I INTRODUCTION

In this note estimates are given for the importance of quality as an explanation of the comparative productivity shortfall of Northern Ireland (NI) firms relative to their West German counterparts and the method of estimation is outlined. As highlighted by our ongoing research programme of international matched comparisons of company performance and productivity, this is an aspect which has not been emphasised sufficiently in the literature nor have attempts been made to measure its importance.

The contribution of product quality is therefore examined in the context of the literature on international productivity differences and its importance is discussed as indicated by our own research relative to the Republic of Ireland (ROI) and NI (where quality deficiencies may be especially important). A method of measurement is outlined which we employed when undertaking matched plant comparisons between NI and West Germany, the former having comparable industrial difficulties to the ROI.
II WHY PRODUCT QUALITY MATTERS

Comparative productivity performance is one key determinant of competitive performance and in this article we emphasise that product quality is an important component of productivity and should be separated from physical productivity performance (i.e., the volume of units produced per head) because this has important theoretical and policy implications. This is because the causes of the physical productivity shortfall, e.g., overmanning (Pratten and Atkinson, 1976) strikes and disruptive industrial relations (Prais, 1981) and a lack of economies of scale (Pratten, 1976), are likely to be different from those of quality differences.

In the latter case typically the size and productivity of R and D inputs are important. In the West German case continuous and adaptive innovations in product and process innovation have underpinned quality improvements (Hitchens, Wagner and Birnie, 1991) and such innovation has been dependent on the commitment of an appropriately qualified management (Lawrence, 1980) and a labour force which displayed flexibility through the possession of high levels of technical skills (Prais, 1981, 1989; Daly, Hitchens and Wagner, 1985; Steedman and Wagner, 1987, 1989).

In addition product quality is one of the main characteristics of non-price competitiveness, the latter being of increasing importance as an explanation of corporate growth and international trade patterns.

III REVIEW OF THE LITERATURE ON INTERNATIONAL COMPARATIVE PRODUCTIVITY PERFORMANCE AND PRODUCT QUALITY

Given these reasons why product quality is of interest, comparisons of productivity performance with countries achieving high levels of manufacturing performance (e.g., West Germany, USA and Japan) provide a general background to considerations of the importance of product quality. These studies of productivity levels have been of two kinds: statistical comparisons which generally ignore the issue of product quality, and matched plant comparisons which highlight quality differences without quantifying them.

Statistical comparisons of manufacturing productivity between Britain and West Germany (Rostas, 1948; Paige and Bombach, 1958; Jones, 1976; Smith, Hitchens and Davies, 1982; O'Mahoney, 1992) implicitly assume that comparisons are being made between identical products manufactured in the two countries. The methods adopted in these studies, where they are based on average value ratios derived from census of production estimates, bias the comparative productivity gaps if product quality differs. Specifically where product quality is higher in West Germany the gap is underestimated. This
has more recently been explicitly recognised (Hitchens, Wagner and Birnie, 1990; Van Ark, 1990).

The matched plant comparisons usually note West Germany's product quality superiority over that of Britain, without attempting to measure it (Daly, Hitchens and Wagner, 1985; Steedman and Wagner, 1987; Steedman and Wagner, 1989; Hitchens, Wagner and Birnie, 1991). In addition export unit values and changes in the pattern of international trade indicate these differences (Kravis and Lipsey, 1971) as do levels of commitment to product and process innovation (Patel and Pavitt, 1987) and the historical records of various industrial sectors (Rothwell, 1982; Parkinson, 1984).

IV PRODUCT QUALITY: THE IRISH CONTEXT

The need to distinguish the contribution of quality to productivity performance may be even more urgent to industrial policy in NI and the ROI where a shortfall in quality competitiveness has been recognised relative even to Great Britain (Hitchens and O'Farrell, 1987, 1988a, 1988b; O'Farrell and Hitchens, 1988, 1989). This is further supported by the lower level of value added achieved by indigenous manufacturing in both parts of Ireland relative to Great Britain (Hitchens and Birnie, 1992), and poor competitiveness as evidenced by a disappointing employment performance (O'Malley, 1989).

