The Structure of International Competitiveness in the Federal Republic of Germany
An Appraisal

Frank D. Weiss

WORLD BANK STAFF WORKING PAPERS
Number 571
A Set of Related
WORLD BANK STAFF WORKING PAPERS

Public Subsidies to Industry
The Case of Sweden and Its Shipbuilding Industry
Number 566

The Political Economy of Protection in Italy
Some Empirical Evidence
Number 567

Bureaucracies and the Political Economy of Protection
Reflections of a Continental European
Number 568

Economics and the Politics of Protection
Some Case Studies of Industries
Number 569

Public Assistance to Industries and Trade Policy in France
Number 570

The Structure of International Competitiveness in the Federal Republic of Germany
An Appraisal
Number 571
The Structure of International Competitiveness in the Federal Republic of Germany
An Appraisal

Frank D. Weiss

The World Bank
Washington, D.C., U.S.A.
ABSTRACT

This report is part of an inquiry undertaken by the World Bank in conjunction with scholars from 12 industrial countries into the penetration of the markets of industrial countries by exports of manufactures from developing countries. The project sought to establish the shares of industrial country markets held by the developing countries, changes in such shares in the 1970s, and why they vary among industry groups and countries. The aim is to assist developing and industrial countries to improve their policies through a better understanding of trade patterns and protectionist pressures.

In the Federal Republic of Germany (West Germany), the 1980s are likely to see a continuation of the trade competition from developing countries and resultant pressures for adjustment. This paper looks at the determinants of West Germany's comparative advantage, using that information in combination with evidence about the evolution of factor endowments and economic policies to assess the likely direction of West Germany's future specialization, particularly with respect to developing countries. Finally, the role of policy in influencing West Germany's specialization and structural adjustment is discussed.

Traditionally, two theories have been used to explain Germany's comparative advantage: neo-factor proportions and neo-technology. Of the two, the neo-factor proportions theory has been the more useful in explaining the patterns of trade with developing countries, and it has confirmed the importance of human capital intensity in determining the pattern of north-south trade.
This study tested the two theories in light of more current data and with somewhat different emphases than have been used in the past. In particular, tests were run to determine if any subgroup of human capital -- specifically craftspeople -- was an important determinant. With respect to the neo-technology approach, two variables were used: innovativeness (R&D) and economies of scale. The tests were run across and within industries.

Several conclusions emerged. Craftspeople in fact carried the burden of explanation, with physical capital becoming insignificant with respect to trade with developing countries. Similarly, innovativeness and scale economies performed less well.

The results also indicated that the developing countries are competitive with West Germany in a far wider range of products than was previously thought. The international division of labor between West Germany and the developing countries is actually quite broad-based.

These findings suggest several probable trends in the future. The faster that income in the developing countries grows, the faster they will become competitive in an even wider range of goods. For its part, West Germany's specialization will lie in human capital (especially craftspeople)- intensive industries or branches of industries. However, West German exports may be more susceptible to downward price pressures in the world markets than previously thought. While innovativeness will also be important, it cannot in itself determine comparative advantage because of a rapid diffusion of innovation through the world economy. The role of this factor cannot, however, be established with any certainty.
A second factor of uncertainty in predicting the future is commercial policy. As competition from below intensifies, so will the demand in West Germany for protection. As such, the government's policy response will be important in determining the nature of West Germany's future international competitiveness. As shown in the cases of agriculture and food in West Germany, commercial policy at the EC and/or national levels can reverse the outcome that would have occurred in the absence of protection. While policy has not had the same effect in other industries, it has definitely influenced the pattern of their resource use.
ACKNOWLEDGEMENTS

The author would like to thank his colleague, Jürgen Horn, for his helpful comments. The views expressed are the author's.
Every blind man who touches a part of the elephant learns some of the truth about it -- but not the whole truth; and only the rare unfortunate is unlucky enough to be caught in generalizing about the elephant from an unrepresentative hand-hold on the tip of its tail.

