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UNIT VALUES, QUALITY LADDERS AND NON PRICE COMPETITION

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Unit values, quality ladders and non price competition

The use of unit values for discriminating between price and quality competition - conceptional issues and applications to the OECD Countries and countries in transition

Paper prepared for the Conference on New Indicators for the Knowledge - Based Economy

OECD, 19 - 21 June, 1996 (oecdwork, 3.6.1996)

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Abstract: This paper proposes using the unit value of exports to assess the competitiveness of nations. The unit value is seen as a measure complementary to indicators focusing on market shares and trade balances on the one hand, and to technology or knowledge indicators on the other hand. Specifically we propose to use the unit value to assess whether the performance of a country depends on low costs (cost competitiveness) or on the superior quality of its products (non price or quality competitiveness).

We start with discussing the relation between unit values and traditional economic concepts. Then we rank countries according to the unit value of exports and imports, and compare this hierarchy with conventional indicators like per capita GNP. This picture evolving comes near to the notion, that countries climb up a quality ladder during their economic development. Then we develop a simple technique to discriminate between industries in which low unit values signal low costs, and those industries in which high unit values signal high quality or highly processed goods. The technique reveals indirectly which sectors are price sensitive and which sectors are less price elastic, therefore we call the technique REVELAST (revealed elasticity approach).

The unit value of the exports is a measure available at practically all levels of disaggregation. This measure thus enables us to judge competitiveness for broad industries as well as to trace its sources and structures into narrowly defined product markets. We apply this concept to assess the competitiveness of the USA, Japan, the European Union, and some countries in transition. The assessment of qualitative competitiveness according to this indicators is compared to other market segmentation techniques, like that developed by Oliveira Martins from the OECD.

Keywords: price and non price competitiveness, price elasticity, quality differentiation, competitiveness of nations, knowledge society

JEL: F12, F14, O52

In section 2 we introduce the indicator unit value and its relation to economic concepts. Section 3 describes the role of the unit value in evaluating the concept of dynamic competitiveness. We demonstrate the correlation between unit values and per capita GNP, illustrating the notion of "climbing up the quality ladder".

Section 4 describes the device how to separate markets in which costs and prices are the most important determinant of trade flows and those where quality is the decisive determinant of success. We operationalize this technique with two extreme applications. The first splits the 3-digit industries for each bilateral trade between two countries into four boxes (application 1). The trade between the US and Japan can be price elastic in a specific industry, however that between a country of transition and the OECD not. This is therefore a country specific concept, in which the same industry can underlay different determinants in different regions. The second application use the trade flows of 18 countries to rank all industries from very price sensitive to very quality sensitive, each industry is ranked in this application once for all. Both applications use the idea that movements of unit values and quantities together reveal implicitly whether markets are price sensitive or not, and are therefore called REVELAST (revealed elasticity).

Section 5 applies the concept to the competitive race of the triade and for assessing the qualitative competitiveness of countries in transition. Section 6 relates the result to the segmentation proposed by Oliveira Martins, section 7 concludes.

2. The indicator: definition, relation to other concepts

2.1 Definition and availability of the indicator

The unit value of exports is defined as nominal sales divided into some quantity measure, usually the kilogram. This indicator is also available for imports, in some cases also for domestic production. Most importantly, it is available for a very large number of countries on data banks provided by the United Nations or the OECD, and it is available at practically all levels of disaggregation: we can calculate unit values for total exports (SITC 0 - 9), for manufacturing exports (SITC 5 - 8), and for more than one thousand products on the six digit industry level[2]).

2.2 The relation of the unit value to conventional economic concepts

The measure "unit value" can, on the one hand be compared to the concepts of productivity and quality, and on the other hand, to the concept of price and costs, depending on specific circumstances and qualifications.

Let us first investigate the relation of the unit value to the concept of partial productivity. We assume a Cobb Douglas production function $Q = A.L^{\alpha}.K^{\beta}.M.$, where Q, L, K, M are quantities of output, labor, capital and material input. Now we add an output price P and distinguish two types of material, M_u and M_w, - material used (embodied) in the final product, and material not embodied ("waste"). The unit value is defined as $UV = P.Q/M_u$, id est nominal output per material "embodied" in the final product. This appears to be very similar to partial productivity, whereby the numerator is expressed in nominal terms, and the denominator contains the material input, instead of labor or capital. It is not total material, since there is waste, and some material is expended in the production process (oil, chemicals). But the essence remains; the unit value is *output per units of input* (material measured in kilograms). The indicator is however much more "quality oriented", because the numerator incorporates all of the quality elements, such as the premiums for higher sophistication, for specialty production, for related services, etc.[3]). Therefore we can use the UV to assess the quality of a heterogeneous good. The more characteristics a good accumulates (which are valued by consumers or investors), the higher its unit value will be. Like any other measure for partial productivity, the unit

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[2]) There are, however, also limits in the availability of unit values. For some industries, the weight in kg is not reported, be it that the denominator is reported in a different unit (square meters, volume, pieces etc.) or be it that there is no denominator available at all. The reporting behavior is different from country to country. We have to use techniques which minimize the importance of this difference. Among these techniques is a computational procedure which calculates unit values at the n- digit level only if the data on the n+1 digit level are complete. We follow the strategy sticking to one reporting country as much as possible. For Germany as a reporter, for example, unit values are available for all but five 3-digit industries, comprising more then 90 % of German exports.

[3]) The unit value also increases with higher market power. We may at first feel uneasy with this, since in the usual structure conduct performance paradigma, market power is not related to quality. In Schumpeterian models, in the theory of quality ladders, and in the new trade theory, market power is however related to innovation, early starting advantages and sucessful vertical differentiation.

value increases, if "the other inputs" are increased per unit of weight, i.e. more or better labor or capital is added.

On the other hand, the unit value can be boiled down to a price, if the quantity unit in which output is measured is identical to the unit in which the input is measured and material is the most important input: if "one unit of Q" is technically linked with "one unit of M_U", and the value added is a rather low, then the UV is the price. Let us assume h kg of concrete are produced with the input of h kg of cement and let wages, capital and other input be very low. In this case the per kg unit value of cement is identical to the price of cement (which is also that of concrete). If economic profits are zero (perfect competition assumption), then the unit value is also identical to average costs. For homogeneous goods competition drives down the price to marginal costs, and eventually the unit value approaches unit costs. The interpretation is very different if the dimensions of input and output differ widely. For example, a car may ultimately be defined by a bundle of characteristics (speed, power, design, electronics), its value or consumer evaluation is far removed from the weight of the steel embodied. The unit value as the car price per kg is much more a sign of quality or of the efficient use of material than of a price.

We will return to this double image of unit values in chapter 4.

2.3 The unit value of aggregates, stages of processing

Like other empirical measures, the calculation of unit value is effected by problems of aggregation. The unit values of the aggregate "road vehicles" is a weighted average of the unit values of cars, trucks, bicycles, where metric tons are used as an implicit weight. The unit value of the subaggregate "cars", itself is the weighted average of large, medium and small cars, as it is the average of cars of high, medium and low quality.

If production shifts from a low quality to a high quality subsegment, the unit value increases. So in comparing the exports with the imports of a given country, or exports of a country at different points in time, or the exports of different countries for a specific aggregate, we will implicitly compare aggregates with different structures. But what seems to be a disadvantage, if we seek to compare "pure prices", proves to be an advantage when we seek to assess composition and quality of production. A country with a higher unit value will in some sense supply more quality, perhaps due to its ability to sell an identical product at a higher price (marketing, advertising, quality), or by specializing in a more highly priced product segment.

The same is true if one additional stage of processing is added. In principle, trade statistics try to separate goods with different stages of processing, putting raw materials in one product group, semi finished products in another, and consumer goods in a third. But this is not always the case for more

sophisticated products. If the surface of flat steel products is made more durable, if a machine is adapted to the specific circumstances in a factory, the unit values increase in a given statistical category due to an additional stage of production. What may be a disadvantage if we want to know the "true" price, is an advantage for assessing the dynamic competitiveness of firms and industries: firms and countries which supply products with more stages of production will be more highly evaluated by consumers and can charge higher prices[4]).

[4]) To show how each stage of fabrication and refining increases the unit value, let us look at a chain of products produced from the same basic input, but which are refined and processed at each stage of the production process (Germany, 1992):

The unit value of iron ores is $ 0.06 /kg, that for flat steel is 0.47 $/kg, steel pipes have a unit value of $ 1,03 /kg. The unit value of machines is $ 13.21/kg, for computers it is $ 61,1 $/kg, for medical instruments the unit value climbs to $ 206.64 /kg. Finally, software and intellectual property, knowledge have theoretically infinite unit values.

