TRADE POLICY AND PRODUCTIVITY GAINS IN DEVELOPING COUNTRIES
A Survey of the Literature

Oli Havrylyshyn

Despite the widely accepted view that liberal, outward-oriented trade policies are superior to restrictive, inward-oriented policies, doubts about liberalization remain strong in many circles. One reason for such doubt is the dearth of research quantifying the large gains that liberal trade policies are said to generate. The survey of the literature undertaken for this article was a review of the evidence on the link between trade policy and efficiency, or productivity, gains in developing countries. Does the literature support the view that more open trade policies bring greater efficiency? Several inferences are drawn from the literature on sources of growth—particularly with regard to increases in capacity utilization and economies of scale. The article also examines evidence from the few studies that explicitly try to correlate efficiency gains directly with trade policy. These studies fall into three categories: those that evaluate the effect of trade policy on market power or degree of competition; those that measure total factor productivity or technical efficiency gains and correlate these with the degree of protection; and those that estimate the aggregate effects of changes in trade policy on welfare (mainly with computable general equilibrium models, which measure dynamic efficiency gains from trade). In a final section, the article pulls together the findings from the indirect and direct evidence as a basis for suggesting a number of hypotheses on the link between efficiency and trade policy. One conclusion is that country-specific analysis over time appears to be superior to cross-country comparisons.
The venerable and now widely accepted view that liberal, outward-oriented trade policies are superior to restrictive, inward-oriented ones is supported by a few empirical studies that estimate the so-called static gains from trade (for instance, Johnson 1960 for the United Kingdom, Magee 1972 for the United States). More recent practical and applied work on the trade policies of developing countries—a voluminous literature highlighted by a series of country studies supported by the Organisation for Economic Co-operation and Development, the World Bank, the National Bureau of Economic Research (NBER), and the Kiel Institute—tends to point in the same direction.

But doubts about liberalization remain strong in many circles. Advocates of protection for domestic infant industries in developing countries abounded at the meeting of leaders of developing countries in Malaysia in May 1986. Academics also express misgivings about the advantages of liberal policies. Diaz-Alejandro and Helleiner (1982) and Taylor (1981), for example, argue that stabilization programs with conditions set by the International Monetary Fund or the World Bank (including programs for liberalization) will not resolve the problems of developing countries.

Political and ideological views are responsible for some of the skepticism: in cases in which these matter, research studies alone can—or should—have little effect. And many who may agree that the long-run advantages outweigh the costs of liberalization oppose it for the pragmatic reason that the short-term costs of adjustment may be too high to sustain politically. The World Bank’s study of the timing and sequencing of liberalization addresses this question (Papageorgiou, Michaely, and Choksi forthcoming).

Some of the opposition is semantic in origin: most advocates of liberalization are calling not for free trade—certainly not immediately—but for a more outward-oriented policy that includes eliminating antiexport biases, lowering very high import tariffs to reduce their variation as well as the average, and moving to make the costs of protection more transparent by lessening reliance on quantitative restrictions and switching to tariff-related measures. Often, however, the term “liberal” is mistakenly equated with free trade. In this article “liberal” signifies outward-oriented in the sense described.

Yet another reason for doubts is that past research—however thorough and academically solid in other respects—has not adequately quantified the large gains that liberal policies are said to generate. The handful of estimates of such gains in the older literature on trade shows very low values of 1 percent or less of gross national product. It was generally thought that these underestimated the benefits of free trade because the methodology measured only the effect of allocating resources to sectors in which there was already a comparative advantage, a policy that yielded so-called static gains. Much greater benefits are likely from improvements in productivity in all sectors over time, which yield so-called dynamic efficiency gains. Since the latter are more difficult to measure, the literature on trade policies of developing countries generally did not
attempt precise estimates of gains. The purpose of this survey is to review the
evidence on the link between trade policies and efficiency or productivity gains
in developing countries and ask, Does the literature support the view that more
open trade policies bring greater efficiency? (See Pack 1987, which addresses a
similar question.)

The number of studies that explicitly analyze the effect of trade policy on
efficiency is still quite limited, but several inferences may be drawn from the
literature on sources of growth. The next section, therefore, will review studies
on total factor productivity (the term is defined there), with an emphasis on
developing countries, and examine the conclusions about trade policy that can
be drawn from them. The evidence from studies that attempt to correlate ef-
ficiency gains directly with trade policy is then examined with reference to
three methodologies: those that evaluate the effect of trade policy on market
power or degree of competition; those that measure total factor productivity
or technical efficiency gains and correlate these with the degree of protection;
and those that estimate aggregate effects of trade policy changes on welfare.
The final section pulls together the findings from the indirect and direct evi-
dence as a basis for suggesting a number of hypotheses on the link between
efficiency and trade policy.

The Indirect Evidence

Gross domestic product (GDP) grows either because of increases in factor in-
puts such as capital, labor (unskilled and skilled), land, and natural resources
or because of improved productivity, including the long-run effects of technol-
ogical progress, shorter-term efficiency gains attributable to better resource al-
location, and greater firm-level efficiency brought about by competition.
Robert Solow (1957) pioneered the empirical application of the analysis of
sources of growth with a simple but powerful methodology: using shares of
factors in national income (wages, payments to capital) as weights applied to
growth in factor inputs, he isolated the portion of GDP growth attributable to
increases in factor inputs. The unexplained portion of output growth, or the
residual, was initially identified with technological progress. Edward Denison
(1967) modified and extended this methodology, in particular by adding factors
besides technological progress to explain the residual. Later analysts developed
more elaborate econometric approaches, but the spirit of the dichotomy Solow
identified has remained, with the residual being interpreted more cautiously
and broadly as reflecting all other possible sources of productivity or efficiency
gains. The share of output growth explained by increases in productivity rather
than by the growth of factor inputs is commonly referred to as total factor
productivity (TFP).
Numerous estimates for industrial countries have isolated the contributions to growth made by factor inputs and improved productivity. Three broad conclusions are relevant to developing countries. First, the share of output growth explained by productivity gains is generally higher in industrial than in developing countries, where growth of capital stock often (but not always) is the most important factor (Nadiri 1972 and Chenery and others 1986; the authors of both of these works suggest similar magnitudes: TFP accounts for about half of growth in industrial countries and about a third in developing countries, whereas capital expansion accounts for about 35 percent and 40 percent respectively). Second, variations in output growth across countries and over time arise mostly from variations in factor input growth rather than in productivity gains (Christensen and others 1980). Third, the problem of comparability must be kept in mind (see Kravis 1976): most studies have differences in periods, sectoral coverage, and even method.

