STRUCTURAL CHANGE AND ECONOMIC DYNAMICS

A framework for evaluating the dynamic competitiveness of countries

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Abstract

This paper presents a framework for evaluating the competitive position of nations which relates competitiveness to the concept of welfare maximization. Consequently it includes an evaluation of wages and productivity, as well as the social and environmental standards at which this result is achieved. In relation to other concepts the role of external balances and of low costs is put into perspective in this concept, the technology, product differentiation and other determinants of qualitative competitiveness are emphasized. We specifically try to incorporate soft factors of competitiveness by the use of the indicator unit value, an indicator rising with higher quality or consumer evaluation of a product. We also use this indicator to discriminate between markets in which firms are competing in prices or in quality.

It is specifically rewarding to apply the broader concept of competitiveness and the notion of competing in quality to the German debate on competitiveness. The trade balance is positive, nevertheless Germany is afraid to deindustrialize and to loose competitiveness due to high wages and high tax rates ('Standortdebatte'). We evaluate the macroeconomic performance, the technological position and the concentration of exports in sectors where quality competition prevails to evaluate the dynamic competitiveness of this country. © 1998 Elsevier Science B.V.

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1. The outline of the paper

A dynamic evaluation of the competitiveness of nations must be done with respect to the ultimate goals of nations, namely to increase the well-being of a nation or its people. The economist believes that the ultimate goal of a state or of its people is to maximize some social welfare function in which incomes, social conditions and environmental preservation are incorporated. This leads to a rather comprehensive definition of competitiveness, with three immediate implications. The first is that

low costs are not a goal of economic policy and not even an indicator for long-run competitiveness. The second is that the external balances contribute directly or indirectly to this well-being, but are small relative to consumption. The third is that competitiveness is a dynamic issue, with aspiration levels changing over time, while investment in human capital, technology and information are the means to change the attainable welfare and the level of competitiveness.[1]

The concept of dynamic competitiveness focuses on technology — it relates productivity to that of the leading country (catching up debate). A specific innovation of this paper is to use the unit value as a complementary indicator for assessing the qualitative side of competitiveness. It increases with quality, consumer evaluation, marketing, customer orientation, etc. Thus higher unit values immunize products from low-cost competition. Firms and consequently countries climbing up the quality ladder (Grossman and Helpman, 1990, 1991a,b) can afford higher wages by offering higher quality products. The unit value is complementary to technology indicators and helps to evaluate the success of countries in this respect.

It is specifically interesting to apply our comprehensive and dynamic definition of 'competitiveness' and the unit value approach to evaluate the position of Germany. Germany specifically fears[2] losing its competitiveness due to its high wages and tax rates ('Standortdebatte'). Trade balance and market share are very insufficient indicators to grasp the meaning of the discussion. Evaluations of the technological potential and the attainment of macro economic goals are important.

The paper is structured as follows. In Section 2 we introduce our concept of dynamic competitiveness of nations. Section 3 introduces the unit value as a complementary indicator, which has up to now not or at least not adequately been used for the evaluation of competitiveness. Section 4 applies our comprehensive definition for an evaluation of the German economy. We emphasize the dynamic issue of the technological competitiveness in Section 5 first by looking at conventional indicators and then on the unit value. In Section 6 we sum up the main results.

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[1] Earlier studies along this line are the examination of the competitiveness of Austria (Aiginger, 1987 Aiginger and Peneder, 1994). See Aiginger (1995a) for an explanation of the development of the concept of competitiveness used in this paper, and Aiginger (1995b) for an application on the competitive position in the triade (USA, Japan and the EU).

[2] The discussion on the competitiveness of a nation typically arises when a country fears it will lose its leading position or fall behind. Servan Schriver's call for cooperation and the creation of large, state-backed firms became a classical document of Europe's fear to fall even further behind the USA in productivity. Later the industrialized countries complained about losing 'competitiveness' vis-à-vis oil producing and other resource abundant countries after the oil crisis in the 70s. Eurosclerosis characterized inflexible structures in Europe compared to a deregulating, tax-cutting US economy at the beginning of the 80s. The vision of a common European market was a counter strategy against Europe's falling further behind. In the beginning of the 90s it was the USA's turn to complain about losing its competitive edge vis-à-vis Japan, facing declining market shares in auto, computer and consumer electronic industries. Currently Japan is afraid of losing its newly gained leading position because of the high value of the Yen and postponed internal reforms.

2. The concept of the competitiveness of nations

2.1. Defining competitiveness on the national level

Defining the competitiveness of nations[3] is a controversial issue (see Appendix A). There are some authors which deny the importance of this concept especially in a world of flexible currency regimes (Cooper, 1961; Suntum, 1986), and it is evident that no income can be lost due to deficits in the external balances in a world of complete markets. Here prices and incomes always adjust, resources are fully utilized and the balance of payment equilibrium is endured. Yet even policy-minded and empirical authors which accept medium-term imbalances in trade balances as a stylized fact play down the issue out of various reasons.[4]

Most studies addressing the competitiveness issue in previous years combine issues of the external balance with domestic performance, forming in definitions such as 'growth without trade imbalances'(Competitiveness Policy Council, 1994; Schumacher et al., 1995). The World Economic Forum in Geneva and the Institute of Management Development in Lausanne apply several hundred objective and subjective indicators to assess whether a country 'proportionally creates more wealth on the world market than its competitors'.[5] We wish to find a comprehensive definition, relating competitiveness to the ultimate goal of economics.

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[3]Many authors implicitly assume that the competitiveness of firms is a clear-cut issue. Firms which survive are competitive, those which exit are not. Yet in reality firms exist at very different costs, technology and profit rates (see Aiginger and Pfaffermayr, 1997 and the literature on the persistency of profit differences). Some firms set prices equal to average costs, other accrue innovation or monopoly rents. Is the second group more competitive than the first? A path between these two extremes was put forward in an US report (President's Commission on Industrial Competitiveness, 1985): a firm is competitive if it can produce products and services of superior quality or lower costs than its domestic or international competitors. This, however, implies that the average firm is by definition not competitive.

[4]See Porter (1990), Reich (1990) and Krugman (1994a,b) as the oft-cited references. Porter (1990, p.6ff.) comes very close to the position that the term competitiveness of a nation makes no sense, stressing that it cannot be that a country is 'competitive in all industries'. Porter arrives at this view after dismissing different concepts of competitiveness ('every firm is competitive', 'positive balance of trade', 'market share', 'job creation') and then stresses that 'the search for a convincing explanation of both national and firm prosperity must begin by asking the right question. We must abandon the whole notion of a 'competitive nation' as a term having much meaning for economic prosperity. The principle goal of a nation is to produce a high and rising standard of living for its citizens. The ability to do so depends not on the amorphous notion of competitiveness but on the productivity with which a nation's resources (labor and capital) are employed' (Porter, 1990), and later on page 6, 'The only meaningful concept of competitiveness at the national level is national productivity'.

In his review of Porter's book Reich (1990) writes 'National competitiveness is one of the rare terms of public discourse that have gone directly from obscurity to meaninglessness without any intervening period of coherence'.

'Competitiveness is a meaningless word when applied to national economies and the obsession with competitiveness is both wrong and dangerous' Krugman (1994a, p. 44).

[5]The definition implicitly stresses the zero sum nature of the concept: whenever some countries are competitive, then there must be others which are not. Another problem of the implementation is that some indicators are valued as positive in one performance group and as negative in another.

2.2. The concept of welfare

It pays to start from what economists usually believe to be the aim of the economic system. Economists believe that societies (nations) try to maximize some welfare function, given some constraints. Let us assume the welfare function can be characterized by welfare, W (C, S, E). Let C denote a consumption vector containing the elements consumption per head $(y1)$, purchasing power in international currency $(y2)$, income and price stability $(y3)$ and leisure $(y4)$. S stands for social goals and may comprise social security $(s1)$, stability of employment $(s2)$, health $(s3)$, education $(s4)$, equity $(s5)$, living expectations $(s6)$, and political stability and democracy $(s7)$. Finally E represents the environment and may be subdivided into the preservation of natural resources $(e1)$ and low emission $(e2)$. The maximization is constrained by external balance conditions $EB > A$. EB can be a condition of the current account, for balance of payment for the currency reserves, for market shares in some world market, A may be zero, a positive number, some relation to GDP or world trade flows.

