OECD DEVELOPMENT CENTRE

POLICY BRIEF No. 32

Commodity Funds: How To Fix Them?

by

Daniel Cohen, Thibault Fally and Sébastien Villemot

- Commodity prices are vulnerable to adverse shocks and slow to recover from them; producers, however, need some income stability.

- By relating price triggers to historical averages, commodity funds can provide some protection to producers without trying to keep prices at unsustainable levels.

- A commodity fund affording reasonable protection to producers from sudden fluctuations in prices can be implemented at a median cost of only about six months' worth of exports.

POLICY BRIEF No. 32

Commodity Funds: How To Fix Them?

by

Daniel Cohen, Thibault Fally and Sébastien Villemot[1,2]

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

The Development Centre of the Organisation for Economic Co-operation and Development was established by decision of the OECD Council on 23 October 1962 and comprises 22 member countries of the OECD: Austria, Belgium, the Czech Republic, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Korea, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and the United Kingdom as well as Brazil since March 1994, Chile since November 1998, India since February 2001, Romania since October 2004, Thailand since March 2005 and South Africa since May 2006. The Commission of the European Communities also takes part in the Centre's Governing Board.

The Development Centre, whose membership is open to both OECD and non-OECD countries, occupies a unique place within the OECD and in the international community. Members finance the Centre and serve on its Governing Board, which sets the biennial work programme and oversees its implementation.

The Centre links OECD members with developing and emerging economies and fosters debate and discussion to seek creative policy solutions to emerging global issues and development challenges. Participants in Centre events are invited in their personal capacity.

A small core of staff works with experts and institutions from the OECD and partner countries to fulfil the Centre's work programme. The results are discussed in informal expert and policy dialogue meetings, and are published in a range of high-quality products for the research and policy communities. The Centre's *Study Series* presents in-depth analyses of major development issues. *Policy Briefs* and *Policy Insights* summarise major conclusions for policy makers; *Working Papers* deal with the more technical aspects of the Centre's work.

For an overview of the Centre's activities, please see **www.oecd.org/dev**

Also available in French under the title:

Fonds de matières premières : comment les améliorer ?

Table of Contents

Introduction

Poor countries are and will remain for some time vulnerable to external shocks, whether to export prices or from natural disasters. The lowest-income countries have a higher incidence of shocks than other developing countries and tend to suffer larger damages when shocks occur. For the poorest countries, the average number of disasters between 1997 and 2001 has been one every 2.5 years. Commodity price shocks are also more severe for poor countries. Low-income countries experience this type of shock on average every 3.3 years. About 26 highly-indebted countries have an export concentration of more than 50 per cent in three or fewer commodities, while 62 per cent of the total exports of the least developed countries are unprocessed primary commodities.

Exogenous shocks on commodity prices have significant direct adverse effects on growth and the multiplier effects of negative terms of trade shocks can also be large. Collier and Sewn (2001) show, for a sample of cases where the direct income loss averaged 6.8 per cent of GDP, the total correlated loss of income amounted to about twice that much, to 14 per cent of GDP. Research shows that these negative shocks increase the incidence of poverty. The shocks also have a significant impact on fiscal and external balances. An IMF study shows that terms-of-trade shocks and adverse weather conditions have played an important role in exacerbating debt problems[3].

In theory, the desired adjustment to a shock depends on the nature of the shock. The response to permanent and to transitory shocks should not be the same. If the shock is expected to be permanent, countries should adjust as fast as possible to the new environment. If instead a negative shock is expected to be reversed by a positive shock, it makes sense to finance the bad years out of savings or out of debt. Commodity prices, however, are usually very slow to recover from adverse shocks. This is one of the reasons why it has proven so difficult either to smooth their effect or to stabilise them. Countries that borrow when prices are low are bound to face financial difficulties before prices recover to their previous levels. In fact, even if a shock is deemed to be transitory, there can be considerable uncertainty about how long it will take to be reversed. Over optimism concerning the pace of a recovery has been a key factor behind the excessive occurrence of debt by poor countries.

Similarly, Commodity Funds that attempt to stabilise prices at a given level are bound to fail. Either there is a negative shock and the Fund soon becomes insolvent, or there is a positive shock and the Fund becomes so well-endowed that the temptation to expropriate it becomes irresistible. This explains why

marketing boards have almost always failed, either through corruption or through bankruptcy. As documented in a recent FAO study, however, the dismantling of marketing boards has not been without creating new problems. Uncertainty regarding their income, in particular, has created credit problems to crop producers, so that input use has dropped significantly, explaining in part the drop of quality of the products[4].

On the donor community, there have been two major compensatory financing programmes for terms of trade shocks: the EU Stabex and Sysmin and the IMF's Compensatory Financing Facility (CFF). The EU's programme covered agricultural commodity exports and selected mineral exports. From 1975 to 2000, about 6.1 billion euros was disbursed. The CFF provides financing when a country experiences a "temporary" shortfall in export earnings or an excess in cereal import costs. A total of SDR 25 billion has been disbursed in response to 344 requests for assistance since 1963. Neither experience was deemed to be highly successful however. As shown in Guillaumont *et al.* (2003), both mechanisms became increasingly contingent on conditionalities of various sorts, which have lengthened the delay between the occurrence of the shock and the need of the countries. Delays in response have actually been so long that they turn out to be pro-cyclical, rather than counter-cyclical as one would have expected (Brun *et al.* 2001).