Some immediate implications follow for any analysis of the link between trade policy and productivity. First, Kravis's concern is well taken: as will be evident from the following review of studies of developing countries, anyone who attempts an empirical analysis of the link must redo any estimates of efficiency gains and not rely on previous, disparate studies. Second, the conclusion of Christensen and others needs verification for developing countries, since it may suggest that differences in trade policy across countries or over time are not as important in explaining growth as are differences in growth of factor inputs. But growth of factor inputs (and capacity utilization in particular) may itself depend on trade policy. Thus great care must be taken to recognize that the effects of such policies on efficiency are both direct (increased competition, increased efficiency, reduced rent-seeking—that is, lobbying) and indirect, expressed through factor inputs (increased capacity utilization, increased investment embodying new technology, increased acquisition of skills).

Table 1 lists thirteen of the many existing studies of sources of growth in developing countries and summarizes their main conclusions. With only four exceptions (Bruton 1967, Harrison 1989, Kim and Park 1985, and World Bank 1987), the studies make only passing reference to the possible effects of trade policy; in general, they simply follow the model of such analyses for industrial countries and pay no attention to trade policy. In fact, until recent attempts to explain declines in factor productivity in the 1970s, even detailed studies of industrial countries made little attempt to explain changes in productivity. They decomposed output growth into factor growth and productivity growth, slowly chipping away at Solow's residual by further decomposing it into effects of education, age of capital stock, shifts of labor from agriculture to industry, and so on.

Most of the studies in table 1 came after Nadiri's (1972) survey, and most confirm his general conclusion that factor inputs are more important in
<table>
<thead>
<tr>
<th>Country group and study</th>
<th>Country or area</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial countries</strong></td>
<td></td>
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<tr>
<td>Christensen, Cummings, and Jorgenson (1980)</td>
<td>Several</td>
<td>Variation in output growth largely because of increases in factor inputs, not in productivity.</td>
</tr>
<tr>
<td>Kravis (1976)</td>
<td>Several</td>
<td>Striking lack of comparability of studies.</td>
</tr>
<tr>
<td>Nadiri (1972)</td>
<td>Several</td>
<td>TFP = 45–55 percent for industrial countries, 30–35 percent for developing.</td>
</tr>
<tr>
<td><strong>Developing countries</strong></td>
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<tr>
<td>Bruton (1967)</td>
<td>Latin America</td>
<td>TFP = 28 percent; TFP = 0 if capacity utilization considered separately.</td>
</tr>
<tr>
<td>Chen (1977)</td>
<td>East Asia</td>
<td>TFP = 53 percent; declines over time in most cases.</td>
</tr>
<tr>
<td>Correa (1970)</td>
<td>Latin America</td>
<td>TFP = 33 percent; labor contribution very high.</td>
</tr>
<tr>
<td>Elias (1978)</td>
<td>Latin America</td>
<td>TFP = 30 percent; capital contribution high; trend down.</td>
</tr>
<tr>
<td>Gaathon (1971)</td>
<td>Israel</td>
<td>TFP = 30–35 percent; no change over period.</td>
</tr>
<tr>
<td>Kim and Park (1985)</td>
<td>Republic of Korea</td>
<td>Low TFP, especially in 1970s; labor most important; scale very important; positive effect of trade regime.</td>
</tr>
<tr>
<td>Kuo (1983)</td>
<td>Taiwan</td>
<td>TFP = 40–60 percent; declines sharply in 1970s.</td>
</tr>
<tr>
<td>McCarthy, Hanson, and Kwon (forthcoming)</td>
<td>Colombia</td>
<td>TFP = 15–30 percent; highest in more open periods.</td>
</tr>
<tr>
<td>World Bank (1987)</td>
<td>12 countries</td>
<td>TFP by country group (from least to most outward-oriented) = 22.7 percent; 37.5 percent; 37.4 percent; 29.8 percent.</td>
</tr>
</tbody>
</table>

TFP = share of total factor productivity in output growth.
developing countries than in industrial countries. One reason for this may be that whereas the long-term rate of technological progress is the same for all countries, relatively low capital-labor ratios in developing countries leave ample opportunity for catching up on growth in capital. Exceptions to these findings are found in Kuo's (1983) results for Taiwan and in Chen (1977) for all East Asia. Table 2 shows that the share of the residual in the growth of GDP is clearly much higher for East Asian economies than the 30 to 35 percent for other countries. De Melo (1985) associates this with the export-oriented policies implemented by these economies since 1960. Easy conclusions, however, are unwarranted. Note that the residual was also high before 1960, and since 1970 the residuals for the Republic of Korea, Singapore, and Taiwan have fallen markedly.