Max $W\,[C,\,S,\,E]$ s.t.:

$$EB \geq A \;\Big\}\text{external constraint}$$

and

$$
\left.
\begin{aligned}
Y &= f(K_1, L_1, R_1) \\
S &= g(K_2, L_2, R_2) \\
E &= h(K_3, L_3, R_3)
\end{aligned}
\right\} \text{ technology constraint}
$$

$$
\left.
\begin{aligned}
\sum K_i &\leq K^+ \\
\sum L_i &\leq L^+ \\
\sum R_i &\leq R^+
\end{aligned}
\right\} \text{ resource availability}
$$

where W = welfare function, welfare (depends on consumption, social performance, environment), $C = [c_1, \ldots c_n]$, $S = [s_1, \ldots s_n]$, $S = [e_1, \ldots e_n]$, EB = external balance (trade balance, current account, market share, market share in high tech, etc.). A = critical, numerical value (zero, positive number, of GDP), K, L, R, K^+, L^+, R^+ = inputs of capital, labor, resources, respective to endowments.

To demonstrate the link between the objective function and the constraint we assume a specific version: external constraint, $X - M \geq 0$, where X, M = exports, imports and the relation between C and Y is defined by $C = Y + M - X$, Y = production.

This stylized simple model focuses on policy variables and leaves out a lot of real world interdependencies.[6] Specifically, the objective function and the constraints must be related, for which we offered one possible route. All variables vary over time although we dropped the time subscripts for convenience. For the concept of competitiveness it opens some important insights.

First it shows the dynamic character. The maximum attainable welfare W^* changes over time, it depends on the technology and on the capital stock. Both determinants may be partly exogenous (being constant or rising over time) or endogenous (influenced by strategic decision of firms or by economic policy — note that both dependencies are not explicitly modeled in this stylized version). Secondly, neither low costs nor a balanced current account attribute directly to the ultimate goals. Indirectly high costs relative to technology can lead to a violation of the constraint,[7] which then limits the welfare level which can be reached. If the constraint is not binding, then higher values of C, S and E are unambiguously positively valued from the welfare point of view. Only if the constraints bind can there can be a trade off between an increase in the arguments of the welfare function and the potential violation of the constraints. As long as the constraint is not binding, higher wages and an appreciating currency are clearly assessed as positive, and countries with higher wages are in a better position. Any assessment which gives negative marks for high-wage countries in which the constraint is not binding, is misleading.

2.3. A tentative definition and its application

The issues welfare maximization and competitiveness are related and it is up to the definition of the later concept how much we separate the issues. Welfare maximization addresses optimal use of all resources to fulfill the economic ends of a society, the notion of competitiveness as used in the political discussion stresses the role of the low costs and external balances. In more enlightened discussions technological competitiveness, productivity and catching up are investigated. Not by concept, but by applying the term competitiveness in the political and economic discussion the relative performance among countries gains attention, while welfare maximization focuses on the aspect of optimal use of resources in a single country.

Some choices to be made if we define competitiveness are listed in Appendix B. We propose a definition which to some degree (but not totally) separates the issues,

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[6]Lippschitz and McDonald (1992) describe these interdependencies as insoluble problem of competitiveness: 'relative prices, rates of return and profit margins are endogenous and determined simultaneously with changes in production incentives' (p. 64). One interdependency economists would like to stress is the identity of savings and absorption. Trade deficits are ex post the result of the fact that savings are too small to accommodate investment and budget deficits. Short-run external deficits are necessary to fulfill the identity. In the long run production could increase and bridge the deficit. Another link between incomes and trade balances would be if the export deficit leads to 'qualitative problems', be it a cumulative loss of demand or a cumulative loss of finance for research or spillovers. Vicious circles can go the Keynesian route or the supply side way, if we accept that external deficits are qualitatively more important than the actual short-run loss.

[7]The constraints of different countries are linked together by a zero sum condition, so that it is impossible for all countries to fulfill their constraints.

and which explicitly states that the 'competitiveness of a country' depends on its aspiration level and its preferences on the one hand and on technology and capabilities on the other (Aiginger, 1987; Aiginger and Peneder, 1994; Aiginger and Wolfmayr, 1996)

Competitiveness of a nation is the ability to

- sell enough products and services (to fulfill an external constraint);
- at factor incomes in line with the (current and changing) aspiration level of the country; and
- at macroconditions of the economic, environmental, social system seen as satisfactory by the people.

The ability depends on the resources given, including endogenous resources such as technology, and human and physical capital.

For use in a definition, the subjective content of the words 'enough', 'aspired' and 'satisfactory' seems to be counterproductive. We could substitute average performance instead of the subjective values, but this would miss the point usually addressed in the political discussion on competitiveness. The targets which decide whether a nation feels competitive are dynamic — they depend on past achievements and current aspirations. They vary from country to country, as used to be the case with aspiration levels.[8] Sometimes an outsider can detect them without difficulty, or substitute them by some objective benchmark; sometimes they are deeply hidden in the political, cultural and economic system of a country. In applying the concept on a real economy, we take a two-step procedure. First we use the performance of a subgroup of similarly developed countries as a yardstick, and then we discuss how the performance relates to (presumed) country specific priorities.

2.4. 'Enough' exports

Usually equilibrium in the current balance is seen as a good benchmark for the current competitiveness of a nation. However, some countries seem comfortable only with a surplus (Japan, Switzerland), while some are unhappy if a negative trade balance is equalized by incomes from a potentially mature industry (alpine tourism in Austria, basic good industries in the Netherlands or oil in Norway). 'Enough' exports could also be measured by some concept of market shares. Again we have to choose the indicator (exports, imports), the regional market (Europe, the world, the US) and the aspiration level (constant or increasing market shares). Implementing this aspect, I will start with an analysis of the trade balance, the balance of current account, and the market share of a country. The objective results will be discussed against presumed aspiration levels.

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[8]I am grateful to Pat Devine for telling me in Crete (1994), that there is a definition of efficiency put forward by Singh (1977) which is quite similar to my concept of competitiveness: '...we may define an efficient manufacturing sector as one which (currently as well as potentially) not only satisfy the demands of consumers at home, but is also able to sell enough of its products abroad to pay for the nation's import requirements...the sector must be able to achieve these objectives at socially acceptable levels of output, employment and the exchange rate' (Singh, 1977, p. 128).

2.5. 'Aspired' factor incomes

Any current balance can be attained (at least theoretically), if we lower wages, if firms are content with low profits, or if the currency is devaluated. Since, however, these 'cheap costs strategies' detract from the final goals of the economic process — namely higher income or higher utility — these strategies are in this respect counterproductive. Additionally, any 'market test of competitiveness' (as balanced trade, or a rising market share) is directly influenced by factor incomes. A country which is comfortable with its position in the hierarchy of wages will tend to assess its economy as 'competitive', while a country facing repeated pressure to keep wages and profits down feels uncomfortable with its performance.[9]

Implementing this aspect of competitiveness we will compare the level and the increase of wages, productivity and labor unit costs. We could also compare macro economic growth and income levels under this approach, but will do this under the next heading. Again, attained levels will be compared to ambitions and to history.

