Long-Run Trends in the Relative Price of Primary Commodities and in the Terms of Trade of Developing Countries

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LONG-RUN TRENDS IN THE RELATIVE PRICE OF PRIMARY COMMODITIES AND IN THE TERMS OF TRADE OF DEVELOPING COUNTRIES

By MICHAEL BLEANEY and DAVID GREENAWAY

1. Introduction

Classical economists such as Ricardo and John Stuart Mill were convinced that the long-run trend in the ratio of primary prices to those of manufactures should be upwards, and there is some evidence to suggest that such a trend did exist in the nineteenth century (see Sarkar, 1986). The twentieth century has witnessed the development of theoretical arguments in the opposite vein, suggesting that relative prices move against primary producers in the long run (Prebisch, 1950; Singer, 1950). This has generated a lively debate, not least because the issue is seen to have relevance to major policy issues such as whether developing countries should pursue inward- or outward-oriented trade strategies (Balasubramanyam and MacBean, 1991).

One aspect of this debate has been statistical: does the evidence show that the long-run trend in the ratio of primary product prices to those of manufactures has been significantly negative or not? Using data from 1900 to 1970, Spraos (1980) concluded that there was a significant downward trend up until the outbreak of the Second World War, but the trend ceased to be significantly different from zero if post-war data were included. Sapsford (1985) extended the series to 1980; using the Cochrane–Orcutt iterative procedure to correct for serial correlation of the residuals, he tested the estimated equation extensively for structural instability and found that if petroleum products were excluded from the index there was a continuous downward trend in the terms of trade of about 1.3% per annum, with a once-for-all upward shift in 1950. The estimated upward shift was substantial, offsetting more than five decades of downward trend. It is therefore critical from the point of view of forecasting future trends whether such a shift is likely to be repeated. More recently, Grilli and Yang (1988) have devised some new series for the period 1900–86. Again using the Cochrane-Orcutt technique, they find that non-fuel primary commodity prices have fallen by about 0.6% p.a. relative to the price of manufactures, with no evidence of structural breaks.

All subsequent work has been based on the Grilli–Yang series. Cuddington and Urzúa (1989) have reworked one of the Grilli and Yang series and claim that there is no downward trend, merely a large once-for-all drop after 1920. Sapsford, Sarkar and Singer (1990) contest the presence of a break in 1920, resurrect the upward shift in 1950, and offer evidence of a trend decline of around 0.6% p.a. Ardeni and Wright (1992) confirm a long-run downward trend.
using a structural time series approach and reject the hypothesis of a structural shift in 1921. Similar conclusions are reported by Bleaney and Greenaway (1990), using an error correction model. Powell (1991) applies cointegration procedures and marginally prefers the hypothesis of three downward jumps (in 1921, 1938 and 1975) to that of a continuous downward trend.

In this paper we extend the discussion by updating the Grilli–Yang series to 1991, which enables us to focus more closely on the recent behaviour of the relative price of primary commodities. A graph of the series appears in Fig. 1. Furthermore, we extend the analysis to sub-groupings of the aggregate primary products price index. This step is essential if we wish to draw policy conclusions for less developed countries from the behaviour of the aggregate series, since such conclusions are only valid if it can be shown that all primary product prices have similar long-run trends. Finally we look at the relationship between the relative prices of primary products and the terms of trade of less developed countries. With a few exceptions (e.g. Evans 1987), policy aspects of the whole issue are generally neglected; thus the paper ends with a discussion of the policy implications.

The paper is organised as follows. Section 2 outlines the model that we use. In Section 3 we apply the model to the aggregate series, over various time spans. In Section 4 we investigate differences in the price behaviour of different types of primary product, and Section 5 considers the policy implications of our analysis. Section 6 offers some concluding comments.
2. An encompassing model

All published work up to 1989 was based on the following model:

\[ \ln PP = a + bt + u \] (1)

where \( PP \) is the ratio of primary product prices to prices of manufactures, \( t \) represents a time trend, \( u \) is a random error term and \( a \) and \( b \) are parameters to be estimated. This is what Cuddington and Urzúa term the ‘trend-stationary’ model. To test for structural breaks, the model is augmented by one or more dummy variables of the form \( D = 0 \) in one part of the data set and \( D = 1 \) in the remainder, and the estimated equation becomes:

\[ \ln PP = a + bt + a'D + b'Dt + u \] (2)

The null hypotheses that \( a' = 0 \) and \( b' = 0 \) may then be tested jointly or separately using the standard F-tests. Cuddington and Urzúa (1989) also consider the ‘difference-stationary’ model

\[ \Delta \ln PP = b + u \] (3)

which is in effect a first difference of (1), the choice between them depending on the behaviour of the error term.

