RESEARCH REPORT

Trends in Developing Country Unit Export Prices, 1988-2001

Project R8244

Raphael Kaplinsky,
Institute of Development Studies,
University of Sussex

and

Amelia Santos Paulino
Institute of Development Studies,
University of Sussex

March 2004.

The UK Department for International Development (DFID) supports policies, programmes and projects to promote international development. DFID provided funds for this study as part of that objective but the views and opinions expressed are those of the author(s) alone.

1. BACKGROUND

In 2002 the World Bank published a comprehensive review of the links between globalisation, growth and poverty (World Bank, 2002). Reviewing the recent experience of the last quarter of the 20th century, it drew three major conclusions "that bear on current policy debates about globalization" (p ix), two of which provide an important background for this Research Report. First, the three billion people who have seen rising incomes in recent decades have largely been those who have "broken into the global market for manufactures" (passim); second, the key to relieving poverty and meeting the Millennium Goals for the remaining two billion is to assist them to integrate into the global economy in the same way.[1]

The theoretical and policy antecedents of these policy conclusions go back to the post-war period. The Prebisch/Singer contribution of the early 1950s had pointed to the declining terms of trade (and, indeed the volatility) of primary products in relation to manufactures (Prebisch, 1950; Singer, 1950). Based on this, and drawing on the historical experience of the high-income developed market economies and the forced industrialisation of the Soviet Union in the pre-war period, there was a widespread policy recognition of the need to promote industrialisation. The heated development debates of the 1980s and 1990s were not so much about the desirability of this policy objective, but rather about the means of getting there. The neo-liberal counter-revolution during this period addressed the role which states and markets play, with the general prescription that markets should determine resource allocation, and that this could be best achieved through a policy agenda of open-ness, privatisation and deregulation, the so-called "Washington Consensus".

Although the pursuit of industrialisation and manufactured exports was a widely-supported policy agenda, it was not without contention. Singer first pointed to the dangers that with growing productive capacity around the world, there was a danger that the terms of trade of some manufactures themselves might decline (Sarkar and Singer, 1991). Wood provided some evidence to support this hypothesis in his aggregate analysis of the price of developing country manufactured exports relative to imports from the developed market economies (Wood, 1997). Then, more recently, in a series of three studies, Maizels identified falling terms of trade in manufactures between developing countries and Europe, the USA and Japan (Maizels,1998, 1999, 2003).

These findings of course present a major policy challenge to the agenda set out in the World Bank Report cited above and reflected in the overwhelming policy agendas adopted not just by individual developing countries, but also by the bilateral and multilateral agencies who supported their development. Manufacturing exports may have underpinned the successful growth of many (predominantly Asian) developing countries, but for other countries to replicate this path, it would depend on *which* manufactures were being exported.

[1] The third conclusion – not affected by this research project – is that there is scope for diverse cultural and social responses to the challenge of globalisation.

However there is a major problem with the studies by Sarkar-Singer/Maizels and Wood, and it is this which has stimulated this research project. The level of aggregation in their analyses – two- and three- digit trade classifications - may (a) be too high to substantiate the analytical conclusions, and (b) may be too blunt to provide clear policy guidelines as to *which* manufacturing exports should be expanded. Consequently, using a largely unexplored detailed database of European imports as a proxy for global trade, in this research project we analysed the unit-prices of these imports to determine the answers to three main questions, all of which have considerable policy import:

1. Does the degree of sectoral disaggregation determine the extent to which price-trends can be identified?

2. Are the prices of manufactured exports from low-income countries falling more rapidly than those from high-income countries?

3. Which sectors can be identified as being least likely to experience falling prices?

2. METHODS

The major source of trade data used in prior analyses has been the UN trade database, COMTRADE. However, COMTRADE suffers from two major disabilities in the analysis of unit-prices. First, the unit of measure of quantity is not the same for all countries for the same product (for example, in furniture, China's trade is measured by units, whereas for most other countries it is by tonnes). And, second, the level of disaggregation is low, so that it is not clear whether what appears to be intra-industry differences are in fact inter-industry differences. By contrast, the little-used EU COMEXT database provides the capacity to determine unit prices to the eight-digit level in many cases, providing a very-specific record of trade flows.