2.6. 'Satisfactory' macro condition

Nonnegative external balances are more difficult to achieve in an economy offering comprehensive health and pension systems, unemployment benefits, and high environmental standards, than at lower levels of social security, employment and environmental preservation. Different countries have different levels of aspiration with respect to economic goals. In the US, job security in established firms, or a comprehensive health system apparently have low priority. In Japan large flats, leisure, long vacations and a short work-week are not considered all that important. In Switzerland, zero inflation is a goal and reduction of the transit traffic is given a high priority, and in Germany a strong currency, an independent Bundesbank, fiscal discipline and a very low inflation have high priorities. A positive trade balance seems natural and a positive current account desirable.[10]

2.7. Relation to other concepts

Relating the definition to a mainstream concept is difficult since no mainstream definition exists. Relative to the political discussion on competitiveness we clearly

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[9]In Austria, for example, economic policy in the late 60s had the goal to attain 'the European wage level', and competitive performance was evaluated with the attainment of this goal kept in mind. If the Portuguese people feel happy with their wage level they will assess their economy as 'competitive'; if they feel a strong desire for higher wages, they will arrive at a different assessment.

[10]Important to the assessment of the competitiveness of the nations are those macro economic and social conditions, which are of actual importance. These are the conditions which are increasing actual costs. A macro goal which is potentially expensive but not actually targeted, is irrelevant for current and (near) future competitiveness. A macro goal which has high priority involves costs now or in the near future. If Japanese people press hard to reduce the working week to the European level, the nation will lose its competitive edge (for some time). If European nations press hard for a Swiss-style transit policy, there will be a large financial burden (today). If the US presses hard for comprehensive health coverage, it will face greater difficulties in regaining competitiveness with Japan.

stress that costs are not the most important issue. Higher costs if paralleled by higher productivity lead to a better attainment of macro goals and welfare. Relative to concepts focusing predominantly on external balances, we stress that the external balance becomes a predominant issue only in cases of imbalance and that targets for external balances may widely differ. Relative to the two-tier concept of 'growth plus balanced trade', we stress on the one hand that growth is not the only target and on the other that this definition abstracts from the long-run determinants of growth such as technology, productivity, and physical and human capital.

Relative to recent studies (Abramovitz, 1994; Silverberg and Soete, 1994; Fagerberg et al., 1994), our concept is less single focused at the leading country and more subjective. A country lagging in income per capita in an area can feel competitive at low wages, while another may assess its industry as not competitive because it cannot pay the wages of its rich neighbor. Relative to the literature which stresses the technological factor, we share the view that technology, knowledge and spillovers are the main determinants of long-term growth. We start, however, from a broader evaluation, maintain that the economic goals may change over time and be different across countries, and stress that the dynamic process implies a continuous increase of wages and productivity, and that richer countries have to climb up a quality ladder (Grossman and Helpman, 1990, 1991a,b).

A comparison with Porter's work is difficult, since Porter denies that the notion of competitiveness of a nation exists. If we compare our approach to his auxiliary meaning of competitiveness which is productivity, we stress how the potential given by a certain level of productivity is used for consumption, exports and the fulfillment of social goals, and that the level of productivity is continuously changing over time. The factors Porter claims to be important for the competitiveness of firms[11] are important for the dynamic competitiveness of an economy too. Porter, however, focuses on the competitiveness of an industrial cluster, since 'no country can be competitive in all industries'. As main indicators for a cluster Porter focuses on the market shares of an industry on the world market and on the market share on the national market. These are measures of ex post competitiveness, where the only qualitative element is that some minimum market share has to be attained to qualify as a competitive sector.

3. Assessing the dynamic competitiveness by unit values

3.1. The unit value as an indicator of qualitative competitiveness

Competitiveness is inherently a dynamic issue. Technology indicators and information about investment ratios indicate how a given position is expected to change over time. However, productivity measures are technical measures relating quantitative input and outputs. Modern growth theory suggest that human capital has

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[11]Porter's famous 'diamond' stresses the importance of supply relations, demand conditions, supporting industries and strategy (Porter, 1990).

become the most important growth factor, and that spillovers, innovation, and quality are decisive factors. Analyses of real industries stress that organization, information, marketing, strategic alliances, specialty production, adding services to products, are perhaps as important as technology.

The unit value of exports is a specific informative indicator for these 'soft' determinants of competitiveness. The unit value of exports is defined as nominal sales divided into some quantity measure, usually kilograms. This indicator is available also for imports, for practically all countries and can be disaggregated into more than a thousand products on the six-digit industry level. The potential of disaggregation into the regional and product dimension is a main operational difference to all the indicators on research input and output data.[12]

On the conceptual side the unit value can be seen either as some sort of productivity or as some sort of price. If we recall that the unit value is nominal exports divided into kilogram, we see that this is an indicator of productivity, with the difference that the numerator is in value terms, so that higher quality, a higher processed subproduct and better marketing increase the unit value, and the denominator is the weight of material input, so that better use or a combination of input increases the unit value. If on the other hand the product is homogeneous, prices are set by the market, and the production process is rather straightforward, the unit value approaches the average costs and the price. It was this two-fold character which so far has limited the use of this indicator.

We use the following device (developed by Aiginger, 1996) 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.

Using this assertion allows us to split industries into those which are dominated by price competition ($UV_{exp} < UV_{imp} \Rightarrow Q_{exp} > Q_{imp}$ and $UV_{exp} > UV_{imp} \Rightarrow Q_{exp} < Q_{imp}$) and those with revealed quality competition ($UV_{exp} > UV_{imp} \Rightarrow Q_{exp} > Q_{imp}$ and $UV_{exp} < UV_{imp} \Rightarrow Q_{exp} < Q_{imp}$). We use the exports and the imports of 18 countries to classify all three digit industries into those which are highly price sensitive, moder-

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

Data are available up to 1993 in a rather but not fully comprehensive range. We concentrate on data for 1992 and check the main results with data back to 1980 and up to 1993 and part of 1994. The data refer to unified Germany unless otherwise mentioned.

ately price sensitive and quality sensitive.[13] We call this industry specific classification of revealed price elasticity.

To gain a country specific classification we can subdivide markets dominated by price conditions and markets dominated by quality competition into those with a higher or lower export unit value, obtaining the following country specific four segment scheme:

Segment 1 combines the industries in which exported quantity exceed imports despite a higher unit value. This has to be the consequence of a quality lead which is appreciated by demand or signals successful specialization in the dearest market segment. This sector is the very target for an advanced country (successful quality competition).

Segment 2 contains price elastic goods in which the home country has a high unit value and consequently faces a trade deficit. Industries in this sector have lost price competitiveness in a market in which prices are important. This part of the deficit can said to be the consequence of high production costs (deficit in price competitiveness).

Segment 3 contains price elastic goods in which the home country has a low unit value. This sector yields a trade surplus (successful price competition).

Sector 4 is a hopeless sector. An industry runs a trade deficit despite low prices. In this sector there have to be some exit barriers (structural problem area).

This classification is country specific, and the same industry at least theoretically can be in different sectors in different countries. We therefore call the classification 'country-specific revealed price elasticity'. From these segments the first 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. We use the relative size of this sector as a complementary indicator on the dynamic competitiveness of Germany.

4. The competitiveness of Germany: a general assessment according to our definition

Assessing the competitiveness of Germany is a specifically rewarding task. The differences between a cost-oriented approach and a technology-oriented one, between a static and a dynamic approach, and between a domestic or export oriented approach all become important in this case.

4.1. The external balance

Germany is highly competitive if we focus at the external balance. The trade balance historically had a huge trade surplus for Former West Germany (1989: ECU

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[13]The indicator ranges from −18 to +18. The value −18 is reached if in all 18 countries (the absolute difference between export and import) unit values and quantities have different signs, +18 if they have identical signs in all countries. The first third of the industries (53) with the highest negative indicator are called highly price elastic, and the 53 with the highest positive indicator are called quality sensitive. See Aiginger (1996).