---

# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I  INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II THE DETERMINANTS OF SPECIALIZATION</td>
<td>5</td>
</tr>
<tr>
<td>III ASPECTS OF WEST GERMANY'S RELATIVE FACTOR ENDOWMENT</td>
<td>12</td>
</tr>
<tr>
<td>IV THE EMPIRICAL EVIDENCE AND TESTS OF TRADE THEORIES</td>
<td>15</td>
</tr>
<tr>
<td>Cross-Industry Analyses</td>
<td>15</td>
</tr>
<tr>
<td>Industry Studies</td>
<td>31</td>
</tr>
<tr>
<td>V  THE INFLUENCE OF COMMERCIAL POLICY</td>
<td>44</td>
</tr>
<tr>
<td>VI A SUMMARY APPRAISAL</td>
<td>50</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>53</td>
</tr>
<tr>
<td>Table</td>
<td>Title</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Share of Imports from Developing Countries in the Apparent Consumption of Manufacturing, Selected Countries, 1970-80</td>
</tr>
<tr>
<td>2</td>
<td>Real GDP Per Capita in West Germany and Selected Countries, 1960-80</td>
</tr>
<tr>
<td>3a</td>
<td>Trade and Industrial Characteristics of West German Manufacturing Industries, ca. 1979 (n=30)</td>
</tr>
<tr>
<td>3b</td>
<td>Trade and Industrial Characteristics of West German Manufacturing Industries, ca. 1979 (n=19)</td>
</tr>
<tr>
<td>4</td>
<td>The Determinants of International Competitiveness of West German Industries, 1979</td>
</tr>
<tr>
<td>5</td>
<td>Determinants of International Competitiveness in West German Engineering Industries, 1974</td>
</tr>
<tr>
<td>6</td>
<td>Effective Rates of Tariff Protection and Domestic Assistance in West Germany</td>
</tr>
</tbody>
</table>
Chapter I
INTRODUCTION

Throughout the decade of the 1970s, the world economy was subjected to repeated shocks, shocks which demanded of the open economies a high degree of structural adaptability. The Federal Republic of Germany (West Germany) was no exception. Because of policy changes in the developing countries initiated even earlier, exports of manufactured goods from those countries began to capture increasing shares of the markets in which West Germany had long been an entrenched supplier, among them clothing, textiles and leather goods. The decade also witnessed the emergence of Japan as a major supplier of goods in which West Germany had held a decisive competitive edge, such as electrical engineering products and, more recently, automobiles. A third factor was the sharp major price increases for energy-related and other raw materials, which placed profound adjustment pressures on industries in West Germany.

These developments in turn contributed to, or at least proceeded concomitantly with, policy changes within West Germany and the EC, changes which tended to hinder the structural adjustments that otherwise would have been induced by the emergence of radically altered supply conditions in the rest of the world. These policy measures, in their turn, were bound to affect adversely the chances of new suppliers, as well as reduce the efficiency of the international division of labor and the gains from trade.
There is no a priori reason to expect the decade of the 1980s to be any different in terms of the degree to which major unexpected changes will occur in the world economy. Hence, further pressure for adjustment will continue to be exerted upon the West German economy, even though the precise details are unknown and unknowable at present. Nevertheless, based on today’s perspective of the impact of potential changes in the world economy and of the foreseeable changes in West Germany’s factor endowment and economic policies, and given the observed and well-tested empirical patterns in the determinants of inter-industrial specialization, some assessment of the likely future course of the country’s specialization in international trade is possible.

There are several compelling reasons for undertaking such an attempt:

- West Germany constitutes a large, growing and still relatively liberal market for the exports of manufactured goods from developing countries (Table 1). Hence, the future course of West German specialization and its determinants is important to the developing countries.

- The changes to be expected in the world economy will in any case profoundly affect West Germany by intensifying the pressure for adjustment there. It is important to realize that the emergence of new sources of supply in the world economy is an ongoing process and that structural adjustment is not a once-and-for-all project, but rather must also remain ongoing.
Table 1: SHARE OF IMPORTS FROM DEVELOPING COUNTRIES IN THE APPARENT CONSUMPTION OF MANUFACTURING, a/ SELECTED COUNTRIES, 1970-80

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany, F.R.</td>
<td>2.3</td>
<td>3.1</td>
<td>4.0</td>
<td>4.2</td>
<td>4.8</td>
<td>8.2</td>
<td>7.3</td>
</tr>
<tr>
<td>EC (9)</td>
<td>2.7</td>
<td>2.9</td>
<td>3.7</td>
<td>4.1</td>
<td>4.6</td>
<td>5.7</td>
<td>7.9</td>
</tr>
<tr>
<td>U.S.</td>
<td>1.3</td>
<td>2.1</td>
<td>2.7</td>
<td>2.8</td>
<td>2.9</td>
<td>8.6</td>
<td>6.4</td>
</tr>
<tr>
<td>Japan</td>
<td>1.3</td>
<td>1.8</td>
<td>1.5</td>
<td>2.3</td>
<td>2.5</td>
<td>5.8</td>
<td>5.0</td>
</tr>
</tbody>
</table>

a/ ISIC 3.
b/ Estimated.
c/ In percent per annum.