Several other conclusions of indirect relevance to the subject of trade policy emerge from these studies: among them, that capacity utilization and economies of scale matter. Bruton (1967) points out that increases in capacity utili-

<table>
<thead>
<tr>
<th>Economy</th>
<th>Source</th>
<th>Period</th>
<th>Annual growth rate of output</th>
<th>Share of TFP in output growth</th>
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<tbody>
<tr>
<td>Hong Kong</td>
<td>Chen</td>
<td>1955–60</td>
<td>2.5</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1960–66</td>
<td>4.3</td>
<td>40.0</td>
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<tr>
<td></td>
<td></td>
<td>1966–70</td>
<td>4.3</td>
<td>62.0</td>
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<tr>
<td>Japan</td>
<td>Chen</td>
<td>1955–60</td>
<td>5.5</td>
<td>60.0</td>
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<tr>
<td></td>
<td></td>
<td>1960–66</td>
<td>4.0</td>
<td>45.0</td>
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<td></td>
<td></td>
<td>1966–70</td>
<td>7.4</td>
<td>62.0</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>Chen</td>
<td>1955–60</td>
<td>2.0</td>
<td>47.4</td>
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<td></td>
<td></td>
<td>1960–66</td>
<td>4.1</td>
<td>59.3</td>
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<td></td>
<td></td>
<td>1966–70</td>
<td>5.1</td>
<td>50.1</td>
</tr>
<tr>
<td></td>
<td>Kim and Park</td>
<td>1963–72</td>
<td>4.8</td>
<td>52.0</td>
</tr>
<tr>
<td>Singapore</td>
<td>Chen</td>
<td>1955–60</td>
<td>3.7</td>
<td>69.0</td>
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<tr>
<td></td>
<td></td>
<td>1966–70</td>
<td>5.1</td>
<td>44.0</td>
</tr>
<tr>
<td></td>
<td>Tsao</td>
<td>1971–79</td>
<td>1.1</td>
<td>9.0</td>
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<tr>
<td>Taiwan</td>
<td>Chen</td>
<td>1955–60</td>
<td>3.1</td>
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<td></td>
<td>1960–66</td>
<td>6.0</td>
<td>55.0</td>
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<td></td>
<td></td>
<td>1966–70</td>
<td>1.8</td>
<td>23.0</td>
</tr>
<tr>
<td></td>
<td>Kuo</td>
<td>1952–61</td>
<td>6.5</td>
<td>42.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1961–71</td>
<td>6.4</td>
<td>20.0</td>
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<tr>
<td></td>
<td></td>
<td>1971–80</td>
<td>1.1</td>
<td>7.0</td>
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</table>

TFP = total factor productivity.  
Sources: Chen (1977), Kim and Park (1983), Kuo (1983), and Tsao (1985).  

zation probably account for much of the calculated residual. The decline in residuals in several East Asian economies (table 2) and to a lesser extent in some Latin American economies (Bruton 1967, Elias 1978) is related by Kim and Park (1985) to early gains from economies of scale.

The studies disagree on whether the contributions of capital or of labor are more important to growth. Thus for Latin America Correa concludes that labor's contribution is very high; Elias finds that capital's contribution dominates. For Korea, Kim and Park state that labor was most important; Chen disagrees. Perhaps more worrisome is the dissimilarity of the absolute values in the Bruton and Elias estimates for similar periods. As an example, the growth rates of output and the shares of the residual for Argentina are shown in table 3. The wide differences in the output growth rate and share of the residual, and even the inconsistency in the direction of change from one period to the next, are also found for other countries and periods of the studies. The confusion is compounded by the still different values found in Correa. The difficulties of comparison necessarily qualify the inferences on trade policy discussed next and transfer correspondingly greater weight to studies that directly link trade policy and productivity gains (reviewed later).

Inferences on Trade Policy and Productivity

Most studies of sources of growth or productivity make no reference to trade policy; those that do generally support the hypothesis of a positive relation between degree of openness and efficiency gains. The conclusions are generally weak, however, and based as much on qualitative as quantitative evidence.

Some are studies of particular sectors in specific countries. Clague (1970) compares relative labor productivity (not TFP) of U.S. and Peruvian industries, relating this to capital-labor ratios, age of capital, skills, and extent of protection of the industry. Though levels of protection are not analyzed statistically,
Clague nonetheless concludes that one can "observe a loose positive relationship between relative competitiveness and relative efficiency" (p. 204). Pack (1984) similarly compares labor productivity growth for Israeli and Philippine industries with U.S. counterparts. Although again no explicit measure of protection is analyzed, he concludes that protection permits lower domestic scale and explains many of the differences in efficiency.

Country studies over time also support the hypothesis. Kim and Park (1985) for Korea find a high residual (52 percent of growth) for 1963–72 and attribute this to "the opening up of the Korean economy to semi-free trade... [which] generated efficiency gains" (p. 173). The decline of this residual to 20 percent during 1972–82 confirms their conclusion, because "Korea again emphasized import substitution of intermediate and capital goods during the seventies." But they add another explanation—"the initial positive momentum from opening up was largely spent by the early seventies"—prompting the intriguing inference that improvements in efficiency may be only transitory.

But the variation in the productivity residual is also affected by some combination of macroeconomic policies and external demand. In Colombia, for example, the highest residual comes in the more open period of 1967–74 (McCarthy and others, forthcoming); liberalization measures seen in the preceding period were merely "a series of ill-fated stabilization packages." The share of the residual in GDP growth in 1963–67 was 14 percent. In 1967–74 liberalization was more substantial, trade-to-GDP ratios rose markedly, and the residual was measured at 37 percent of growth. After 1974, looser domestic policies, weakening markets for exports, and eventually some retrenchment in liberalization followed, and the residual declined sharply.

Calculations of the share of TFP in output growth in Latin America indicate a distinctly downward trend over time (table 4), with the exception of Colombia. The data for Colombia are consistent with calculations of McCarthy and others (1987), who inferred from these a positive relation between more liberal trade and productivity. But the long-term decline in TFP values for Latin America does not support that hypothesis. If there were a positive link between outward orientation and productivity, TFP would be expected to have risen from about 1960 to 1965, when Latin American countries implemented at least some correction of the strong import-substitution policies prevalent from 1940. Nevertheless, country-by-country consideration suggests some evidence of positive effects.