However, the recent development of unit root tests by Fuller (1976), Dickey and Fuller (1979), Said and Dickey (1984), and others suggests the estimation of a more general model which encompasses these alternatives. This is the strategy adopted by Bleaney and Greenaway (1990) and Powell (1991). If \( \ln PP \) has a unit root, it follows a random walk (possibly with drift) and does not in general revert to trend; indeed its time path may well contain apparent structural shifts in (1) as estimated by Sapsford (1985). If it has a less-than-unit root, it will tend to revert to trend. Consider the following autoregressive model with time trend:

\[ \ln PP = a + bt + c \ln PP_{-1} + u \] (4)

The crucial difference between (4) and (2) is the inclusion of a lagged dependent variable as a regressor. Equation (4) may be rearranged to read:

\[ \Delta \ln PP = a + bt + \mu \ln PP_{-1} + u \] (5)

where \( \mu = c - 1 \). If \( \mu < 0 \), (5) describes an error-correction model in which the change in \( \ln PP \) is negatively related to its current level, and this has the effect of pulling it back towards its long-run trend. If, on the other hand, \( \mu = 0 \), this ‘gravitational pull’ does not operate and \( \ln PP \) describes a random walk, with increasing variance over time; the path followed is then unpredictable and may contain apparent shifts in trend or intercept. As Engle and Granger (1987) have shown, such an error-correction representation only exists if the primary products and manufactures price series are co-integrated, so this can be regarded as an alternative test for co-integration. Estimation of (4) and (5) will yield identical results, but (5) is the more convenient form. If (5) exhibits serial
correlation, this can be picked up by the inclusion of one or more lagged dependent variable terms as regressors (Said and Dickey, 1984). The long-run equilibrium solution to (4) takes the form:

$$\ln PP = \hat{a} + \beta t; \quad \Delta \ln PP = \beta$$  \hspace{1cm} (6)

Substituting from (6) into (4) and ignoring the error term generates the long-run solution:

$$\beta = -b\mu^{-1}; \quad \hat{a} = -\mu^{-2}[b(\mu + 1) + a\mu]$$  \hspace{1cm} (7)

This highlights the special nature of $\mu = 0$, for in this case $\hat{a}$ and $\beta$ are not defined. If $\mu = -1$, we obtain equation (1).

In estimating (5), there are four distinct alternative hypotheses:

(i) $b = 0; \mu = 0; \ln PP$ performs a random walk with zero mean. Its history gives no indication of its future path, and at any date in the future it is equally likely to be greater or less than its current value;
(ii) $b = 0; \mu < 0; \ln PP$ has no long-term trend but tends to be pulled back towards its historical mean;
(iii) $b \neq 0; \mu = 0; \ln PP$ performs a random walk with drift, so that if $b$ is positive (negative) it is more probable that it will be greater (less) than its current value in the future;
(iv) $b \neq 0; \mu < 0; \ln PP$ reverts towards a non-zero long-run trend.

Only in the second and fourth cases can the estimated equation be treated as a reliable guide to future trends in the relative prices of primary commodities.

3. Results for the aggregate series

The series used here are based on those calculated by Grilli and Yang (1988) and published in the appendix to their paper. The aggregate series (PPV) is a price index of all non-fuel primary commodities divided by an index of unit values of manufactured exports; this is the series labelled GYPI’/MUV by Grilli and Yang. The three component series, namely food (PPFD), non-food agricultural commodities (PPNF) and metals (PPM) are those labelled respectively GYPIF/MUV, GYPINF/MUV and GYPI/MUV by Grilli and Yang. We have updated these series to 1991.

