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AN EVALUATION OF THE REASONS FOR HIGH NORDIC PRICE LEVELS*

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ABSTRACT: Prices in the Nordic countries have been clearly higher than in the EC. This is due to five potential reasons: more monopolistic-oriented competition, deficient productivity, import barriers, better terms-of-trade developments and higher indirect taxation.The paper decomposes the price level sectorally and analyzes the Finnish and Swedish price levels to that in Germany. High Nordic prices are basically a result of high sheltered sector prices, a result of more monopolistic competition and lower productivity. In terms of, i.a., the Malmquist index of efficiency, the productivity in the Nordic countries' sheltered sectors is found to be markedly lower than in Germany.

KEY WORDS: price level, sheltered sector, Malmquist index

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TIIVISTELMÄ

Pohjoismaiden hintataso on ollut tunnetusti selvästi korkeampi kuin EY-maissa. Poikkeuksena tästä yleiskuvasta Suomessa oli 1970-luvulla sama hintataso kuin Saksassa, mutta 1980-luvulla hintatasomme nousi muiden Pohjoismaiden kanssa samalle tasolle.

Tutkimuksessa selvitetään syitä, jotka ovat olleet Pohjoismaiden korkean hintatson taustalla. Näitä on viisi. Ensinnäkin suljetun sektorin toiminta voi olla tehottomampaa kuin EY:ssä. Tämä saattaa olla seurausta maatalouden runsaasta panoskäytöstä, julkisen sektorin suuresta koosta ja laajalle alueelle levinneestä asutuksesta. Tämä on merkinnyt kallista jakeluverkkoa ja suurtuotannon etujen vähäistä hyväksikäyttöä palvelutuotannossa ja jakelussa. Varsinaisesti tutkimus ei kuitenkaan pyri erittelemään näitä taustatekijöitä suljetun sektorin poikkeavalle tuottavuudelle. Niinikään tarkastelun ulkopuolelle jää viimeaikaisten delvalvoitumisten aiheuttama hintatasojen lasku Pohjoismaissa samalle tasolle kuin EY:ssä.

Edelleen syitä korkeaan hintatasoon voi olla vähäisempi kilpailu Pohjoismaissa kuin EY:ssä. Kolmas mahdollinen taustatekijä ovat tuonnin korkeammat esteet. Edelleen jos vaihtosuhde, eli vienti- ja tuontihintojen suhde on kehittynyt Pohjoismaissa edullisemmin kuin EY:ssä, tämä on voinut heijastua koko kansantalouden palkkatasoon ja siten suljetun sektorin hintoihin ilman, että talous olisi joutunut pois tasapainosta. Samalla tavalla on voinut vaikuttaa myös viennin voimakas määrällinen kasvu. Ja viidentenä, korkeampi verotus voi olla osasyynä korkeampiin hintoihin.

Tutkimuksessa hajotetaan OECD:n ostovoimapariteettilaskelmissaan arvioima kansantalouden kokonaishintatasojen suhde kahden maan välillä neljään osaan: avoimen sektorin kotimaahan myymien hyödykkeiden hintasuhteeseen, suljetun sektorin hintasuhteeseen, tuontihintojen suhteeseen sekä välillisen verotuksen eroon. Tämän lisäksi monopolistisen kilpailun astetta mitataan estimoimalla hintojen ja kustannusten, joista tärkein on yksikkötyövoimakustannukset, välille malli, josta voidaan arvioida kuinka paljon hintoja on korotettu rajakustannusten yläpuolelle.

Kun tätä kuvaavat ns. mark up-tekijät ovat selvillä, voidaan suljetun sektorin hintasuhteesta edelleen ratkaista suhteellisten palkkojen avulla työpanoksen rajatehokkuuden ero maiden välillä. Tuontihintojen erojen arvioimiseen tarvitaan ulkopuolista informaatiota tuonnin esteistä, jota on kerätty eri lähteistä.

Hintatasoeroa tutkitaan Suomessa ja Ruotsissa suhteessa Saksaan. Hintatasojen hajote laaditaan vuodelle 1985. Tuontihintojen osalta on päädytty siihen, että Suomessa tuontihinnat ovat 10 % ja Ruotsissa 5 % korkeammat kuin Saksassa.

Tulosten mukaan suljetun sektorin hinnat olivat Suomessa noin 40 % ja Ruotsissa 25 % korkeammat kuin Saksassa. Kilpailu suljetulla sektorilla on Pohjoismaissa vähäisempää kuin Saksassa ja selittää 10 %-ykskköä tästä hintaerosta. Vähäisempi tuottavuus selittää hintaerosta Suomessa 20 ja Ruotsissa 10 %-yksikköä.

Hintasuhdetta tutkittiin myös hajottamalla hintasuhteen muutos vuodeta 1970 vuoteen 1990 yo. tavalla eri sektoreiden hintasuhteiden muutokseen. Suomen kallistuminen suhteessa

Saksaan riippui jossain määrin vaihtosuhteen paranemisesta, mutta suurelta osalta suljetun sektorin kallistumisesta. Ruotsin hintataso taas aleni jossain määrin Saksaan nähden, mikä oli seurausta vaihtosuhteen heikkenemisestä.