Brazil's residual hit a low point in 1960–65, when the economy's inward orientation was probably strongest, then rose sharply in the period 1966–74, a time of export orientation. The decline for Venezuela strongly suggests a positive link with outward orientation; Venezuelan policy ran counter to the Latin American trend, becoming less liberal and more protectionist over time. The case of Chile is ambiguous; it was least open and liberal in the period 1960–73 and more open before and after. The residuals for Chile are somewhat lower in
Table 4. Shares of TFP in Output Growth for Latin America, 1940–75

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<td><strong>Argentina</strong></td>
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</tr>
<tr>
<td>Elias</td>
<td>0.76</td>
<td>0.42</td>
<td>0.28</td>
<td>0.35</td>
<td>0.43</td>
<td>0.20</td>
<td>0.23</td>
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<td>0.55</td>
<td>0.12</td>
<td>—</td>
<td>-0.35</td>
<td>-0.50</td>
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<tr>
<td><strong>Brazil</strong></td>
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<td>—</td>
<td>—</td>
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<td>0.51</td>
<td>0.05</td>
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<td>—</td>
<td>0.30</td>
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<tr>
<td><strong>Chile</strong></td>
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<td>Elias</td>
<td>0.81</td>
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<td>0.36</td>
<td>—</td>
<td>0.03</td>
<td>0.23</td>
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<td>—</td>
<td>0.10</td>
<td>0.33</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Mexico</strong></td>
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<tr>
<td>Elias</td>
<td>0.87</td>
<td>0.49</td>
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<td>0.26</td>
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<tr>
<td>Bruton</td>
<td>0.74</td>
<td>0.24</td>
<td>—</td>
<td>0.35</td>
<td>0.45</td>
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<tr>
<td><strong>Peru</strong></td>
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<tr>
<td>Elias</td>
<td>0.69</td>
<td>-1.60</td>
<td>-0.20</td>
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<td>Bruton</td>
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<tr>
<td><strong>Venezuela</strong></td>
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<td>Elias</td>
<td>—</td>
<td>—</td>
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<td>0.37</td>
<td>0.52</td>
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<td>-0.21</td>
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<td>—</td>
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</tr>
</tbody>
</table>

--- = not covered in study.

Sources: Elias (1978), Bruton (1967).
this period than in the preceding years. Comparisons of countries also lend
some support, again ambiguous, to the hypothesis.

World Bank 1987 relates data on sources of growth from Chenery and oth-
ers (1986) to the degree of outward orientation of twelve countries as given in
Greenaway (1986). Although the least outward-oriented group does show the
lowest contribution of TFP to GDP growth (22.7 percent), the most outward-
oriented group had a TFP share only slightly higher than this and lower than
the values for countries with intermediate degrees of liberality (table 1). But if
Singapore, with its negative TFP, is excluded, the other two most outward-
oriented economies (Hong Kong and Korea) show by far the highest values of
TFP (42.3 percent and 47.0 percent).

Though other studies of productivity make no reference to trade policy—in
fact, most of them do little beyond measuring sources of growth—some informal
inferences can be drawn from them. There is a much higher residual for
East Asian economies (50 percent or more) than for Latin American ones (25
to 30 percent, as table 1 shows). East Asia's relatively more outward-oriented
trade policies may be the explanation, as both Chen (1977) and de Melo (1985)
suggest. The conclusion is more ambiguous, however, if one considers the ten-
dencies found by Ch (and others) for each country over time (table 2). In
Singapore and Taiwan the residual distinctly declines over time, suggesting a
negative relation with trade liberality. For Korea, the residual was already very
high in the period of import substitution (up until 1960), rose only slightly in
1960-66 with outward orientation, but then fell in 1966-70, when selective pro-
tection of heavy industry occurred. Chen's calculations for Korea show a more
ambiguous link between trade policy and productivity than is found by Kim
and Park (1985). But a strong suggestion of a positive link is seen in the resid-
ual for Hong Kong, which rises sharply and consistently over time.

Chenery (1983) supplies a broader comparison, grouping countries into
three categories: (1) Western Europe and North America, with very high TFP
growth relative to factor input growth; (2) semi-industrial countries in East
Asia, plus Israel and Spain, with very high growth of factors and productivity;
and (3) middle-income developing countries with high factor input but low
productivity growth. The second group comprises more outward-oriented
countries and the third more inward-oriented countries, so the implication is
clear: more open regimes encourage productivity gains.

The evidence from studies of TFP is weak and ambiguous. Some evidence of
positive links between trade policy and productivity growth certainly exists, es-
pecially in broad cross-country comparisons. But many cases, in particular
comparisons over time within a single country, are ambiguous, and some sug-
gest a negative relation. Given the lack of comparability of the various studies,
the difficulty of defining outward orientation, and, most important, the lack
of a cohesive, unifying theory of how trade affects efficiency, to attempt a rig-
orous net balance of the evidence would serve little purpose. A more fruitful
approach is to draw from these studies hypotheses about the link. Two hy-
potheses suggest themselves. The main contributions of an outward-oriented trade policy to efficiency may arise from the larger total market available when exports are not discouraged, allowing for both (1) increased capacity utilization and (2) economies of scale arising from specialization.

TRADE POLICY AND CAPACITY UTILIZATION. Having found that productivity growth accounted on average for about 30 to 35 percent of output growth (less than in industrial countries), Bruton (1967) emphasizes a more important conclusion. Differences in productivity growth for five Latin American economies "could be accounted for largely by the ability of countries to utilize all their available resources.... [Thus] 'pure' productivity growth has been virtually zero" (p. 1115). The predominant connection with trade policy is clear, and it is worth quoting Bruton on this point at length: "The explanation of this [connection] rested on three points: (1) a growing inappropriateness of the input mix of production due in large part to the continued undervaluation of foreign exchange to interest and wage rate policies, etc.; (2) a growing inappropriateness of the composition of output in the sense that productive activity was not based on cost or potential cost considerations, but rather has evolved in response to the incentives generated by protectionist policies made up largely to meet balance-of-payments crises; (3) a decline in competition" (p. 1115).