We estimated equation (5) for the aggregate series over a variety of time spans, with the results reported in Table 1. The issue of how many lag terms to retain is an important one, because the significance of the other coefficients declines quite steeply as additional lag terms are added. We began with four lag terms in order to ensure that we captured the dynamics adequately, but found that none except the first was ever statistically significant. It is likely that the significance of the lag term reflects demand factors. If a demand variable
Table 1
Regression results for the aggregate series over various time spans
Dependent variable: Δ ln x

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimation method:</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
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<tr>
<td>Variable:</td>
<td>PPV</td>
<td>PPV</td>
<td>PPV</td>
<td>PPV</td>
<td>PPV</td>
</tr>
<tr>
<td>constant</td>
<td>0.105</td>
<td>0.116</td>
<td>0.188**</td>
<td>0.194**</td>
<td>0.155*</td>
</tr>
<tr>
<td>(1.50)</td>
<td>(1.85)</td>
<td>(3.50)</td>
<td>(3.71)</td>
<td>(2.43)</td>
<td>(−3.20)</td>
</tr>
<tr>
<td>time (0 in 1899)</td>
<td>−0.00101</td>
<td>−0.00088</td>
<td>−0.00232**</td>
<td>−0.00276**</td>
<td>−0.00220*</td>
</tr>
<tr>
<td>(−0.84)</td>
<td>(−0.91)</td>
<td>(−2.83)</td>
<td>(−3.67)</td>
<td>(−2.38)</td>
<td></td>
</tr>
<tr>
<td>ln x_{−1}</td>
<td>−0.342</td>
<td>−0.421*</td>
<td>−0.360*</td>
<td>−0.327*</td>
<td>−0.311</td>
</tr>
<tr>
<td>(−3.10)</td>
<td>(−3.94)</td>
<td>(−4.06)</td>
<td>(−4.00)</td>
<td>(−3.30)</td>
<td>(−4.31)</td>
</tr>
<tr>
<td>Δ ln x_{−1}</td>
<td>0.210</td>
<td>0.278*</td>
<td>0.173</td>
<td>0.163</td>
<td>0.226</td>
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<tr>
<td>(1.41)</td>
<td>(2.05)</td>
<td>(1.50)</td>
<td>(1.52)</td>
<td>(1.78)</td>
<td>(1.99)</td>
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<tr>
<td>c0080</td>
<td>0.174**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>degrees of freedom</td>
<td>42</td>
<td>52</td>
<td>75</td>
<td>86</td>
<td>63</td>
</tr>
<tr>
<td>Implicit trend</td>
<td>−0.00295</td>
<td>−0.00208</td>
<td>−0.00619</td>
<td>−0.00844</td>
<td>−0.00707</td>
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<tr>
<td>R^2</td>
<td>0.189</td>
<td>0.238</td>
<td>0.180</td>
<td>0.163</td>
<td>0.152</td>
</tr>
<tr>
<td>standard error (s.e.)</td>
<td>0.102</td>
<td>0.108</td>
<td>0.115</td>
<td>0.116</td>
<td>0.115</td>
</tr>
<tr>
<td>RSS</td>
<td>0.328</td>
<td>0.607</td>
<td>0.989</td>
<td>1.17</td>
<td>0.831</td>
</tr>
<tr>
<td>Normality</td>
<td>4.61</td>
<td>0.72</td>
<td>24.79**</td>
<td>20.49**</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Notes
Figures in brackets are t-statistics.
d0080: a dummy variable taking the value 1 up to 1980 and 0 from 1981 onwards.
* significantly different from 0 at the 5% level.
** significantly different from 0 at the 1% level.
Critical values for the coefficient of ln x_{−1} at the 10, 5 and 1% significance levels are respectively −3.18, −3.50 and −4.15.
Normality test is the Bera–Jarque statistic which is distributed as a chi-square with 2 degrees of freedom, yielding critical values at the 5 and 1% significance levels of 5.99 and 9.21 respectively.

is included in the regression the fit is slightly improved over all time spans and the lag term becomes insignificant.¹