Tuottavuuden suhdetta suljetun sektorin osalta mitattiin myös laskemalla ns. Malmquist-tehokkuusindeksi. Tätä varten toimialalle sovitettiin CES-tuotantofunktiot. Niiden avulla laskettiin se panosten monikerta, joka Suomessa ja Ruotsissa tarvitaan suhteessa Saksaan, jotta Saksan tuotanto voidaan tuottaa käyttäen Suomen ja vastaavasti Ruotsin tuotantoteknologiaa. Tulosten mukaan tehokkuus suljetussa sektorissa Suomessa ja Ruotsissa on ollut noin kolmanneksen pienempi kuin Saksassa. Tulos vastaa melko tarkasti myös työn keskimääräisestä tuottavuudesta saatavaa arviota, kun tämän laskemisessa käytetään apuna tutkimuksessa ratkaistua suljetun sektorin hintasuhdetta.

AN EVALUATION OF THE REASONS FOR HIGH NORDIC PRICE LEVELS[1]

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Introduction

One special feature of the Nordic countries is that they are expensive. As figure 1 shows, the general price level in Sweden, Norway and Denmark has persistently been at least 20 per cent higher than in Germany. Finland in the 1970s was a notable exception, with roughly the same price level as Germany; but it joined the other Nordic countries in the 1980s.[2] Norway was exceptionally expensive when oil prices were high, but has also converged to the other countries' situation in the late 1980s.

Trade theory predicts that price and cost levels should be equalized under free trade and competition. This should also concern nontraded goods and services used as inputs for the traded goods, if identical technology is used in all countries (see Burgess, 1990). Goods which do not have a direct or indirect link in the production of traded goods can thereby show persistent price differences. In the Nordic countries, centralized labour markets are an important factor which links virtually all the sectors of the economy as contributors to the production costs of traded goods. Thus, the equalization of prices should in fact concern almost all sectors of the economy.[3]

As there is free trade in goods, the problem of high Nordic price levels is not trivial. In their seminal paper, Smith ja Venables (1988) found that the reduction of trade barriers contributes only a small part of the gains to be reached by the EC's internal market program. The "end of price discrimination" is a much more important goal of European integration. So, price differentials tend to point out that there are achievable gains from further integration of the Nordic countries with the EC.

It is evident that the scope and effects of integration differ, depending on the reason for the price differential. The large general price differentials between the Nordic countries and the EC can be caused by several potential factors. Basically, we have five major explanations available. First, the Nordic countries' sheltered sectors may be inefficient. Second, there may be more monopolistic price formation in these countries. Third, higher import barriers may cause higher prices. This third factor mostly applies to sectors left outside integration, especially agriculture. A fourth potential explanation, terms-of-trade booms, may have been more vigorous in the Nordic countries than in the EC. These booms, spreading throughout the economy, may have simultaneously resulted in overall income and cost increases, thus increasing sheltered sector prices. This factor has been strongly advocated by Forsman and Haaparanta (1991). It is also likely that a vigorous expansion in the volume of

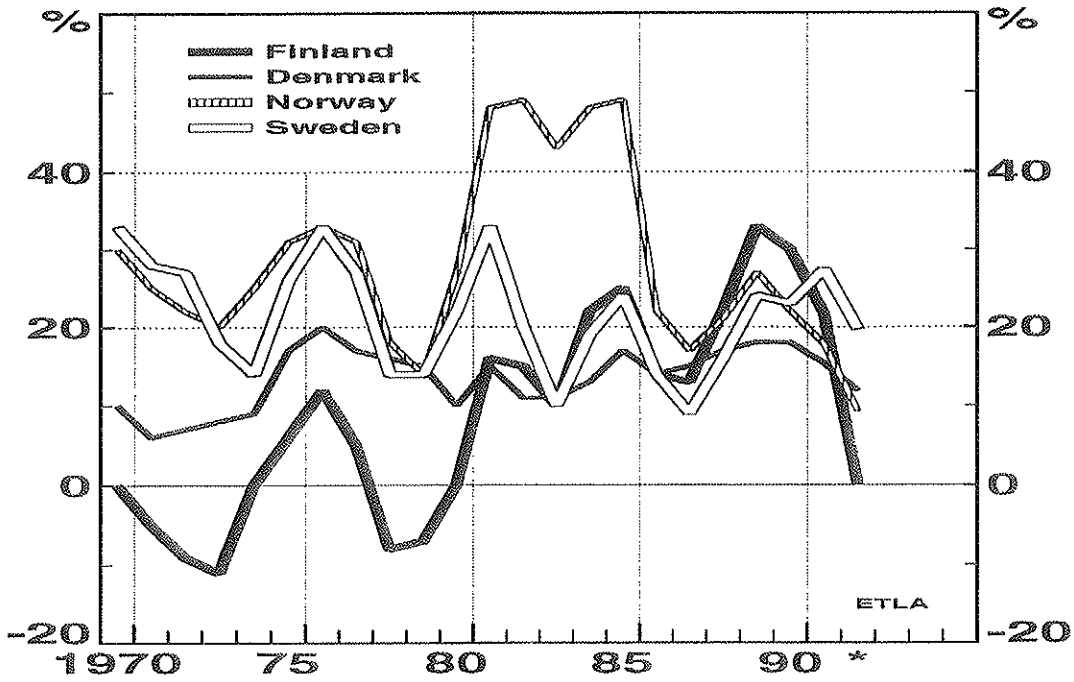

Figure 1
The price levels in the Nordic countries in relation to Germany

exports can lead to a strong demand for domestic factors of production, in turn leading to a rise in prices in the sheltered sector. And fifth, indirect taxation may be higher in the Nordic countries than in the EC.