3. Unit value and the notion of a quality ladder

3.1 The relevance for the competitiveness issue

An issue which is raised in all evaluation of the competitiveness of nations[5]) is the split between price competitiveness and technological competitiveness. The first is the ability to produce at low costs, and this is exceedingly crucial in mature, homogeneous markets. The latter is the ability to compete in high tech areas, to innovate, to target at the most sophisticated market segment. There are cases especially in process innovation, where the two aspects lead to the same result: the most efficient country producing at the technology frontier has the lowest cost per unit (if measured in quantities). In other cases, wages and skills may be much higher in one country, but the product is superior to that of competing firms, therefore the firms are price setters, and charge their costs plus a Schumpeterian monopoly rent. In this case, any comparison of costs per unit will show a lack of price competition, but price competition is not a meaningful concept here, since there is no real competition for identical products.

The unit value exactly mirrors either of these two concepts. If price competition is important, because the products are homogenous, and the technique is available all over the world, margins are zero and unit values will reflect average costs. If however, quality, product innovation, and the adaptation of the product to specialized needs are the important success factors, the higher unit value will reflect this ability to set prices, to face inelastic markets. The UV will be far from unit costs and reflect technological superiority, at least as far as product innovation is concerned.

3.2 Increasing the focus on quality as the basis for a dynamic evaluation

The notion of quality has become increasingly important in economics during the past decade. On the macro economic level, it has become obvious that the advanced industrialized countries can compete with countries well endowed with cheap labor only when they climb up the "quality ladder", by producing ever more sophisticated products. The competition between Mexico and the US, between the former socialist countries and Western Europe, as well as between China or the Philippines and Japan cannot be countered by lower wages. Grossman and Helpman (1991A, B, C) provide such a model, in which the South is imitating the North, using lower wages to threaten its position by lower

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[5]) Defining the competitiveness of nations is not an innocent issue. There are some authors, who deny the importance of this concept (Cooper 1961, Balassa 1962, Suntum 1986), or at least try to play it down (Porter 1990, Krugman 1994). There are other authors, who focus on external balances only. Most studies try to combine issues of external balance with domestic performance (resulting in definitions such as "growth without trade imbalances" etc., see EU 1994, Competitive Policy Council 1994, Schumacher et al. 1995). I have proposed a rather comprehensive definition which includes external balances, domestic economic performance and social and environmental standards (Aiginger 1987B, 1995A, C, Singh 1987).

wages. The North can regain its advantage through innovation, both countries are thus consecutively climbing up the quality ladder[6]).

3.3 The unit value hierarchy and per capita GNP: evidence on the quality ladder

If the unit value signals primarily quality and if countries in their economic development continuously have to upgrade their production from low quality to high quality products, we should expect a positive correlation between the unit value of exports and the per capital GNP. There may be an effect of secondary order: if growth is export driven and exports are fueled by low costs, then the relationship could be weakened, if however exports rely on high quality (human capital, knowledge, research and development) the relationship should be closer. The expected relation between import unit values and per capita GNP is not so clear-cut. Richer countries could make use of the division of labor and import raw material and semi finished good, this would imply a negative correlation. On the other hand richer countries tend to use quite sophisticated input, given the structure between raw materials and finished products. This would give rise to a positive correlation.

The correlation between the relative unit values (export unit value divided into import unit value) and per capita income, depends on the factors mentioned above. It should be stronger if export is quality led and if countries are vertically specialized, it will be lower if exports are price sensitive and if sophistication of imports and exports move parallel.

For preliminary results see table 1 . We relate the aggregate unit values of the exports, then the unit value of the imports and finally the relative unit values each with per capita GNP. Our sample includes 30 countries, namely all OECD countries and seven countries in transition. Data are for 1993, all data were transformed into logarithms.

The correlations are all positive. The correlation is much stronger between export unit values and per capita GNP, than for import unit values. But the closest correlation exists between per capita GNP and the relative unit values. If the usual statistical indicators for the fit could be taken seriously, we could say that 57 % of the variation in per capital GNP could be „explained" by this single indicator. I do not know about any single indicator which has such a good fit.

However we have to be careful not to claim any "prove" of an economic law by the statistics presented in table 1 for several reasons. First we do not know in which direction the causality runs. GNP per head influences unit value as well as the unit value influences GNP. My economic interpretation of the

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[6]) Microeconomics tells us that the willingness to pay, on the part of the consumer, can be increased by horizontal or vertical product differentiation. Horizontal product differentiation leads to a price premium, due either to value placed by consumers on diversification as such (love of variety approach), or because a specific new product comes nearer to the ideal variety preferred by some consumer (preferred variety approach). Product innovation results in a product assessed as superior by all consumers (vertical product differentiation).

relation is, that economics in general and the quality ladder approach specifically, implies that there is a two way relationship. In this case OLS regressions are not adequate, and statistical measures of significance may be grossly misleading. Secondly we know that other explanatory variables are missing (like investment, human capital, R&D), so that we cannot interpret the coefficients. Most of this issues are shared with other single determinant explanations of cross section variance in GDP, but I want to be especially careful to say that I could not test the quality ladder hypothesis, and that I could not prove the positive relationships. What I have done is to demonstrate that there is a strong cross section correlation between unit values and per capital GNP.

If we look how close the relationship is and which countries fit especially good and which are outsiders we see that Greece is the largest negative outlier. GNP per head is low (rank 20), but unit values of exports and especially their relation to imports are even lower (ranked 24, paralleled or surpassed by the countries in transition). The second negative outlier is Iceland (due to its high income position). The third outlier is Canada, probably due to its vicinity to the USA (the unit value of imports is higher than that of exports, which does not fit to the above middle income position). The same is to be seen for Austria, again partly due to its intensive trade with Germany.

On the positive side, there is a single dominant outlier: Ireland has the highest unit value of exports and above average unit value of imports, together this gives the highest relative unit value of exports. This position is due to the role Ireland plays as a host to subsidiaries of multinational firms in high unit value sectors (Ireland is attractive to the so-called "mobile technological intensive industries", such as computer parts, chemicals etc.)

The countries in transition fit rather well into the hierarchy, they contribute to the good fit of the correlation, since unit values of exports, relative unit values and per capita GNP go together. Within the bloc the assessment looks brighter for Hungary and Slovenia (where export unit values reach at least one half of import unit values), and least favorable for Slovakia.

In absence of a method to overcome the problems of causality at this stage of research, we tested the robustness of the relation. We reversed the direction of causality (estimating „the other regression), we disaggregated the relation into subgroups of one digit SITC industries (to mitigate the aggregation problem), and we deleted outliers (to overcome deleted information). The basic results proved very robust.

4 The revealed elasticity approach (REVELAST)

As mentioned above, the main problem which has limited the use of the unit value specifically in disaggregated economic analysis so far, has been its twofold character. It can be either a cost indicator where low unit values signal cheap costs or it can be an indicator of quality, product differentiation and market power, where a high unit value signals superior performance.

We implement the following device (developed in 1996A) to distinguish between markets in which the unit value signals costs and those in which it informs about quality differences:

If unit values reflect costs and the product is homogeneous, then countries with lower costs should be net exporters in quantities and countries with higher costs should be net import countries. If a country is a net exporter in quantities despite the fact that it has higher unit values, then this must be due to quality differences. This assertion makes use of the fact that economic theory tells us that under quite broad circumstances demand is price elastic.

Application 1: country specific segmentation of the markets

Using this assertion allows us to split industries into those which are dominated by price competition (Uvexp < UV imp $\Rightarrow$ Qexp > Qimp et v.v.) and those with revealed quality competition (Uvexp > UV imp $\Rightarrow$ Qexp > Qimp et v.v.) . For a specific country we can furthermore subdivide markets dominated by price conditions and markets dominated by quality competition into those with a higher resp. lower export unit value, arriving at the following four segment scheme:

Segment 1 contains price elastic goods which in the home country have a high unit value and which consequently lead to a trade deficit in the home country. Industries in this sector have lost price competitiveness in a market in which prices are important. This part of the deficit can be said to be the consequence of high production costs (*deficit in price competitiveness*).

Segment 2 contains price elastic goods, which in the home country have a low unit value. This sector yields a trade surplus (*successful price competition*).

Segment 3 combines the industries in which the exported quantities exceed imports despite a higher unit value. This has to be the consequence of a quality lead, which is reflected in demand or, signals successful specialization in the most sophisticated market segment. This sector is the very target for an advanced country (*successful quality competition*).

Segment 4 is the sector in which industries run a trade deficit despite low prices. In this sector there have to be some exit barriers (*structural problem area*).

