this group. Both the lead and current aggregate tariff reduction increases sectoral imports more than the increase in aggregate imports, so the import shares increase (especially in sectors 73 and 75 for the current reduction; in sectors 76 and 77 for the lead reduction). A decrease in sector-specific tariff rates, especially in the current year, has the same impact on sectors 74, 76 and 79, but the opposite impact on sector 75. A decrease in the lead sector-specific tariff rate in sector 79 decreases its import share in total. A rise in relative import prices is found to increase import shares of sectors 75 and 79. An appreciation in Mercosur countries' currencies (a decrease in the exchange rate) decreases the import shares of sectors 75 and 76, which might be due to a larger increase in aggregate imports compared to the increase in sectoral imports.

S*pecialization effects in "miscellaneous manufactured articles"*

(sectors #81-89, SITC-Rev 3, [see Table 6.1]):

The effects of a decrease in unweighted average tariffs are mixed across sectors. It increases the import share of sector 83 in the current year, and of sector 84 in the lead year, whereas it decreases the import share of sectors 82 and 84 in the current year, and of sector 88 in the lead year. Both the expected and the current sector-specific tariff reductions, however, decrease the import shares of sectors 81, 83, and 85, which may be due to aggregate imports increasing more than sectoral imports. An increase in the relative import price increases the import share of sector 89, the reason of which may be that demand is relatively price inelastic, and there is a complementarity relationship between sector 89 and the rest.

S*pecialization effects in "commodities and transactions not classified elsewhere in the SITC" (sectors #91-97, SITC-Rev 3, [see Table 6.1]):*

In this group, the econometric evidence is only found for sector 93. An increase in the relative import price decreases the share of sector 93's imports in total, suggesting that demand is probably relatively price elastic.

Overall Evaluation

We evaluate the effects of aggregate and sectoral tariff liberalization with respect to changes in sectoral and aggregate imports, and we classify our findings in 4 groups:

<u>The effects of aggregate tariff liberalization</u>

1. The sectors that experience an increase in import shares, which we refer to as **positive import specialization**, are included in this group. That is, overall, aggregate tariff liberalization increases imports in these sectors more than the increase in the rest of the economy; production factors probably move away from these sectors.

In the very short-run:

- Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof,
- Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.,
- Medicinal and pharmaceutical products,
- Metalworking machinery,
- Office machines and automatic data processing machines,
- Travel goods, handbags and similar containers.

After an adjustment period:

- Live animals other than animals of division 03,
- Dairy products and birds' eggs,
- Cereals and cereal preparations,

- Vegetables and fruit,
- Sugars, sugar preparations and honey,
- Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric),
- Animal oils and fats,
- Telecommunications, sound recording and reproducing apparatus and equipment,
- Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non electrical counterparts, n.e.s., of electrical household,
- Articles of apparel and clothing accessories.

2. The sectors that experience a decrease in import shares, which we refer to as **negative import specialization**, are included in this group. That is, overall, aggregate tariff liberalization increases imports in these sectors less than the increase in the rest of the economy; production factors probably move towards these sectors.

In the very short-run:

- Live animals other than animals of division 03,
- Tobacco and tobacco manufactures,
- Coal, coke and briquettes,
- Gas, natural and manufactured,
- Textile yarn, fabrics, made up articles, n.e.s., and related products,
- Non-metallic mineral manufactures, n.e.s.,
- Furniture, and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings,
- Articles of apparel and clothing accessories

After an adjustment period:

- Fixed vegetable fats and oils, crude, refined or fractionated,
- Organic chemicals,
- Dyeing, tanning and colouring materials,
- Medicinal and pharmaceutical products,
- Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations,
- Cork and wood manufactures (excluding furniture),

- Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks.

The effects of sector-specific tariff liberalization

3. The sectors that experience an increase in import shares, which we refer to as **positive import specialization**, are included in this group. That is, overall, sector-specific tariff liberalization increases imports in these sectors more than the increase in the rest of the economy; production factors probably move away from these sectors.

In the very short-run:

- Live animals other than animals of division 03,
- Dairy products and birds' eggs,
- Oil seeds and oleaginous fruits,
- Non-metallic mineral manufactures, n.e.s.,
- Iron and steel,
- Non-ferrous metals,
- General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.,
- Telecommunications and sound recording and reproducing apparatus and equipment,
- Other transport equipment.

After an adjustment period:

- Beverages,
- Organic chemicals,
- Fertilizers (other than those of group 272),
- Textile yarn, fabrics, made up articles, n.e.s., and related products.

4. The sectors that experience a decrease in import shares, which we refer to as **negative import specialization**, are included in this group. That is, overall, sector-specific tariff liberalization increases imports in these sectors less than the increase in the rest of the economy; production factors probably move towards these sectors.

In the very short-run:

- Vegetables and fruit,
- Feeding stuff for animals (not including unmilled cereals),
- Petroleum, petroleum products and related materials,
- Medicinal and pharmaceutical products,
- Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations,
- Chemical materials and products, n.e.s.,
- Rubber manufactures, n.e.s.,
- Cork and wood manufactures (excluding furniture),
- Office machines and automatic data processing machines,
- Travel goods, handbags and similar containers.

After an adjustment period:

- Meat and meat preparations,
- Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof,
- Cereals and cereal preparations,
- Vegetables and fruit,

- Miscellaneous edible products and preparations,
- Crude rubber (including synthetic and reclaimed),
- Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.,
- Paper, paperboard and articles of paper pulp, of paper or of paperboard,
- Other transport equipment,
- Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.,
- Footwear.

Table 6.1: Regression results on the explanation of sectoral import shares

SITC #	Description	Aggregate import tariff				Sectoral import tariff		Relative price (logs)		Other variables (logs)		
		t-1	t	t+1	t+2	t	t+1	t-1	T	GDP	GDP/POP	e
00	Live animals other than animals of division 03		7.16e-06 (3.40e-06)	-8.41e-06 (3.53e-06)		**-1.42e-05** (4.39e-06)			**3.56e-05** (5.91e-06)			
01	Meat and meat preparations						**2.18e-05** (8.33e-06)		-0.00012 (5.34e-05)	++		++
02	Dairy products and birds' eggs			**-7.18e-05** (1.11e-05)		**-1.92e-05** (4.39e-06)			-0.00011 (4.25e-05)	-		++
03	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof		**-4.62e-05** (1.61e-05)	-3.47e-05 (1.64e-05)			**2.78e-05** (1.04e-05)			--		
04	Cereals and cereal preparations			**-2.34e-05** (7.85e-06)			4.62e-06 (2.31e-06)	**4.62e-05** (1.28e-05)	**-6.37e-05** (1.51e-05)			++
05	Vegetables and fruit			-4.30e-05 (1.74e-05)		**4.26e-05** (8.39e-06)	**2.55e-05** (8.86e-06)			+		++