The contribution of this research project was to work with the EU database to analyse unit prices of traded goods at the different levels of aggregation provided by the harmonized system (HS two-, four-, six-, and eight-digits). It however suffers from three major disadvantages:

- It only covers the period after 1988 – this, as we shall observe below –limits the types of statistical analysis which can be used

- The value of recorded trade until 2000 was in ECUs, a notional unit of account; the € was only introduced in 2001. (However the data is also provided in US$, which facilitates international and inter-sectoral comparison).

- The data is not as comprehensive as hoped, or particularly user-friendly for researchers.

Our initial analysis involved the application of ADF unit-root analysis and Kalman Filter statistical tests to determine the existence and direction of price trends (the

detail of this is reported in the methodological appendix). However it became evident that the time-period involved, coupled with uneven data, made it difficult to identify any statistically-validated trends; the problem was exacerbated when we imposed dummies to determine whether there was any impact on unit prices arising out of the 1997 Asian Crisis (did this speed-up price competition?) and the transition to the € in 2001. It also limited our ability to test for price-volatility. We consulted widely on this issue, both with UK and global expertise; the considered view was that this was a problem besetting almost all trade analysis (for example, an FAO meeting we attended concluded that ADF unit-root tests were unhelpful since their data only went back to 1926!). Consequently we then undertook a series of calculations of arithmetic price trends, using monthly data and attempting to compensate for price volatility by using two-year averages – 19988/9, and 2001/2.

Again after extensive consultations, we decided to utilise the $ rather than the € as a unit of account. This is partly because the € was only introduced in 2001 and therefore the backdating of value transactions before this date raised difficulties. But, with very few exceptions (Anderton, 2002 being one), almost all of the analysis of unit prices using COMEXT also employs the $; Maizels' analysis of terms of trade in the US, Europe and Japan also uses the $. We undertook extensive calculations to determine whether this affected the results. Although there is a correspondence between $ and € price trends, this is not close, and more importantly varies between commodities.[2] We have no unambiguous response to this challenge however, and it is one which affects all similar analyses.

The very large size of the EU dataset (see the Methodological Appendix) meant that we had to be selective in the sectors subject to price analysis. At the 2-digit level we investigated 71 products; at the 4-digit level 67 products; at the 6-digit level 99 products; and at the 8-digit level 151 products. The analysis of sectoral characteristics (question 2 below) involved price analysis of 12,439 products (many of which were incorporated in more than one sectoral classification).

Three sets of questions were addressed, the first primarily of analytical interest, and the second two more narrowly focused on policy:

- Does the degree of disaggregation determine the extent to which price-trends can be identified?

- Are the prices of manufactured exports from low-income countries more likely to fall than those from high-income countries?

- Which sectors can be identified as being least likely to experience falling prices?

[2] For example, comparing unit prices at the two-, four-, six- and eight-digit levels, the proportion of sectors with non-stationary coefficients (the ADF test) was 17, 32, 40 and 32 percent for the $ values, and 20, 22, 32 and 24 percent for the € values. In other words the direction of change was similar, but the amplitude was only loosely correlated.

3. FINDINGS

3.1. Does the degree of disaggregation determine the extent to which price-trends can be identified?

This, as we have seen, is an important question which has particular relevance for the academic analysis of terms of trade (but also, as Celi and Smith 2003 point out, for the analysis of the employment impact of trade). Table 1 shows the results of our ADF unit-root calculations. As can be seen, with the exception of the upper middle income group of exporters, there is a general tendency for the degree of non-stationary trends to increase with the degree of sectoral disaggregation, at least as we move from the two- through the four- and six-digit levels. (A "non-stationary trend" means that there is in fact a trend in prices – these may be upward – positive – or downward – negative).

Why does the pattern not continue to the eight-digit level? We were not able to investigate this question within the time frame of the project, but it is possible that it is at the eight-digit level that protectionism enters the picture. (For example, the seasonal protection on particular agricultural commodities is defined at the eight-digit level). This might explain why the proportion of non-stationary trends falls at the highest degree of disaggregation, since it is here that protectionism insulates products from intense price competition.[3] Also, the data available at eight digits is less complete than at the other digits.