Of these four segments, the third is the most promising from the perspective of technological or dynamic competitiveness. A country with high costs is well prepared for future competition, if a large part of its industry is located in the sector where high unit values are consistent with an export surplus.

Application 2: Developing an hierarchy of industries according to REVELAST

The first application created market segments in which for a specific country or for the bilateral trade between two countries industry groups were put into one of four boxes. The industries in the specific boxes could change slightly from year to year, and they are very different depending on the countries concerned. If price sensitivity dominates the US- Japanese trade in a specific industry, there is some probability that it may be important also for the trade of a country in transition with OECD, but there could be other factors dominating this trend.

Our second application ranks the three digit industries according to the number of countries in which the price sensitivity resp. the quality sensitivity dominates. We use the trade flows of 18 countries (12 EU 1992 members, USA, Canada, Japan, Hungary, Poland, Czech Republic) to calculate in how many of these countries there is a positive sign and in how many there is a negative sign between quantities and unit values. The result is an index, within the range of + 18 to - 18, ranking the 3- digit industries according to their revealed price or quality elasticity. This index is taken as relevant for all countries and periods of investigation. This „once for all categorization" is therefore the other extreme to application 1, where the revealed elasticity was determined for each country and year individually.

5. Applications of REVELAST

5.1 REVELAST and the competitive race in the triade

In this section we divide markets according the four sectors of REVELAST, the bilateral trade flows are used for the segmentation (application 1). The results are part of Aiginger 1996 B.

US vs. Japan

The US exports[7]) manufacturing goods to Japan for $ 25 bn; imports are more than three times higher, at $ 81 bn. This imbalance is due first to higher volumes of imports (quantities are traded roughly by 2 : 1) and secondly to a higher unit value of Japanese exports ($ 9.05/kg for US imports Vs $ 5.47/kg for US exports). Disaggregation reveals that the lower unit value for the US comes from a lack of specialization. The unit value is lower in Japan's exports to the US for 88 three digit industries, and higher in only 75 categories. Nevertheless the aggregate unit value is higher for the Japanese exports. This difference results from the specific concentration of Japanese exports in engineering industries. The US exports are much more evenly distributed across industries and include many low value added products. Of the ten 2-digit industries with an unit value larger than $ 30, the US has a quality lead in nine[8]), but it does not concentrate its exports in these sectors. Japan, on the other hand, has a lower unit value in the majority of the sectors, but concentrate in the sectors with high unit values, whether it has higher or lower unit values, as compared to the US, in these specific industries. If Japan hypothetically had - in addition to its concentration in high unit value sectors -the high US unit values charged on the basis of its real industry structure, its unit value would reach $ 19.77 (instead of $ 9.05).

The US has higher unit values in its bilateral exports to Japan specifically in high tech industries:

- for pharmaceuticals $ 174.2/kg compared to $ 55.4/kg
- in all nine engineering industries, and among these
- the US export unit value is specifically high for computers, for transport machines (including air planes) and for scientific equipment

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[7]) For our analysis of the bilateral trade between the USA and Japan, we employ those files in which Japan is the reporter, since this file is far more comprehensive than the opposite one. We substitute the data for the groups SITC 761 - 763 and 781 - 785 as described. We then have data for 164 out of 174 3-digit industries. The 10 industries for which we cannot calculate unit values have a combined weight of 2.2% in the bilateral trade (the largest are SITC 525 - radio active material, and 884 - optical goods). There is another data loss, since for some 3-digit industries the unit values are available only for a subset of the 4-digit industries. The data on the 3-digit level are then consistently calculated (namely only for those industries for which data are complete on the 4-digit level). This leads to a loss of data for $ 8 bn, or 7% of the trade volume.

[8]) The two exceptions are clothing (where the unit value is a misleading concept) and optical instruments (the Japanese concentrate on cameras and equipment; the US has a higher unit value for this sophisticated segment, also. The US, however does not concentrate on this high value added segment, but supplies the threefold quantity of films, SITC 882).

If we now divide the bilateral flows into the four sectors, we find that the US is cheaper and accrues a quantity surplus in 54 industries (Table 12). These industries with "price competitiveness" for the US are mainly chemical industries, but also paper, copper, and aluminum. The total US surplus in these industries together is only $ 3.7 bn. A mirror image results when Japanese exports are cheaper and quantities are higher. This sector is comprised of 72 industries, among them electronic industries and control instruments. Japan transforms this price advantage into a surplus of $ 50.2 bn. This demonstrates quite an asymmetric use of cost advantages in the two sectors in which prices dominate the competitive position.

In sector 3, the US exports higher quantities, despite higher prices. This sector is comprised of 16 industries, the most important being aircrafts (SITC 792). The overall surplus of the USA is however only $ 3.0 bn. Japan, on the other hand has an apparent lead in quality in 21 industries, which it has transformed into a surplus of $ 11.8 bn. Transistors, vehicles and photo supplies are the most important single industries in sector 4.

US vs. EU

The US has a slight trade surplus, exporting $ 82 bn to the European Union versus imports of $ 75 bn in 1992: The unit value is lower in Europe's exports ($ 5.38/kg Vs $ 8.19/kg), and in the majority of the industries (83 vs. 77 categories)[9]). The sector in which the US is cheaper and accrues quantity surpluses is comprised of 30 industries, mainly computers, aircraft and medical instruments. The total US surplus is $ 19.2 bn. The sector in which European exports are cheaper and the EU enjoys a trade surplus in quantities is comprised of 46 industries, primarily machine industries, with a net surplus of $ 8.9 bn.

US exports have a higher unit value, but accrue a quantity surplus in 37 industries, the most important of which are electrical machinery, measurement and control instruments. The overall surplus of the USA is $ 10.2 bn. On the other hand, the EU has higher export unit values and nevertheless enjoys a quantity surplus in 47 industries, amounting to $ 13.1 bn. The most interesting categories are:

- SITC 781 passenger motor vehicles with a surplus of $ 2.9 bn
- SITC 784 parts, tractors, motor vehicles with a surplus of $ 1.8 bn

[9]) Since data are more complete for the EU, the bilateral trade between the US and Europe is analyzed for the EU as a reporter. Data are lost for six 3-digit industries, amounting to 4.54% of the bilateral trade, since no unit values are available (largest industries: 667 (pearls, precious stones) and 896 (paintings) - both are non manufactured products). Furthermore, data are lost for 9% of trade, since in some 3-digit industries not all 4-digit subcategories are reporting unit values. For this bilateral comparison, the EU and Japan are both alternatives for the reporter, since both files are rather complete. We take Japan as a reporter, but can use the EU/Japan relation to demonstrate that the results do not depend too much on the choice of the reporter. Data are missing for nine industries amounting to 3.35% of the trade volume (none is important, pearls and precious stones is the largest). Data are lost for 15% due to the effect that in some 3-digit categories not all 4-digit industries are reporting).

The differences in specialization between Europe and the US are therefore not as large as between the US and Japan. The US is better at transforming price competitiveness into a surplus, while Europe has a somewhat larger sector which enjoys successful quality competition.

Japan versus the EU

The overall bilateral trade balance is asymmetric for Europe, too, but not to the same extent as for the US. EU exports amount to $ 22.6 bn, imports to $ 51.4 bn (SITC 5 - 8, 1992). Europe exhibits superior price competitiveness, resulting in a positive quantity balance in 41 industries, but exports are very low in all these industries and the positive trade balance is only $ 1.7 bn. On the other hand, Japan is apparently cheaper, and enjoys a quantity surplus in 68 industries, notably in electronic industries, musical instruments, and other vehicles. The total balance is +30.1 bn $ in favor of Japan.

Successful quality competition can be seen in 16 European industries; 3 of the leading industries are in the chemical sector, three in the textile sector. The net surplus for Europe is $ 3.1 bn. Successful quality competition from the Japanese standpoint is given in 26 industries, the largest single surplus is created in telecommunications and electrical switches and relays (in both industries, the unit values of Japan's exports do not differ greatly from the unit values of Europe's exports). Japan accrues a surplus of $ 11.4 bn in this sector.

The positions of the US and Europe are similar insofar as neither is able to transform a lower price into a positive quantity surplus (more exactly, surpluses of only $ 3.7 bn resp. $ 1.7 bn are accrued), while Japan creates a surplus of $ 50.2 bn resp. $ 30.1 bn in industries with lower unit values. In sectors where it is possible to sell at higher unit values, the US achieves a net gain of $ 3.0 bn, Europe of $ 3.1 bn, each in relation to Japan. Japan, on the other hand, enjoys a $ 11.8 bn and $ 11.4 bn surplus in trade with its partners. The ability to transform a quality lead into a trade surplus is only marginally better in Europe than in the US; Japan creates one forth of its surplus in industries with higher unit values.