06	Sugars, sugar preparations and honey			**-1.80e-05** (5.12e-06)				**3.19e-05** (9.84e-06)		--		
08	Feeding stuff for animals (not including unmilled cereals)					**9.30e-06** (2.83e-06)			-1.55e-05 (6.41e-06)			
09	Miscellaneous edible products and preparations						1.51e-05 (6.10e-06)			++		
11	Beverages						**-4.68e-05** (1.45e-05)					++
12	Tobacco and tobacco manufactures		**1.17e-05** (4.42e-06)					**5.61e-05** (1.51e-05)	-2.56e-05 (1.22e-05)	+		
22	Oil seeds and oleaginous fruits					-3.77e-06 (1.86e-06)				+		
23	Crude rubber (including synthetic and reclaimed)						1.44e-05 (7.30e-06)	-8.05e-05 (3.63e-05)	8.63e-05 (3.57e-05)	--		
24	Cork and wood								**-4.81e-05** (7.19e-06)			

26	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)			**-2.02e-05** (7.50e-06)					-6.29e-05 (2.53e-05)			
32	Coal, coke and briquettes		1.30e-05 (6.49e-06)						**-0.00018** (3.59e-05)	++		-
33	Petroleum, petroleum products and related materials					0.000673 (0.000302)			**-0.00214** (0.000445)	++		
34	Gas, natural and manufactured		**1.62e-06**					-1.32e-06		++		
41	Animal oils and fats			**-1.44e-05** (3.75e-06)					**-3.02e-05** (6.25e-06)	++		++
42	Fixed vegetable fats and oils, crude, refined or fractionated			2.45e-05 (1.12e-05)				5.50e-05 (2.81e-05)		--		

43	Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.		-1.77e-05 (8.41e-06)				**1.52e-05** (5.81e-06)					
51	Organic chemicals			**0.000280** (6.80e-05)			-0.000141 (7.18e-05)					--
52	Inorganic chemicals							**-0.0002** (7.01e-05)	**0.000264** (7.75e-05)			
53	Dyeing, tanning and colouring materials			**5.69e-05** (1.89e-05)					**0.000115** (4.29e-05)			--
54	Medicinal and pharmaceutical products		-0.00019 (8.48e-05)	**0.000402** (8.43e-05)		**0.000408** (7.22e-05)						--
55	Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations			**8.14e-05** (2.94e-05)		5.42e-05 (2.28e-05)						--

56	Fertilizers (other than those of group 272)						-4.88e-05 (2.28e-05)					
59	Chemical materials and products, n.e.s.					**0.000101** (3.37e-05)						--
62	Rubber manufactures, n.e.s.					4.26e-05 (1.95e-05)						--
63	Cork and wood manufactures (excluding furniture)			3.02e-05 (1.23e-05)		1.67e-05 (7.39e-06)						--
64	Paper, paperboard and articles of paper pulp, of paper or of paperboard						**0.000132** (4.92e-05)			-		
65	Textile yarn, fabrics, made up articles, n.e.s., and related products		**2.20e-05** (8.32e-06)				-7.50e-06 (3.36e-06)					
66	Non-metallic mineral manufactures, n.e.s.		**2.63e-05** (8.74e-06)			**-1.93e-05** (6.91e-06)			**-6.53e-05** (2.31e-05)	+		++
67	Iron and steel					**-6.57e-05** (2.39e-05)			**-0.00042** (0.000144)	--		--

68	Non-ferrous metals					-4.33e-05 (2.07e-05)		**0.000334** (7.95e-05)		++		
73	Metalworking machinery		**-0.000155** (5.51e-05)									
74	General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.					**-9.77e-05** (2.94e-05)						
75	Office machines and automatic data processing machines		-3.46e-05 (1.65e-05)			**3.87e-05** (1.12e-05)			0.000123 (4.87e-05)			++
76	Telecommunications and sound recording and reproducing apparatus and equipment			**-0.000530** (0.000123)		**-0.000239** (5.60e-05)						++

77	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non electrical counterparts, n.e.s., of electrical household			**-0.000226** (7.23e-05)								
79	Other transport equipment					-0.000124 (5.61e-05)	0.000116 (5.84e-05)		0.000755 (0.000359)			
81	Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.						**2.81e-05** (7.98e-06)			--		
82	Furniture, and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings		**4.26e-05** (1.01e-05)									
83	Travel goods, handbags and similar containers		**-5.54e-06** (1.92e-06)			3.96e-06 (1.89e-06)						

84	Articles of apparel and clothing accessories		3.17e-05 (1.47e-05)	**-3.98e-05** (1.36e-05)								
85	Footwear						**3.29e-06** (8.03e-07)			++		
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks			3.24e-05 (1.60e-05)						++		
89	Miscellaneous manufactured articles, n.e.s.								**0.000283** (0.000126)			
93	Special transactions and commodities not classified according to kind								**-0.00115** (0.000212)			

Bold numbers mean that the coefficient is significant at the 1 % level, else the coefficients are significant at the 5 % level.

In the last five columns: -- or ++ : the coefficient having a negative or positive sign is significant at the 1 % level;

- or +: The coefficient having a negative or positive sign is significant at the 5 % level.

6.2 Export specialization results for the Mercosur countries

In all panel estimations of the sectoral export supply functions for the group of Mercosur countries, our dependent variable is the export share, which is defined as the share of a particular sector's exports from a certain Mercosur country to a certain EU member in total industrial exports of this Mercosur country to that EU member.

We employ different sector-specific and macroeconomic supply variables, as well as a number of exogenous demand shifters. Table 6.2 reports our main results, especially for variables of interest (i.e., the unweighted average import tariff, the relative export price, the CPI inflation rate, the exchange rate, labor productivity, technical progress). As is clear from Table 6.2, all these reported variables may affect sectoral export shares positively or negatively, and in different lags. As for the (unweighted) average import tariff, a negative impact implies that, in the case of a general reduction in import tariffs, which makes primary inputs cheaper, the sectors that are dependent on imported intermediate products increase their international competitiveness, and so increase their export shares in total industrial exports, especially when the decrease in import tariffs affects other industries, on average, less.

That said, the sectors that are positively affected by a reduction in import tariffs suffer from a decrease in their export shares as their international competitiveness deteriorates, especially if the decrease in import tariffs leads to an influx of cheaper imported goods, and if it affects other sectors, on average, more. By the same token, if an increase in the relative export price decreases the export share of a sector, then we may conclude that there is a strong correlation between the sectoral and aggregate export prices which changes aggregate exports by more than the sector's exports. As for the macroeconomic variables of interest,

domestic production and export supply of a sector are expected to increase, especially *(i)* if there is an unexpected increase in the CPI inflation rate, denoted π in Table 6.2, which decreases labor costs, *(ii)* if there is an appreciation of the Mercosur countries' currencies, denoted *e* in Table 6.2, which decreases costs of importing primary inputs, *(iii)* if there is an increase in aggregate **labor productivity**, denoted Y/L in Table 6.2, or *(iv)* if there is an increase in the ratio between the price level of consumption goods and that of investment goods, denoted p_{con}/p_{inv} in Table 6.2, which captures **technical progress**. Of course, the impact on a sector's export share will be determined by how much its export supply changes compared to the aggregate change.