64 bn). After unification it dropped to a low of 9 bn in 1991, but is now rising again. If judged from this indicator there can be no discussion on the competitiveness of Germany and no complaint about too 'high costs' in German manufacturing. The current account had been in the positive up to 4% of GDP before unification, and is now in the red by approximately 1% of GDP. The reason for the switch from a structural surplus to this moderate deficit is the explosion of the deficit in the tourist balance, secondly the net payments to the European Union and thirdly the decline of capital yields. The official currency reserves of the Deutsche Bundesbank were between 3 and 4.5% of GDP in the 80s, when they plunged to 2.2% after unification (data for 1990) and since that year recovered to 2.8% of GDP.[14]

4.2. Costs and price competitiveness

Price competitiveness results from two components: labor cost per hour or worker and productivity. Combined, these two factors determine unit labor costs. Germany has high labor costs and short working time. Labor costs per hour are 42.67 DM in former West Germany, relative to 27.84 in the USA and 37.30 in Japan. This is higher than in Switzerland, and much higher than in the EU average. Working hours of 1639 hours per year are low even in the European context, relative to 1904 hours in the USA and 1888 hours in Japan. Value added per hour is 4% higher than in Japan, 12% higher than in EU average and 15% higher than in the USA. Productivity in the Netherlands, Belgium and France is very close (the first one even 3% higher). The resulting unit costs (labor costs divided into productivity) rank Germany as the highest cost country, 9% more expensive than the USA and 18% higher than Japan. Canada, the Netherlands, United Kingdom and Sweden are within the 5% range.[15]

Studies comparing levels of wages and levels of productivity yield somewhat diverse results, but the essence remains. Labor costs are very high in Germany, and

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[14]Schumacher et al. (1995, p. 364) report the share of German exports of total OECD exports to be stable or slightly increasing. If anything the market share has decreased between 1970 and 1980 and then did change to the positive after 1989.

Market shares in the world market are stable in a period in which the EU lost two percentage points. The market share slightly decreases from 18.19% in 1980 to 18.14% in 1992, or from 14.25 to 14.08% in 1992 according to another indicator. These data show a stable market share for Germany in a period in which the EU partners lost two percentage points. The winner in this contest was Japan, who won two to three percentage points and to a lesser extent the USA (which won particulary in relation to its performance in the late 80s). A problem arises with the data in 1993 and 1994. Data for Germany show a drop of the market share of exports in the range of two points, and it is matched by an even larger drop in the import market share of the same amount. Exports in DM decreased by 6.4% in 1993 and imports by 13.8%; all these figures turned into the positive in 1994 and further contributed to an increase of the positive balance of Germany in merchandized trade.

[15]A similar picture is drawn by Fröhlich et al. (1994): labor costs in Germany are the highest within the EU-12 (15% above average, see Fröhlich et al., 1994. p. 35), while unit labor costs in the EU is 9% above those in the US and 20% higher than those in Japan (data for West Germany, 1992). The Bureau of Labor Statistics reports hourly wages of workers in manufacturing in Germany to be 25.9 US$ in 1992, relative to 16.2 $ for the USA as well as for Japan. Again, Germany is by far the most expensive country, productivity at the same time is reported as high as in Japan and 18% lower than in the USA (reported in data from OECD, 1993).

the difference is not fully compensated by measured productivity. This is a contrast to the maintained surplus in the German trade balance. Either other cost components are much lower in Germany or some qualitative features of the competitive strength are dropped in the measures for productivity.

Fears usually refer to the future. The dynamics of labor costs is heavily influenced by the changing currency values. Between 1989 and 1993 unit labor costs in international currency increased by 29.9% in Japan, 16.5% in Germany and 13.5% in the Netherlands, but declined by 7.8% in the USA and by 8.3% in Italy. Unit labor costs measured in national values are more stable. They decreased by 2.5% in Germany and by 3.3% in the EU. Combining these two information sets we conclude that Germany remains a high cost location; if anything, the position becomes more pronounced over the most recent years (with the exception in relation to Japan).

4.3. Macroeconomic goals and fiscal stability

Real growth in West Germany had been slightly lower than in the EU average before unification, because since unification no trend has been seen for unified Germany, which is an extremely good performance for a country whose currency is appreciating. There is a split between the former West which is growing slower, and the former East which experiences higher growth. Manufacturing has been the subject of concern after a large drop in 1993; however, the share of manufacturing in GDP decreased not much more than, for example, in France, and the share of manufacturing in GDP is still the highest in all OECD countries (OECD, 1993: 28.9% in unified Germany).[16] Inflation is definitely lower than in the other countries of the community. Consumer prices have risen 2–3.3% over the last 3 years, and the long-term rate in West Germany was between 3 and 4%. The inflation rate in the community is never lower than 3% and had a historical record of 10%.

There is also the fear that future costs will increase due to the costs of German unification. However, up to now the taxes as a percentage of GDP are only slightly above the EU average and the net deficit of government is much smaller than the EU average. Historically Germany had been always committed to stronger fiscal discipline than its competitors. The fact that the unified Germany could not stick to this goal is seen as a severe problem by its people and politicians. This is an example how the politically defined notion of competitiveness depends on the aspiration level and not on objective criteria or comparisons with other countries.

Unemployment has risen up to 9.6% in unified Germany in 1994, with an average of 7.8% for the period 1990–1994. Both figures are well below that of the European union (11 and 9.4%, respectively). Unemployment is higher in the Neue Länder and lower in the former West Germany. The rate in western Germany appears to be unacceptable high compared to standards of 2% in the 60s and 3% at the beginning of the 80s (1980: 3.2%).

[16]Germany is one percentage point ahead of Japan, Portugal and Spain, and 10 percentage points ahead of the USA and many other western industrialized countries. The share has fallen from 32.4% in West Germany in 1980 (OECD, 1995b, p. 118).

Germany is a country with a comprehensive social security system. Working hours are low, and unemployment and health insurance are comprehensive. Social security outlays in percentage of GDP is 27.3%, this is slightly above the EU average (27.1%, EUROSTAT, data for 1992) and of course well above similar ratios in the USA. The environmental achievement in Germany is assessed by the OECD as remarkable. Germany has 'decoupled economic growth from the flow of several major pollutants over the past two decades' (OECD, 1993, p. 205) and spends 1.65% of GDP for pollution abatement and control (OECD, 1993, p. 207). Its environmental industry employs 320 000 people. The environmental damage in the Neue Länder is serious, but concentrated in some areas. Environmental expenses in relation to GDP is reported to be 1.7%, the second highest figure in an international comparison of 11 countries (Institut der Deutschen Wirtschaft, 1994, p. 16).[17]

Hence the fear of lacking competitiveness in the case of Germany refers mainly to forecasts of future developments or are related to goals which are more ambitious compared to other countries. It is important to look at indicators which help to forecast the future development.

5. Assessment of the dynamic position

5.1. The traditional approach: technology indicators

There are many studies available attempting to assess the technological position of Germany[18]. Schumacher et al. (1995) investigates the technological competitiveness incorporating the issue of productivity, innovation and marketing.[19] The techno-

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[17]The equity issue is raised primarily due to the split between the Alte and Neue Länder. Numerous books and assessments have been written about the differences in the wages, about the decline of manufacturing production to one-fifth of its pre-transition level (Sinn, 1994, p. 25) in the Eastern parts, not at least at the occasion of the 5 years' anniversary. The facts available today include that the GDP per head is still 40% lower in the East, unemployment is still higher in the 'Eastern Länder'. Productivity in manufacturing is 54% of the 'Western Länder', wages in relation to sales are 108.5% (Sinn, 1994, p. 38). Massive capital flows from the West to the East have mitigated the problem, investment per head has been higher in the Eastern part since 1993 (Sinn, 1994, p. 24). Manufacturing has lost its competitiveness, because it had to calculate in the same currency as the technically superior plants in the 'Western Länder' from the beginning, and afterwards because of the pressure for wages to catch up faster than productivity. Today the remaining part of the industry is in the main restructured, investment is somewhat higher and capital stock younger in the East. From the perspective of other countries the economic strength of Germany has not weakened, but to some extent even increased by the unification. Political tensions and transfer payments had been very high from the perspective of domestic people and firms.

[18]Not including the many studies on the competitiveness of Germany in general. Michel and Standort (1993) reports about that 800 papers and books have been published between 1985 and 1993 on this issue.