Columns 1–5 of Table 1 show the results of estimating equation (5) over the following time periods: 1925–70; 1925–80; 1902–80; 1902–91; and 1925–91. The implicit time trend, derived as shown in (7), varies from a negligible (and statistically insignificant) −0.2 p.a. for 1925–80 to a highly significant −0.8% p.a. for 1902–91. However, if data from before 1925 are used, there is strong evidence of non-normality of the residuals, which invalidates hypothesis tests. As the studies of Cuddington and Urzúa (1989), Powell (1991) and Ardeni and Wright (1992) have shown, this largely reflects the exceptionally violent movements of commodity prices in 1920–21. Moreover, data from the latter part of the nineteenth century suggest that relative commodity prices were unusually high in the period 1900–20, in which case estimation over a period

¹ For details of the demand variable used see Bleaney and Greenaway (1990). Results including the demand variable are not reported here since they did not alter the conclusions in any way.
Table 2

Likelihood ratio tests for the aggregate series 1925–91
Dependent variable: $\Delta \ln x$

<table>
<thead>
<tr>
<th>Test no.</th>
<th>Competing hypotheses</th>
<th>degrees of freedom</th>
<th>LR statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$t$, d0080 vs $t$</td>
<td>1</td>
<td>9.54†</td>
</tr>
<tr>
<td>2</td>
<td>$t$, d0080 vs d0080</td>
<td>1</td>
<td>1.02</td>
</tr>
<tr>
<td>3</td>
<td>d0037, d0074, d0080 vs d0080</td>
<td>2</td>
<td>1.54</td>
</tr>
<tr>
<td>4</td>
<td>d0037, d0074, d0080 vs d0037, d0074</td>
<td>1</td>
<td>4.94*</td>
</tr>
<tr>
<td>5</td>
<td>$t$, d0037, d0074 vs $t$</td>
<td>2</td>
<td>5.20</td>
</tr>
<tr>
<td>6</td>
<td>$t$, d0037, d0074 vs d0037, d0074</td>
<td>1</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Notes
The following independent variables were included in addition to those listed: a constant, $\ln x_{-1}, \Delta \ln x_{-1}$.
$t$: a time trend.
d0080: a dummy variable taking the value 1 up to 1980, 0 from 1981 onwards.
d0037: a dummy variable taking the value 1 up to 1937, 0 from 1938 onwards.
d0074: a dummy variable taking the value 1 up to 1974, 0 from 1975 onwards.
LR statistic is the likelihood ratio statistic for variable addition, which is distributed as $\chi^2_m$ where $m$ is the number of degrees of freedom.
* denotes significant at the 5% level.
† denotes significant at the 1% level.

commencing in 1902 will exaggerate the downward trend (Bleaney and Greenaway, 1990). Nevertheless the estimated downward trend of $-0.7\%$ p.a. (significant at the 5% level) for the period 1925–91 is consistent with the estimates of Grilli and Yang (1988) for the period 1900–86. This contrasts with the negligible trend estimated for 1925–80.

This discrepancy is highlighted in column 6 of Table 1, which reports the results of replacing the 1925–91 time trend by a dummy variable which takes the value of one up to 1980 and zero thereafter. This results in a reduction of the standard error from 0.115 to 0.108, and the estimated downward jump in the series after 1980 is 37% (significant at the 1% level).² This regression confirms Powell’s conclusion that the series are cointegrated, as the error correction term is highly significant, but he identifies two downward jumps, at the end of 1937 and 1974, rather than one at the end of 1980. Powell’s tentative hypothesis is that commodity booms stimulated technical progress which resulted in a permanent fall in relative prices. However he advances no evidence in favour of this hypothesis and prefers it to a declining trend on statistical grounds alone (the apparent normality of the residuals).³

We turn shortly to the issue of how a downward jump after 1980 might be explained. First we address the statistical question of whether any of the competing hypotheses dominates the others. Table 2 gives the results of a

² Calculated as the ratio of the coefficient of the dummy variable to that of the error correction term.
³ As is evident from Table 1, this criterion does not provide a basis for discriminating between the two hypotheses if data from before 1925 are omitted.
non-nested hypothesis testing procedure between a declining trend, a post-1980 dummy and the Powell dummies. The procedure involves setting up an encompassing hypothesis between each pair and testing each of this pair against the encompassing hypothesis using a likelihood ratio test. An asymmetry in the results then indicates that one of the original hypotheses can be rejected in favour of the other.