S*pecialization effects in "food and live animals"*

(sectors #00-09, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that sectors 03, 04, and 08 increase their export shares if a general tariff reduction is in place one year in advance, enabling them to adapt to the foreseeable change in tariffs. In the period the tariff reduction is realized, however, the export shares of sectors 04 and 05 decrease, probably due to the availability of cheap imports, deteriorating their competitive position, and so decreasing their domestic production and export supply. We shall note that in other sectors in the group "food and live animals" the aggregate import tariff variable has no significant influence on sectoral export shares.

According to our estimation results, the export shares of sectors 01 and 04 decrease with an increase in the relative export price, probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than these sectors' exports. In contrast, the export shares of sectors 03, 05, 07, 08, and 09 increase with an increase in the relative export price. In addition to these immediate-run changes, an increase in the relative export price differently affects sectors 00, 01, and 09,

especially with a lag of one year, which may be due to these sectors sluggishly adjusting to the change in the relative export price, and so may lead to some longer-run changes. In particular, the influence with a lag of one year is negative – a decrease in export shares – in sectors 00 and 09, and is positive in sector 01. As might be expected, the coefficient that is significant and reflecting the impact on a particular sector's export share in the same period (the immediate-run impact) is larger in absolute values than that (if significant) reflecting the impact on the export share of the same sector with a lag of one year.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sector 00 by more than aggregate exports, and so this sector's export share increases. In contrast, aggregate exports increase by more than domestic production and export supply of sectors 01 and 03, so their export shares decrease. Similarly, an unexpected increase in the CPI inflation rate decreases the export shares of sectors 02 and 03, because aggregate exports increase by more than these sectors' exports. The export share of sector 03 decreases also with an increase in labor productivity. Though an increase in labor productivity increases the export share of sector 08. Finally, an improvement in technical progress increases domestic production and export supply of sector 09 by more than aggregate exports, so its export share increases, whereas the opposite is true in sectors 01 and 02, and so their export shares decrease.

S*pecialization effects in "beverages and tobacco"*

(sectors #11-12, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that sector 12 increases its export share if a general tariff reduction is in place one year in advance, enabling it to adapt to the foreseeable change in tariffs. In the period the tariff

reduction is realized, however, the export share of sector 11 decreases, probably due to the availability of cheap imports, deteriorating their competitive position, and so decreasing their domestic production and export supply.

According to our estimation results, only sector 12 is significantly influenced by a change in the relative export price, especially with a lag of one year. That is, the export share of sector 12 decreases with an increase in the relative export price, probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than this sector's exports.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sector 11 by more than aggregate exports, and so this sector's export share increases. There is no significant impact in sector 12. That said, an increase in labor productivity increases (decreases) the export share of sector 11 (12). Finally, an improvement in technical progress increases domestic production and export supply of both sectors 11 and 12 by more than aggregate exports, so the two sectors' export shares increase.

S*pecialization effects in "crude materials, inedible, except fuels"*

(sectors #21-29, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that sector 24 decreases its export share if a general tariff reduction is in place one year in advance. In the period the tariff reduction is realized, however, the export shares of sectors 21, 24 and 29 increase, probably due to the availability of cheaper imported intermediate products, on which they are dependent, improving their competitive position, and so increasing their domestic

production and export supply. That said, in the period the tariff reduction is realized, the export share of sector 27 decreases, probably due to the availability of cheap imports, deteriorating its competitive position, and so decreasing its domestic production and export supply. We shall note that in other sectors in the group “crude materials, inedible, except fuels” the aggregate import tariff variable has no significant influence on sectoral export shares.

According to our estimation results, the export shares of sectors 22, 24, 27 and 28 decrease with an increase in the relative export price, probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than these sectors' exports. In contrast, in addition to these immediate-run changes, an increase in the relative export price differently affects sectors 21, 25, 27 and 29, especially with a lag of one year, which may be due to these sectors sluggishly adjusting to the change in the relative export price, and so may lead to some longer-run changes. In particular, the influence with a lag of one year is negative – a decrease in export shares – in sectors 25 and 27, and is positive in sectors 21 and 29.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sector 23, especially by more than aggregate exports, and so this sector's export share increases. There is no significant impact on export shares of other sectors in the group “crude materials, inedible, except fuels”. As for the impact of an unexpected increase in the CPI inflation rate, the export shares of sectors 21, 25 and 27 decrease, because aggregate exports increase by more than these sectors' exports. The export share of sector 22, however, increases, as its export supply increases by more than aggregate exports. By the same token, an improvement in technical progress increases domestic production and export supply of

sectors 25, 27, and 29 by more than aggregate exports, so their export shares increase. Finally, an increase in labor productivity decreases the export shares of sectors 21 and 25. There is no significant impact of a change in labor productivity on export shares of other sectors, nor is there any significant impact of a change in technical progress on export shares of other sectors in the group "crude materials, inedible, except fuels".

S*pecialization effects in "mineral fuels, lubricants and related materials"*

(sectors #32-35, SITC-Rev 3, [see Table 6.2]):

Our data does not allow for estimations in sectors 32, 34, and 35. So we report our estimation results only for sector 33, which suggest that, in the period the tariff reduction is realized, the export share of sector 33 increases. This is due to the availability of cheaper imported intermediate products, on which the sector is dependent, improving its competitive position, and so increasing its domestic production and export supply.

As for the impact of the relative export price, our results reveal that the export share of sector 33 changes with a lag of one year such that its export share increases with an increase in the relative export price. As for the estimation results in terms of the macroeconomic variables, we find that only labor productivity has a significant impact. The export share of sector 33 decreases with an increase in labor productivity.

S*pecialization effects in "animal and vegetable oils, fats, and waxes"*

(sectors #41-43, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that, in the period the tariff reduction is realized, the export share of sector 41 increases, probably due to the availability of cheaper imported intermediate products, improving its

competitive position, and so increasing its domestic production and export supply. We shall note that in other sectors in the group “animal and vegetable oils, fats, and waxes” the aggregate import tariff variable has no significant influence on sectoral export shares.

As for the impact of the relative export price, only the export share of sector 43 significantly changes, such that it decreases with an increase in the relative export price, probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than this sector's exports. Also, according to our estimation results, an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sector 42 by more than aggregate exports, and so this sector's export share increases, whereas the export share of sector 43 decreases as aggregate exports increase by more than domestic production and export supply of sector 43. We shall note that there is no significant impact of other macroeconomic variables on export shares of the sectors in the group “animal and vegetable oils, fats, and waxes”.

S*pecialization effects in “chemicals and related products”*

(sectors #51-59, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that only sector 52 increases its export share if a general tariff reduction is in place one year in advance, enabling it to adapt to the foreseeable change in tariffs. That said, sectors 55 and 57 decrease their export shares in case a general tariff reduction is in place one year in advance. In the period the tariff reduction is realized, however, the export share of sector 52 decreases, probably due to the availability of cheap imports, deteriorating its competitive position, and so decreasing its domestic production and export supply. As for sectors 57 and 59, there is an increase in export shares following a reduction in general tariffs, especially in the period the tariff reduction is realized.