5.2 REVELAST and countries in transition

In this chapter we demonstrate the segmentation of industries into the four REVELAST segment for Poland and Slovakia (5.2.1)), Then we use application 2 to demonstrate that the countries in transition have a considerable trade surplus in price sensitive sectors and a huge deficit in quality sensitive industries (as defined by REVELAST).

5.2.1 The four segments demonstrated for Slovakia and Poland (application 1)

We start with classifying the trade between Slovakia and the OECD according to the criteria whether the unit values are higher or lower in the Slovakian exports (compared to its imports to OECD) and to the criteria whether quantities exported or imported are larger. This gives a four quadrant segmentation based on the trade between Slovakia and the bloc of all OECD countries.

The sector in which Slovakia is too expensive (and the country consequently suffers a trade deficit) is rather small: Slovakia exports $ 56 mill. and imports $ 157 mill. Cars are the single most important category (exported cars are more expensive than imported ones!), but the import value is far greater. This indicates a difference in the class of the cars imported and exported (vertical differentiation in intraindustry trade), which has to be discussed later.

The largest quantitative success for Slovakia is to be seen in the sector, where Slovakia is cheap and markets are price elastic. This sector comprises 156 industries, which export $ 1,072 mill. and imports only $ 554 mill. The largest surpluses occur in basic good industries (SITC 673 - flat steel, SITC 661 - cement, SITC 651 - textile yarns, and SITC 641 - paper, SITC 562 and 821 - fertilizers and furniture). The six most important industries (where importance is measured by Slovakia's trade surplus) accrue a joint surplus of $ 336,807 mill.

The sector in which export unit values and exported quantities are higher (as seen from Slovakia's perspective) is rather small. It comprises 8 industries, six of which are in the apparel and shoe area. The exports amount to $ 255 mill., imports are $ 47 mill. The two non apparel industries are basic chemical industries. Usually in our segmentation we interpret industries in this segment as industries in which quality is important and the home country is able to compete by quality. In the case of Slovakia we have to be a little bit more specific: the industries in this sector are apparently not price sensitive in the imports and exports of Slovakia. In the total European trade these industries are among the most price sensitive (see Aiginger, 1996A). The difference could come from the consumption structure: Slovakia imports rather cheap products for domestic production, but exports in some excellent factories quality products.

The largest imbalance comes from the sector in which exports are cheaper, but nevertheless imports dominate. This sector comprises 50 industries , imports amount to $ 810 mill., exports are only $ 83 mill.. Slovakian industries in this sectors are not competitive, although the prices are lower for exports. The largest deficit accrue for machinery industries and computers. Quality is important in these industries, but insufficient in Slovakia.

Here we split the trade between OECD and Poland into sectors according to the relative unit values resp. quantities traded. In this step the quadrants are defined by unit values and quantities between Poland and the OECD bloc.

The sector in which Poland is expensive and consequently suffers a trade deficit yields exports of $ 222 mill. and imports of $ 603 mill., both ratios are tenfold those in 1989, but the sector in total remained small.

Successful exports at low unit value is an important sector for Poland's trade balance with exports of $ 3,965 mill. and imports of $ 2,498 mill. Furniture, copper and wood manufactures are the largest industries in which low prices result in a large trade surplus. If compared to 1989 the relation between exports and imports and the composition of industries is stable.

The sector in which unit values and export quantities is higher in Poland is small if compared to the price sensitive sectors and contains only 11 industries, but it creates exports of $ 1,921 mill. (against imports of only $ 357 mill.). The most important industries are apparel industries (additionally important industries are fertilizers in 1993, and pottery in 1989). The picture is similar to that in Slovakia. These industries are among the most price sensitive in our general ranking, but Slovakia and Poland can export more at a higher price. This can be explained only by a very strong market segmentation.

5.2.2 Trade balances and price sensitivity (application 2)

The results indicate that the definitions which sectors are price sensitive should not based on one country alone, but on price sensitivity or market characteristics in a larger number of countries. We therefore used the REVELAST ranking by Aiginger 1996A for 18 countries[10]) to group industries into three groups of "highly price sensitive industries", "moderately price sensitive industries" and "quality sensitive industries".

The first group contains those industries where in most countries bilateral trade balances were decided by the lower unit costs (53 "highly price sensitive industries"), the second group was that in which the rank were in the middle (52 "moderately price sensitive industries"), the third group was that in which the majority of the bilateral balances where decided by quality (53 industries with revealed quality competition)[11]).

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[10]) The 18 countries are the 12 EU countries (before the last enlargement, USA, Japan, Canada, the Czech Republic, Hungary and Poland).

[11]) Since in the overall balances price elasticity is more important than quality elasticity, the groups were not totally symmetric. In the first group negative signs dominate positive ones by 12.2 : 3.3 in the second group by 9.1 to 5.7, in the third negative signs dominate by 8.2 : 6.2.

The seven countries in transition have a positive balance of $ 3.9 bn in the highly price intensive industries, they accrue a deficit in medium price sensitive industries of 3.8 bn $ and a deficit of $ 7.1 bn in the quality sensitive industries. The result is qualitatively as expected, what is surprising is the consistency of the results over countries: each of the seven countries has a surplus in the first sector , each has a deficit in the second sector and in each of the countries the deficit in the third sector is larger than that in the second.

The results for individual countries can be demonstrated for Slovakia and Poland specifically: in the group with high price elasticity Slovakia is a net exporter. Exports in 1993 are $ 857 mill., imports only $ 388 mill. These figures represent 58.4% of exports and 24.6% of imports. In the middle group exports are $ 256 mill., imports $ 442 mill., this gives 17.5% of exports and 28.0% of imports. In the group with revealed quality sensitivity, Slovakia exports of $ 354 mill. are less than half as high as its imports of $ 747 mill. Industries in which quality decides about net trade in the group of 18 countries, contribute a deficit for Slovakia of $ 393 mill. Only 24.1% of the exports, but 47.4% of the imports fall into this category.

For price sensitive industries Poland has a positive trade balance: exports of $ 3,724 mill. stand against imports of $ 2,615 mill., yielding a trade surplus of $ 1,110 mill.

In the moderately price sensitive sectors Poland suffers a very slight deficit of $ 1,357 bn, in the quality sensitive sectors the deficit is $ 2,719 bn (exports $ 2,014 mill., imports $ 4,733 mill.).

The relation is rather similar to that in 1989, in which for price sensitive industries, Poland had a trade surplus of $ 160 mill. In the medium price sensitive sectors trade was balanced (deficit of $ 17 mill.), in the quality sensitive sectors the deficit was $ 381 mill., the rising deficit in the medium sensitive may be an indicator that the structural adjustment process worked slowly.

6. The relation between REVELAST and other indicators

In this section we compare our results with that drawn by the definition of market segments offered by Oliveira Martins market segments.

In the "fragmented, low differentiation" sector the seven countries in transition accrue a surplus of $ 3.6 bn. This group is the group with the highest price elasticity in the 18 country sample by Aiginger, in all the individual industries most bilateral balances reveal price sensitivity.

In the fragmented high differentiated sectors, the transition countries suffers a trade deficit of $ 6.8 bn.. This sector comprises a majority of industries which is price sensitive, but also some machinery industries which are quality sensitive as revealed by Aiginger's method.

The segmented low differentiation sector the transition countries enjoy a trade surplus of $ 594 mill. All industries are price sensitive with the notable exception of Parts, tractors, vehicles (SITC 784). This is one of the most quality intensive industry (only three balances are decided by price, in eleven bilateral balances the higher pricing country has also a quantity surplus).

In the final group of segmented high differentiation products the transition countries suffers a trade deficit of $ 1$ 4.3. The industries are on average less price sensitive than the low differentiated sectors.

The OMSEG results underline the REVELAST findings. Though both indicators stress different aspects of the quality spectrum, they underline the same economic trends. High income countries should and do specialize in markets where prices are important and which are neither differentiated nor segmented too much. Higher income countries evade the pressure of cost competition by climbing up a quality ladder, trying to differentiate the market by innovation and knowledge.

Further studies will show the relation between REVELAST and OMSEG with other concepts of specialization, human capital and technological content (Wolfmayr-Schnitzer 1996).

7. Conclusions

(1) The unit value is an indicator which can be used to provide complementary information on the competitiveness of firms and industries. One of its advantages is that information on nominal exports and imports, as well as on traded quantities, is available for practically all countries and for the majority of products. Therefore, analyses may be conducted for bilateral trade and on any desired level of aggregation.