Williamson (1969) reaches a similar conclusion on the overwhelming importance of increased capacity utilization and its link with trade policy for the Philippines, although in fact neither Bruton nor Williamson had data but only inferred the hypothesis from indirect analysis. In Korea, although TFP accounts for 36 percent of output growth; once capacity utilization is included this falls sharply to 8 percent, and even lower to 5 percent if variation in employment hours per week is also included (Kim and Kwon 1985).

Finally, McCarthy and others (forthcoming) attach great importance to increases in capacity utilization in Colombia, although they include no direct measures of this in their computations of sources of growth. Qualitative evidence leads them to conclude that "the large residuals of the 1967-74 period can be explained by growing world markets and, particularly in the latter years, by expansive aggregate demand policies which correspondingly increased capacity utilization" (p. 15).

The other part of the link—the idea that more open trade policies result in higher capacity utilization—was not tested or even mentioned by Kim and Kwon. The period covered, however, coincided with the first significant step toward liberalizing the Korean economy. Recall that Chen (1977) had found the contribution of productivity increased in the 1960s compared with the 1950s, and that Kim and Park (1985) had attributed the high productivity residual to trade policy—though they did not make the explicit connection by reference to capacity utilization.

Data at the firm level for Ghana and India confirm the overwhelming importance of capacity utilization in explaining differences in efficiency.
(1980) uses the efficiency-frontier methodology (pioneered by Farrell 1957), which relates actual input usage to technically efficient levels. Applying this methodology to firm-level data, Page (1980) finds that in Ghana the level of efficiency (measured in this case by the cost of domestic resources) is most affected by the following: (1) correction of factor prices (efficiency rises by zero to 15 percent), (2) move to full capacity (efficiency rises by 5 to 20 percent), and (3) pure technical efficiency, that is, shifts from inefficient use of inputs relative to the optimal level of production (efficiency rises by 25 to 30 percent). With regard to the last, some inefficiently high costs of inputs could be a result of rent-seeking, or efforts to obtain the limited import or export opportunities available under protectionist regimes.

These activities and associated costs could be eliminated under a freer trade program, but this is purely speculative. Another explanation (again speculative) might be that protection results in learning by doing and explains technical efficiency gains. The Indian study (Page 1984) set out to test the relation between firm size and efficiency. This was found to be positive but weak; an important coincidental finding was that capacity utilization was a significant explanation of efficiency.

Analysis of the effect of capacity utilization is limited by lack of data. But the existing evidence is consistent, and the statistical relation, in cases in which it is directly observable, is significant. Thus the first half of the Bruton hypothesis—trade liberalization increases capacity utilization—although intuitively and theoretically obvious, has not been adequately tested and certainly merits far greater attention than it has so far received. A problem with testing is recognized by Krueger (1978), who summarizes the NBER’s country studies: both import substitution and export orientation increase capacity utilization. Krueger goes on to make the judgment that on balance this effect is greater for export promotion (pp. 181–82), but this remains to be demonstrated.

Trade Policy and Economies of Scale. A hypothesis analogous to the one on capacity utilization concerns the effect of economies of scale. The literature on industrial organization for developed countries generally finds that greater import competition limits the exercise of market power. More specifically, many studies find that trade openness is positively related to economies of scale. As Caves (1980) relates, Sanders and Hazledine conclude this for Canada, but for large economies such as the United States, this effect is not so evident (Pugel). In France, the effect of economies of scale depends not so much on import competition as on expanded export opportunities. Jacquemin and others found both kinds of effects in Belgium.

The effects of economies of scale on productivity gains in developing countries have rarely been analyzed; the few cases in which the issue is addressed, however, tend to confirm the existence of some positive effect. In Indonesia, “larger firms are more efficient than smaller firms, younger firms are more efficient than older firms, and domestically owned firms are more efficient than
foreign owned firms" (Pitt and Lee 1981, p. 55). An Indian study (Page 1984) is less conclusive: machine tools show a systematic increase in relative efficiency with size; in shoes, the largest firms (those with one hundred or more workers) are most efficient and the smallest (with five or fewer workers) are least efficient, but the correlation is less clear in the intermediate range; in soap, the largest firms are most efficient, whereas the rest show no tendency; and in printing, the relation is mildly but insignificantly negative. The mixed results for different industries are not inconsistent with the basic hypothesis, because not all industries are subject to economies of scale.

Analysis of TFP at the sectoral level in Israel and the Philippines furnishes much stronger confirmation of both parts of the putative effect of economies of scale. Pack (1984) found smaller scale—hence lower efficiency—in Israel than in the United States and ascribes the small scale to high protection, a result similar to that cited earlier for Canadian industry. For the Philippines, economies of scale were the third-largest contributor to growth after labor and capital inputs, and this contribution was "substantially higher than that in both Japan and the United States" (Kim and Park 1985, p. 171). Similarly, "the opening up of the Korean economy to semi-free trade... encouraged the exploitation of internal scale economies" (p. 173).

The Direct Evidence: Explicit Analyses of Trade Policy and Productivity

Until the Bhagwati-Krueger studies of trade regimes (Bhagwati 1978, Krueger 1978), no researcher investigated directly the link between productivity and trade policy. Even in these important studies, which showed the advantages of more liberal trade regimes, analysis of the effect on productivity was extremely limited. Thus for Chile and Ghana a very broad correlation was made between different trade regimes and the amount of capital used per unit of output (the ICOR, or incremental capital-output ratio, values). For Israel slightly more precise measures were made using TFP calculations. Both results were vague and inconclusive. But this is not surprising, given the limited sample of observations and (as Bhagwati 1978, pp. 83–84, points out) the crudeness of the tests, which never considered what could influence productivity aside from trade policy.