All five possible factors need not be mutually exclusive. Agriculture especially, with the exception of Denmark and possibly also Sweden, has both an inefficient production structure and very high import barriers in the Nordic countries. All imports are virtually banned in order to protect domestic production.

The deficiency in productivity in the Nordic sheltered sectors may partially be caused by agriculture which - somewhat strikingly - all EFTA countries pursue intensively under generally unbeneficial conditions. A second reason could be the large public sector in the Nordic countries. The third is surely the region's small population (distributed over a large area), the consequently limited use of scale economies in public and private service production, and an expensive distribution network. Accordingly, an important explanation for the different price levels could be that Nordic technology is different from that in the EC. As shown by Burgess (1990), under such conditions free trade in goods does not lead to an equalization of price levels.[4]

Deficient domestic competition and monopolistic price formation with limited entry (including, notably, the distribution network of goods) are popular explanations for high Nordic prices. According to this view, prices could be driven down by aggressive competition policies.

If the Nordic countries' export performance was better than the EC's, this success has been reflected by wage increases for the sheltered sector, not experiencing any

the sheltered sector. An important feature contributing to this linkage is the fact that the Nordic countries prioritize equality more than the EC countries, not only in welfare policies but also in labour market practices and incomes policies. As wage negotiations occur under the umbrella of institutionalized incomes policies with government influence and intervention, the ties between wage increases and levels of wages in the various sectors and branches of the economy are closer than those in the EC. Due to these linkages, terms-of-trade increases produce an inflationary process throughout the economy. However, this factor does not seem to have too much bearance in making the Nordic countries more expensive during recent years, as the developments hardly deviate from those in Germany. During the 1980s Finnish terms-of-trade improved by 11 per cent, in Sweden the improvement was 3 per cent, and in Germany - 10 per cent.

The aim of this paper is to find the reason why the Nordic countries are so expensive. This is carried out by an analysis which decomposes the aggregate price level and identifies empirically the role of the five reasons for a price differential, mentioned above. The model is applied to explain price levels in Finland and Sweden relative to Germany. Section 2 presents the theoretical model, the estimation results of which are presented in section 3. On the basis of these results, section 4 evaluates the reasons behind the Nordic price level differentials vis-à-vis Germany, and section 5 concludes.

A model for the relative price level

In the spirit of the Nordic model of inflation, it is essential to divide the economy into open and sheltered sectors. Due to statistical constraints, we have to be satisfied with the open sector being crudely captured by manufacturing and the sheltered sector is represented by the rest of the economy, including the public sector.

Purchasing power parity calculations, carried out by the OECD, compare the aggregate price level of domestic final expenditure on GDP (see e.g. OECD 1985). In this way, the true purchasing power of incomes in various countries can be evaluated. Let us first decompose the aggregate price level in a manner useful for our purposes. Final expenditure E is allocated into final use of domestic gross production Q_E, and imports of final expenditure M_E. Domestic gross production is produced by domestic factors of production; value added being Y_E, and imported inputs M_I. The price of the final expenditure can be presented,

$$(1) \qquad P_E = \frac{Q_E}{E}P_{QE} + \frac{M_E}{E}P_{ME} = \frac{Y_E}{E}P_{YE} + \frac{M_I}{E}P_{MI} + \frac{M_E}{E}P_{ME} \quad ,$$

with weights summing to unity. Next, we disaggregate P_{YE} in (1) into the value added prices of the open and sheltered sectors. So far, no taxes have been taken into account, the price indices refer to producer prices. Market prices are influenced by indirect taxation, which is added below in expression (2). The price of domestic expenditure in a country can now be decomposed into four components: the implicit producer price deflator P_O for the value added to domestic open sector goods sold in the home market, the value added price P_S for the domestic sheltered sector, the

aggregate import price P_M (including trade barriers), and the level of indirect taxation τ. In the following it is simpler to use a Cobb-Douglas price index so that

$$(2) \qquad P_E = (1+\tau)(P_O)^{\alpha}(P_S)^{\beta}(P_M)^{1-\alpha-\beta}, \ with \ \alpha,\beta>0,$$

where α and ß are the value shares in final expenditure. Y, the value added, is produced by labour L and capital K in both sectors. Both the open and sheltered sectors are assumed to produce under constant returns to scale technology. The unit cost c_i is a combination of the wage rate W_i and the capital cost, to be denoted by r,

$$(3) \qquad c_i = \frac{L_i}{Y_i} W_i + \frac{K_i}{Y_i} r \quad .$$

The pricing equilibrium of firms is made by the mark-up equation for the price-cost margin,

$$(4) \qquad P_i = (1+m_i)c_i \quad ,$$

where m_i is the mark-up factor over unit costs. This mark-up reflects the market power of the firm in the product market. This, in turn, depends on the substitution properties between the product of the firm concerned and its competitors, trade barriers, and the concentration of the industry concerned (see e.g., Norman 1989 and Alho 1990). In a small price-taking economy the wage rate in the open sector is priced through (4) combined with (3). Then, sheltered sector prices are determined through their equilibrium condition (4).

Open sector firms use price discrimination in an optimal way to differentiate their prices in home and foreign markets, which are taken to be segmented from each other. In a normal situation, the mark-up factor is higher in the home than in the foreign market, corresponding to a similar relation in the firm's market power in the two markets. So we can specify,

$$(5) \qquad P_{OH} = (1+\Phi)P_X, \ \Phi>0,$$

where $1+\Phi$ is the ratio between the two $1+m_i$-terms in (4), and P_{OH} is the price of the open sector good sold in the home market.