(2) Ranking countries according unit values gives a ranking remarkable close to that of per capita income. The fit is closer for the relation between exports unit values and income, than for that of the import unit values. The best fit is given for the relative unit values (exports/imports). We do not claim that this correlation proves a causal relationship. However, the ranking is in line with the notion, that countries during development climb up a quality ladder. Incomes and wages rise, products become differentiated, high income countries specialize in the more sophisticated segment and innovate, the innovation lead disperses over time, but new innovation come up etc. The fit between unit values and per capita income seems closer than for any other single variable usually claimed as determinant of growth or per capita income. Relative outliers are Ireland (which attracted a lot of inward investment in high tech industries) and Canada and Austria as two countries with specific relations to a large neighbor. The countries in transition range at the lower end of the hierarchy and add to the high correlation, since position in income and relative unit values are similar.

(3) A disadvantage of the indicator unit value revealed in previous research was, that the unit value can in some industries be an indicator of costs and in other industries, it can be an indicator of quality, when a high unit value provides information as to additional product characteristics The unit value shares this problem with any price information: prices can reflect costs in competitive industries and generic products, but it can also indicate quality, specialty production, and finally innovation and ingenuity, when we are dealing with high- tech products and finally, such services as consulting.

(4) We develop a simple device (in Aiginger 1996A), which allows to discriminate between these two effects. If a low unit value leads to a quantity surplus (UVexp < UV imp $\Rightarrow$ Qexp > Qimp et v.v.) then it is revealed that the cost side dominates, since economic theory tells us that most goods are price elastic. If a high unit value leads to a quantity surplus (UVexp > UV imp $\Rightarrow$ Qexp > Qimp et v.v.), then demand is dominated by quality, since economic theory tells us that prices can be higher for a good, only if the market is vertically differentiated. We apply this device to split bilateral flows of the countries called the triade into four segments (application 1), according to higher and lower unit values and higher and smaller quantities exported. This gives country to country definitions of sectors, where prices and where quality dominates (and which country is competitive of course). Additionally we use the combined information of the quantity balances and of the unit values of 18 countries to rank each of the three digit industries according to their revealed price elasticity (REVELAST, application 2). This

index varies between + 18 and - 18 depending of the number of countries in which price competition and quality competition is revealed to prevail. The first approach is applied on the competitive race in the triade, the second is applied to assess the qualitative competitiveness of the countries in transition. This specialization is due to the research program of the author, not implied by the concepts.

(5) The success of Japan in the trade with the USA and with Europe is partly due to the successful specialization in quality elastic industries. The US has a traditional deficit in bilateral trade with Japan. The unit value of manufacturing exports is lower than that of imports, though in the majority of industries, exports have a higher unit value in the US. This comes from the concentration of Japanese exports in high unit value groups, especially engineering industries and telecommunication. The US has a quantity surplus in 54 industries, attributable to price advantages, but accrues only a surplus of $ 3.7 bn. In the mirror case, Japan has a price advantage in 72 industries, among them electronics and control instruments, and achieves a surplus of $ 50.2 bn. The US enjoys a quality lead in 16 industries (most notably aircraft), but again achieves a surplus of only $ 3.0 bn. Japan is capable of transforming a quality lead into a $ 11.8 bn surplus (transistors, vehicles, photo supplies).

European trade with Japan is also asymmetric, and unit value is lower, but this is not due to an aggregation effect. The sector of lower prices is comprised of 41 industries, resulting in a surplus of $ 1.7 bn. Japan transforms a price lead in 68 industries into a surplus of $ 30.1 bn. Europe is revealed to have a quality lead in 16 industries and transforms this into a surplus of $ 3.1 bn. Japan's lead in quality is revealed for 26 industries (telecommunications, switches and relays), yielding a $ 11.4 bn surplus.

The bilateral trade between the US and Europe is approximately balanced, with a higher unit value for the US. Europe seems to be cheaper in 46 industries, accruing a surplus of $ 8.9 bn. The US transforms a price lead in 30 industries into a surplus of $ 19.2 bn. The US has a quality lead in 37 industries, and accrues a surplus of $ 10.2 bn. Europe achieves this in 47 industries, but attains a surplus of $ 13.1 bn.

(6) The trade structure of the seven countries in transition is very asymmetric according to REVELAST. The seven countries in transition have a positive balance of $ 3.9 bn in the highly price intensive industries, they accrue a deficit in medium price sensitive industries of $ 3.8 bn and a deficit of $ 7.1 bn in the quality sensitive industries. The result is qualitatively as expected, what is surprising is the consistency of the results over countries: each of the seven countries has a surplus in the first sector, each has a deficit in the second sector, and for each of the countries the deficit in the third sector is larger than that in the second.

(7) We do not claim that the unit value is an indicator, which can substitute other indicators on competitiveness. What we claim is, that it is a good complementary indicator, and that its specific

advantage is to focus on the qualitative issue. We can sort out markets in which price competitiveness prevails and the unit value is therefore an indicator on the cost position. At least one third of the markets are, however, dominated by quality competition. REVELAST gives us a device to rank industries from price sensitivity to quality sensitivity and to evaluate whether the competitiveness of a nation comes from low prices or from high quality. Data show that the strategies within the triade are very different between countries, and that the trade balance of countries in transition are ranging from high surpluses in price sensitive sectors, to large deficits in qualitative sensitive sectors.

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Annex 1

Ranking of the SITC 3-digit industries according to price versus quality competition
(number of countries in which a specific price-quantity relation is revealed)

		negative sign	*positive sign*	*difference pos-neg*	*ranking*
784	Parts, Tractors, Motor Veh.	3	11	8	1
687	Tin	5	12	7	2
722	Tractors	4	11	7	2
726	Printing, Bookbinding Machs.	4	11	7	2
745	Oth. Nonelec. Mch., Tool, Nes	3	10	7	2
553	Perfumery, Cosmetics, etc.	5	11	6	6
591	Insecticides, etc.	6	11	5	7
721	Agric. Machines, ex. Tractr.	5	10	5	7
725	Paper, Pulp Mill Machines	5	10	5	7
744	Mechanical Handling. Equip.	5	10	5	7
531	Synth. Colours, Lakes, etc.	7	11	4	11
582	Plastic Plate, Sheets, etc.	6	10	4	11
613	Furskins, Tanned, Dressed	6	10	4	11
711	Steam Gener. Boilers, etc.	5	9	4	11
781	Pass. Motor Vehcls. ex. Bus	5	9	4	11
655	Knit. Crochet. Fabric Nes	7	10	3	16
728	Oth. Mach, Pts, Spcl Indust.	6	9	3	16
735	Parts, Nes, for Mach-Tools	6	9	3	16
741	Heating, Cooling Equip., Part	5	8	3	16
749	Non-elect. Mach. Parts, etc.	6	9	3	16
533	Pigments, Paints, etc.	6	8	2	21
572	Polymers of Styrene	7	9	2	21
574	Polyacetal, Polycarbonate	7	9	2	21
597	Preprd. Additives, Liquids	8	10	2	24
653	Fabrics, Man-made Fibres	8	10	2	24
723	Civil Engineering Equipt	6	8	2	24
792	Aircraft, Assoctd. Equipnt	6	8	2	24
811	Prefabricated Buildings	7	9	2	24
873	Meters, Counters, Nes	6	8	2	24
884	Optical Goods Nes	5	7	2	24
551	Essntl. Oil, Perfume, Flavr	8	9	1	31
562	Fertilizer, Except Grp 272	7	8	1	32
625	Rubber Tyres, Tubes etc.	7	8	1	32
629	Articles of Rubber, Nes	7	8	1	32
657	Special Yarn, Txtl. Fabric	7	8	1	32
662	Clay, Refrct. Constr. Material	7	8	1	32
675	Flat-Rolled, Alloy Steel	8	9	1	32
733	Mach-Tools, Metal-Working	7	8	1	32
742	Pumps for Liquids, Parts	7	8	1	32
747	Taps, Cocks, Valves, etc.	7	8	1	32
522	Inorganic Chem. Elements	6	6	0	41
525	Radio-active Materials	0	0	0	41
541	Medicines, etc. exc. Grp 542	0	0	0	41
542	Medicines	0	0	0	41
583	Monofilament of Plastics	8	8	0	41
642	Paper, Paperboard, Cut etc.	8	8	0	41
667	Pearls, Precious Stones	0	0	0	41
681	Silver, Platinum, etc.	0	0	0	41
751	Office Machines	7	7	0	41
774	Electro-Medcl., XRAY Equip	8	8	0	41
783	Road Motor Vehicles Nes	7	7	0	41
786	Trailers, Semi-Trailer, etc.	7	7	0	41