It is clear from tests 2 and 6 that a time trend adds little to the explanation if a jump dummy of some kind is included. A time trend can be rejected in favour of the Powell dummies only at the 10% significance level (test 5). The Powell dummies can be rejected in favour of the post-1980 dummy at the 5% significance level (tests 3 and 4), and the time trend can be rejected in favour of the post-1980 dummy at the 1% level (test 1).

Thus the data definitely prefer a once-for-all drop in the relative price of primary commodities after 1980 to a declining trend or an alternative dummy specification. Is there an economic explanation for this? This is a difficult issue. It is perhaps suggestive that the apparent drop coincided with the onset of the international debt crisis. Although this did not break until mid-1982, the world recession that began in 1980 would have depressed commodity prices earlier. The debt crisis forced a considerable number of developing countries into a sharp reduction in their real exchange rates as part of an effort to generate trade surpluses to service debt. This would have raised profit margins to exporters in those countries; with price-inelastic world demand any resulting stimulus to supply would depress prices. Thus, if the demand for primary products is price-inelastic and supply has some price-elasticity, the macro-adjustments induced by the debt crisis could have had a downward effect on the relative price of primary commodities. Conversely, the sizeable foreign borrowing of the 1970s could have pulled real exchange rates above their equilibrium levels, depressing export profitability and through supply response raising the relative price of primary commodities. What would otherwise have been a smoother and probably smaller decline would then be transformed into a sudden jump.

Morrison and Wattleworth (1988) identify supply factors as the main reason why commodity prices failed to recover following the 1980–81 recession: ‘... the supplies of almost all agricultural commodities increased substantially because of generally favourable worldwide weather conditions and policies in producing countries that encouraged continued growth of production, even in the face of falling world prices’ (p. 375). Gilbert (1989) has explicitly linked these supply factors to the real exchange rate policies of indebted countries. He proxies this effect by a debt service variable which he finds to be statistically significant in a food price equation.

These effects might have been reinforced by the trend towards more outward-looking strategies which has been apparent over the last decade, partly as a result of pressure from international organisations but also because of a perception that more outward-oriented developing economies have performed
better. If import protection is reduced and nominal exchange rates lowered in compensation, export profitability rises with the effects described above.

The message here is that government policies in developing countries may have a significant impact on the relative price of primary products if there are global policy shifts. This factor has been played down in previous discussion of long-run price trends in favour of others such as relative rates of technical progress. However, it may be empirically at least as important as any underlying trend, which the data suggest is no worse than a gentle decline.

4. Results for the component series

Policy conclusions can only be validly drawn from an empirical analysis of trends in the relative price of a basket of primary commodities if the trends are similar for each of the components of the basket. If, as is typically the case, a country only exports a subset of the commodities in the basket, it is only that subset whose relative price trends are relevant to its policy decisions. It is straightforward to test whether the data support the hypothesis that all primary commodities are subject to common long-run trends or not. We address this issue by estimating our preferred model for three major sub-groups of commodities: food, non-food agricultural commodities, and metals.

Table 3 reports the results of estimating the model for the three component series over the period 1925–91, with a dummy variable rather than a time trend. The estimated equation for food is very similar to that for the aggregate series reported in Table 1. For non-food agricultural commodities the estimated post-1980 drop in prices is smaller, but still significant, and the lagged dependent variable is insignificant. For metals none of the explanatory variables is significant and the estimated equation suggests that metal prices have simply followed a random walk, without a post-1980 fall. These results suggest marked differences in the price behaviour of different primary commodities. A formal test of the hypothesis that all coefficients other than the constant are identical across the three component series yields a likelihood ratio statistic of 22.66 which compares with a 1% critical value of 16.81 for a $\chi^2$ statistic with six degrees of freedom. Thus the hypothesis of common coefficients can be decisively rejected. The same result is obtained if the dummy variable is replaced by a time trend.

This implies that generalisations about the relative price of primary commodities as a whole are likely to be seriously misplaced. This is a point which has been overlooked in much of the previous debate.