The wage rate in the open and sheltered sectors is linked in a fixed relationship, either due to a centralized labour market structure or by arbitrage,

$$(6) \qquad W_S = \Omega W_O \quad .$$

If the labour market is homogeneous and labour is mobile between the sectors, Ω is unity.

In order to find the background for price differential in the sheltered sector between two countries, let us relate sheltered sector prices to marginal labour productivity. Let F(K,L) be a production function, with normal properties, of the value added. Profit maximization produces the optimal condition for labour input, which can be solved to give the price in the sector concerned,

$$(7) \qquad P_i = (1+m_i)W_i(\frac{1}{F_L})_i \quad .$$

The price in a sector depends positively on the mark-up factor, the wage rate, and the marginal labour input per unit of production (i.e., the inverse of the marginal productivity of labour, which is denoted by b_i in the sequel).

For the following analysis we need not explicitly specify the production function F; this is not required to identify the reasons behind high Nordic price levels. This is solely based on the general production function (7). However, in order to properly study the relative efficiency of the sheltered sector in two countries with different production technologies, we construct a Malmquist index of productivity with the aid of a CES production function. This construction is presented in the appendix.

We now turn to compare the price levels in two countries, home and foreign, the foreign country being denoted by an asterisk. It is important to note that in the national accounts the 'true' level of prices cannot be identified, as all price measurements are index numbers. Therefore, unlike the OECD PPP calculations, they do not allow for a comparison of price levels. This situation necessitates an exogenous assumption concerning the relative price levels of the export sector in the two countries.

Here we can basically make two assumptions. First, we can assume that the two countries have quite similar export products, one possibility for which is that their trade is of an intra-industry type.[5] This implies that the export price (in foreign currency) of the home country is the same as that for the foreign country, or,

$$(8) \qquad P_X = eP_X^*,$$

where e is the exchange rate, defined as units of foreign currency per unit of home currency. On the basis of (5) and (8) we can now write the open sector price differential,

$$(9) \qquad \frac{eP_{OH}^*}{P_{OH}} = \frac{eP_X^*(1+\Phi^*)}{P_X(1+\Phi)} = \frac{1+\Phi^*}{1+\Phi} \quad .$$

An alternative assumption would be the following. Write first the price ratio for the open sector using (7),

$$(10) \qquad \frac{eP^*_{OH}}{P_{OH}} = \frac{eP^*_X(1+\Phi^*)}{P_X(1+\Phi)} = \frac{1+\Phi^*}{1+\Phi}\frac{1+m^*_X}{1+m_X}\frac{eW^*_O}{W_O}\frac{b^*_O}{b_O} \quad .$$

This presentation is more general than that in (9) above. However, using (10) leads us to an identification problem in the sense that we cannot separate the relative productivities (the two b^*_i/b_i-ratios) in the open and sheltered sectors from each other (see below). Therefore, let us proceed in the following way. Assume that the economic policy in the small country is aimed at preserving competitiveness (profitability) of the export industry, unchanged over time through income and exchange rate adjustments. A widely used measure of competitiveness is the relative unit labour cost, in common currency. Here, this policy norm would imply that the last three terms in (10), when multiplied, produce a unity; returning us to expression (9). However, to reveal possible deviations from the competitiveness norm in a specific year of price level comparisons, we also carry out a decomposition of the change in the relative price ratio over a longer period. By doing so, we are able to release the above assumptions concerning the levels of open sector prices and also to reveal the effect of a terms-of-trade change.

Now we are ready to write the ratio of the two aggregate price levels as follows, using (2) and (9),

$$(11) \qquad \frac{eP^*_E}{P_E} = \frac{1+\tau^*}{1+\tau}\frac{(1+\Phi^*)^{\alpha^*}}{(1+\Phi)^{\alpha}}\frac{(eP^*_S)^{\beta^*}}{(P_S)^{\beta}}\frac{(eP^*_M)^{1-\alpha^*-\beta^*}}{(P_M)^{1-\alpha-\beta}} \quad .$$

In (11), the PPP estimate for the relative price level gives us the left-hand side. If we can provide estimates for the two first factors on the right-hand side of (11), we can solve (11) for the product of the price ratios between sheltered sector goods and import prices in the two countries.

Using (7), the price level comparison in the sheltered sector is

$$(12) \qquad \frac{eP^*_S}{P_S} = \frac{(1+m^*_S)eW^*_S b^*_S}{(1+m_S)W_S b_S} \quad .$$

If we have information on the left-hand side, and the relative mark-ups and the wage rates, we could solve for the relative b's (i.e., the relation between the marginal labour productivities in the two countries). Note that this procedure does not take any recourse to the value of productivity, as shown by the national accounts. However, the price ratio on the left-hand side of (12) is intertwined in (11) with the ratio for the import price. Therefore, we must separate them by collecting outside evidence on relative import prices.

Now we are ready to identify how the five explanations, mentioned in the introduction as potential reasons for the high Nordic price levels, are reflected in our model. The tax factor plays a clear role in (11). The effect of monopolistic competition is felt in both the open and sheltered sectors in (11) and (12). Relative productivity in the sheltered sector is incorporated in the b_S-terms. The import prices, including import barriers, are in the last factor in (11). The terms-of-trade effect can be seen in the following way. Assume that the international price of the home country's export goods rises in relation to that of the foreign country. With an unchanged exchange rate, this gives room to a rise in both sectors' wage rate. Alternatively, the country could revalue its currency. The expression (10) can be used to study the terms on the right-hand side by comparing the situation in two years, before and after the change in the terms-of-trade. This is the reason we also carry out the difference decomposition for the relative price level.