Table 1: Augmented Dickey-Fuller (ADF) unit root tests: Percent of non-stationary coefficients

Country group	**HS Category**			
	2	**4**	**6**	**8**
US$				
All countries	17	32	40	32
Low-income	9	17	28	26
Lower-Middle-income	23	28	28	36
Upper-middle-income	28	24	23	24
High-income	21	22	29	24

3.2. Are the prices of manufactured exports from low-income countries more likely to fall than those from high-income countries?

Table 2 shows that the degree of price competition is closely and inversely related to the per-capita income of the exporting country. In other words, it is the poorest countries – and particularly China – who are most likely to be locked into heavily competitive markets. This of course corroborates the concerns of Singer-Sarkar, Wood and Maizels cited above.

[3] We are grateful to Chris Stevens for suggesting this explanation.

Table 2: Number of sectors and trends in unit prices, (simple averages) 1988/89-2001/02

HS/Country Category	*Total*	***Positive slopes***		***Negative slopes***	
		Number	**%**	**Number**	**%**
HS2					
Total	71	41	57.8	30	42.3
Low income	71	46	64.8	25	35.2
China	71	33	46.5	38	53.5
Lower-middle income	71	60	84.5	11	15.5
Upper-middle-income	71	60	84.5	11	15.5
High-income	71	67	94.3	4	5.6
HS4					
Total	67	37	55.2	30	44.8
Low income	64	43	67.2	21	32.8
China	63	35	55.6	28	44.4
Lower-middle income	67	55	82.1	12	17.9
Upper-middle-income	67	58	86.6	9	13.4
High-income	67	61	91.1	6	8.9
HS6					
Total	94	49	52.1	45	47.9
Low income	86	59	68.6	22	25.6
China	74	52	70.3	22	29.7
Lower-middle income	93	76	81.7	17	18.3
Upper-middle-income	93	77	82.2	16	17.2
High income	94	86	89.4	8	8.5
HS8					
Total	77	47	61	30	38.9
Low income	67	50	74.6	17	25.4
China	57	39	68.4	18	31.6
Lower-middle income	75	63	84	12	16
Upper-middle-income	76	66	86.8	10	13.2
High-income	77	71	92.2	6	7.8

3.3. Which sectors can be identified as being least likely to experience falling prices?

We reviewed 23 studies which developed different taxonomies of sectors. These were designed to identify factor-, innovation-, knowledge- and technology-intensity (see attached paper). Table 3 summarises the results arising from the sectoral classifications which we found most insightful, taking into account the level of disaggregation, and the period in which sectoral classifications were made. (For example, we rejected Leamer's widely-used classification since it is based on structural relationships drawn from the US economy during the 1950s and 1970s!).

In general it would seem that something between 60 and 65 percent of all sectors experienced price declines during the 1988/89-2001/02 period. However, the degree of price fall was lower the greater the technological content. Surprisingly, utilising Lall's schema, if anything, resource-based sectors displayed a diminished tendency towards falling prices – we turn to the policy significance of this below.

Table 3: Sectoral unit price behaviour, 1988-2001

Sector	*Total*	*Positive slopes*		*Negative slopes*	
		Number	**%**	**Number**	**%**
UNCTAD					
Total	3,632	1,287	35	2,345	65
Labour/resource intensive	1,118	343	31	775	69
Low-skill/low-tech/low capital intensive	430	142	33	288	67
Medium-skill/medium-tech/medium capital intensive	738	264	36	474	64
High-skill/high-tech/high capital intensive	1,043	432	41	611	59
OECD					
Total	3,816	1,297	34	2,519	66
Low	1,215	362	30	853	70
Medium low	767	204	27	563	73
Medium high	1,451	544	37	907	63
High	384	188	49	196	51
Lall					
Total	2,006	737	37	1,269	63
Resource-based	472	185	39	287	61
Low technology	674	196	29	478	71
Medium technology	295	120	41	175	59
Engineering	336	111	33	225	67
High technology	245	119	49	126	51
UNCTAD					
Dynamic products	322	141	44	181	56
SUTTON					
R&D Intensive	144	71	49	73	51

4. IMPLICATIONS

There are significant implications of our analysis for the academic literature, particularly with regard to the implications of disaggregation for the analysis of terms of trade and the employment impact of trade. Most studies of these issues work at the two- and three-digit level, and fail to distinguish between intra- and inter-industry

effects.[4] However, it is the policy implications which we would like to stress, particularly those which relate to the achievement of the Millennium Goals.