5. Policy implications

The principal reason for the longevity of the debate on the Prebisch-Singer hypothesis is the potency of the claims made for its policy significance. As one of the patrons of the hypothesis has recently put it: ‘...its main concern was with the welfare impact of terms of trade upon industrial countries and developing countries respectively’ (Singer 1989, p. 324), and going on from this:
Table 3
Regression results for component series 1925–91
Dependent variable: Δ ln x

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimation method:</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>Variable:</td>
<td>PPFD</td>
<td>PPNF</td>
<td>PPM</td>
</tr>
<tr>
<td>Constant</td>
<td>−0.173†</td>
<td>−0.091*</td>
<td>−0.017</td>
</tr>
<tr>
<td>ln x−1</td>
<td>−0.398†</td>
<td>−0.322</td>
<td>−0.208</td>
</tr>
<tr>
<td>Δ ln x−1</td>
<td>0.267*</td>
<td>0.083</td>
<td>0.139</td>
</tr>
<tr>
<td>d0080</td>
<td>0.191†</td>
<td>0.111*</td>
<td>0.019</td>
</tr>
<tr>
<td>degrees of freedom</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>R²</td>
<td>0.260</td>
<td>0.169</td>
<td>0.116</td>
</tr>
<tr>
<td>standard error (s.e.)</td>
<td>0.119</td>
<td>0.117</td>
<td>0.098</td>
</tr>
<tr>
<td>RSS</td>
<td>0.889</td>
<td>0.858</td>
<td>0.602</td>
</tr>
<tr>
<td>Normality</td>
<td>0.82</td>
<td>3.34</td>
<td>2.51</td>
</tr>
</tbody>
</table>

Notes
Figures in brackets are t-statistics.
d0080; a dummy variable taking the value 1 up to 1980 and 0 from 1981 onwards.
* significantly different from 0 at the 5% level.
† significantly different from 0 at the 1% level.
Critical values for the coefficient of ln x−1 at the 10, 5 and 1% significance levels are respectively −3.18, −3.50 and −4.15.
Normality test is the Bera-Jarque statistic which is distributed as a chi-square with 2 degrees of freedom, yielding critical values at the 5 and 1% significance levels of 5.99 and 9.21 respectively.

‘the need for . . . producer action and the need for international commodity agreements to raise and stabilise primary commodity prices is one of the possible policy conclusions arising from the Prebisch-Singer hypothesis’ (op. cit., p. 325). The analysis has undoubtedly been influential in the formulation of policy in developing countries. Curiously however, remarkably little discussion of policy has accompanied statistical analysis of long-term movements in the relative price of primary commodities. We now consider the policy implications of our results.

The positive results from the foregoing analysis can be summarised as follows. Using data from the start of this century up to 1991 there does seem to have been a statistically significant long-run downward trend in the relative price of primary products of 0.8% per annum. However, if data earlier than the mid-1920s are excluded to avoid the problems associated with the exceptional price fluctuations of 1920–21, then a once-for-all drop in commodity prices in the early 1980s fits the data better than a smooth trend. The evidence suggests that the price behaviour of different types of primary commodities is not
identical. In particular there is little evidence of a long-run downward trend in the price of metals.

Thus the first point to be made is an obvious one—the findings one gets on long-run trends depend crucially on the time period selected and the commodity bundle concerned. There is some tendency for decline but it is far from clear that this is true of all commodities or that the decline takes the form of a smooth trend rather than a succession of downward jumps.

There are three questions which need to be addressed. First, in view of the fact that not all developing countries are exporters of primary products, and not all industrialised countries rely solely on exports of manufactured goods, how does a given change in the relative price of primaries translate through to a change in the terms of trade of developing countries? Second, assuming that the potential for quality improvement in manufactures is greater than that in primaries, to what extent do changes in the relative price of primaries or the terms of trade reflect differences in the rate at which products are upgraded? Third, even if we conclude that export diversification and quality upgrading are not of major significance and accept the existence of a declining trend in the relative price of primary commodities, is the estimated downward trend of a sufficiently 'large' order to shape policy to a substantive degree, and if so how?