Estimation results

The empirical analysis is carried out to decompose the price differentials between Finland and Sweden on the one hand, and Germany, on the other. First, we estimate the mark-up coefficient in equation (4) from annual national accounts data for 1970-1990, by substituting in the unit cost from (3). The labour cost is the total labour cost per wage earner in the sector concerned. The capital cost is treated in a simplified way. The capital stock series are not usually internationally comparable, due to deviations in the methods for calculating depreciation allowances. Real interest rates have generally been stationary, even though they clearly rose in the 1980s. We have replaced the capital cost contribution to the unit cost with a constant and a linear time trend, capturing both the influence of the capital-output coefficient and the rising unit cost of capital. Deficient information for capital costs is also the reason that we can only estimate an average mark-up factor for the whole period, and not a time-varying one. As we should also allow for Hicks neutral technical change, the coefficient of the time trend T can either be negative or positive. Nevertheless, it is likely to be positive, as the rise in the prices of capital goods has outpaced that of the technical change. Altogether, the estimated price functions have been of the following kind

$$(13) \qquad P_i = \delta_{iO} + \delta_{i1}T + \delta_{i2}(W_iL_i/Y_i) \quad .$$

The factor $1+m_i$ in (4) above is now equal to δ_{i2}.[6] The price formation of the open sector in the home market cannot be directly estimated as there exists no data for this price (P_{OH}). This estimation has been done indirectly as follows. The export price has been explained as in (13). The aggregate price of manufacturing P_O comprises the export price P_X and the domestic price P_{OH}, with weights w and 1-w respectively. The domestic price P_{OH} obeys a similar expression as (13) with subscript O. Substituting into the aggregate price for manufacturing, we get

$$(14) \qquad P_O = \delta_{O0} + \delta_{O1}T + \delta_{O2}(W_O L_O/Y_O) + \delta_{O3}P_X \ .$$

As the model for the price P_{OH} is here multiplied by (1-w), and w is equal to δ_{O3} in (14), the mark-up factor in the domestic market of the open sector can now be identified as

$$(15) \qquad 1+m_{OH} = \delta_{O2}/(1-\delta_{O3}) \ .$$

Because of the significant simultaneous dependence between prices and wages, a consistent estimation method is used. We have instrumented the unit labour cost variable in (13) and (14) with import prices, lagged wages and productivity. Estimation results for the three countries are presented in table 1.

In Sweden, the mark-up equations did not work well when the time trend variable was included, therefore we have deleted it from the export price equation in table 1. The mark-up factor seems to be higher in German exports than in the sheltered sector, while the situation is the reverse in Finland and Sweden. The mark-ups in the sheltered sector in Finland and Sweden are quite similar and higher than in Germany; this confirms the standard view that there is less vigorous competition in this sector in the Nordic countries. In exports, the Finnish mark-up is very low while that for Sweden is quite high. In all countries, the open sector mark-ups are strikingly high in the home market. However, because of the roundabout way they are determined, presented in (15) above, some caution should be taken with respect to their reliability.

All the estimations seek to find long-run relationships between the variables. Therefore the R^2s are normally high and the residuals positively autocorrelated, which biases downwards the t-values. But the coefficient estimates, to be used below in the price level decomposition, are unbiased. We have also added to the table the estimate of the rate of indirect taxation as shown by the OECD tax and revenue statistics for 1985.

We now turn to evaluate relative import prices and barriers. Basically, these can deviate for three reasons. The transport costs can be higher for imports to the Nordic countries than to the more centrally located EC countries. Secondly, there may be different tariffs, or thirdly, there may be non-tariff barriers which deviate between the countries.[7]

There are other studies which we rely on to determine the relative import prices. The evidence is collected in table 2. The bulk of the evidence is from Leamer (1990) who has analyzed tariffs and non-tariff barriers in 14 countries, including Finland and Germany, but unfortunately not Sweden. We also borrow from Horwitz (1988) and use Alho's (1990) estimates of the overall export barriers in the EFTA countries' exports to the EC and vice versa using a method based on imperfect competition and an analysis of market shares' data.

This evidence shows that tariffs do not differ markedly in these countries, and their effect on the possible difference in import prices can only be marginal. However, non-tariff barriers may play a more substantial role. The coverage of NTBs is clearly higher in Finland than in Germany, which is mainly due to the fact that Finland uses extensively NTBs in petroleum and labour-intensive manufacturing products, whereas Germany uses them on its imports of cereals.

Table 1
The parameter estimates for the price equations for Finland, Sweden and Germany (the standard error of the coefficient estimates are in parentheses)

Variable	Finland	Sweden	Germany
Exports			
WL/Q	1.158	1.430	1.247
	(.300)	(.072)	(.242)
T	0.014		0.010
	(.009)		(.004)
Constant	0.233	-0.080	0.269
	(.185)	(.038)	(.139)
Mark-up factor	0.16	0.43	0.25
Open sector			
WL/Q	0.592	0.548	0.231
	(.348)	(.232)	(.701)
P_X	0.688	0.649	0.870
	(.212)	(.159)	(.375)
Constant	-0.017	-0.008	0.027
	(.025)	(.028)	(.055)
Mark-up factor[a] in home market	0.90	0.56	0.78
Sheltered sector			
WL/Q	1.267	1.270	1.130
	(.179)	(.192)	(.348)
T	0.012	0.011	0.008
	(.007)	(.007)	(.008)
Constant	0.216	0.181	0.235
	(.109)	(.122)	(.236)
Mark-up factor	0.27	0.27	0.13
Aggregate indirect tax	0.134	0.133	0.097

a Solved from expression (15) above.