According to our estimation results, the export shares of sectors 52, 53, 54, and 57 increase with an increase in the relative export price, whereas the export shares of sectors 58 and 59 decrease. The relative export price influences the export shares of sectors 58 and 59 with a lag of one year, and the decrease in these sectors' export shares is probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than these sectors' exports.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies influences only the export shares of sectors 53 and 54 such that in the former the export share increases, whereas in the latter it decreases. Similarly, an improvement in technical progress influences only the export shares of the same sectors, 53 and 54, such that the export share of sector 53 increases with an increase in technical progress, and that the export share of sector 54 decreases. Finally, an increase in labor productivity influences only the export shares of sectors 58 and 59, such that the export share of sector 58 decreases, and that the export share of sector 59 increases.

S*pecialization effects in "manufactured goods"*

(sectors #61-69, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that only sector 63 increases its export share, especially when a general tariff reduction is in place one year in advance, enabling it to adapt to the foreseeable change in tariffs. In the period the tariff reduction is realized, however, the export share of sector 69 decreases, probably due to the availability of cheap imports, deteriorating its competitive position, and so decreasing its domestic production and export supply. We shall note that in other sectors in the group "manufactured goods,

classified chiefly by material" the aggregate import tariff variable has no significant influence on sectoral export shares.

According to our estimation results, the export shares of sectors 63, 65 and 67 decrease with an increase in the relative export price, probably due to a strong correlation between the sectoral and aggregate export prices which changes aggregate exports more than these sectors' exports. In contrast, the export share of sector 61 increases with an increase in the relative export price. In addition to these immediate-run changes, an increase in the relative export price differently affects sectors 61 and 63, especially with a lag of one year, which may be due to these sectors sluggishly adjusting to the change in the relative export price, and so may lead to some longer-run changes. In particular, the influence with a lag of one year is negative – a decrease in export shares – in both sectors.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sector 67 by more than aggregate exports, and so this sector's export share increases. In contrast, aggregate exports increase by more than domestic production and export supply of sectors 65 and 69, so their export shares decrease. Similarly, an unexpected increase in the CPI inflation rate increases the export share of sector 67, because its domestic production and export supply increase by more than aggregate exports. Although, there is no significant impact of a change in labor productivity on export shares of sectors in the group "manufactured goods, classified chiefly by material", the export shares of sectors 63 and 64 decrease with an improvement in technical progress.

S*pecialization effects in "machinery and transport equipment"*

(sectors #71-79, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that sectors 76 and 77 decrease their export shares if a general tariff reduction is in place one year in advance. In the period the tariff reduction is realized, however, the export shares of sectors 75, 76, and 77 increase, probably due to the availability of cheaper imported intermediate products, improving their competitive position, and so increasing their domestic production and export supply. Similarly, the export shares of sectors 75, 77, and 79 increase with an increase in the relative export price. In addition to these immediate-run changes, an increase in the relative export price further increases the export share of sector 77 with a lag of one year.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sectors 71, 77, 78, and 79 by more than aggregate exports, and so these sectors' export shares increase. In contrast, aggregate exports increase by more than domestic production and export supply of sectors 73 and 75, so their export shares decrease. Similarly, an unexpected increase in the CPI inflation rate (an increase in labor productivity) increases the export share of sector 78 (72), because its domestic production and export supply increase by more than aggregate exports. Finally, an improvement in technical progress increases domestic production and export supply of sectors 74, 76, 77, 78, and 79 by more than aggregate exports, so their export shares increase.

S*pecialization effects in "miscellaneous manufactured articles"*

(sectors #81-89, SITC-Rev 3, [see Table 6.2]):

Our estimation results suggest that sectors 82, 83 and 85 decrease their export shares if a general tariff reduction is in place one year in advance. In the period the tariff reduction is realized, however, the export

shares of sectors 83 and 85 increase, probably due to the availability of cheaper imported intermediate products, improving their competitive position, and so increasing their domestic production and export supply. We shall note that in other sectors in the group “miscellaneous manufactured articles” the aggregate import tariff variable has no significant influence on sectoral export shares.

According to our estimation results, only the export shares of sectors 82 and 84 are significantly influenced by the relative export price, such that an increase in the relative export price increases the export shares of both sectors, though sector 84 reacts with a lag of one year.

As for the estimation results in terms of the macroeconomic variables, we may conclude that an appreciation of the Mercosur countries' currencies increases domestic production and export supply of sectors 82 and 88 by more than aggregate exports, and so these sectors' export shares increase. In contrast, aggregate exports increase by more than domestic production and export supply of sectors 83 and 87, so their export shares decrease. Similarly, an increase in labor productivity decreases the export share of sector 88, because aggregate exports increase by more than its exports. Finally, an improvement in technical progress decreases the export share of sector 87.

S*pecialization effects in “commodities and transactions”*

(sectors #91-97, SITC-Rev 3, [see Table 6.2]):

Our data does not allow for estimations in sectors 91, 96 and 97. So we report our estimation results only for sector 93, which suggest that, in the period the tariff reduction is realized, (also when a general tariff reduction is in place one year in advance), the export share of sector 93 decreases. This is probably due to the availability of cheap imports, deteriorating its competitive position, and so decreasing its domestic

production and export supply. According to our estimation results, there is no significant impact of the relative export price, the CPI inflation rate, or of labor productivity on the export share of sector 93. An appreciation of the Mercosur countries' currencies, however, increases domestic production and export supply of sector 93 by more than aggregate exports, and so this sector's export share increases. Similarly, an improvement in technical progress increases domestic production and export supply of sector 93 by more than aggregate exports, so its export share increases.

Overall Evaluation

We evaluate the effects of aggregate tariff liberalization with respect to changes in sectoral and aggregate exports, and we classify our findings in 2 groups:

<u>The effects of aggregate tariff liberalization</u>

1. The sectors that experience an increase in export shares, which we refer to as **positive export specialization**, are included in this group. That is, overall, aggregate tariff liberalization increases exports in these sectors more than the increase in the rest of the economy; production factors probably move towards these sectors. We may argue that as primary inputs get cheaper with a general reduction in import tariffs, production in these sectors gets less costly enabling these sectors to increase their international competitiveness, and so to increase their domestic production and export supply.

In the very short-run:

- Hides, skins, furskins, raw,
- Cork and wood,
- Crude animal, vegetable materials,
- Petroleum, petroleum products,
- Animal oils and fats,
- Plastics in primary forms,
- Chemical materials and products,
- Office machines and automatic data processing machines,
- Telecommunications, sound recording, and reproducing apparatus and equipment,

- Electrical machinery, apparatus and appliances,
- Travel goods, handbags, similar containers,
- Footwear.

After an adjustment period:

- Fish, crustaceans, molluscs, aquatic invertebrates,
- Cereals, cereal preparations,
- Feeding stuff for animals (no unmilled cereals),
- Tobacco, tobacco manufactures,
- Inorganic chemicals,
- Cork and wood manufactures.