5.1. Relative price changes and terms of trade movements

IMF data on the terms of trade of developing countries are available for a sub-period of the analysis conducted in Section 3, specifically for the period 1955–89. This is a series constructed using information on import unit values of total imports and exports, thereby adjusting for the fact that not all LDC exports are primary commodities, nor are all imports manufactures. Using this information the following cointegrating regression was estimated:

$$\ln NTT = a_0 + a_1 \ln PPV + a_2 \ln OP + \varepsilon$$  \hspace{1cm} (8)

where $NTT$ represents terms of trade of non-oil developing countries, $OP$ is real oil prices, $PPV$ is as defined above and $\varepsilon$ is a random error.

The results of estimating (8) are reported in Table 4. As expected, the estimated coefficient on $\ln PPV$ is positive and suggests that a 1% decline in the relative price of primary commodities passed through to a decline in the terms of trade of non-oil developing countries of about 0.3%. This result is similar to that reported by Grilli and Yang (1988) and Powell (1991) for a slightly shorter data period. The ADF statistic is $-3.94$, which implies that the null hypothesis of non-cointegration could be rejected at the 5% level.

5.2. Quality change

For reasons that are well known, the potential for quality improvement tends to be greater in manufactures than in primaries. That some part of any increase
in the relative price of manufactures is due to quality improvement is not in
doubt, but its exact magnitude is extremely difficult to calibrate. Grilli and
Yang (1988) cite the work of Kravis and Lipsey (1981) which concludes that
some 25% of the cumulative increase in the price index of manufactures
classified in SITC 7 is due to quality improvements. This estimate can in fact
be complemented by recent work which has different origins. Analysts have
noted that a common by-product distortion of voluntary export restraints
(VERs) and other source-specific quotas is upgrading. In turn this has led to
attempts to disentangle the price-raising effects of VERs into quality and
non-quality induced elements. This of course is not the same as tracking these
effects over long periods of time. Nevertheless it does provide an indication of
potential. Examples of this work are Feenstra (1988), Boornstein and Feenstra
(1988) and Aw and Roberts (1986). Feenstra (1988) estimates that approxi-
mately half of the price increase in Japanese automobiles between 1980 and 1985
is due to quality change. By contrast Boornstein and Feenstra (1988) can only
attribute about 13% of the recorded increase in the price of steel between 1969
and 1974 to quality improvement. Finally, Aw and Roberts (1986) estimate that
between 6% and 25% of recorded price increases on footwear imports into the
US between 1974 and 1982 can be attributed to quality improvement, depending on the source of supply.\(^4\)

5.3. Commodity prices and trade strategy

What does all this imply from a policy standpoint? Some analysts take the view that terms-of-trade decline is of a sufficient magnitude to be a cause for concern and action: ‘...as an economic projection [the Singer-Prebisch hypothesis] seems to have stood the test of time better than most others. As a result there is now a renewed willingness to look at compensatory mechanisms, commodity agreements, debt reduction, changes in structural adjustment procedures ...’ (Sapsford, Sarkar and Singer 1990, p. 21). There are really two issues here. One is the magnitude of any decline; the other is what it implies from a policy standpoint.

If we choose to interpret the data as suggesting a trend decline in the relative price of primary products, then our best guess of the rate of decline is about 0.7% per annum. The data can be equally well explained, *ex post*, by one or two downward jumps interspersed by periods of approximate stability, but this is no aid to forecasting unless the jumps are predictable. Whatever interpretation we prefer, it needs to be set against a standard error for the models reported in Table 1 of more than 10% p.a., which implies that in the short term real commodity prices are highly unpredictable. Indeed this is clear from a glance at Fig. 1. Over any reasonable policy horizon long-run trends are dwarfed by fluctuations, implying that any trend is unlikely to be economically (as opposed to statistically) significant. Moreover, less than one-third of any decline in the relative price of primaries passes through to terms-of-trade decline, and some part of the price change may be due to quality improvement in manufactures.