Recent research has generally used three methodologies to analyze directly the relation between trade policy and productivity. First are tests of the hypothesis of import discipline: measures of market power such as concentration, profitability, and price-cost margins are related in regression analysis to several factors, including openness of trade and intensity of trade. Many empirical studies exist for industrial countries but so far few for developing countries, though the number is rapidly expanding. The second methodology studies how TFP or efficiency gains are affected by the level of or change in protection.

Oli Havrylyshyn
A few studies of a third kind exist; these are mainly computable general equilibrium models measuring dynamic efficiency gains from trade that include but go beyond the traditional static resource allocation gains referred to earlier. Evidence from each of these three kinds of study is considered in the following sections.

Trade and the Degree of Competition

Traditional neoclassical theory on trade and perfect competition is clear about the effect of more trade: it increases competition and hence efficiency. What has come to be called the new trade theory (see Krugman 1987) includes imperfect competition in the analysis and connects such competition more closely to the market-power theory of industrial organization. The new theorists frequently conclude that the direction of effects of trade on welfare can be uncertain or even negative under certain conditions (see Jacquemin 1982).

This radical view of the effects of trade on welfare is well illustrated in the exploratory studies found in Krugman (1986). But the challenge to the received truths of prevailing neoclassical economics is not as formidable, either in intention or in fact, as it might seem at first sight (see Krugman 1987 on the relevance to policy of the new theories). Conclusions on actual gains from liberalization are not challenged; most of these writings address the question, Is free trade always best theoretically? (One such theoretical condition—learning effects under infant-industry protection—is familiar.) This new body of literature simply finds more theoretical conditions based on imperfect competition. It remains to be demonstrated whether these conditions occur frequently enough and clearly enough to be relevant to policymaking.

The new trade theory focuses on product differentiation, which allows monopolistic competition and thus offsets the gains of free trade. The older literature on industrial organization—from which much of the new theory springs—may already provide tests for the negative effects on welfare postulated in the new theory (see the empirical studies of the 1970s reviewed by Caves 1980 and Jacquemin 1982). If the harm done to welfare by such imperfect competition in trade were large enough to negate positive effects of competition, this should have shown up in the results of the empirical studies as a positive relation between import competition and profitability. With few exceptions (Murfin 1972 for the United Kingdom, as cited in Caves 1980) the relation tends to be significantly negative: the literature on industrial organization clearly shows that greater trade openness improves welfare by restricting oligopolistic market power through import competition and export opportunities.\(^2\)

Very few studies apply the market-power methodology to developing countries, and the results, though similar, are less conclusive than for industrial countries, perhaps because so few cases have been studied. DonSimoni and Leos-Arguelles (1981) for Spain and Harrison (1989) for Côte d'Ivoire all con-
clude that greater import openness increases competition, though the statistical results are weaker in Harrison. A contradicting result for Chile (de Melo and Urata 1986) is explained by the fact that a given firm often produced and imported the same product. Thus, although liberalization increased competition and pushed down the profit rate, continued monopolization of import distribution channels more than offset this effect and, on balance, profit rates increased. The authors conclude that liberalization is still preferable, since consumer welfare rises. Their positive interpretation is supported by a related study that shows that increases in efficiency are positively related to degree of import competition (Condon, Corbo, and de Melo 1985).

Efficiency Gains and Trade Policy

One of the first attempts to measure directly the effect of trade policy on efficiency in a developing country was that of Bergsman (1974) for Brazil. The study extends the traditional methodology of static welfare gains to incorporate elements of profitability and efficiency. Referring to studies that show a wide range of cost among Brazilian firms producing the same product, Bergsman identifies two categories of protected firms: the low-cost, efficient firm with a high profit, and the high-cost, "quiet life," inefficient firm. Protection affords both firms a haven from imports, but one uses it to be technically lazy and comfortable, the other to achieve higher profits through greater technical efficiency. In other words, protection has both positive and negative effects on profitability; this is an inference also drawn by de Melo and Urata (1986) for Chile. The fact that conflicting mechanisms are at work compounds the problem of testing the hypothesis linking trade and productivity.

Bergsman estimates the costs to efficiency of protection separately from the costs of static resource allocation, using an extended version of the conventional model which accounts for changes in demand and supply in response to changes in price and incorporates effective protection rates. Estimates of the first-round benefits forgone by consumers because of import restrictions and the initial profits forgone by producers because of disincentives to export (deadweight losses) are only 0.3 percent in Brazil, whereas losses in efficiency are estimated at 6.8 percent. Bergsman's estimates of losses in efficiency for other countries are Malaysia, 0.4 percent; Mexico, 2.2; Pakistan, 5.4; and the Philippines, 2.6.

The vague results from TFP residuals in the NBER's studies were noted earlier. Several sector-level studies provide stronger confirmation of the efficiency gains to be derived from liberalization. Krueger and Tuncer (1982b) find for Turkey that periods of greater liberality are periods of faster growth in TFP, as do Havrylyshyn (forthcoming) and Nishimizu and Page (1982) for Yugoslavia, although the statistical results in the last two studies are not nearly as strong or unambiguous. Efficiency-frontier studies on Yugoslavia also show a positive link, but TFP calculations show a negative one, with productivity gains much
lower after the liberalization of 1965. But the lower productivity gains may have arisen from reduced capacity utilization, as macroeconomic anti-inflationary policies slowed economic growth sharply while encouraging rapid expansion of capital. A cross-country comparison of sectoral factor productivity growth in Japan, Korea, Turkey, and Yugoslavia by Nishimizu and Robinson (1984) leads to the conclusion that "export expansion leads to higher TFP growth through economies of scale and/or through competitive incentives...[and that] import substitution leads to lower TFP growth" (p. 198).