2. The sectors that experience a decrease in export shares, which we refer to as **negative export specialization**, are included in this group. We may argue that aggregate tariff liberalization leads to increased availability of cheaper imported goods, with which their international competitiveness deteriorates. They may thus decrease their domestic production, which may lead to a decrease also in their export supply; production factors probably move away from these sectors.

In the very short-run:

- Cereals, cereal preparations,
- Vegetables, fruit,
- Beverages,
- Crude fertilizers, crude minerals (no coal, petroleum, precious stones),

- Inorganic chemicals,
- Manufactures of metals,
- Special transactions, commodities not classified according to kind.

After an adjustment period:

- Cork and wood,
- Essential oils, resinoids, parfume materials,
- Plastics in primary forms,
- Telecommunications, sound recording, and reproducing apparatus and equipment,
- Electrical machinery, apparatus and appliances,
- Furniture,
- Travel goods, handbags, similar containers,
- Footwear,
- Special transactions, commodities not classified according to kind.

Table 6.2: Regression results on the explanation of sectoral export shares

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
00	Live animals *coefficient* *(st.error)*					**-0.00097** **(0.000355)**			- -			
01	Meat, meat preparations					0.0302 (0.0148)	**-0.0413** **(0.0153)**		++			-
02	Dairy products, birds' eggs									- -		-
03	Fish,crustaceans, molluscs, aquatic invertebrates			-0.00699 (0.00292)			0.0295 (0.0130)		++	-	- -	
04	Cereals, cereal preparations		**0.00928** **(0.00187)**	**-0.00557** **(0.00192)**			**-0.0208** **(0.0059)**					
05	Vegetables, fruit		0.00426 (0.00211)				0.0294 (0.0143)					
06	Sugars, sugar preparations, honey											
07	Coffee, tea, cocoa, spices						0.00308 (0.00156)					
08	Feeding stuff for animals (no unmilled cereals)			-0.0106 (0.00502)			**0.159** **(0.0316)**				++	
09	Miscellaneous edible products, preparations					-0.000999 (0.00040)	**0.00136** **(0.000425)**					+
11	Beverages		0.00229 (0.00111)						-		++	++

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

Table 6.2: continued

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	t	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
12	Tobacco, tobacco manufactures *coefficient* *(st.error)*			**-0.00218** **(0.000771)**		**-0.012** **(0.00409)**					- -	++
21	Hides, skins, furskins, raw		-6.36e-05 (2.82e-05)			0.000106 (4.62e-05)				- -	- -	
22	Oil seeds, oleaginous fruits						**-0.0462** **(0.00706)**			++		
23	Crude rubber								+			
24	Cork and wood		-0.000314 (0.000149)	0.000389 (0.000174)			**-0.00302** **(0.00083)**					
25	Pulp and waste paper					-0.00945 (0.00453)				-	- -	+
26	Textile fibres											
27	Crude fertilizers, crude minerals (no coal, petroleum, precious stones)		7.08e-05 (3.42e-05)			-0.00014 (6.89e-05)	**-0.000296** **(7.92e-05)**			- -		++
28	Metalliferous ores, metal scrap						**-0.0142** **(0.00396)**					
29	Crude animal, vegetable materials		-0.000467 (0.000212)			0.000751 (0.000335)						++
32	Coal, coke, briquettes											

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

Table 6.2: continued

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	T	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
33	Petroleum, petroleum products *coefficient* *(st.error)*		-0.00131 (0.000581)			0.00276 (0.0012)					- -	
34	Gas, natural and manufactured											
35	Electric current											
41	Animal oils and fats		-0.000161 (7.08e-05)									
42	Fixed vegetable fats, oils, crude, refined or fractionated								- -			
43	Animal or vegetable fats and oils, processed, inedible mixtures or preparations						-0.000401 (0.000189)		+			
51	Organic chemicals											
52	Inorganic chemicals		**0.000623** **(0.000185)**	**-0.000632** **(0.000163)**			0.00135 (0.000551)					
53	Dyeing, tanning, colouring materials						**0.00182** **(0.000689)**		- -			++
54	Medicinal, pharmaceutical products						**0.00402** **(0.00143)**		++			- -
55	Essential oils, resinoids, parfume materials			0.000709 (0.000336)								
56	Fertilizers											
57	Plastics in primary forms		-0.000785 (0.000341)	**0.0012** **(0.000381)**			**0.00238** **(0.000779)**					

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

Table 6.2: continued

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	T	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
58	Plastics in non-primary forms *coefficient* *(st.error)*					**-0.00162** **(0.000524)**					- -	
59	Chemical materials and products		-0.00094 (0.000472)			-0.00248 (0.00119)					++	
61	Leather, leather manufactures, dressed furskins					**-0.0424** **(0.0098)**	0.0226 (0.0107)					
62	Rubber manufactures											
63	Cork and wood manufactures			-0.000221 (0.000108)		-0.000285 (0.000131)	-0.000286 (0.000134)					-
64	Paper, paperboard, articles of paper pulp, of paper or of paperboard											- -
65	Textile, yarn, fabrics, made up articles, related products						-0.000848 (0.00036)		+			
66	Non-metallic mineral manufactures											
67	Iron and steel						**-0.0182** **(0.00555)**		-	++		
68	Non-ferrous metals											
69	Manufactures of metals		0.00109 (0.000488)						++			

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

Table 6.2: continued

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	T	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
71	Power generating machinery and equipment *coefficient* *(st.error)*								-			
72	Machinery specialized for particular industries										++	
73	Metalworking machinery								+			
74	General industrial machinery and equipment											++
75	Office machines and automatic data processing machines		**-0.00019** **(6.20e-05)**				0.000289 (0.00012)		++			
76	Telecommunications, sound recording, and reproducing apparatus and equipment		**-0.000889** **(0.000263)**	0.000575 (0.000270)								+
77	Electrical machinery, apparatus and appliances		**-0.00296** **(0.000708)**	0.00162 (0.000709)		**0.00355** **(0.00114)**	**0.0443** **(0.0151)**		- -			++
78	Road vehicles (including air cushion vehicles)								- -	++		++
79	Other transport equipment						0.00420 (0.00146)		-			++

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

Table 6.2: continued

SITC Nr.	Description	Aggregate Import Tariff				Relative Price (logs)		Other Variables				
		t-1	T	t+1	t+2	t-1	t	i_l	e logs	π	Y/L logs	p_{con}/p_{inv} logs
81	Prefabricated buildings *coefficient* *(st.error)*											
82	Furniture			0.000363 (0.000173)			**0.00157** **(0.000322)**		-			
83	Travel goods, handbags, similar containers		**-6.15e-05** **(1.58e-05)**	4.40e-05 (1.91e-05)					++			
84	Articles of apparel and clothing accessories					0.000531 (0.000254)						
85	Footwear		-0.000214 (9.64e-05)	0.000209 (9.05e-05)								
87	Professional, scientific, controlling instruments and apparatus								++			- -
88	Photographic apparatus, equipment and supplies, optical goods								-		-	
89	Miscellaneous manufactured articles											
91	Postal packages not classified according to kind											
93	Special transactions, commodities not classified according to kind		**0.000859** **(0.000273)**	0.000579 (0.000264)					- -			++
96	Coin (no gold coin), not being legal tender											
97	Gold, non-monetary (no gold ores, concentrates)											

Coefficients in **bold face,** or the impacts (- -) and (++), are significant at 1%. All other coefficients, or the impacts (-) or (+) are significant at 5%.