[19]This study defines competitiveness in a broad way. It is, however, still less comprehensive than my own approach, since it does not incorporate an evaluation of the social and environmental standards (it is easier to attain a positive external balance and attain a certain rate of real growth if the social net is comprehensive and the environmental standards are high). The assessment is generally positive, with a sentence at the end hinging at a less favorable perspective. 'A problem may be that in the Federal Republic of Germany the provision for future decreases. Research and development outlays and educational outlays decrease in relation to GDP...' (Schumacher, 1995, p. 264).

logical position is evaluated by definitions for high-, medium- and low-tech industries, and then market shares, patent data and research input are analyzed. Gehrke and Grupp (1994) assess the research input and output and market shares of German industries in areas of different sophisticated technologies, also addressing and analyzing differences between the former Westdeutschland and the Neue Länder. Guerrieri and Milana (1995) report market shares and the external position in high-tech sectors for more countries and in more detail.

5.1.1. Share of high-tech industries

Schumacher et al. (1995) makes use of a OECD scheme defining sectors of high-,[20] medium- and low-tech industries. The scheme comes partly from objective sources such as input data, partly from expert assessments.[21] As far as investment is concerned Germany is in a middle position — its investment share in high-tech industries is higher than that of France or Italy, approximately as high as that of Great Britain, but lower than that of Japan and USA.

The OECD (1995a) report Germany[22] to have a high market share for medium technology (20.7%, OECD/TEP, 1992), as compared to high and low technology (14.3 and 14.7%, respectively). For high technology goods the USA (23.5%) and Japan (20.0%) are leaders, but France and the UK have much lower shares. As far as the trend between 1980 and 1992 is concerned Germany is losing 1.5 percentage points in the high technology market, but so does the US, Switzerland and the United Kingdom. The winner is primarily Japan which increases its share by 3.5 points and to some degree France (starting from a much lower value).

Guerrieri and Milana, 1995 present their own classification, partly using objective indicators (R&D sales ratio > 4%), and partly using experts evaluation to calculate countries' shares in world trade in high-tech sectors, finally reporting a share of 16.2% for Germany in 1970–1972, which declined to 12.4% in 1988–1990. Decreasing shares are reported for other EU countries and for the EU-12 the decline is from 46.4 to 38.5%. The relative loss of the US is even greater (from 30.2 to 20.5%). The winner in this contest is again Japan which now holds second place after the US. A jump-start is made by the Asian newly industrialized countries (from 1 to 9.7%). Guerrieri and Milana calculate a measure of revealed comparative advantage by dividing the export market share in high-tech industries of individual countries into the share of its total manufacturing output. While the USA (192), Japan (133), but also France and the United Kingdom have a comparative advantage, the EU-12 and Germany do not (index 91 for each). Breaking this picture into industrial catogories reveals a good position for Germany in chemicals, mechanical and scientific instruments, but a deficit in electronics and aerospace.

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[20]High-tech industries are ISIC 3522, 3825, 383, 3845, 385.

[21]The IFO Institute (Faust and Schedl, 1984) has developed a classification of high-tech industries, which focuses on the fact that developing countries are not able to compete in this industries.

[22]The data refer to Germany after unification (OECD, 1995a, p. 176).

5.1.2. Research and innovation intensity

Rankings according to the share of research and development expenses of value added in manufacturing give Germany a middle position — it is higher than for most of its competitors, but behind Japan and the US (6.4% for Germany, 6.7% for Japan and 9.7% for the US, 1988–1990). The same is true for German research outlays (GERD), which amount to 2.5% of GDP, slightly behind USA and Japan (2.7% each) and Sweden (3.1%), but well ahead of the remaining nine countries for which data are available (OECD, 1995b).

5.1.3. Patent data and technological balances

Germany has a stable and positive performance with regard to patents. Germany has been leading in 1970 and is now second to Japan. Again Germany is specialized not in high technology (where it has a negative specialization index) but on medium technology. Faust and Schedl (1984) deplore the negative industry structure effect of patenting activity (specialization in declining industries).

A technology balance of payment comprises two broad categories of financial flows: transactions relating to industrial property (patents, licenses, techniques, know-how, designs, pattern) and transactions relating to services with a technological content and to intellectual services (engineering studies, technical assistance, R&D services, etc.). According to this balance the US is the main exporter of technology with receipts of $20bn and a positive balance of $15bn. Europe has a negative balance of $ −7.5bn, of which Germany has the main share (−$3.0bn), the relation of the deficit to the payments is 1.39 for Germany, a similar ratio as is seen for France, or Italy (European average 1.32). United Kingdom, Sweden and the Netherlands have positive balances (OECD, 1995b, p. 178).

5.2. The complementary approach: unit value and quality competition

The unit value of German exports exceeds that of German imports by a margin of 29%. The level as well as the margin is the fourth highest among the OECD countries and is higher than that of the USA, Japan and France. We now start with the country-specific classification of revealed price elasticity.

For 26.4% of its trade Germany can export higher quantities than it imports, even if the export unit value is higher. This sector of successful quality competition is thus higher than in any other OECD country. It comprises 14% of trade in Japan and in the EU total, but only 6% in the US. The sector of successful price competition is relatively low (7% against 76.7% in Japan and 9.6% in the EU). The sector with a deficit in price competitiveness is lower than in other countries (−7.8%). The most striking feature is the extremely low deficit in the structural problem area. In this sector a country suffers a trade deficit even if its exports are cheaper, and the sector suffers a deficit of 1.4% in Germany, 10.6% in the EU, 8.9% in Japan and 10.4% in the USA.

The industry-specific classification is based on the trade flows of 18 countries. In the highly price-sensitive industries Germany suffers a deficit of 2.5% of its trade

volume. This is the eighth largest deficit in the OECD. On the other hand Germany enjoys a surplus of 19.7% of trade, the highest next to Japan in the quality-sensitive industries.

These results complement the picture drawn by the technology indicators. Firstly they incorporate many soft factors such as organization, marketing, reliability and service components which cannot be addressed by technology indicators. Secondly they show whether a high-cost country can successfully retreat from price-sensitive industries and gain enough reputation and consequently market shares in industries in which quality is important, thus allowing assessments of the future competitive position. Germany is well placed in this respect; the picture revealed by price elasticities is even more favorable for Germany's dynamic competitiveness than that revealed by the technology indicators.

6. Conclusions: the concept and its application for Germany

6.1. A framework for dynamic competitiveness

(1) The competitiveness of nations is one of the most intensively discussed issues in politics. Economic investigations on this issue differ in content, in scope and most importantly according to the definition of competitiveness. We want to define competitiveness having the final goals of the economic process in mind, as replicated in a social welfare function: here consumption, social goals and environmental standards are the final ends. External balances are only a possible constraint, and low costs can be important only indirectly. We define in this study competitiveness as the ability of a nation to sell enough products and services in the world,[23] at factor incomes in line with the country's aspiration level and at macro conditions seen as satisfactory by the electorate. The ability depends on the resources given, including endogenous resources such as technology and human physical capital.

(2) We prefer to separate analytically the issues of external balance, factor incomes and macro condition, although they are interdependent. The reason is that a given external balance is to be assessed differently, whether it is reached by a low-income strategy, a devaluation of the currency and low social and environmental standards, or by rising incomes and comprehensive social and environmental standards. In the second case, for which Switzerland is a good example, the position is compatible with the final aim of the economic process (as seen by the welfare function in which income, social values and environment are arguments). In the first case, in which the US is a good example, the position is reached by disregarding the goals given by the social welfare function for the sake of solving a side issue.

(3) This concept is less normative, broader and more dynamic than other definitions of competitiveness. Using subjective terms (enough, satisfactory, aspired) allows to accommodate for national differences in the aspiration levels. The concept

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[23]This ability is usually measured in the balance of the current account or in world market shares.

demands a broader evaluation of competitiveness (leading to a welfare or performance evaluation), than focusing on trade balances alone would allow. This mitigates the critique raised by economists like Paul Krugman, that competitiveness is quantitatively a minor issue as compared to productivity. The productivity issue is, however, nested in our approach. For two countries with similar external balances or with identical market shares, the country with the higher productivity has a competitive advantage since it can afford higher wages and/or a more comprehensive health and social system, or more environmental preservation. The approach is more dynamic insofar as the importance of the current external position is played down, and the factors of technology and qualitative competitiveness are stressed. The model of the social welfare function shows how the potential welfare changes with the resources and the technology. This change is partly exogenous (technical trends), partly endogenous, depending on research and innovation climate.