874	Measure, Control Instrmnt.	7	7	0	41
885	Watches and Clocks	0	0	0	41
896	Works of Art, Antique etc.	0	0	0	41
897	Gold, Silverware, Jewl Nes	0	0	0	41
635	Wood Manufactures, Nes	7	6	-1	57
679	Tubes, Pipes, etc. Iron, Steel	6	5	-1	57
691	Metallic Structures Nes	9	8	-1	57
694	Nails, Screws, Nuts, etc.	9	8	-1	57
712	Steam Turbines	8	7	-1	57
713	Intrnl. Combus Pstn. Engin	8	7	-1	57
714	Engines, Motors Non-Elect.	8	7	-1	57
724	Textile, Leather Machines	7	6	-1	57
727	Food-Process. Mch. Non Dom	8	7	-1	57
772	Elec. Switch. Relay. Circut	8	7	-1	57
778	Electric. Mach. Appart. Nes	6	5	-1	57
782	Goods, Spcl. Transport Veh.	7	6	-1	57
851	Footwear	7	6	-1	57
872	Medical Instruments Nes	8	7	-1	57
892	Printed Matter	7	6	-1	57
514	Nitrogen-Funct. Compounds	9	7	-2	72
581	Plastic Tube, Pipe, Hose	9	7	-2	72
689	Misc. Non- Ferr. Base Metal	7	5	-2	72
695	Tools	7	5	-2	72
699	Manufacts. Base Metal, Nes	7	5	-2	72
716	Rotating Electric Plant	8	6	-2	72
718	Oth. Powr. Genrtng. Machinery	8	6	-2	72
761	Television Receivers etc.	8	6	-2	72
898	Musical Instruments, etc.	7	5	-2	72
899	Misc Manufactrd. Goods Nes	2	0	-2	72
677	Railway Track Iron, Steel	10	7	-3	82
731	Metal Removal Work Tools	9	6	-3	82
737	Metalworking Machnry. Nes	9	6	-3	82
743	Pumps Nes, Centrifugs etc.	9	6	-3	82
775	Dom. Elec, Non-Elec. Equipment	8	5	-3	82
633	Cork Manufactures	10	6	-4	87
654	Oth. Textile Fabric, Woven	11	7	-4	87
678	Wire of Iron or Steel	11	7	-4	87
746	Ball or Roller Bearings	10	6	-4	87
748	Transmissions Shafts etc.	10	6	-4	87
881	Photograph Appar. etc. Nes	9	5	-4	87
883	Cine. Film Exposd. Develpd	9	5	-4	87
893	Articles, Nes, of Plastics	10	6	-4	87
895	Office, Stationary Suppls.	9	5	-4	87
573	Polymers, Vinyl Chloride	10	5	-5	96
592	Starches, Inulin, etc.	10	5	-5	96
593	Explosives, Pyrotechnics	10	5	-5	96
621	Materials of Rubber	11	6	-5	96
659	Floor Coverings, etc.	10	5	-5	96
682	Copper	10	5	-5	96
683	Nickel	11	6	-5	96
686	Zinc	11	6	-5	96
692	Containers, Storage, Trnsp.	10	5	-5	96
764	Telecomm. Equip. Parts Nes	9	4	-5	96
791	Railway Vehicles. Equipnt.	9	4	-5	96
793	Ship, Boat, Float. Structrs.	9	4	-5	96
515	Organic-Inorganic Compnds.	11	5	-6	108
554	Soap, Cleaners, Polish, etc.	11	5	-6	108
579	Plastic Waste, Scrap etc.	12	6	-6	108
641	Paper and Paperboard	11	5	-6	108
651	Textile Yarn	11	5	-6	108
663	Mineral Manufactures, Nes	10	4	-6	108
763	Sound Recorder, Phonograph	10	4	-6	108
785	Cycles, Motorcycles etc.	10	4	-6	108
894	Baby Carriage, Toys, Games	10	4	-6	108
575	Oth. Plastic, Primary Form	11	4	-7	117
656	Tulle, Lace, Embroidry, etc.	12	5	-7	117

672	Ingots etc. Iron or Steel	12	5	-7	117
673	Flat-Rolled Iron etc.	11	4	-7	117
674	Flat-Rolled Plated Iron	12	5	-7	117
676	Iron, Stl. Bar, Shapes etc.	11	4	-7	117
812	Plumbng, Sanitry, Eqpt. etc.	11	4	-7	117
882	Photo. Cinematograph Suppl.	10	3	-7	117
891	Arms and Ammunition	9	2	-7	117
511	Hydrocarbons, Nes, Derivts	10	2	-8	126
512	Alcohol, Phenol, etc. Derivts	10	2	-8	126
523	Metal. Salts, Inorgan. Acid	11	3	-8	126
524	Other Chemical Compounds	11	3	-8	126
532	Dyeing, Tanning Materials	13	5	-8	126
571	Polymers of Ethylene	12	4	-8	126
612	Manufact. Leather etc. Nes	12	4	-8	126
634	Veneers, Plywood, etc.	11	3	-8	126
661	Lime, Cement, Constr. Material	11	3	-8	126
664	Glass	11	3	-8	126
671	Pig Iron, Spiegeleisn, etc.	12	4	-8	126
697	Household Equipment, Nes	11	3	-8	126
752	Automatc. Data Proc. Equip	11	3	-8	126
871	Optical Instruments, Nes	11	3	-8	126
516	Other Organic Chemicals	11	2	-9	140
693	Wire Products excl. Elect.	12	3	-9	140
759	Parts, for Office Machins	12	3	-9	140
776	Transistors, Valves, etc.	10	1	-9	140
821	Furniture, Cushions, etc.	12	3	-9	140
842	Women, Girl Clothing, X-Knit	12	3	-9	140
598	Misc. Chemical Prodts. Nes	12	2	-10	146
652	Cotton Fabrics, Woven	14	4	-10	146
685	Lead	14	4	-10	146
771	Elect Power Machny. Parts	12	2	-10	146
773	Electr. Distribt. Eqpt. Nes	13	3	-10	146
813	Lightng Fixtures etc. Nes	13	3	-10	146
841	Mens, Boys Clothing, X-Knit	13	3	-10	146
846	Clothing Accessrs., Fabric	13	3	-10	146
513	Carboxylic, Acids, Derivts	13	2	-11	154
665	Glassware	13	2	-11	154
684	Aluminium	13	2	-11	154
696	Cutlery	13	2	-11	154
762	Radio-Broadcast Receiver	12	1	-11	154
658	Textile Articles Nes	13	1	-12	159
831	Trunk, Suitcases, Bag, etc.	13	1	-12	159
843	Mens, Boys Clothing, Knit	14	2	-12	159
845	Othr. Textile Apparel, Nes	13	1	-12	159
844	Women, Girls Clothing, Knit	15	1	-14	163
848	Clothing, Non-Txtl.; Headgear	14	0	-14	163
611	Leather	15	0	-15	165
666	Pottery	16	0	-16	166

negative sign: quantity balance and unit value difference have opposite signs (indicator of price competitiveness)

positive sign: quantity balance and unit value difference have the same sign (revealed dominance of quality)
ranking: 1=industry with the most positive signs in bilateral flows of 18 countries
18 countries: EU-12 members, USA, Canada, Japan, Hungary, Poland, Czech Republic