As we have seen there is a widespread perception that poverty reduction and growth can best be achieved through the promotion of manufactured exports. However, on the basis of our detailed analysis of these trade data we offer three cautionary conclusions:

- The promotion of manufactured exports as a response to the declining and volatile prices of primary commodities is more complex than it seems. Particularly with China's rapidly-growing participation in price sensitive global markets, there may be a fallacy of composition in this policy agenda.

- The way to avoid this trap of participating in price-declining products is to augment the export of innovation-, knowledge- and technology-intensive products. This accords with the micro-level research undertaken within the family of value chain analysis (for example in the Globalisation and Poverty research programme).

- There may be scope for reconsidering the conclusion that developing countries should vacate resource-intensive sectors. This is not only because our research in this project suggests that these products may be less price-threatened than low-technology and labour-intensive manufactures, but also because our complementary research has shown that there is unutilised scope for poor countries to augment the value of some primary commodities (Fitter and Kaplinsky, 2001).

5. DISSEMINATION

Our research has been much more time-consuming than anticipated and we have therefore not yet been able to devote as much time as we intend to the dissemination process. So far we have:

- Prepared a paper on technology-related issues and presented it to the Pavitt Memorial Conference last September. It was well-received and has been sent out for review in a peer-reviewed journal of note. (This paper is attached with this report)

- Given presentations at the FAO to a global network of analysts and policy makers working on primary commodities, and at UNCTAD

- Lectures in London (Birkbeck College), Manchester and Sussex.

[4] We are in the process of preparing a Discussion Paper on these issues.

In addition we will:

- Prepare a Discussion Paper which summarises our work, and which has a more direct policy focus than the attached paper on sectoral price trends. This will be submitted in a revised form for journal publication.

- Place the empirical material and the analytical tools on a web-site (housed within the IDS Globalisation web-site) to allow for interactive use

- Give papers at the Globelics Conference in Beijing in October, and at the MIT Industrial Performance Centre in June.

Raphael Kaplinsky is also writing a book on globalisation and poverty and the material generated by this project will comprise one of its core chapters (outline attached).

REFERENCES

Acha, V., A. Davies, M. Hobday and A. Salter (2002), "Exploring the Capital Goods Economy: Complex Product Systems in the UK", mimeo, Brighton: Science and Technology Policy Research, University of Sussex, and Centre for Research in Innovation Management, University of Brighton.

Anderton, Bob (2003), 'Extra-Euro Area Manufacturing Import Prices and Exchange Pass-Through', Working Paper No. 219, European Central Bank.

Davies, S. and B. Lyons et. al. (1996), Industrial Organization in the European Union: Structure, Strategy, and the Competitive Mechanism, Oxford: Clarendon Press.

Fitter, R. and R. Kaplinsky, (2001), "Can an agricultural "commodity" be de-commodified, and if so, who is to gain?", IDS Discussion Paper 380, Brighton: Institute of Development Studies.

Hamilton, J. (1994), Time Series Analysis, Princeton NJ: Princeton University Press, USA.

Harvey, A. (1989) Forecasting, structural time series models and the Kalman Filter, Cambridge: Cambridge University Press.

Harvey, A. (1997) 'Trends, cycles and autoregressions' Economic Journal, 107, pp.109-201.

Koopman, S. J., A. Harvey, J. A. Doornik, and N. Shepard (2000), STAMP: structural Time Series Analyser, Modeller and Predictor, London: Timberlake Consultants Press.