There has been a tendency for exponents of inward orientation to use a trend decline in the relative price of primaries to support a case for import substitution. This policy conclusion does not follow automatically, because an import-substituting strategy may involve large losses through rent-seeking and missed opportunities for diversification of exports and export-led growth, even if the movement of the terms of trade is adverse. Moreover, as our results demonstrate for commodity sub-groups, there are dangers in reaching policy prescriptions which are particular to specific countries on the basis of trends in aggregate indices.\(^5\)

Our findings appear to offer support for the view that price instability is

\(^4\) There are at least two reasons for believing that this work may exaggerate the ‘normal’ rate of quality change. First, the quantity constraint drives the increase in prices; upgrading may be a mechanism for realising higher prices without too obviously exploiting the consumer. Second, VERs are often directed at emerging producers who may initially compete on price, but rapidly upgrade to challenge the market leaders. Notwithstanding these caveats, the upgrading evidence gives some indication of the potential impact of quality change on price.

\(^5\) It is interesting to note that with some attention having recently focussed on the relative price of manufactures of developing countries (Sarkar and Singer, 1989), the same ‘fallacy of composition’ has been repeated.
a more serious issue than long-term terms of trade decline, particularly from the perspective of countries which are heavily dependent on exports of a narrow range of primaries. Nevertheless the exceptionally low average prices of the 1980s must be a cause for concern. An interesting question is whether the drop is permanent or temporary. We argued that it was related to (debt induced) macroeconomic adjustment and trade policy reforms, both of which tended to reduce real exchange rates in primary producing countries, raising profitability and evoking a supply response which depressed prices. Maizels (1992) also emphasises the slowdown of growth in industrial countries and the effect of technical change, which he assesses to have reduced the demand for primary commodities. In his view these negative influences on demand are unlikely to be reversed in the 1990s, so that a bounce back in commodity prices is improbable. If this forecast turns out to be correct it is unlikely to have much of an adverse effect on the growth prospects of countries which are in the process of diversifying their export base away from primaries towards manufactures. By contrast, however, it could pose a much more serious threat to the growth prospects of the least developed countries, especially those in Sub-Saharan Africa where limited export diversification has occurred and such depressing growth rates were recorded in the 1980s.

6. Conclusions

We have evaluated the statistical evidence on the ratio of the prices of primary commodities to those of manufactures using the new series dating back to 1900 calculated by Grilli and Yang (1988) which we have updated to 1991. We have considered the price behaviour of different categories of primary products as well as the relative price of a complete basket of primaries. Finally, we have discussed the policy implications of our results. Our conclusions may be summarised as follows.

(i) Analysis of data for 1900–91 suggests that there may have been a statistically significant long-run downward trend in the ratio of the prices of primary products to those of manufactures, but this trend is a slow one, little more than 0.5% p.a. for non-fuel primary commodities and certainly less than 1.0% p.a. Moreover only a fraction of any decline in the relative price of primary commodities passes through to the terms of trade of developing countries.

(ii) The magnitude and statistical significance of the trend varies according to the time span of data used. Indeed from 1925 to 1980 the trend was negligible, but since 1981 the relative price of primary commodities has been persistently low, much lower than would have been predicted by extrapolation of the 1925–80 average. The sudden drop may have resulted in part from the macroeconomic policies pursued by developing countries before and after the international debt crisis, but looks unlikely to be reversed in the medium term.

(iii) The price behaviour of different categories of primary commodities is
sufficiently different to cast doubt on the validity of any conclusions drawn about long-term trends in the relative price of primary products as a group. Since the export composition of most countries which are heavily dependent on the export of primary products does not remotely resemble the aggregate basket used in these studies, analysts and policymakers may be better advised to consider long-term trends in the prices of particular commodities rather than in the prices of primary products as a whole.

(iv) Fluctuations around any trend are more important from a policy standpoint than the trend itself.

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APPENDIX

Data sources

Data on the ratio of primary commodity prices to manufactured goods prices from 1900 to 1986 were taken from Grilli and Yang (1988). These were updated to 1991 using the commodity price data given in International Financial Statistics and the world export price of manufactures as given in National Institute Economic Review 1/92, Table 20. Terms of trade data were obtained from International Financial Statistics (Supplement on Trade Statistics 1988). Oil price data were obtained from OECD Economic Outlook and (for earlier years) OPEC Annual Statistical Review.

REFERENCES