Table 1

Quality ladders and unit value forecast by GNP

Country	UV exports $/kg	UV imports $/kg	UV exp/UV imp	UV exp/UV imp rank	GNP/head US $	GNP/head rank	forecasts error (1)	(2)	(3)
Austria	2,650	3,653	0,725	15	22.849,5	8	0,192	0,426	-0,234
Germany	3,596	2,782	1,293	4	23.503,2	6	0,486	0,159	0,327
Italy	3,343	2,491	1,342	3	17.260,5	14	0,541	-0,006	0,547
Belgium	1,531	1,861	0,823	10	20.834,6	11	-0,318	-0,264	-0,053
France	3,003	2,864	1,049	8	21.692,3	9	0,339	0,174	0,165
Netherlands	1,991	2,673	0,745	14	20.390,0	12	-0,046	0,094	-0,140
Greece	0,536	2,577	0,208	24	8.670,7	20	-1,003	-0,094	-0,909
United Kingdom	4,144	3,842	1,079	7	16.195,8	16	0,783	0,416	0,367
Denmark	2,884	2,369	1,217	5	25.954,5	4	0,224	0,016	0,208
Portugal	2,459	3,181	0,773	13	8.580,0	21	0,525	0,115	0,410
Ireland	7,461	3,102	2,405	1	13.333,0	17	1,452	0,168	1,284
Spain	1,541	1,979	0,779	11	12.244,5	19	-0,090	-0,297	0,207
Switzerland	5,622	3,445	1,632	2	33.443,6	2	0,786	0,435	0,351
Norway	1,153	1,953	0,590	18	26.850,4	3	-0,707	-0,171	-0,536
Sweden	2,278	3,414	0,667	17	21.253,6	10	0,071	0,346	-0,275
Iceland	1,206	3,293	0,366	23	22.934,0	7	-0,596	0,323	-0,920
Finland	1,405	2,794	0,503	21	16.669,8	15	-0,311	0,103	-0,414
Turkey	0,910	1,324	0,687	16	3.032,9	24	-0,036	-0,945	0,909
Canada	0,449	1,022	0,439	22	18.909,1	13	-1,504	-0,881	-0,623
USA	1,481	1,253	1,182	6	24.251,9	5	-0,414	-0,633	0,219
Japan	2,993	3,428	0,873	9	33.611,9	1	0,154	0,431	-0,277
New Zealand	0,497	0,877	0,567	19	12.422,5	18	-1,228	-1,108	-0,120
Poland	0,767	3,742	0,205	25	2.233,4	27	-0,080	0,040	-0,119
Czech Republik	0,782	4,552	0,172	26	3.023,5	25	-0,187	0,289	-0,476
Slovakia	0,527	4,478	0,118	29	2.256,3	26	-0,460	0,221	-0,680
Hungaria	2,019	3,753	0,538	20	3.739,8	23	0,673	0,134	0,540
Slovenia	2,380	3,057	0,779	12	6.366,3	22	0,617	0,022	0,594
Romania	0,719	5,758	0,125	28	1.159,3	29	0,128	0,355	-0,226
Bulgaria	0,664	4,545	0,146	27	1.276,2	28	0,009	0,135	-0,126

(1) ln UV exports = -3,393 ln GNP/head +0,416 (t = 3,41 R2 = 0,301)
(2) ln UV imports = 2,643 ln GNP/head -0,177 (t = -2,22 R2 = 0,155)
(3) ln (UV exp/imp) = -6,036 ln GNP/head +0,593 (t = 5,95 R2 = 0,567)

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The Relation between Relative Prices (Unit Values) and Relative Exported Quantities EU/USA

(seen from the position of EU; exports = exports of EU to the USA)

Unit Value and quantities in EU higher than in USA

	exports	imports	exports	imports
	Mill. $		$/kg	
514 Nitrogen-Funct. Compounds	825.1	594.3	11.176	2.115
515 Organo-Inorganic Compnds.	1,678.8	1,173.1	15.477	10.370
542 Medicaments	1,136.4	388.4	108.621	102.168
553 Perfumery, Cosmetics, etc.	586.8	292.2	16.645	7.706
673 Flat-Rolled Iron etc.	781.6	10.5	0.410	0.393
724 Textile, Leather Machines	1,175.5	201.3	24.352	18.643
745 Oth. Nonelec. Mch., Tool, Nes	749.9	675.0	37.076	19.276
781 Pass. Motor Vehicles ex Bus	4,476.1	1,593.8	20.395	10.012
784 Parts, Tractors, Motor Veh.	2,568.9	771.4	10.266	8.902
851 Footwear	1,279.4	190.7	34.251	22.850
all industries (n=47)	22,964.8	9,853.1		
balance		*13,111.7*		

Unit Value in EU lower and quantities in EU higher than in USA

	exports	imports	exports	imports
	Mill. $		$/kg	
713 Intrnl. Combus Pstn. Engin	1,580.1	820.2	11.490	11.864
714 Engines, Motors Non-Elect.	5,753.2	5,136.9	485.708	558.213
722 Tractors	613.1	143.9	5.901	6.602
723 Civil Engineering Equipt	708.3	556.3	6.013	8.123
726 Printing, Bookbinding Machs.	774.8	448.3	28.266	46.232
728 Oth. Mach, Pts, Spcl Indust.	1,603.3	881.5	21.533	23.828
744 Mechanical Handling. Equip.	487.6	442.4	7.931	8.095
748 Transmissions Shafts etc.	537.8	334.4	8.761	10.939
774 Electro-Medcl., XRAY Equip	1,089.5	691.6	109.569	111.737
821 Furniture, Cushions, etc.	979.4	274.0	6.056	6.600
all industries (n=46)	22,640.5	13,788.5		
balance		*8,852.0*		

Unit Value in EU higher and quantities in EU lower than in USA

641 Paper and Paperboard	607.6	831.3	1.339	0.684
741 Heating, Cooling Equip., Part	513.8	770.3	20.817	17.734
742 Pumps for Liquids, Parts	556.9	593.8	23.114	20.901
743 Pumps Nes, Centrifugs etc.	732.2	862.8	17.610	17.186
752 Automatc. Data Proc. Equip	1,824.8	8,481.8	174.638	150.839
759 Parts, for Office Machins	2,091.3	5,187.5	129.716	42.559
764 Telecomm. Equip. Parts Nes	869.5	2,119.2	105.974	101.522
792 Aircraft, Assoctd. Equipnt	4,885.9	8,633.7	592.777	348.321
872 Medical Instruments Nes	682.7	1,422.0	104.144	75.810
893 Articles, Nes, of Plastics	493.0	647.5	9.345	9.216
all industries (n=30)	16,345.3	35,523.8		
balance		*-19,178.5*		

Unit Value and quantities in EU lower than in USA

541 Medicines, etc. exc. Grp 542	891.1	1,342.1	85.104	106.259
598 Misc. Chemical Prodts. Nes	779.2	1,271.4	4.545	5.649
699 Manufacts. Base Metal, Nes	677.1	683.6	6.752	11.968
747 Taps, Cocks, Valves, etc.	523.8	596.4	17.178	32.327
772 Elec. Switch. Relay. Circut	994.2	1,432.9	59.823	76.839
776 Transistors, Valves, etc.	966.5	3,027.7	326.310	367.934
778 Electric. Mach. Appart. Nes	935.8	1,417.4	19.997	30.053
874 Measure, Control Instrmnt.	2,018.2	3,726.7	129.828	173.699
882 Photo. Cinematrograph Suppl.	703.5	1,104.1	16.509	28.109
892 Printed Matter	696.7	928.6	9.965	10.755
all industries (n=37)	13,107.8	23,269.2		
balance		*-10,161.4*		

The Relation between Relative Prices (Unit Values) and Relative Exported Quantities EU/Japan

(seen from the position of EU; exports = exports of EU to Japan)

Unit Value and quantities in EU higher than in Japan

	exports	imports	exports	imports
	Mill. $		$/kg	
515 Organo-Inorganic Compnds.	702.5	420.0	19.257	15.022
522 Inorganic Chem. Elements	152.4	101.2	4.049	3.977
551 Essntl. Oil, Perfume, Flavr	67.1	7.6	21.469	17.713
654 Oth. Textile Fabric, Woven	400.0	6.4	73.369	36.901
792 Aircraft, Associtd. Equipnt.	431.3	18.0	932.298	145.879
821 Furniture, Cushions, etc.	222.2	34.2	11.881	10.535
831 Trunk, Suitcases, Bag, etc.	469.6	16.7	150.356	27.418
842 Women, Girl Clothing, X-Knit	376.4	11.9	200.205	51.958
845 Othr. Textile Apparel, Nes	504.1	11.5	160.525	38.701
851 Footwear	283.2	6.4	30.540	22.424
all industries (n=16)	3,777.0	662.2		
balance		*3,114.8*		

Unit Value in EU lower and quantities in EU higher than in Japan

	exports	imports	exports	imports
	Mill. $		$/kg	
533 Pigments, Paints, etc.	93.4	80.8	3.131	10.339
542 Medicaments	972.3	114.5	128.165	427.077
553 Perfumery, Cosmetics, etc.	262.7	42.6	25.018	31.843
591 Insecticides, etc.	100.7	32.8	7.013	13.396
592 Starches, Inulin, etc.	81.2	20.2	1.472	13.521
598 Misc. Chemical Prodts. Nes	279.8	242.9	5.107	9.226
661 Lime, Cement, Constr. Material	178.0	1.4	1 154	1.158
665 Glassware	96.0	34.9	5.400	13.484
684 Aluminium	143.4	17.5	1.900	4.389
727 Food-Process. Mch. Non Dom	80.2	24.5	29.341	53.150
all industries (n=41)	3,786.0	2,031.3		
balance		*1,734.7*		