Lall, S. (2000), "The Technological Structure and Performance of Developing Country Manufactured Exports, 1995-1998, Oxford Development Studies, Vol. 28, No. 3, pp 337-369.

Maizels, A., T. Palaskas and T. Crowe (1998), "The Prebisch-Singer Hypothesis Revisited", in Sapsford, D. and J. Chen (eds.) (1998), Development Economics and Policy: The Conference Volume to Celebrate the 85th Birthday of Professor Sir Hans Singer, Basingstoke: Macmillan.

Maizels, A. (1999), 'The Manufactures Terms of Trade of Developing Countries with the United States, 1981–97', Working Paper 36, Oxford: Finance and Trade Policy Centre, Queen Elizabeth House.

Maizels, A. (2003), The Manufactures terms of Trade of developing and developed countries with Japan, 1981-2000, mimeo, Oxford: Queen Elizabeth House.

Marsili, O. (2001). The Anatomy and Evolution of Industries: Technological Change and Industrial Dynamics, Cheltenham: Edward Elgar.

Mayer, J., A. Butkevicius and A. Kadri (2002), "Dynamic Products in World Exports", Discussion Paper No. 159, Geneva: UNCTAD.

Neven, D. (1994), "Trade Liberalisation with Eastern Nations: How Sensitive?", in R. Faini, and R. Portes (eds), European Union Trade with Eastern Europe: Adjustment and Opportunities, London: CEPR.

OECD (1994), Industrial Policies in OECD Countries, Annual Review 1994, Paris: OECD.

Prebisch, R. (1950), "The Economic Development of Latin America and Its Principal Problems", Economic Bulletin for Latin America 7, N. York: United Nations.

Sarkar, P. and H. W. Singer (1991), "Manufactured Exports of Developing Countries and Their Terms of Trade", World Development, Vol. 19, No. 4, pp 333-340.

Singer H W (1950), "The Distribution of Gains between Investing and Borrowing

Countries", American Economic Review, 15, pp. 473-85.
Sutton, J. (1998), Technology and Market Structure: Theory and Practice, Cambridge, Mass: MIT Press.UNCTAD (1996
Mayer, J., A. Butkevicius and A. Kadri (2002), "Dynamic Products in World Exports", Discussion Paper No. 159, Geneva: UNCTAD.
Wood, A. (1997), 'Openness and wage inequality in developing countries: the Latin American challenge to East Asian conventional wisdom', World Bank Economic Review, Vol. 11 no 1: 33-57
World Bank (2002), Globalization, growth, and poverty: building an inclusive world economy, Policy Research Report, Washington: World Bank and Oxford: Oxford University Press.

METHODOLOGICAL APPENDIX

The Database
The COMEXT database provides price and volume data for more than 10,000 commodities at the HS two-, four-, six-, and eight-digits levels, on a monthly basis for 250 trading partners, using the Harmonised System nomenclature. Thus just considering the eight-digit data, between 1988 and 2002 there are around 1.9 million data-points. Were these data to be contained in a single file, the analytical task would be relatively uncomplicated by the need to organise data. But since the data is provided in more than 150 files, the sheer task of organising the data was enormous, and far exceeded our expectations. In fact we have had to put considerably more time into organising this data analysis than anticipated and had to invest additional resources into augmenting our hardware.

Table A1 displays the number of sectors under consideration at the different levels of aggregation, from 2- to 8-digits:

Table A1
Composition of the Harmonised System Nomenclature
(Manufactures)

HS Codes	Number of commodities
All manufactures	
02	74
04	1,064
06	4,714
08	10,775
Manufactures (excluding oil ores, and precious stones)	
02	71
04	1,008
06	4,587
08	10,512

Sample selection

Given the size of this database we have necessarily had to be selective. In the case of the country groups, the choice of sectors for quantitative analysis was structured by the following criteria:

- 2-digit category: we analysed 71 product lines, that is, all HS 2 sectors excluding ores, oils and precious stones (the full universe of manufactures)

- 4 digit category: we analyse 67 product lines. This was defined by those sectors accounting for the top 40 percent of EU imports in each of the 20 largest 2-digit categories

- 6 digit category: we analyse 99 product lines. This was defined by those sectors accounting for the top 40 percent of EU imports in each of the 20 largest 4-digit categories

- 8 digit category: we analysed 151 product lines. This was defined by those sectors accounting for the top 40 percent of EU imports in each of the 20 largest 6-digit categories

For our assessment of the unit price trends of imports coming from different countries, we used the World Bank income groups-classification

- low-income

- lower-middle-income

- upper-middle-income,

- and high-income.