Efficiency-frontier studies using sector- or firm-level data with one exception found strong empirical evidence of a positive effect of trade policy liberalization on efficiency. The results of Nishimizu and Page (1982) and Havrylyshyn (forthcoming) for Yugoslavia have been noted. Condon, Corbo, and de Melo (1985) find positive effects for Chile, Page (1984) for India, Pitt and Lee (1981) for the Indonesian weaving industry. The exception is Moran (1987). But his analysis is a comparison of thirty-two countries using aggregate data in a methodology that generally requires a large number of data points. Further, his measure of technical efficiency gain, although sensible in concept, yields little enough variation across the countries studied (the index of efficiency ranges from 90.6 to 97.4) to arouse skepticism. Moran recognizes this problem and attributes it to the use of aggregate data, but that begs the question of whether aggregate data produce meaningful results in the efficiency-frontier methodology. That only nine of the thirty-two countries had positive output elasticities for both factors throws more doubt on the validity of the estimates of efficiency. Results should be forthcoming soon from a large number of studies of efficiency and trade now under way at the World Bank and elsewhere.

The concept of the incremental capital-output ratio is often used in policy analysis as a general indicator of effectiveness of economic performance and policy. Unlike TFP, ICOR measures only the relation of one factor (capital) to output, but it resembles TFP in being a catchall measure and in practice tends to reflect the same movements as TFP. It has been demonstrated that the efficiency of capital usage is related to trade orientation: ICORs become systematically lower the more outward-oriented an economy is (see World Bank 1987); the gap between inward-oriented and outward-oriented countries widens over time. Thus for 1965-73 the respective values for the two groups were 4.6 and 3.3; in 1973-84 they were 5.2 and 17.4 (Greenaway 1986, p. 39).

Finally, we consider a study that attempts to test the hypothesis opposed to the one that links liberality and productivity: that higher protection gives infant industries more opportunity to increase productivity. This study (Krueger and Tuncer 1982a) is not necessarily more significant than others but is worth looking at in some detail because it illustrates well the ambiguity in the links between productivity and trade policy, and the need to take great care in drawing conclusions from data that turn out to be amenable to different and even opposite interpretations.
Krueger and Tuncer measure the rate of growth of output per unit of input in sixteen Turkish industrial sectors for 1963–74 and conclude that there is no systematic evidence that more protected industries (those with higher effective protection) attain faster productivity growth (p. 148). Hence they infer that arguments about the need to protect infant industries do not have an empirical basis. Closer examination of the data shows that the factual conclusion is correct, but the inference is not justified because the data are at best too weak to support this conclusion and at worst may actually be interpreted in the opposite way.

Table 5 reproduces the data on effective rates of protection and rates of growth of output per unit of input. Krueger and Tuncer present only the data and no statistical correlation analysis to support their conclusion. A regression the author performed produces an insignificant correlation, supporting Krueger and Tuncer’s assertion that “there is no systematic tendency” (p. 142). But a different analysis of the data can suggest, equally, support for moderate protection of infant industries. Consider the simple averages calculated for the

<table>
<thead>
<tr>
<th>Effective protection rate</th>
<th>Output growth-input ratio</th>
<th>Group average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>-1.17</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>-0.55</td>
<td>-0.30</td>
</tr>
<tr>
<td>16</td>
<td>-0.56</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>4.10</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>1.61</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>0.46</td>
<td>1.97</td>
</tr>
<tr>
<td>63</td>
<td>1.41</td>
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<tr>
<td>72</td>
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<td></td>
</tr>
<tr>
<td>77</td>
<td>4.27</td>
<td></td>
</tr>
<tr>
<td>Very high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>113</td>
<td>-0.93</td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>0.62</td>
<td>-2.00</td>
</tr>
<tr>
<td>200</td>
<td>-8.80</td>
<td></td>
</tr>
<tr>
<td>209</td>
<td>0.94</td>
<td></td>
</tr>
</tbody>
</table>

Source: Krueger and Tuncer (1982a), table 1.
three groups of industries represented in table 5. Those with low protection rates (to 23 percent) experienced a slightly negative growth of the output-input ratio; those with intermediate levels (40 to 80 percent) had the highest growth of the ratio (1.97 percent); those with very high rates of protection (greater than 100 percent) had strongly negative growth. This view of the data is consistent with Westphal's (1982) modification of the infant-industry argument based on Korean experience: limited and selective protection of infant industries may be successful.

But the data are also consistent with yet a third hypothesis: a U-curve effect. Protection can increase productivity as sheltered markets permit increased economies of scale or capacity utilization, or both. But if protection is too high, the "quiet life" of Bergsman's firms, or rent-seeking, brings negative effects on efficiency that outweigh the positive effects. Over time, even moderate levels of protection can lose the advantages they conferred on economies of scale and capacity utilization, which are swallowed by the rent-seeking, inefficient effects. (This is the well-known notion of the easy first phase of import substitution, which may bring some benefits.) Many have recognized that, in practice, almost all liberalizing policies have been preceded by a phase of import substitution (see, for example, Nishimizu and Robinson 1984, de Melo 1985). To go one step further and accept that some short-term positive gains do come from this phase by no means undermines the logic of the argument in favor of more liberal and outward-oriented policies. In fact, it may enhance that argument's credibility.

Estimates of Welfare Costs

Perhaps the most comprehensive methodology for analyzing the effect of trade policies is the use of computable general equilibrium (CGE) models, which attempt to trace out what the results would have been if policies or events had been different. The early attempt by Bergsman (1974) to measure efficiency costs of protection is a crude version of this notion. Krueger (1984) in a survey of trade policies in developing countries refers to only a small number of model-based estimates of welfare costs of protection. She cites several studies: Baysan for Turkey found in a linear programming model that the costs were substantially higher when computed in a dynamic model analysis that captures indirect effects and interactions throughout the economy than in a partial equilibrium one that does not; Taylor and Black for Chile found a very small rise in consumption (1 percent) with liberalization, but their tariff cuts were only 10 to 20 percent on levels of 50 to 100 percent and more; in contrast, de Melo, in a CGE model for Colombia, found gains from free trade of 4 to 15 percent of GDP. Grais, de Melo, and Urata (1986) estimated a 5.4 percent gain for Turkey, and Clarette and Whalley (1985) a 5.2 percent gain for the Philippines; Condon and de Melo (1986) obtain values that range from 6 to 17 percent if one allows for economies of scale and collusive behavior in oli-
gopolistic markets. None of these consider separately the effect of efficiency improvements; rather, they lump all effects together. But in a broad sense, if static effects on resource allocation of traditional measures are correct at about 1 to 2 percent, all of the additional gain estimated by CGE models is attributable to improved efficiency or productivity.