6.2. The competitiveness of Germany

(4) Assessing the competitiveness of Germany demonstrates how important it is to start from a well-defined and broad concept and how important it is to include the aspiration level of an economy into the assessment.

If we were to assess the competitiveness of the German economy only with regard to the external balances, we could not understand the discussion about the competitiveness of the German economy (Standortdebatte). The trade balance had always been highly positive, and a decline of the positive balance in the first years of unification has been converted again in a large surplus. The balance of current account is slightly in the red in 1994 and 1995. The change relative to the large surplus before unification stems from an increasingly negative tourist balance, from decreasing capital incomes, and from increasing transfers to multinational organizations (the EU, for example). None of these factors are related to a decreasing competitiveness of the manufacturing sector. The market shares of German exports in the world are high and stable.

Thus we conclude that Germany exports enough products to accumulate a large and increasing trade surplus and to keep market shares constant. The extreme ambitious aspiration that the manufacturing sector has to cover the losses of the tourist sector and to cover net payments to international organizations (and therefore to balance the current account) is not reached. However, the deficit of the current account balance is small and currency reserves of the Deutsche Bundesbank are satisfactory and continue to increase.

(5) The successful competition of Germany is achieved at high wages and with the strongest and most stable currency of the big industrialized countries. Wages are absolutely higher than in any other EU country, and are higher than those of the US and Japan (if social contributions are included and the short working time is incorporated). This problem is mitigated since productivity in manufacturing is also one of the highest. However, unit labor costs remain to be the highest in the

European Union, although not by a dramatic margin (relative to other advanced economies). Unit labor costs over time (in international dollars) in manufacturing increase slightly faster in Germany than in other European countries.

(6) Growth of real output is slightly below European average, productivity growth equal to or slightly above the average of the main competitors. Data differ to some extent whether they refer to former Westdeutschland or to the unified Germany. Unemployment is rising (and higher in the Neue Länder), but even for total Germany the unemployment rate is still below the EU average. Inflation and interest rates are low; however this is assessed as not fully satisfactory with regard to the high priority of low inflation in this country. Public deficits and debt as well as taxes increased due to the burden of unification. These trends are seen as a major problem in Germany. Historically the overall tax rate had been lower than the EU average, but now it is above the average. Budget deficit and accumulated debt in relation to GDP has increased, but is still below the EU average. Fiscal discipline is therefore better than for most EU countries, but taxes and accumulated debt is considered too high in relation to the traditional aspiration level and to the Maastricht criteria. The transfers from West to East is seen as too high in the western part and too low in the eastern part, straining the solidarity between the former West and East. Social standards and environmental preservation have reached higher levels in Germany than in most other countries, although some of the standards had to be weakened and progress has slowed down in the wake of tightening fiscal problems.

So we conclude that Germany has an average performance as far as growth and per capita growth is concerned, having attained a favorable position in productivity levels well beforehand. The macro economic goals of price stability, full employment, fiscal discipline, social and environmental standards are better achieved than in most other EU countries, but the attainment of the goals of fiscal discipline and full employment is less than experienced historically and well below the aspiration level of the people, government and the Maastricht criteria.

(7) Data on the technological position reveals a position of Germany slightly behind the leading countries in some respects, but well above the average according to all indicators. The technological position can be assessed by examining input data (research outlays, innovation rates), output data (patents), the industry structure of exports and imports (using definitions on high-/medium-/low-technology intensity). Germany has an above-average research input, but does not reach Japan in this respect and in previous years has ranked behind the US, Sweden and Switzerland at position number 4, or 5 among the 13 OECD countries. Germany has a patent rate which is lower than Japan, but higher than its many competitors. Its technological balance (patents, licenses, technological services) is negative, but this trend is shared with most countries and the relation of the deficit to the outlays is not much larger than France or Italy. Among industries with future strategic relevance Germany has an excellent position in environmental techniques, but the situation is less favorable for telecommunication and biotechnology. The German industry is not specialized in high-tech areas, but in medium-tech industries. Germany has a surplus in industry specialty machines, but a deficit in electronic industries, and

exports are spread in general over a very broad range of industries including those with medium technology and low unit values.

(8) The picture is even better if we use the unit value to assess the 'soft' components of dynamic competitiveness. The unit value of the German exports is higher than that of its imports, and its level as well as the margin of the export unit value over the import unit value are among the highest in the world. German exports are extremely specialized in the quality sensitive industries, accepting a trade deficit in the price-sensitive industries. The share in the promising sector, where goods can be sold even if they are more expensive, is very large, and the structural problem area is the smallest among the countries investigated. This leads to a positive forecast for the dynamic competitiveness. Though wages and tax rates may be high in Germany, high technology and specialization in quality-sensitive markets guarantee long-run competitiveness.

(9) The overall assessment is that Germany is able to balance its current account and to defend its large market shares in OECD exports, despite high wages, an appreciating currency and a high social and environmental standard. Unemployment, inflation and governmental debt is low by European standards, but are seen as unsatisfactory in Germany. Technical standards and research efforts are high. Production is spread over a large range of industries. Some sectors lose their competitive edge due to high costs, but the segment where Germany can export despite high costs (due to a quality lead) is large especially vis-à-vis the European countries and the United States. Germany is well endowed with human capital; however, the educational outlays decrease in relation to GDP.

Acknowledgements

Appendix A

A small sample of available definitions of the competitiveness of a nation

Uri (1971): the ability to create the preconditions for high wages.
The German Sachverständigenrat (1981, p. 459): the 'ability to develop specialty products and technical solutions which generate income growth under full employment, despite the emerging competition of newly industrialized countries.'
Orlowski (1982, p. 70): 'the ability to sell'.
Scott and Lodge (1985, p. 15): 'a nation state's ability to produce, distribute and

service goods in the international economy..., and to do so in a way that earns a rising standard of living'.

Fagerberg (1988, p. 355): 'the ability of a country to realize central economic policy goals, especially growth in income and employment, without running into balance of payment difficulties'.

Porter (1990, p. 6ff.): 'The only meaningful concept of competitiveness at the national level is national productivity'.

OECD/TEP (1992, p. 237): 'to produce goods and services that meet the test of foreign competition while simultaneously maintaining and expanding domestic real income'.

Competitiveness Policy Council (1994): the ability to sell products on international markets, while incomes in the domestic markets increase in a sustainable way.

Europäische Wirtschaft (1994a, p. 117): competitiveness as the ability to 'combine growth with balanced trade'.

Management Forum (1994): 'World competitiveness is the ability of a country or a company to, proportionally, generate more wealth than its competitors in the world markets'. No definition up to that year, only 'factors of competitive strength' and a 'formula for competitiveness'. It reads 'competitive assets × competitive processes [plus internationalization] gives competitive results'.

Europäische Wirtschaft (1995, p. 122): the 'ability to increase or to maintain the living standard relative to comparable economies (e.g. developed industrialized countries), without long-run deterioration of external balance'.

OECD (1995b, p. 8): 'competitive policy...[is] supporting the ability of companies, industries, regions and nations or supra-national regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis'.

OECD (1995a, p. 3): describes the aim of policy to enhance the competitiveness of nations as supporting 'the ability of companies, industries, regions, nations or supra-national regions to generate, while being and remaining opposed to international competition, relatively high factor oncome and factor employment levels'.

Von Tunzelmann (1995): Historians have tended to equate 'competitiveness...with political, technical, commercial leadership'.