Table 2
The level of trade barriers in Finland, Germany and Sweden, per cent

Variable	Finland	Sweden	Germany
Average tariff[a]	7.9		7.5
Average tariff[b]	4.8		2.7
Average tariff for manufactured goods[c]		5.0	4.0
Coverage ratio of tariffs in imports[d]	49		29
Coverage ratio of various NTBs in imports[d]	35		10
Effect of tariffs and NTBs on imports[d]	-14		-2
Average total export barrier[e]	10	10	15

a The average tariff rate on imports where tariffs are collected. The figure for Germany is that for the EC as a whole. Source: Report by the Finnish Government to the Parliament on the Application for the EC membership, January 1992

b Average import weighted tariff, source Leamer (1990)

c Source: Horwitz (1988)

d Source: Leamer (1990)

e Estimates for total implicit barriers for EFTA and EC exports to each other by Alho (1990).

Based on Leamer's estimations, tariffs and NTBs taken together have reduced Finnish imports by 14 per cent, but those of Germany by only 2 per cent. Leamer does not, however, translate these estimates into an equivalent price difference, or ad valorem barrier of imports. For Finland, the price elaticity of aggregate imports is -0.8 according to the estimates by Torsti (1992). Based on this information, the rise in import prices, equivalent to the reduction in imports produced by Leamer,

would be 17.5 per cent. For Germany, an equivalent estimate would be 2.5 per cent, which is not fully plausible as it would be lower than the effect of tariffs.

All in all, there seems to be support for the belief that import prices are higher in Finland than in Germany. Unfortunately, for Sweden we have only scant information, but we think Sweden lies in the middle of the two other countries. Among other things, this can be based on the fact that the level of agricultural protection in Sweden is clearly lower than in Finland. On the basis of the above estimates, we assume that import prices are 10 per cent higher in Finland than in Germany, while for Sweden this figure is 5 per cent.

Decomposition of the price level differentials

We first decompose the relative price level for 1985, which is a suitable year for comparison as it is not preceded by large relative changes in export prices. The results are collected in table 3. The calculations are based on the decomposition of the price level in (11) above. In Finland, the share of the three supply components in total domestic expenditure are (see the input-output data by Torsti 1992): open sector - 14 per cent, sheltered sector - 58 per cent, and imports - 28 per cent. These should correspond to those for other countries, as the breakdown of the balance of resources and expenditures is quite similar.

The home market's higher price-cost margin in the open sector (compared to its export market) is a factor which raises the relative price level in Finland, but lowers it in Sweden. However, due to the small weight of open sector goods in final expenditure, this factor contributes only marginally to the overall price differential.

We then solve, from expression (11), for the relative price levels in sheltered sector goods using estimates of the import price differential. As can be seen, the implied price deviations are really quite significant: in Sweden the sheltered sector prices were in 1985 25 per cent higher than in Germany, while in Finland they were as much as 40 per cent higher. Next, we utilize the decomposition of the sheltered sector prices in (12). The higher mark-ups in Finland and Sweden seem to contribute roughly 10 percentage points to their higher sheltered sector prices. The relative wage level in the sheltered sector raises the price ratio by 5 per cent in Finland, and slightly also in Sweden. Lastly, from (12), we solve as a residual the marginal labour input needed to produce an extra unit of sheltered sector goods. In Finland the estimate of this is some 20 per cent higher than in Germany, whereas in Sweden a tenth more labour is required for an extra unit of output. The results very clearly suggest that the major factor behind the high Nordic prices is the high price level in the sheltered sector due mainly to monopolistic competition and deficient productivity in this sector.[8]

Table 3
Decomposition of the price levels in 1985 in Finland and Sweden in relation to Germany (S=sheltered sector)

Variable	Finland	Sweden
PPP price ratio	1.25	1.24
Relative indirect taxation $(1+\tau)/(1+\tau_{GER})$	1.03	1.03
Relative mark-up of the open sector in the home market vis-à-vis exports $(1+\Phi)/(1+\Phi_{GER})$	0.87	1.31
Relative import price	1.10	1.05
Producer price relative to Germany[a]		
S	1.41	1.25
Relative mark-ups in the sheltered sector $(1+m_S)/(1+m_{S,GER})$	1.12	1.12
Labour cost/ wage earner relative to Germany		
S	1.05	1.03
Marginal labour input per unit of prod. relative to Germany[b]		
S	1.19	1.08
Average physical productivity relative to Germany		
S	0.65	0.78
Malmquist input based productivity index for Germany with respect to Finland and Sweden[c]		
S	1.55	1.48

a Solved from expression (11)
b Solved from expression (12)
c On construction, see the appendix.

If we compare the average value productivity of the sheltered sector in two countries, as calculated in the national accounts, we get a markedly different result from the relative physical productivity shown in table 3 (derived by deflating the relative value of productivity by the relative price of the sheltered sector). According to the national accounts there is not much difference in the average sheltered sector productivities, but the estimate in table 3 shows a gap in productivity of 20-35 per cent in the Nordic countries as compared to Germany. Nor do national accounts distinquish the contribution of the diverging productivity to the price level, as the value of productivity can reflect both efficiency and consequent low prices, as well as high sheltered sector prices, gained through inefficiency.