A reduction in tariff rates may have different impacts on different sectors. We may see an increase in the export (import) share of a sector when tariffs decrease, that is, a **negative coefficient**, which we refer to as **positive export (import) specialization**. Similarly, we may see a decrease in the export (import) share of a sector when tariffs decrease, that is, a **positive coefficient**, which we refer to as **negative export (import) specialization.** Using the econometric methods described above, we can identify the changing sectoral import and export patterns which come with trade liberalization. These are interesting in their own light, but we will go one step further by interpreting the results with respect to their effects on sectoral production as follows:

1. If a sector exhibits positive export specialization and negative import specialization there is a strong case for concluding that domestic production is specializing production on this sector.

Positive export specialization that is driven by a general tariff reduction that is in place one year in advance (this phrase is used instead of expected tariff reduction from now on); negative import specialization that is driven by a general tariff reduction in the current year:

- **Tobacco and tobacco manufactures**

Positive export and negative import specialization that are both driven by a general tariff reduction that is in place one year in advance:

- **Cork and wood manufactures**

Positive export specialization that is driven by a general tariff reduction in the current year; negative import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Petroleum, petroleum products**
- **Chemical materials and products**
- **Office machines and automatic data processing machines**
- **Travel goods, handbags, similar containers**

Positive export specialization that is driven by a general tariff reduction in the current year; negative import specialization that is driven by a sector-specific tariff reduction that is in place one year in advance:

- **Footwear**

Positive export specialization that is driven by a general tariff reduction that is in place one year in advance; negative import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Feeding stuff for animals**
- **Cork and wood manufactures**

Positive export specialization that is driven by a general tariff reduction that is in place one year in advance; negative import specialization that is driven by a sector-specific tariff reduction that is in place one year in advance:

- **Fish, crustaceans, molluscs, aquatic invertebrates**
- **Cereals and Cereal Preparations**

2. On the other hand, negative export specialization and positive import specialization of a sector signal that domestic production has shifted away from this sector.

Negative export specialization that is driven by a general tariff reduction in the current year; positive import specialization that is driven by a general tariff reduction that is in place one year in advance:

- **Cereals, cereal preparations**
- **Vegetables, fruit**

Negative export specialization that is driven by a general tariff reduction that is in place one year in advance; positive import specialization that is driven by a general tariff reduction in the current year:

- **Travel goods, handbags, similar containers**

Negative export and positive import specialization that are both driven by a general tariff reduction that is in place one year in advance:

- **Telecommunications, sound recording, and reproducing apparatus and equipment**
- **Electrical machinery, apparatus and appliances**

Negative export specialization that is driven by a general tariff reduction in the current year; positive import specialization that is driven by a sector-specific tariff reduction that is in place one year in advance:

- **Beverages**

Negative export specialization that is driven by a general tariff reduction that is in place one year in advance; positive import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Telecommunications, sound recording, and reproducing apparatus and equipment**

3. A finding of positive export and positive import specialization is more difficult to interpret with respect to specialization effects in domestic production.

Consider first the case in which the positive import specialization occurs in response to a decrease in the aggregate tariff rate. An increase of the import share for a specific good *i* occurs only if the good is on balance complementary to all other industrial goods.[13] Thus, the fall in the aggregate tariff rate raises demand for all other goods and hence, since it is a complement, also for good *i*. (This is possible because there is a positive income effect due to lower tariffs, so aggregate demand will rise). Part of this additional demand will fall on imported goods *i*, parts will fall on domestically produced goods *i*, an imperfect substitute. Hence the import share may rise. Moreover, we know that there is more demand for domestically produced good *i* and the export share of good *i* has also increased. It is thus very likely that domestic production of good *i* has increased.

[13]In this case, lower tariff rates for all other goods generates a positive income effect which boosts the demand for good *i*. By contrast, if good *i* were on balance a substitute, the lower aggregate tariff rate would impact negatively on the import demand for good *i* precisely because the other goods can be substituted for it.

Positive export and positive import specialization that are both driven by a general tariff reduction in the current year:

- **Travel goods, handbags, similar containers**
- **Office machines and automatic data processing machines**

Positive export specialization that is driven by a general tariff reduction in the current year; positive import specialization that is driven by a general tariff reduction that is in place one year in advance:

- **Animal oils and fats**
- **Telecommunications, sound recording, and reproducing apparatus and equipment**
- **Electrical machinery, apparatus and appliances**

Positive export specialization that is driven by a general tariff reduction that is in place one year in advance; positive import specialization that is driven by a general tariff reduction in the current year:

- **Fish, crustaceans, molluscs, aquatic invertebrates**

Positive export and positive import specialization that are both driven by a general tariff reduction that is in place one year in advance:

- **Cereals and Cereal Preparations**

Consider now the case where the positive import specialization in a sector occurs in response to a falling sectoral import tariff. Then, the total effect on production is unclear. The positive export specialization is a signal for specialization of production on that sector's goods while the positive import specialization rather signals a shrinking domestic production. Hence the interpretation depends on whether the econometric results single out the specific or the aggregate tariff rate as the main determinant of import shares.

Positive export specialization that is driven by a general tariff reduction in the current year; positive import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Telecommunications, sound recording, and reproducing apparatus and equipment**

4. Finally, a sector which exhibits negative ex- and import specialization will most likely experience a shrinking production share among all industrial sectors. There are two scenarios which imply shrinking export and import shares. First, this sector's goods may simply be outdated. Consumers both at home and abroad shift to other commodities, so that foreign trade shares fall and so would, undoubtedly, production. Second, a country may, for whatever reasons, isolate itself from the world market, for instance due to an import substitution policy. In this case, domestic production may survive and even expand. But the case of import substitution policy is incompatible with trade liberalization and our finding that the export and import shares shrink in response to lower tariffs. Thus only the first scenario seems relevant

Negative export and negative import specialization that are both driven by a general tariff reduction that is in place one year in advance:

- **Essential oils, resinoids, parfume materials**

Negative export specialization that is driven by a general tariff reduction in the current year; negative import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Vegetables, fruit**

Negative export specialization that is driven by a general tariff reduction in the current year; negative import specialization that is driven by a sector-specific tariff reduction that is in place one year in advance:

- **Cereals, cereal preparations**
- **Vegetables, fruit**

Negative export specialization that is driven by a general tariff reduction that is in place one year in advance; negative import specialization that is driven by a sector-specific tariff reduction in the current year:

- **Essential oils, resinoids, parfume materials**
- **Travel goods, handbags, similar containers**