In addition, since China's presence in manufactured trade has played such a significant role in recent years, the price analysis within these two-, four-, six- and eight-digit product codes was also undertaken for its exports.

For the sector classification, we reviewed 23 studies and selected eight for detailed analysis, based on the scope they offered for detailed disaggregation and their more recent vintage. Almost without exception each of these sectoral categories were defined at the two- and three- digit level; in addition they were all in the SIC (and SIC-related) or SITC classificatory systems, so we had to invest considerable resources in converting these classificatory systems to the HS schema, and in expanding the degree of disaggregation. (The 23 studies are reviewed in the attached paper). The eight classifications are as follows

a) Technology and branding intensity (Davies and Lyons et. al., 1996):

- Horizontal differentiation – no quality focus
- R&D Intensive - >1% sales
- Advertising Intensive - >1% sales
- R&D and Advertising Intensive - >1% sales

b) Dynamic Products in Global Trade (Mayer, 2002):

- 20 most dynamic products in world non-fuel exports, ranked by annual average export growth, 1996-98.

c) Europe's revealed comparative advantage (Neven, 1994):

- High-tech, high human capital (high wages/VA, high avg wage, high white collar)

- High human capital, low invest (low invest/VA, high avg wages, high wage/VA)
- Lab intensive (low avg wage, high wage/VA, low invest/VA)
- Labour and capital intensive (high invest/VA, low avg wage, low white collar, intermediate wage/VA)
- Human capital and invest intensive (high avg wages, intermediate wages/VA, high invest/VA, high white collar)

d) UNCTAD (UNCTAD, 1996):

- Labour and resource-based industries
- Low-to-medium levels of skill, technology, capital and scale
- Medium-to-high levels of skill, technology, capital and scale
- High levels of skill, technology, capital and scale

e) OECD process approach (OECD, 1994):

- high-tech
- medium-high tech
- medium-low tech
- low-tech

f) Lall (Lall, 2000):

- Resource based
- Low technology
- Medium technology
- Engineering
- High technology

g) COPS (complex manufactured products) (Acha et. al., 2002)

h) Sutton (Sutton, 1998)
- R&D Intensive (>4% sales)

Testing

Structural time series models.

There are a variety of time series models which could be used, for example the estimation of univariate time series models such as the Auto-Regressive Integrated Moving Average (*ARIMA*). However, these models are increasingly widely seen as simple data-fitting techniques with little or no economic meaning. Consequently, a group of econometricians led by Harvey proposed an alternative method to model time series (See Harvey, 1989, 1997), leading to the development of structural time series models. One of the key features of these models is that they allow both the level and the slope of the parameters in a model to change through time.

Working within this tradition, we applied the Augmented Dickey Fuller (ADF) unit-root test, based on a regression of the form:

$$\Delta y_t = \alpha + \phi y_{t-1} + \sum_{i=1}^{T} \Theta \Delta y_{t-i} + \delta t + \varepsilon_t \,, \qquad (1)$$

where ε_t is a random error term, and α and t are a constant and time trend respectively. The ADF test corresponds to the value of the t-ratio of the coefficient ϕ. The null hypothesis of the ADF test is that y_t is a non-stationary series, which is rejected when ϕ is significantly negative. Twelve lags, a constant, and a time trend were included in the ADF regressions of the levels of the variables. For the level variables, the sample is 1988-2001 monthly.