A proper measure for relative efficiency can be reached by constructing a Malmquist productivity index, see on this, e.g., Berg et al. (1991). The construction of this efficiency score is explained in details in the appendix. The idea is to study the efficiency of a unit, here the sheltered sector in Germany, and compare it to that in Finland and Sweden. To do so it is necessary to find a scale factor such that the German output is produced with the German factor proportions, but using Finnish or Swedish production technology. In order to carry out this comparison we have had to transform the comparison to the same currency, circumvent the lack of data of the capital stock, and specify a technology, here CES. The results (see the last row in table 3) indicate that German efficiency was in 1985 some 50 per cent higher than Finnish and Swedish efficiency.

Another way to analyze the price levels, referred to above, is to carry out a decomposition for the change in the price ratio. As mentioned above in section 3 in connection with the treatment of open sector prices, this method allows us to discern the effect of a possible change in the terms-of-trade and the diverging export price developments. We study the change in the relative price ratio in 1970 to 1990 between Finland and Sweden, on the one hand, and Germany, on the other (see table 4).

The results show that Swedish and German import prices have stayed at the same level. The relative price of both the open and sheltered sector in Sweden has clearly gone down. In Finland the pattern of change is quite different. Sheltered sector goods have become much more expensive relative to Germany, the manufacturing prices somewhat - but only to the extent that export prices have risen more favourably - and import prices have also become more expensive.

The results in table 4 show why Finland became a more expensive country in the 1980s as compared to the 1970s (see figure 1): its sheltered sector became more expensive. There also seems to be a general deviation by roughly 10 per cent from the PPP situation cumulated over the two decades between Finland and Germany in the open sector. Both the Finnish export and import prices have gone up by this amount relative to Germany. For Sweden, there is a reduction in the aggregate price differential, contributed by the reduced open and sheltered sector prices. This corresponds to the reduction in the Swedish terms-of-trade by 10 per cent vis-à-vis Germany.

Table 4
Decomposition of the change in the relative price level of Finland and Sweden vis-à-vis Germany, 1970-90

Variable	Finland	Sweden
Aggregate price ratio (PPP)		
1970	1.00	1.33
1990	1.30	1.23
Export price, in common currency in 1990 relative to Germany (year 1970=1)	1.13	0.89
Manufacturing price, in common currency in 1990 relative to Germany (year 1970=1)	1.10	0.86
Sheltered sector price, in common currency in 1990 relative to Germany (year 1970=1)	1.29	0.88
Import price, in common currency in 1990 relative to Germany (year 1970=1)	1.12	1.01

Concluding remarks

We have above considered the various reasons behind the high price levels in the Nordic countries using a decomposition of both the relative price levels, and of a change in this ratio. Through the decomposition we were able to derive the relative sheltered sector prices for two countries. We found that a more monopolistic oriented competition explains a part of the higher sheltered sector prices in the Nordic countries. However, a major reason of similar magnitude for the Nordic countries being more expensive than Germany is that the productivity in the sheltered sectors in Finland and Sweden is significantly lower than in Germany. In addition, the wage differential does not compensate for the gap in productivity. We were also able to

derive a quantitative estimate for the productivity gap between the two Nordic countries and Germany.

In our framework we did not try to find the reasons for the deficient productivity. Delving more into these factors - as well as exploring the channels through which further integration of the Nordic countries with the EC can lead to a rise in this productivity and an increase in real incomes - is important for future research concerning the important, but often omitted, role of the sheltered sector in integration.

Notes

1. The author thanks Esko Torsti for invaluable assistance in the estimations, Rolf Maury for data collection and manipulations, and the organizers of the Nordic workshop for constructive comments. Financial support by the Finnish Cultural Foundation and the Yrjö Jahnsson Foundation is gratefully acknowledged.

2. After a devaluation in November 1991 and a weakening of the Finnish markka after it was allowed to float in September 1992, the price level in Finland is even lower than in Germany. After the Swedish krona was put on floating in November 1992, the Swedish price level was at the end of 1992 roughly the same as in Germany.

3. On the other hand, a cost test applied to the manufacture - or the open sector - does not reveal the same kind of difference. Norman (1991) compared unit labour costs in manufacturing and found them roughly the same in the Nordic countries as in the northern member countries of the EC. From this he inferred that these countries cannot expect sizable gains from further integration utilizing comparative advantages in the trade of manufactured goods.

4. Of course, there is the possibility that the quality of services in the Nordic countries is higher than what can be properly discerned by price measurements. However, we are not able to elaborate this point here.

5. This applies quite well for Sweden and Germany, but not so well for Finland and Germany. The share of intra-industry trade in trade with the EC is 75 per cent for Germany, 70 per cent for Sweden, but only 39 per cent for Finland, see Baldwin (1992).

6. It should be noted that the estimates for the mark-up factors in table 1 cannot be properly contrasted between sectors in a country, as the export price is in fact the price of gross production and not of the value added.

7. It should be noted that each import good is normally combined with a domestic input before it reaches the hands of an intermediate or final consumer. Thus, the market price of an imported good is a combination of its price at the border, the import barriers (translated into an ad valorem form), and the domestic cost component. In our setting, the last factor is included in the price of the sheltered sector.

8. However, we should bear in mind all the reservations related to the above calculations. It is also true that the OECD PPP estimates have been revised over the years. The current estimate is that the price level in Finland and Sweden was 25 and 24 per cent higher than in Germany in 1985, respectively. In the earlier 1985 PPP calculations for these price ratios the estimates were only 14 per cent and 13 per cent.