6.3 Conclusions and Policy Recommendations for Mercosur Countries

Summary

According to these results, we may see specialization of domestic production in ***Tobacco and tobacco manufactures, Animal oils and fats, Telecommunications, sound recording, and reproducing apparatus and equipment,*** **Electrical machinery, apparatus and appliances,** and in ***Fish, crustaceans, molluscs, aquatic invertebrates*** production, especially with trade liberalization leading to an immediate reduction in general tariffs, provided future reductions in general tariffs also are in place especially one year in advance. That said, trade liberalization that is in place one year in advance – such that there will be a general reduction in import tariffs in one year – per se might lead domestic production to shift away from ***Telecommunications, sound recording, and reproducing apparatus and equipment,*** and **Electrical machinery, apparatus and appliances** sectors, although it might lead to specialization of domestic production in ***Cork and wood manufactures,*** and in ***Cereals, cereal preparations***. If future trade liberalization that is in place one year in advance is supported by a reduction in sectoral tariffs, especially in the current year, not only may we observe specialization of domestic production in ***Cork and wood manufactures*** production, but also in ***Feeding stuff for animals production****.*

By the same token, current trade liberalization leading to an immediate reduction in general tariffs may lead to specialization of domestic production in ***Petroleum, petroleum products, Chemical materials and products, Office machines and automatic data processing machines,*** and ***Travel goods, handbags, similar*** **containers** production, as long as this is supported by a reduction in sectoral tariffs, especially in the current year. If, however,

current trade liberalization is supported only by a reduction in sectoral tariffs that is in place one year in advance, then we may observe specialization of domestic production only in **Footwear** production, along with the ***Beverages*** sector from which domestic production may shift away. We shall note that alterations in trade liberalization may generate significantly different specialization patterns, especially in the sector ***Travel goods, handbags, similar containers***. For example, we may see specialization of domestic production in this sector with or without a reduction in current sectoral tariffs, as long as there is current trade liberalization. If, however, current trade liberalization is followed by a decrease in general tariffs that is only in place one year in advance, or if there is only sectoral trade liberalization in the current year, which is supported by a general tariff reduction that is in place one year in advance, then we may observe domestic production shifting away from this sector. In the former case, domestic production may shift away also from ***Cereals, cereal preparations***, and from ***Vegetables, fruit,*** which may be true when trade liberalization is followed by sectoral tariff reductions, rather than general ones. In contrast, in the latter case, we may observe domestic production shifting away from the sector ***Essential oils, resinoids, parfume materials,*** even when there is no sectoral trade liberalization in the current year, but just a general tariff reduction that is in place one year in advance.

Concluding remarks and Policy recommendations:

As is clear from the Summary section, trade liberalization may affect most sectors differently, especially depending on whether it is carried out in a certain sector or in general (i.e., sector-specific tariff liberalization vs general tariff reductions), and on how it is handled in terms of timing (i.e., a current tariff reduction vs trade liberalization that is in place one year in advance). We shall note that there is a few number of sectors whose specialization

patterns might seem to contradict when trade liberalization is not in effect in the current year, but will be in one year. We shall make it clear that it is not trivial to explain the reasons behind such results, but that expectations and the responsiveness of a sector to policy changes, affecting the adjustment period, most certainly play a crucial role. In those sectors, it might be helpful to consider not only the sign of the coefficients, but also the magnitudes.

In particular, in the sectors, ***Travel goods, handbags, similar*** **containers,** in **Footwear**, and in **Electrical machinery, apparatus and appliances,** general trade liberalization in the current year leads to positive export specialization, whereas if trade liberalization is in place one year in advance, we may see negative export specialization. The reason is that, these sectors probably benefit from reductions in tariffs in the current year (t), especially more than other industries, on average, as they may get primary inputs cheaper in the current year, with which they may increase their international competitiveness. Although when there is sufficient time for adjustment, say in period (t+1), they may have to compete with cheaper imported goods, with which their international competitiveness may deteriorate. By taking into account the magnitudes of the coefficients, we may conclude that it is likely that we will see positive export specialization in these sectors, as the former has a larger impact. Therefore, it is now clear that in these three sectors, the net effect is such that there is an increase in domestic production with trade liberalization, with which we will see specialization of domestic production.

In the sector ***Cereals, cereal preparations,*** however, the opposite is true. That is, according to the estimation results, general trade liberalization in the current year leads to negative

export specialization, whereas if trade liberalization is in place one year in advance, we may see positive export specialization. In this case, probably, due to the fact that other sectors, on average, benefit more from tariff reductions in the current year than this sector, we see negative export specialization in period (t). That said, although in period (t+1), that is, when there is sufficient time for adjustment so that there may be fierce competition between cheap imported goods and domestic production, this sector might suffer from decreased competitiveness, other sectors are affected, on average, more than this sector, which leads to positive export specialization in period (t+1). Again, by taking into account the magnitudes of the coefficients, we may conclude that it is likely that we will see negative export specialization in this sector, as the impact in period (t) seems to dominate the impact in period (t+1). Therefore, it is now clear that in this sector, the net effect is such that there is a decrease in domestic production with trade liberalization, with which we will see domestic production shifting away from this sector.

As for the sector ***Telecommunications, sound recording, and reproducing apparatus and equipment,*** things are a bit different. While general trade liberalization in the current year leads to positive export specialization, trade liberalization that is in place one year in advance leads to negative export specialization. Following the same argument above, we may say this sector probably benefits from cheaper primary inputs, more than other industries, on average, especially in the current year (t), leading to positive export specialization, although after an adjustment period, say (t+1), it is likely that there is increased competition driven by an influx of cheaper imported goods, and that this sector is affected more than other sectors, on average, leading to negative export specialization. By taking into account the magnitudes of the coefficients, we may conclude that it is likely that

we will see the net effect that leads to positive export specialization in this sector. As our estimation results suggest, in this sector, trade liberalization also leads to positive import specialization, that is either through reductions in general tariffs, or through sector-specific tariff reductions. As we have already discussed in the previous section, taking positive export specialization in this sector for granted, if positive import specialization occurs in response to a decrease in the aggregate tariff rate, then we should expect specialization of domestic production in this sector's production. If, however, positive import specialization in this sector occurs in response to a falling sectoral import tariff, then we should expect domestic production shifting away from this sector. Interestingly enough, for this specific sector, the coefficients of both unweighted average tariff rates, and sectoral tariff rates are statistically significant at the one per cent significance level, though the coefficient of the aggregate import tariff is larger in magnitude than that of the sectoral import tariff. This may well be the reason why we should pay attention to how trade liberalization is handled, that is, how general tariffs are affected along with sectoral tariffs. To be able to elaborate on this, we need detailed sectoral information, so that we can find out about different measures that may delineate the prospects for the realization of either of the two cases.