It is in the context of changes to industrial policy in NI and the ROI that the contribution of quality to competitiveness should be highlighted (Hitchens and Birnie, 1992). The major shift in industrial policy in both the ROI and NI during the last ten years has been towards a greater emphasis on selectivity in place of generalised state subsidisation geared to simple job creation targets.

Telesis (1982) gave priority to the identification and promotion of indigenous firms in the ROI which would be competitive within international markets and since the mid-1980s the IDA has been attempting to operationalise these aims (Programme for National Recovery, 1987; Programme for Economic and Social Progress, 1991). The recent Culliton Report (1992) has given further impetus to such an approach to industrial development. Similarly, the IDB has now been charged with facilitating the market competitiveness of individual private sector companies in NI (Department of Economic Development, 1990). The pre-Telesis (1982), pre-Department of Economic Development (1990) policies, North and South, were heavily criticised on grounds of cost and efficacy (Lee, 1990; NI Economic Council, 1991) but the success of the new policies will depend critically on the ability of the development agencies to establish information systems which can measure and monitor the performance of companies.
As the recent policy review documents show, Irish policy makers, both North and South, are becoming aware of the importance of product quality. Hence indicators of comparative product quality performance and the sources of differences in quality performance are needed to test the success and cost effectiveness of their initiatives. This is especially important since the thrust of industrial policy in post-war Ireland was directed towards improving physical productivity (e.g., through capital grants and re-equipment subsidies) with consideration of product quality being comparatively neglected.

V SEPARATING QUALITY FROM PHYSICAL PRODUCTIVITY IN NORTHERN IRELAND

In Hitchens, Wagner and Birnie (1990), an attempt was made to separate the contributions of product quality and physical productivity to the comparative productivity shortfall when making a comparison of 39 matched plants between NI and West Germany in 1987/88. Estimates of physical productivity differences were made during visits to matched companies (e.g., dozens of garments, thousands of screws etc.). In addition data were collected on gross output and value added achieved in production with a view to providing measurement and explanation of productivity differences. Here we discuss more fully the method used and the relevance of the results for industrial policy North and South.

The relative price level of the West German product is equal to the ratio of West German gross output to NI gross output divided by the ratio of West German physical output to NI physical output. This conclusion is trivial but if the assumption is made that the market exchange rate maintains purchasing power parity for goods of homogenous quality then any difference between the West German relative price level as calculated from the firm data from that implied by the market exchange rate is suggestive of the fact that the products are not of the same quality.¹

(There are other factors such as monopoly power which enable a firm to raise product prices, and further research is required to investigate how these

¹. This matter is important given that there is a degree of variability relating to the measured productivity gap recorded by the various studies. Smith, Hitchens and Davies (1982) estimate a German productivity advantage of 35 per cent relative to the UK in 1968 which they updated (using indices of output and employment) to 35 per cent in 1970 and 52 per cent in 1977. The recorded productivity gap using the method of unit values are much smaller than that which emerges when comparison is made with studies based on purchasing power parities (PPPs). Jones (1976) estimates a German productivity advantage of 55 per cent in 1970. Comparisons of unit value ratios, being closer to comparisons of factory gate prices, are to be preferred on technical grounds (the PPPs include differential retail and wholesale margins, transport costs and indirect taxes) even though they may underestimate the quality related value added advantage (Hitchens, Wagner and Birnie, 1990).
differ at the international level (Davies and Caves, 1987), but improvements in product quality are likely to be the major reason why some firms can raise their prices and hence value added relative to competitors.)

The excess of value added per head at the West German firm over that of the NI company after allowing for the physical productivity difference is a measure of the relative importance of quality (and other factors) to productivity. Although the method is unsophisticated it was derived from a detailed and time consuming set of managerial interviews and is (as far as the authors are aware) the first attempt which has been made to separate out the responsibility for the international productivity gap between physical productivity and other factors inclusive of quality. Table 1 shows that on average three-fifths of the value added gap is attributable to physical productivity differences and two-fifths to other factors inclusive of quality. Alongside the figures is shown the proportion of products matched which were agreed by managing directors at the matched plants to be superior in the West German case.