Appendix B

Choices in the concept of competitiveness

Narrow concept vs comprehensive concept

Narrow concepts focus on external balances, comprehensive concepts uses the perspective of a social welfare function, include factor incomes and other macro goals (inflation, unemployment, currency), very comprehensive concepts include social and environmental targets. *Our decision*: focusing on external balances only may direct policy measures against final goals of economic and social system (increasing welfare); start from the external position, analyze the income level and macrocondition at which it is attained, analyze technological capacity for future trends.

Investor's view vs economic performance (welfare)

The investor prefers low costs, minimal social and environmental burdens; the economy aims at the ability to sell at high income and standards. *Our decision*: concentrating in the investor's view is misleading politics except under very rare circumstances (large gap to aspired goals or lag to other countries, lack of domestic capital, large external imbalances).

Price competitiveness vs technological competitiveness

Price competitiveness stresses cheap labor, low social costs, lax environmental laws; indicator — low unit labor costs; technological competitiveness stresses high productivity, skills, R&D, high-tech industries, unit values. *Our decision*: include both aspects and present them as part of the policy choice, lowering costs and increasing innovation are two ways to make domestic production easier to sell, the first is defensive and diverts an economy from its final ends, the second leads up the quality ladder; the first is often easier, and more feasible in the short term.

Absolute vs relative standards

Absolute standards compare 'level of competitiveness' with some natural yardstick, some neighbor or the technology leader; relative standards stress comparisons with own past, relative to national potential, history, ambitions. *Our decision*: it is important to define what position in the competitive race is aimed at or aspired. Speaking about competitiveness of the USA means the race with Japan, for the EU means the position in the triade. Complaints about losing competitiveness in Switzerland and Germany differs from the issue addressed in countries in transition to market economies.

Objective vs subjective

Objective definitions use average values (for other countries) as a benchmark, and implicitly this introduces a normative concept; subjective definitions acknowledge that people and nations have different priorities and different aspiration levels. *Our decision*: start from average performance, but stress the different implicit preferences and aspirations; goals which are not attained in a country, because they are not seen as important do not influence the external balances and are not diminishing welfare.

Present vs future

The first concepts relies on ex post indicators; the second collects information about probable future developments. *Our decision*: start from ex post indicators to assess the current position, then investigate the dynamics and look for indicators on the future prospects; starting from the present situation diminishes the importance of hopes and fears.

Appendix C

Unit labor costs in $ (EU = 100)

	USA	JA	BRD[a]	BE	DK	FR	GR	GB	IRL	IT	LI	NL	PT	SP
1980	112	59	95	135	90	99	49	102	105	74	127	122	48	85
1992	92	83	115	108	107	94	61	89	72	85	99	105	67	93

[a] Alte Länder.
  Source: Institut der Deutschien Wirtschaft

Labour costs and productivity

	Wage costs per hour	Value added per hour (Germany = 100)	Unit costs	Absolute wage per hour (blue collar workers only) (DM)
Austria		95.6		33.3
Belgium	89.2	97.0	92.0	36.3
Denmark	74.4	80.0	93.0	33.0
France	84.4	97.0	87.0	28.5
Germany	100.0	100.0	100.0	42.7
Greece				11.6
Ireland				21.3
Italy	61.6	77.0	80.0	27.1
Netherlands	88.6	103.0	86.0	34.7
Portugal				7.8
Spain				20.7
Sweden	81.7	86.0	95.0	29.9
United Kingdom	57.0	60.0	95.0	22.2
EU[a]	79.6	88.4	91.0	26.9[b]
Switzerland				39.6
Norway	83.4	86.0	97.0	36.3
Japan	80.6	96.0	84.0	37.3
USA	79.1	83.0	92.0	27.8
Canada	67.9	70.0	97.0	28.0

Sources: WIFO-Databank, using data from US Department of Labor, OECD, Deutsche Bundesbank, Insitut der Deutschen Wirtschaft 1994.
  [a] Unweighted average of countries above.
  [b] 30.0 DM without Greece and Portugal.

Real growth of GNP

	Germany[a]	Japan	USA	Switzerland	Austria	EU	OECD-Europe
1980	−6.4	3.6	−0.4	4.6	2.9	1.5	1.5
1981	0.1	3.6	2.2	1.4	−0.3	0.3	0.3
1982	−0.9	3.2	−2.2	−0.9	1.1	0.8	0.8

1983	1.8	2.7	3.6	1.0	2.0	1.7	1.7
1984	2.8	4.3	6.7	1.8	1.4	2.5	2.5
1985	2.0	5.0	3.1	3.7	2.5	2.6	2.6
1986	2.3	2.6	2.8	2.9	1.2	2.9	2.9
1987	1.5	4.1	3.1	2.0	1.7	2.9	2.9
1988	3.7	6.2	3.9	2.9	4.1	4.0	4.0
1989	3.6	4.7	2.7	3.9	3.8	3.3	3.3
1990	5.7	4.8	1.2	2.3	4.2	3.0	3.1
1991	13.3	4.3	−0.6	−0.0	2.9	1.4	1.5
1992	2.2	1.1	2.3	−0.3	1.8	1.0	1.1
1993	−1.1	−0.2	3.1	−0.9	−0.1	−0.4	−0.3
1994	2.9	0.6	4.1	2.1	2.7	2.5	2.6
1990/1980	2.2	4.1	2.7	2.1	2.1	2.4	2.4
1994/1990	1.3[b]	1.4	2.2	0.2	1.9	1.1	1.2

Source: WIFO-Databank, using data from OECD, 1994.

[a] Until 1990 West Germany.

[b] 1994/1992.

Different countries' shares in world trade in high-tech sectors

	1977–1979	1988–1990
Area OECD	91.0	82.7
United States	23.8	20.5
Canada	2.2	2.6
Japan	9.6	15.2
EU (12)	48.1	38.5
Germany	16.5	12.4
France	8.7	6.9
United Kingdom	9.9	7.6
Italy	4.1	3.4
Other EU countries	8.2	7.1
Greece, Portugal, Spain	0.7	1.2
EFTA	6.9	3.7
Non-OECD	8.0	15.8
NICS in Asia	3.3	9.7
Other Asian countries	1.0	2.6
NICS in America	0.8	1.2
Former Soviet Union	0.6	0.1
Eastern Europe	0.6	0.3

Source: Guerrieri and Milana (1995).

R&D to GNP

	1991
Austria	1.51
Denmark	1.69
France	2.42
Germany	2.65
Ireland	1.05

Itlay	1.32
Netherlands	1.92
Spain	0.87
Sweden	2.86
United Kingdom	2.13
Norway	1.84
Japan	3.05
USA	2.67
Canada	1.50

Source: WIFO-Databank, using data from OECD and IW, 1994.

Sectoral balance in relation to trade volume^a in the four quadrants (REVELAST 1) 1993

	Successful quality competition	Deficit in price competitiveness	Successful price competition	Structural problem area
USA	6.1	−20.7	5.1	−10.4
Canada	4.8	−13.9	43.0	−22.7
Japan	14.0	−9.3	76.7	−8.9
Germany	26.4	−7.8	7.2	−1.4
France	5.0	−7.4	1.9	−6.7
Italy	18.9	−4.4	29.1	−12.8
United Kingdom	3.3	−15.0	0.9	−13.4
Spain	4.3	−13.4	5.3	−24.6
Netherlands	4.1	−14.3	7.8	−9.5
Sweden	14.4	−6.5	19.3	−15.5
Belgium	20.3	−12.0	11.7	−5.6
Austria	6.8	−21.3	6.0	−15.5
Denmark	24.1	−16.0	5.6	−20.9
Finland	13.0	−21.8	51.1	−18.8
Portugal	5.1	−5.0	27.7	−61.9
Greece	—	−51.3	6.0	−73.3
Ireland	43.8	−18.7	5.3	−8.9
EU	14.4	−10.8	9.6	−10.6
Switzerland	24.0	−29.2	9.5	−28.0
Norway	0.2	−25.5	17.7	−46.8
Turkey	14.2	−33.3	25.9	−92.8

^{a}Trade volume = (exports + imports)/2.