Empirical evidence suggests that it is not possible to make all sectors better off by trade liberalization. Eventually we will have some sectors that suffer from domestic production shifting away from them. In such sectors, producers may lobby and ask for protection, which may jeopardize liberalization efforts. Although, as we know from the international trade literature, a distortion is best addressed directly. For example, if domestic production is shifting away from some sectors for some reason, and if more production is desired, then the best policy is not protecting such sectors by tariffs, which distorts both consumer and

producer prices, but probably, a production subsidy that only alters producer prices. This is also referred to as the targeting principal in the international trade literature. In particular, it is crucial to figure out why domestic production is shifting away from some sectors. Is it due to trade liberalization, per se, or is it due to some structural problems; e.g., low productivity, inferior technology, lack of knowledge capital (intangible assets such as blue prints, reputation for quality, brand names, etc.), or historical reasons, etc.? It may be the case that the problem stems from a fact that is beyond government control. That said, it is important to facilitate structural adjustment, rather than engaging in policy reversals.

In general, governments tend to support distressed sectors, especially if they think the problematic situation is only temporary, though how long to protect a sector has always been a question that has no answer as protection may generate wrong incentives such that protected sectors may enjoy this and cut efforts to increase their competitiveness over time, especially expecting that they will be protected indefinitely. That said, as we may argue, trade liberalization may enable sectors to take advantage of economies of scale, and may provide competition and opportunities for innovation. Also any policy that deviates from trade liberalization may be quickly manipulated by such pressure groups, which may lead to inefficient allocation of resources decreasing national welfare. We shall note that, in addition to appropriately designed trade liberalization practices, designing sector-specific programs that address sector-specific stuctural problems might be helpful; e.g., technology upgrading through vertical integration, training programs to improve labor skills, and relocation of labor across sectors, especially according to sector-specific factor input requirements, and according to expected/realized specialization patterns of domestic production. That said, improving the institutional and business environment, law

enforcement, and pursuing transparency will certainly help overcome some structural problems.

7. Conclusions:

Economic theory makes a strong case that trade liberalization leads to sectoral specialization of foreign trade and domestic production. Whether this specialization is due to comparative advantages in terms of production technologies or due to relative factor abundance or both, is of secondary importance. What really matters is the pattern of specialization and its welfare implications.

Clearly, import and export shares vary over time and there may be many underlying causes which are completely unrelated to trade liberalization. It is an empirical question whether specialization effects due to decreasing external protection are strong enough to be visible (i. e. statistically significant) among the unrelated noise. If so, the next empirical issue is whether there is both negative and positive specialization, since trade theory necessarily implies that some sectors will shrink while others will expand if tariff rates fall. Only if we find that negative developments in some sectors are offset by positive developments in other sectors is the conjecture legitimate that overall welfare has improved.

Our work presents evidence for this for three major trade areas which have liberalised trade vis à vis the European Union. For the MPCs, a very clear pattern emerges from our analysis: The production of beverages and tobacco is expanding as a consequence of trade liberalization. The same is true for everything related to the metal manufacturing value added chain, including the production of metals and even of metal working machinery. Thirdly, our results indicate that rubber production and the manufacturing of rubber has also been stimulated by trade liberalization. Since a large part of the manufacturing of rubber is

the production of tires, this connects nicely to metal production aimed at manufacturing parts of road vehicles.

On the other hand, trade liberalization in MPCs seems to have hit chemicals and related products. There is clear evidence of negative specialization, i. e. of a comparably smaller role for domestic production of these products. This may be the consequence of a highly price elastic domestic demand which shifted to cheaper imports. Also, with the exception of metal and rubber, other crude materials and their manufacturing seem to have shrunk in relative terms as a response to freer trade. The same is true for food production with the notable exception of fish.

Clearly, policy must react to and support these developments. Expanding sectors like metal and rubber related productions open up a window of opportunity to create centers of competence in these areas. Cluster formation is essential in the long-run success of particular industries. No doubt that much of this happens just by itself, but prudent economic policy can remove obstacles and actively promote these developments.

For instance, real estate development for new or expanding old businesses is important, particularly so if it allows for proximity of a great many firms working in the value chain of the same group of products to support cluster formation. Also, supplying microfinance to liquidity-constrained would-be entrepreneurs can be of key importance and effectiveness in these sectors. Of course, fighting corruption, enforcing the rule of law and regulatory reforms aiming at a better business climate are also rewarding forms of government activity.

For the ASEAN countries, our analysis has revealed a trade block in a more mature phase of adjusting to world market conditions. While in the MENA states we see broad sectors of the economies moving in the same direction (e. g. an expansion of metal and rubber industries at the expense of chemical and food products), such developments are absent in ASEAN states. It may well be that these have taken place in earlier phases of ASEANs history, i. e. in the twenty years preceding our sample, i. e. in the years pre-1988. As of 1988, ASEAN economies seem to be roughly in line with world market conditions, remaining levels of protection vis-à-vis the EU not withstanding. Consequently, further trade liberalizing measures do not result in more or less uniform reactions across broadly defined industries. Rather, we observe finer adjustments where some specific industries shrink and other, closely related industries expand.

This observation is very important for economic policy. To simplify the discussion, let us call a rather homogenous response of broadly defined industries (such as observed for the MENA states) a phase-I-response, while the finer adjustment processes we find in a mature trade area like ASEAN will be called a phase-II-response. Phase-I-responses imply difficult challenges for labor market policies, because whole industries shrink. Workers with human capital specific to this shrinking industry will be laid off and will have great trouble finding a suitable new job at a similar level of compensation, since the specificity of their knowledge makes it hard for them to move on to very different production processes in the very different industries which are expanding.

For instance, in the MENA states we saw that food production is shrinking in response to trade liberalization on a very broad range of processes. It will be hard for laid-off workers to

find jobs at a similar level of qualification in the industries which are, on balance, expanding, e. g. metal producing and manufacturing industries. Hence, in a phase-I-reponse, the surge of unemployment in the shrinking industries may be very protracted, because the unemployment which develops is deeply structural due to factor specificity. On the other hand, in a type-II response such as in the ASEAN countries, expanding and shrinking industries may be in the same value added chain, i. e. production of crude cork and wood is expanding while the manufacturing of these crudes is shrinking. Workers laid off in the latter should have less trouble finding an appropriate new job in the former than in a phase-I-response.

For the Mercosur countries, we find a single industry which seems to be broadly expanding (production of machinery, in particular office machines, data processing, telecommunication, sound recording, electrical machinery). Other responses are clearly phase-II. This finding is very much in line with our previous interpretation: The Merecosur agreement entered into force in 1999 (roughly ten years earlier than the Association Agreement with the MENA countries), but much later than the ASEAN treaty. Hence, the finding for Mercosur states is the finding one would expect for a trade block which is in the transition between the initial and the mature phase of a free trade area.

Clearly, this interpretation is good news for the MPCs. If realignments in a country's industry structure and their repercussions on unemployment are the main problem associated with freer trade, then our results indicate that the MPCs have walked a good way of the rough part of the road already. Industries have undergone some broad adjustments and it is fairly clear to identify the winners and the loosers. Future developments – as far as they are

related to trade liberalization – should be easier to manage with the means of domestic policies than what the MENA countries have already gone through. In particular, deeply rooted structural unemployment due to the competitive pressures of the world market is less likely to occur and labor markets should, in principle, find it easier to clear than they may have done in recent years.

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