We also applied the Kalman Filter as an indicator of the slope and size of these trends. Following the exposition in Koopman, Harvey, Doornik, and Shepard (2000), a general univariate time series model can be written as

$$x_{it} = \lambda_{it} + \psi_t + \varepsilon_t$$

$$\varepsilon_t \approx IN(0, \sigma_\varepsilon^2) \qquad (2)$$

$$t = 1,...,T$$

where x_{it} is the unit price, λ_t is the trend, ψ_t is a first-order autoregressive element, and ε_t is an irregular term. The trend component (λ) in (2) is a key and flexible element, and can be specified as

$$\lambda_{it} = \lambda_{t-1} + \delta_{t-1} + \varsigma_t \qquad (3)$$

where δ_t is the slope of the trend component λ_t.

Monthly data was used, with the fixed level and slope specification (and an auto-regressive component), including dummy interventions for the periods 1996/97 and 2001, to account for the Asian crises and the introduction of the Euro respectively. The trends provided by the Kalman-Filter methodology are very sensitive to the number of observations; thus the reported coefficients are less than the number of commodities that comprise the different country and sector categories.

Structural time series models are computed through maximum likelihood estimators and the forecasts (i.e. the trends analyses) are generated by applying the Kalman filter (see Hamilton, 1994). The Kalman-Filter technique is particularly useful to extract the long-term components (*smoothing*, e.g. potential GDP) or expected values (*filtering*, e.g. expected inflation, or unit prices) of a given time series. Notably, the first application of the technique uses all the observations in a given sample (T), whereas the second only uses information available at the time of the estimation $\langle t | t-1 \rangle$, where $t = 1,...,T$.

The ADF and the KF tests were undertaken for all of the country-group analysis.

Annual variation of unit prices (arithmetic means)
Given the restrictions of the Kalman-Filter method in terms of data requirements, annual unit price performance was calculated for both the country- and the sector-groups.

Future challenges
Five further research challenges can be identified as an outcome of our research:

1. The received sectoral classifications – reviewed in the attached paper – suffer from three major problems. First, they tend to use dated structural relationships, especially those building on Leamer's 1984 study. Second, almost all occur at high levels of aggregation, generally involving two- and three-digit classifications. And, thirdly, they are frequently based on based on judgement, often of a non-technical sort.

   For this reason we spent considerable time and resources in beginning a process in which we developed new sectoral classifications. Our data sets were the UK Annual Business Inquiry and the Community Innovation Survey. The former covers 78,500 enterprises and was conducted most recently to cover the years 1997-2001; the latter is a recent DTI firm-based survey of innovation conducted between 1998 and 200 and covering 8,173 manufacturing firms based on an EU wide structured enquiry (DTI, Community Innovation Survey). This involved considerable work in translating across nomenclatures.

   However the task was too great to be completed, although much background research was done. It lends itself to further enquiry in the future however.

2. China is by hypothesis a major cause of price competition. We have undertaken preliminary analysis on this issue (Table 2 above) but there is scope for extending this into the sectoral analyses, and to other rapidly emerging Asian exporters such as India and Indonesia.

3. We were unable to complete our work on the impact of concentration on prices. This is an important issue, lending itself to further enquiry, incorporating the Herfindhal index.

4. We had intended to determine the impact of different protectionist regimes on unit price performance, but were unable to complete this work with the resources available.

5. There is scope for a variety of structural models which combine the impact of a number of different factors (country, sector, protection, period, etc) on price behaviour. They will also allow for the use of interval scale measurements of price fall – that is, relating country and sectoral data with the degree of price change rather than whether prices have risen or fallen.

APPENDIX 2:

OUTLINE OF BOOK IN PREPARATION BY RAPHAEL KAPLINSKY

LOOSE TITLE "GLOBALISATION – A RACE TO THE BOTTOM?"

Chapter 1	Overview of globalisation	Draft completed
Chapter 2	Globalisation and poverty	Draft completed
Chapter 3	Generating and appropriating rents as a basis for sustainable income	Draft completed
Chapter 4	How poor producers connect to markets	In outline
Chapter 5	What's happening to global prices?	To be drafted using data from this research project
Chapter 6	The global furniture industry: A case study	Analysis completed and written up in another form
Chapter 7	How does theory help us to respond appropriately?	In note form
Chapter 8	The role for policy	In note form