Unit Value in EU higher and quantities in EU lower than in Japan

726 Printing, Bookbinding Machs.	209.1	294.6	40.394	26.465
741 Heating, Cooling Equip., Part	177.8	825.0	23.521	15.175
745 Oth. Nonelec. Mch., Tool, Nes	226.8	356.9	44.143	40.424
752 Automatc. Data Proc. Equip	257.7	5,432.8	153.821	84.389
759 Parts, for Office Machins	327.4	2,648.3	266.436	32.606
778 Electric. Mach. Appart. Nes	252.0	2,130.0	32.577	28.808
784 Parts, Tractors, Motor Veh.	563.6	1,966.7	20.217	9.392
872 Medical Instruments Nes	260.3	515.6	149.034	87.183
874 Measure, Control Instrmnt.	449.6	916.1	145.890	120.355
898 Musical Instruments etc.	179.7	1,290.0	62.446	22.560
all industries (n=68)	7,195.8	37,276.2		
balance		*-30,080.4*		

Unit Value and quantities in EU lower than in Japan

513 Carboxylic, Acids, Derivts	96.0	166.1	2.524	4.315
722 Tractors	78.7	110.9	7.336	8.353
724 Textile, Leather Machines	239.6	475.3	27.533	31.783
728 Oth. Mach, Pts, Spcl Indust.	357.6	687.4	25.036	45.441
764 Telecomm. Equip. Parts Nes	99.3	5,243.0	73.662	74.946
772 Elec. Switch. Relay. Circut	152.9	1,070.6	55.725	58.503
774 Electro-Medcl., XRAY Equip	158.1	482.7	112.181	125.746
881 Photograph Appar. etc. Nes	74.4	921.5	87.259	118.395
882 Photo. Cinematograph Suppl.	160.1	992.8	20.097	21.292
894 Baby Carriage, Toys, Games	231.2	1,975.5	26.493	60.936
all industries (n=26)	2,022.7	13,434.3		
balance		*-11,411.6*		

Table 2c

The Relation between Relative Prices (unit values) and Relative Exported Quantities Japan/USA

(seen from the position of Japan; exports = exports of Japan to the USA)

Unit Value and quantities in Japan higher than in the USA

	exports	imports	exports	imports
	Mill. $		$/kg	
515 Organo-Inorganic Compnds.	523.0	343.3	21.408	15.942
724 Textile, Leather Machines	524.0	44.5	26.980	24.764
762 Radio-Broadcast Receiver	976.4	22.0	41.529	15.916
776 Transistors, Valves, etc.	691.2	78.1	17.540	12.600
782 Goods, Spcl. Transport Veh.	1,572.7	23.3	6.976	5.952
784 Parts, Tractors, Motor Veh.	5,777.6	311.1	9.392	8.902
785 Cycles, Motorcycles etc.	863.9	71.7	17.641	17.111
882 Photo. Cinematograph Suppl.	392.3	48.0	22.277	3.386
894 Baby Carriage, Toys, Games	471.9	27.1	67.232	25.234
all industries (n=21)	13,192	1,373.4		
balance		*11,818.8*		

Unit Value in Japan lower and quantities in Japan higher than in the USA

	exports	imports	exports	imports
	Mill. $		$/kg	
713 Intrnl. Combus Pstn. Engin	2,896.4	150.4	10.309	11.180
728 Oth. Mach, Pts, Spcl Indust.	1,282.6	498.6	27.701	59.995
751 Office Machines	1,361.8	30.7	26.190	42.555
752 Automatc. Data Proc. Equip	8,033.0	2,041.2	51.994	260.396
759 Parts, for Office Machins	4,922.2	1,492.9	64.628	261.098
763 Sound Recorder, Phonograph	2,759.3	10.3	52.569	157.999
764 Telecomm. Equip. Parts Nes	1,094.7	931.5	55.578	131.276
772 Elec. Switch. Relay. Circut	1,633.6	405.6	58.336	149.503
781 Pass. Motor Vehcls. ex Bus	21,283.7	783.6	9.821	10.012
874 Measure, Control Instrmnt.	1,240.7	1,446.1	113.092	290.216
898 Musical Instruments, etc.	1,102.8	237.5	17.693	35.346
all industries (n=72)	64,468	14,230.9		
balance		*50,237.1*		

Unit Value in Japan higher and quantities in Japan lower than in the USA

	exports	imports	exports	imports
	Mill. $		$/kg	
513 Carboxylic, Acids, Derivts	251.5	119.3	5.509	1.156
514 Nitrogen-Funct. Compounds	253.6	228.9	10.235	1.797
516 Other Organic Chemicals	120.0	145.4	8.533	1.202
533 Pigments, Paints, etc.	124.9	134.5	8.014	4.032
598 Misc. Chemical Prodts. Nes	319.8	752.6	9.830	3.115
641 Paper and Paperboard	197.3	568.6	3.426	0.853
682 Copper	129.3	154.6	5.730	2.796
684 Aluminium	112.1	766.4	4.544	1.546
893 Articles, Nes, of Plastics	199.3	180.3	13.110	8.647
all industries (n=54)	3,412	7,161		
balance		*–3,749.0*		

Unit Value and quantities in Japan lower than in the USA

	exports	imports	exports	imports
	Mill. $		$/kg	
575 Oth. Plastic, Primary Form	207.8	273.3	3.055	3.310
696 Cutlery	127.2	0.40	13.607	44.388
714 Engines, Motors Non-Elect.	122.6	868.4	388.201	492.451
775 Dom. Elec, Non-Elec. Equipment	0.3	55.4	13.314	21.458
792 Aircraft, Assoctd. Equipnt	546.2	2,582.7	331.719	642.759
all industries (n=16)	1,130.7	4,107.0		
balance		*–2,976.3*		

Table 3

Net Exports in 3 sectors of REVELAST 1993

	Highly price sensitive industries	*Medium price sensitive industries*	*Quality sensitive industries*	*Total industries*
Bulgaria	200,725.6	- 138,586.0	- 329,141.2	- 267,001.6
Czech Republic	497,100.8	- 811,205.3	- 1,251,915.3	- 1,566,019.8
Hungaria	268,236.2	- 768,061.1	- 1,551,650.1	- 2,051,475.0
Poland	1,109,624.0	- 1,356,771.3	- 2,719,051.0	- 2,966,198.4
Romania	953,966.0	- 477,313.6	- 591,505.0	- 114,852.6
Slovakia	469,238.9	- 166,386.3	- 393,349.9	- 110,497.3
Slovenia	442,506.5	- 87,531.0	- 284,017.5	70,958.0
Transition countries	3,941,396.1	- 3,825,854.1	- 7,120,630.7	- 7,005,088.7

Table 4

Net Exports in the 4 Oliveira-Martins Sectors 1993

	Fragmented low differentiation	*Fragmented high differentiation*	*Segmented low differentiation*	*Segmented high differentiation*	*Total industries*
Bulgaria	128,143.1	- 319,167.2	95,090.2	- 175,873.7	- 271,807.6
Czech Republic	669,457.9	-1,618,065.5	268,139.8	- 885,552.0	- 1,566,019.8
Hungaria	136,973.1	-1,124,679.6	-187,437.3	- 876,331.2	- 2,051,475.0
Poland	994,430.6	-2,391,205.9	41,749.0	- 1,611,172.1	- 2,966,198.4
Romania	647,429.5	- 585,075.7	198,769.0	- 375,975.4	- 114,852.6
Slovakia	291,480.9	- 480,750.4	262,196.5	- 182,424.3	- 110,497.3
Slovenia	689,812.2	- 293,155.2	-89,462.7	- 236,236.3	70,958.0
Transition countries	3,557,727.0	-6,813,099.4	593,848.4	- 4,343,565.1	- 7,005,008.7

Table 5

Net Exports in the 4 Quadrants 1993

	Unit value and quantities in ... higher than in OECD	*Unit value in ... higher and quantities in ... lower than in OECD*	*Unit value in ... lower and quantities in ... higher than in OECD*	*Unit value and quantities in ... lower than in OECD*	*Total industry*
Bulgaria	245,571.0	- 187,356.8	242,827.4	- 561,519.6	- 260,478.0
Czech Republic	433,420.2	- 225,476.9	764,680.3	- 2,538,643.4	- 1,566,019.8
Hungaria	494,560.9	- 660,951.4	590,360.1	- 2,475,444.6	- 2,051,475.0
Poland	1,564,315.7	- 381,216.9	1,466,613.3	- 5,615,910.5	- 2,966,198.4
Romania	437,355.2	1,097,184.9	-170,228.0	- 1,479,164.7	- 114,852.6
Slovakia	207,478.8	- 100,508.2	517,482.1	- 727,716.7	103,264.0
Slovenia	691,638.8	- 486,743.4	707,590.3	- 841,471.5	71,014.2
Transition countries	4,324,414.9	- 452,116.6	3,758,032.7	-14,635,419.7	- 7,005,088.7