Sectoral balance in relation to trade volume^a in three sectors (REVELAST 2) 1993

	Highly price sensitive industries	Moderately price sensitive industries	Revealed qualitiy sensitive industries
USA	−10.3	−0.2	−9.5
Canada	30.0	−6.6	−12.3
Japan	19.9	29.4	23.8
Germany	−2.5	7.2	19.7

France	−3.9	−2.0	−1.3
Italy	16.2	3.2	11.4
United Kingdom	−6.2	−4.6	−13.4
Spain	−9.6	−14.7	−4.1
Netherlands	−0.7	−4.2	−7.0
Sweden	3.5	−1.2	5.2
Belgium	5.6	1.9	7.2
Austria	−4.1	0.5	−20.4
Denmark	−4.4	0.6	−3.3
Finland	35.1	−0.2	−12.8
Portugal	12.5	−15.2	−31.4
Greece	−5.3	−44.2	−69.1
Ireland	23.4	−4.1	2.1
EU	**0.7**	**−0.4**	**2.2**
Switzerland	−17.9	−6.7	2.9
Norway	3.1	−22.5	−36.4
Turkey	15.5	−30.1	−71.9

[a]Trade volume = (exports + imports)/2.

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

		Negative sign	Positive sign	Difference of positive–negative	Ranking
784	Parts for tractors, motor vehicles	3	11	8	1
687	Tin	5	12	7	2
722	Tractors	4	11	7	2
726	Printing, bookbinding machines	4	11	7	2
745	Other nonelectric machines, tools, Nes	3	10	7	2
553	Perfumery, cosmetics, etc.	5	11	6	6
591	Insecticides, etc.	6	11	5	7
721	Agricicultural machines, excluding tractors	5	10	5	7
725	Paper, pulp mill machines	5	10	5	7
744	Mechanical handling equipment	5	10	5	7
531	Synthetic colors, lakes, etc.	7	11	4	11
582	Plastic plates, sheets, etc.	6	10	4	11
613	Furskins, tanned and dressed	6	10	4	11
711	Steam generators, boilers, etc.	5	9	4	11
781	Passenger motor vehicles, excluding buses	5	9	4	11
655	Knitting, crochet, fabric Nes	7	10	3	16
728	Other machinery parts, specialist industries	6	9	3	16
735	Parts, Nes, for Machine-Tools	6	9	3	16
741	Heating, cooling equipment, parts	5	8	3	16
749	Nonelectrical machine 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	Preprepared additives, liquids	8	10	2	24
653	Fabrics, man-made fibres	8	10	2	24
723	Civil engineering equipment	6	8	2	24

792	Aircraft, associated equipment	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	Essential oil, perfume, flavour	8	9	1	31
562	Fertilizer, except group 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, textiles fabric	7	8	1	32
662	Clay, refrct. construction material	7	8	1	32
675	Flat-rolled, alloy steel	8	9	1	32
733	Machine-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 chemical elements	6	6	0	41
525	Radioactive materials	0	0	0	41
541	Medicines, etc. except group 542	0	0	0	41
542	Medicaments	0	0	0	41
583	Monofilaments 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-medical, X-ray equipment	8	8	0	41
783	Road motor vehicles Nes	7	7	0	41
786	Trailers, semi-trailer, etc.	7	7	0	41
874	Measuring, control instruments	7	7	0	41
885	Watches and clocks	0	0	0	41
896	Works of art, antiques etc.	0	0	0	41
897	Gold, silverware, jewellery Nes	0	0	0	41
635	Wood manufacturers, 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	Internal combustion piston engines	8	7	−1	57
714	Engines, motors nonelectric	8	7	−1	57
724	Textile, leather machines	7	6	−1	57
727	Food-processing machinery nondomestic	8	7	−1	57
772	Electric switches, relay circuits	8	7	−1	57
778	Electrical machine apparatus, Nes	6	5	−1	57
782	Goods, specialist transport vehicles	7	6	−1	57
851	Footware	7	6	−1	57
872	Medical instruments, Nes	8	7	−1	57
892	Printed matter	7	6	−1	57
514	Nitrogen-functioning compounds	9	7	−2	72
581	Plastic tube, pipe, hose	9	7	−2	72
689	Miscellaneous nonferrous base metal	7	5	−2	72
695	Tools	7	5	−2	72
699	Manufacturers of base metal, Nes	7	5	−2	72
716	Rotating electric plants	8	6	−2	72
718	Other power generating machinery	8	6	−2	72
761	Television receivers etc.	8	6	−2	72
898	Musical instruments, etc.	7	5	−2	72

899	Miscellaneous manufactured 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 machinery, Nes	9	6	−3	82
743	Pumps Nes, centrifuges etc.	9	6	−3	82
775	Domestic electrical, nonelectrical equipment	8	5	−3	82
633	Cork manufacturers	10	6	−4	87
654	Other 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 apparatus etc. Nes	9	5	−4	87
883	Cine film exposed and developed	9	5	−4	87
893	Articles, Nes of plastics	10	6	−4	87
895	Office, stationary supplies	9	5	−4	87
573	Polymers, vinyl chloride	10	5	−5	96
592	Starches, insulin, 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, transport	10	5	−5	96
764	Telecommunication equipment parts Nes	9	4	−5	96
791	Railway vehicles equipment	9	4	−5	96
793	Ship, Boat, floating structures	9	4	−5	96
515	Organo-inorganic compounds	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 manufacturers, 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	Other plastic, primary form	11	4	−7	117
656	Tulle, lace, embroidery, etc.	12	5	−7	117
672	Ingot 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, steel bar, shapes etc.	11	4	−7	117
812	Plumbing, sanitary, equipment etc.	11	4	−7	117
882	Photographic and cinematographic suppliers	10	3	−7	117
891	Arms and ammunition	9	2	−7	117
511	Hydrocarbons, Nes, derivatives	10	2	−8	126
512	Alcohol, phenol, etc. derivatives	10	2	−8	126
523	Metallic salts, inorganic 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	Manufacturers of leather etc. Nes	12	4	−8	126
634	Veneers, plywood, etc.	11	3	−8	126
661	Lime, cement, construction 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	Automatic data processing equipment	11	3	−8	126
871	Optical instruments, Nes	11	3	−8	126
516	Other organic chemicals	11	2	−9	140
693	Wire products excluding electrical	12	3	−9	140
759	Parts, for office machines	12	3	−9	140
776	Transistors, valves, etc.	10	1	−9	140
821	Furniture, cushions, etc.	12	3	−9	140
842	Women's, girls' clothing, X-knit	12	3	−9	140
598	Miscellaneous chemical products Nes	12	2	−10	146
652	Cotton fabrics, woven	14	4	−10	146
685	Lead	14	4	−10	146
771	Electric powered machnery parts	12	2	−10	146
773	Electrical distribution equipment Nes	13	3	−10	146
813	Lighting fixtures etc. Nes	13	3	−10	146
841	Men's, boys' clothing, X-knit	13	3	−10	146
846	Clothing accessories, fabric	13	3	−10	146
513	Carboxylic, acids, derivatives	13	2	−11	154
665	Glassware	13	2	−11	154
684	aluminum	13	2	−11	154
696	Cutlery	13	2	−11	154
762	Radio-broadcast receivers	12	1	−11	154
658	Textile articles Nes	13	1	−12	159
831	Trunk, suitcase, bag, etc.	13	1	−12	159
843	Men's, boys' clothing knitted	14	2	−12	159
845	Other textile apparel, Nes	13	1	−12	159
844	Women's, Girls' clothing, knitted	15	1	−14	163
848	Clothing, nontextile; headgear	14	0	−14	163
611	Leather	15	0	−15	165
666	Pottery	16	0 .	−16	166

Negative: net quantities (exports minus imports) and unit values (difference export minus import) have different signs.

Positive: quantities and unit values have the same sign (revealed quality sensitivity).

Ranking: 1 = industry with most positive signs in bilateral flows.

18 countries: EU-members (1992), USA, Canada, Japan, Hungary, Poland, Czech Republic.

Source: Aiginger (1996).

Nes = not elsewhere specified

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