Srinivasan (1986) points to studies using CGE models that explicitly incorporate effects on efficiency, economies of scale, oligopolistic profits, and rent-seeking reductions. For Canada, Harris (1985) finds much higher benefits for welfare from free trade—about 5 percent of GDP—than in calculations that exclude economies of scale and oligopolistic rents. This high level is confirmed by studies of the effect of nontariff barriers on levels of imports. Thus, for example, Bertola and Faini (1987) found for Morocco that imports might have been 10 to 20 percent higher without the existing nontariff barriers (similar calculations are described in Laird and Yeats 1990). As Srinivasan (1986) points out, even this may be an underestimate, since the analogous phenomenon of revenue-seeking from tariffs is not counted.

But even CGE models may not fully capture all of the possible efficiency gains of liberalized trade. Many base their estimates on the assumption that the economy is operating at its full productive capacity, with prices set by the convergence of relative costs of production and consumers’ demand for the product. Thus they miss the gains from increasing capacity utilization and elimination of rent-seeking. Even when these are recognized, most models remain static in spirit if not in formal specification and do not allow for longer-term responses of economic agents. Nevertheless, general equilibrium models yield far higher values for the gains from liberalization than do the earlier partial equilibrium models. These higher values strongly suggest that efficiency or productivity gains from more liberal or at least more outward-oriented trade are overwhelmingly more important than the gains from resource reallocation alone.

Summary and Conclusion

Few studies measure directly the effect of trade policy on productivity, but most of those that do conclude that outward orientation leads to productivity gains, though the results are not always consistent or statistically robust. At the same time, a handful of studies of sources of growth attempts to make the connection, albeit loosely, and finds support for a positive relation. The explicit analyses use three different methodologies to test for the relation. First, a set of studies—so far only three for developing countries—tests for the effect of import competition on market power measured by profit. Whereas the studies of industrial countries tend to support the hypothesis that import competition reduces market power, the results for developing countries have been weak and sometimes ambiguous. Second, a set of studies measures sector- or firm-level efficiency improvements (factor productivity) as these relate to trade...
policy. Eight of these nine studies conclude quite strongly that liberalization clearly leads to efficiency gains. The one exception is not in fact a sector- or firm-level study but uses the same method applied to aggregate output across thirty-two countries. Third, even stronger results are found in a number of computable general equilibrium model applications to developing countries. All the half a dozen such studies reviewed here found gains from liberalization on the order of 5 to 15 percent of GDP—far higher than the estimates of 1 to 2 percent typically found when the traditional measure of resource allocation gains is applied. What does this say about the effect on productivity? That it is more important than improvements from resource allocation. The traditional static measures are sensitive only to the gain from shifting the economy’s production toward goods in which the country seems to have the most appropriate combination of factors of production. General equilibrium measures include this allocative effect as well as the effect of economies of scale, efficiency from greater competition, reduction of monopolistic levels of profit, and the like. Thus the difference between the overall gains from CGE models and the static resource allocation gains (3 to 13 percent) can be taken as the total productivity gains.

A second conclusion, about which type of study yields the strongest results in the sense of statistical reliability, has clear implications for future research on the question. The weakest results come from studies of sources of growth, partly because of problems of comparability among the methods used by different studies, but, perhaps more important, as Bhagwati (1978) pointed out, because trade policy may have only a minor influence on productivity, and consequently its impact is hard to isolate from that of other determinants. Much stronger results tend to be observed in studies using the efficiency-frontier methodology, especially those done at the firm level, as well as general equilibrium model calculations. And country-specific analysis over time appears superior to cross-country comparisons.

Third, although studies differ in the strength (and in some cases even in the direction) of the relations estimated, several points emerge about the mechanism through which outward orientation or liberalization affects productivity. Increased competition, or import discipline, is important in moving producers from inefficient positions toward potential efficiency. Also, specialization in internationally competitive goods allows for greater economies of scale. And equally important, specialization plus opportunities for export growth contributes to greater capacity utilization. All of these effects result, in the end, in greater efficiency at the firm level and greater productivity growth in the economy as a whole.

The fourth and last conclusion is that one needs to recognize and accept that protection can and does generate some benefits to an economy, at least temporarily. This by no means undermines the argument for liberalization and outward orientation, for the critical issue is whether the benefits of a given policy exceed its costs. Some of the studies reviewed here certainly demonstrate
that protection of infant industries appears to give impetus to the effects on economies of scale and capacity utilization. But they also reveal that these benefits are not sustainable and are in the long run inferior to those from more outward-oriented, liberal policies.

The conclusion has two implications for future research. One is that arguments that recognize all the benefits and costs of alternative trade policies will be more credible. The second is that research on the effect of trade policy needs to specify the paradox that both protection and liberalization may have some similar effects and in effect test for an asymmetrical U-curve relation: protection at moderate levels and for moderate periods may increase productivity, but too much protection reverses this effect and leads to a sharp deterioration in productivity. The long time lags give yet another reason to prefer country-specific studies extending over longer time periods.

Notes

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1. One other case in which good data on capacity utilization exist, Turkey, strongly suggests confirmation of the hypothesis. Since the 1980 liberalization of the Ozal government, exports have boomed, bringing a substantial increase in manufacturing capacity utilization, from about 60 percent to about 72 percent in 1985.

2. Caves (1980) is an introduction to a symposium volume on how trade limits the exercise of market power and reduces monopolistic profit and prices. A similar symposium volume (Recherches Economiques Louvain, 1981) also contains several empirical studies.

References

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