Source: World Bank, Market Penetration Project.

One objective of this paper is to bring together evidence on the determinants of West Germany's specialization. This information is then combined with evidence on the evolution of factor endowments and economic policies, following which the likely future course of the country's specialization is assessed. A key focus of the analysis is the continuing, if not continuous, emergence of new sources of supply and adjustment pressures across many branches of industry. At the same time, domestic policy reactions are described and their effect on specialization discussed. Finally, some qualitative predictions particularly relevant to trade with the developing countries and to domestic structural adjustment will be ventured.

Chapter II presents the conceptual framework found most useful in analyzing West Germany's comparative advantage. Chapter III
considers the evidence on factor endowments, while Chapter IV presents empirical evidence for testing comparative advantage, including detailed investigations highlighting the continuous changes in the international division of labor. Chapter IV presents and discusses developments in trade policy and factor endowments and their repercussions on specialization. Finally, Chapter V crystallizes these results and considers the implications for the future.
Chapter II
THE DETERMINANTS OF SPECIALIZATION

The conceptual frameworks which have been most fruitful in analyzing West Germany's comparative advantage are the groups of hypotheses which emerged in international trade theory in the wake of Leontief's empirical refutation of the until-then prevalent theory of comparative costs framed in terms of homogeneous labor and homogeneous capital. These sets of hypotheses constitute the neo-factor proportions account for the commodity composition of international trade. Still competing with these is a looser body of theory, the neo-technology account of international trade structure.

The neo-factor proportions hypothesis focuses on international differences in relative endowments of, and inter-industry differences in, the intensity of human capital, with the total of the knowledge, experience and ability embodied in that human capital being treated as an investment good yielding a return. This wider definition of capital was developed by Schultz and Becker and was applied to international trade by Kenen.

---


It was soon recognized that human and physical capital did not need to be either perfect substitutes or perfect complements, but rather needed to be recognized as separate factors of production. While the operational measurement of the stock of human capital employed in each industry was addressed from the returns side in the form of wage differentials among skills that reflected returns on investment in human capital, Keesing suggested focusing directly on the skill differentials.

Both measurement concepts have proven equally successful in explaining the commodity composition of trade in various countries. Nor has the focus on human capital or skills been to the exclusion of other factors which could be readily identified beyond physical capital, particularly raw materials.

When attempting to explain changes in trade structure over time, rather than the determinants of trade structure at a point in time, it has proven both fruitful and convenient to approach the problem from the cost side rather than the factor intensity side. Divergences


in the different evolution of unit labor costs among industries go far in explaining shifts in competitiveness. This approach, very much in the spirit of Ricardo,\textsuperscript{1} derives its justification -- and explanatory power -- not so much from the \textit{a priori} relevance of a labor theory of value per se, but from two other sources. One is that it is an empirical phenomenon that the cost of labor is a very large share of the total cost in manufacturing industries in developed country locations. Second, relative factor intensities have to differ quite radically among industries to make the marginal rate of transformation of the output of one industry into another deviate much from approximate constancy.\textsuperscript{2} Apparently, factor intensities among \textit{manufacturing} industries do not differ sufficiently to obviate the usefulness of a pure labor cost approach.

A distinctly different approach to explaining the inter-industry structure of trade which also emerged in the wake of Leontief's results focuses on more particular aspects or characteristics of goods and production processes than those subsumable into simple production functions. This method of analysis is centered around the newness of a good or its stage in a product cycle and the capability of a country to innovate. It was begun by Posner\textsuperscript{3} and conforms to the spirit of the

\begin{itemize}
\item \textsuperscript{1} D. Ricardo, \textit{The Principles of Political Economy and Taxation}, London: J. M. Dent, 1911.
\end{itemize}
writings of Schumpeter. In addition, other features were recognized as crucial in determining trade structure, such as dynamic economies of scale (learning-by-doing) or international differences in tastes.

Voluminous empirical tests of the various hypotheses have been conducted for a substantial number of countries, including explicitly comparative tests for the United States and West Germany.