Bibliography

Alho K. (1990), 'Identification of the Barriers in International Trade under Imperfect Competitition', ETLA Discussion Paper, No. 348.

Baldwin R. (1992), 'An Eastern Enlargement of EFTA: Why the East Europeans Should Join and the EFTAns Should Want Them', CEPR Occasional Paper No. 10, 1992.

Berg S.A., Førsund F.R. and Jansen E.S. (1991), 'Malmquist Indices of Productivity Growth during the Deregulation of Norwegian Banking, 1980-89', The Scandinavian Journal of Economics, Vol. 94, 1992, Supplement, pp. 211-228.

Burgess D.F. (1990), Services as Intermediate Goods: The Issue of Trade Liberalization, in Jones, R.W. and Krueger, A.O. (eds.), The Political Economy of International Trade, Basil Blackwell, Worchester, pp. 127-139.

Forsman P and Haaparanta P. (1991), Hinnat ja vaihtosuhde: onko Suomen hintataso epätasapainossa ? (Prices and the Terms-of-Trade: is the Finnish Price Level in Imbalance?, in Finnish), in: Korkean hintatason Suomi (Finland with a high price level, in Finnish), Paulo Foundation, Helsinki, pp. 53-70.

Horwitz E.C. (1988), Några aspekter av en svensk anpassning till EGs handelspolitik mot tredje land. Skillnader i tullar och tariffära handelshinder (On the Swedish Adjustment to the EC Trade Policy vis-à-vis Third Countries. Differences in Tariffs, in Swedish), in: The Nordic Countries and the EEC, papers presented at a workshop in Lund, September 1988, FIEF, NEF and Institute of Economic Research at Lund University.

Leamer E.E. (1990), 'The Structure and Effects of Tariff and Nontariff Barriers in 1983, in Jones, R.W. and Krueger, A.O. (eds.), The Political Economy of International Trade, Basil Blackwell, Worchester, pp. 224-260.

Norman V.D. (1989), 'EFTA and the Internal European Market', Economic Policy, No. 9, pp. 425-465.

Norman V.D. (1991), 1992 and EFTA, in Venables, A.S. and Winters, L.A. (eds.), European Integration, Trade and Industry, CEPR and STEP, Cambridge University Press, Cambridge, pp. 120-139.

OECD (1985), Purchasing Power Parities and Real Expenditure in the OECD, Paris.

Report by the Finnish Government to the Parliament, January 1992.

Smith A. and Venables A.T. (1988), 'Completing the Internal Market in The European Community: Some Industry Simulations', European Economic Review, Vol. 32, No. 7, September, pp. 1501-1525.

Torsti E. (1992), Tuotantopanosten kysyntä ja hyödykemarkkinoiden lyhyen ajan tasapaino avoimella ja suljetulla sektorilla (Demand for Factor Inputs and the Short-run Equilibrium of the Goods Market of the Open and Sheltered Sector, in Finnish), ETLA, series C 63, Helsinki.

Wieser T. (1989), 'What Price Integration? Price Differential in Europe: The Case of Finland', ETLA Discussion Papers, No. 311, Helsinki.

Appendix. The evaluation of production efficiency in the sheltered sector with the Malmquist index of productivity.

In order to assess the relative productivity of the sheltered sector in various countries we have to recognize the fact that there may be different production technologies in them. So, let s specify the production function for the value added being of the CES-type,

$$(A1) \qquad Y = (a_L L^{-\mu} + a_K K^{-\mu})^{-1/\mu}, \ \mu > -1 \ .$$

We estimate this production function in a factor share form. Profit maximization with respect to labour demand gives the following relationship,

$$(A2) \qquad \frac{WL}{PY} = (1+m)^{-1} a_L \left(\frac{Y}{L}\right)^{\mu} \ .$$

The estimation results of (A2) are the following.

Table 5
The estimation results of the CES-production function
for the sheltered sector in Finland, Sweden and Germany
(in parentheses are the standard errors)

Country	μ	$(1+m)^{-1}a_L$
Finland	0.127	0.325
	(.041)	(.067)
Sweden	-0.224	2.087
	(.022)	(.236)
Germany	-0.340	2.363
	(.104)	(1.055)

As can be seen from these results, in Finland the elasticity of substitution (i.e., $1/(1+\mu)$) between the factors is higher than unity, while in Sweden and in Germany the production technology is quite similar, and this elasticity is less than unity.

We then proceed to construct the Malmquist index of productivity. This is defined in the following way for production units 1 and 2. Let α be the minimal scale factor. When applied to both factors of production of unit 2, it produces the output of unit 2 by the technology of unit 1, i.e.,

$$(A3) \qquad Y_2 = F_1(\alpha K_2, \alpha L_2) \quad .$$

When the two production units are in different countries we have to transform the comparison to the currency of one of the countries. For the home country (unit 1) we write Y=V/P, where V is the value of production, and for the foreign country (unit 2) Y*=eV*/eP*. We then solve (A2) with respect to Y and apply (A3). Now we can write

$$(A4) \qquad \frac{eV^*}{WL^*} = \alpha \frac{eP^*}{P} \frac{1+m}{a_L} \left(\frac{eV^*}{eP^* \alpha L^*}\right)^{-\mu} \quad .$$

Now we are able to solve (A4) for the value of the α-parameter without knowledge of the capital stock using the estimated production function and the information derived from the relative prices in the sheltered sector. If α is higher than unity, this means that the foreign (German) sheltered sector is more efficient than the home by the amount α-1.

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