Table 1: Importance of Differences in Product Quality in West German/NI Comparisons 1987/88

<table>
<thead>
<tr>
<th>Percentage of Cases where W. German Quality Greater*</th>
<th>Per Cent of W. German Productivity Advantage Attributable to —*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Physical Productivity</td>
<td>(2) Other Factors</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Engineering</td>
<td>50</td>
</tr>
<tr>
<td>Food, Drink, etc.</td>
<td>0</td>
</tr>
<tr>
<td>Textiles</td>
<td>50</td>
</tr>
<tr>
<td>Clothing</td>
<td>57</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>60</td>
</tr>
<tr>
<td>Total Cases</td>
<td>48</td>
</tr>
</tbody>
</table>

Note: *The partition of the value-added gap between quality and physical productivity is based upon a total of 22 matched pairs where it was possible to compare both value-added and physical productivity.

+In only 7 per cent of cases did NI companies enjoy a product quality superiority.

Total number of matched comparisons: engineering 10, food 5, textiles 6, clothing 16, miscellaneous 5, and total manufacturing 42.

While there are data difficulties, measurement errors and problems in principle in choosing appropriate exchange rates and of attributing the residual of the calculation above to product quality, the method raises an issue the importance of which suggests the requirement for further research.

Furthermore, a matched comparison of post-unification East German firms with their western counterparts, undertaken by the authors, has indicated a similar policy problem (Hitchens, Wagner and Birnie, 1992). A physical productivity difference of 59 per cent was measured but when account is taken of prices achieved given the poorer quality products manufactured by firms in East Germany (in this single German market), comparative value added per head (assuming the East German plants were to achieve capacity utilisation comparable with that of West German counterparts) falls to 46 per cent of the West German level. With actual capacity utilisation levels the value added per head of the East German plants was only 33 per cent of that of their counterparts in West Germany. The policy instruments required to raise East German manufacturing productivity to West German levels (the progress towards wage parity makes this a critical policy goal) will vary according to whether physical productivity of product quality is to be improved. Physical productivity growth might be attained through reduction of overmanning, and this has already been substantially achieved through the rationalisation programmes imposed by the Treuhand agency. On the other hand, upgraded product quality might require more fundamental adjustment to the types of inputs used such as the application of West German management.

VI CONCLUSIONS

Product quality derives its importance as a variable which policy makers can use to "nudge" firms towards greater competitiveness. Studies of international trade indicate that non-price factors are now at least as significant determinants of market share as price competitiveness and West Germany's competitive edge has been found to lie with such non-price factors (Kravis and Lipsey, 1971; Rothwell, 1982; Parkinson, 1984; Porter, 1990).

From the perspective of the business manager the benefit of higher product quality is that it is a means by which higher prices can be charged. Indeed a review of the evidence of matched plant studies suggests that one of the principal benefits of West German quality standards was to maintain relatively high prices (which in turn allowed high labour costs to be supported).

More needs to be known as to the reasons why managers in Britain, NI and the ROI do not respond to this price signal and attempt to make and sell products similar to current West German ones at the (higher) German price levels (thereby gaining enhanced profits). Part of the answer may be that
managers in Britain, NI and the ROI perceive that their investment and training costs would increase to achieve the better quality and no addition to profits would occur (such attributes were evidenced by a group of NI managers during a set of managerial exchange visits with West Germany; Hitchens, Wagner and Birnie, 1991). Alternative explanations of the behaviour of NI and ROI managers include: myopia, a short-termist bias induced by the structure of the capital market, or the difficulties facing individual firms attempting to break out of any low level equilibrium trap which the economy as a whole may be stuck in — i.e., low skills, low productivity and low wages. All of these require more research.

In this note we have brought together a number of studies of comparative productivity performance and considered the particular importance of product quality and especially of its measurement. Most studies note that higher value added per head is correlated with improved quality of products but they have not attempted to measure the importance of this explanation of comparative productivity performance. Measurement is important because the policy implications arising from poor quality (e.g., innovations policy and special training) differ from those of poor physical productivity (e.g., upgrading of physical capital). More research is required to refine measurement techniques so that sources of differences in quality can be identified and the effectiveness of policies aimed at improving quality performance can be monitored.

REFERENCES


Manufacturing Industry", Department of Employment Gazette, No. 84, pp. 571-576.