Collier and Dehn (2001) also present evidence that aid allocations are not well targeted to commodity price shocks. Commodity price shocks, they argue, are like "silent crises". Financial assistance in the event of a terms-of-trade shock appears to be harder to design and target than that for natural disasters assistance (natural disasters actually attract more external financing than commodity price shocks).

These failures explain the conclusion that not much can or should be done to stabilise commodity prices. Exporting countries, it is sometimes argued, should behave as if any commodity shock was bound to be permanent and adjust accordingly. This is too extreme a conclusion. There is no reason why countries should not find ways to protect themselves against adverse shocks, if not fully at least partially. The idea developed in this Brief builds indeed upon the following intuition: countries can get protection against commodity shocks, but for a while only rather than indefinitely.

Technically, the solution that we explore is the following. We propose to create new Commodity Funds, with limited liabilities, to stabilise commodity producers' income around a reference price which is a moving average of past prices. The reference price upon which the income of the producers is calculated is known in advance to the producers and yet is allowed to follow market trends smoothly. This avoids the pitfalls of past stabilisation based around

a given reference price, which is bound, sooner or later, to be out of touch with market forces. In the simulations that we present, the reference price is a moving average of previous prices over the past five years. Even in the event of a permanent shock, this gives the country time to take the needed adjustment.

How much would it cost to create a Fund that protects producers against deviations from such a five-year moving average? The answer is twofold. In the worst case scenario where the Fund should stand ready to guarantee producers against a total collapse of their prices, it would cost a one-off endowment worth 2.7 times the yearly value of the exports that one seeks to protect. Note that this is a finite number: even if prices were to stay indefinitely nil, the Fund would stop guaranteeing producers after five years. In general, however, the Fund is bound to cost less. Over a period of 50 years, the median cost would be worth about six months exports. The Brief also presents the risk of default of the Fund associated to lower levels of endowment than the maximum needed. One year of exports would be associated to a risk of default of about 10 per cent over a 50 years horizon.

There are many ways by which the ideas involved in this mechanism could be applied. One is simply to create a Fund in which producers would be free to participate and which would be endowed accordingly. The Fund would act as an insurer, which producers would draw upon or replenish according to the prices that they face.

Another idea would be to modulate traditional ODA according to the moving average idea that we propose. Commodity exporters would receive ODA that would vary inversely with deviations of commodity prices from past averages. The computations that are performed in the *Brief* would then help donors assess the cost to proceed along these lines.

Empirical Investigation

We seek to analyse how a Commodity Fund could guarantee a reference price to an exporting country, where the reference prices is a moving average of the price over the preceding years. In the sequel, we shall focus on a reference price based on the average of the past five years. In the simulation that we offer, the stabilisation is done through a Fund which is initially endowed with a given amount of resources. The aim of this *Policy Brief* is to determine the probability of depletion of the Fund and to investigate how much resources are needed to avoid (with various degrees of probability) its bankruptcy.

In order to calibrate the results, monthly commodity price data reported in the International Monetary Fund's *International Financial Statistics*, for the period January 1957 to December 2003 are used. The commodities used for the study are presented in Table 1. For each selected commodity, the table presents the sample period used for the study, the spot price in July 2003, then a figure which can be regarded as a rough estimate of the total exports of developing countries in 2003. In the following analysis, all prices will be real prices, deflated by a US producer price index, taking July 2003 as the reference.

Table 1. **Selected Commodities**

Commodities	Sample period	Price 7/2003	Annual Value ($ million)
Bananas	1/75-12/2003	296.30 US$/ton	3 438
Cocoa Beans	1/1957-12/2003	1 556.87 US$/ton	43 287
Cotton	1/1957-12/2003	60.19 US cts/lb	4 248
Rice	1/1957-12/2003	199.48 US$/ton	3 970

Figures 1 to 4 plot monthly spot prices, along with monthly moving averages over 2, 5 and 10 years, with an initial lag of 1 year (i.e. the moving average is lagged by one year). With the exception of bananas, one striking feature of price movements is that the peaks appear to be more accentuated than the troughs, a feature that is analysed in Deaton and Laroque (1992).

Simulating the Fund[5]

There are many parameters which can be adjusted for the simulations. One is the number of years over which the moving average is calculated. We present simulations based on a 5 years moving average. Another parameter is the yearly interest rate, which we take equal to 5 per cent. The other key parameter, which we allow to vary in the simulations, is the initial endowment of the Fund, called F_0.

The first set of simulations has computed which endowments are needed in order to reduce the risk of bankruptcy of the Fund below a given level. They are presented in Table 2.
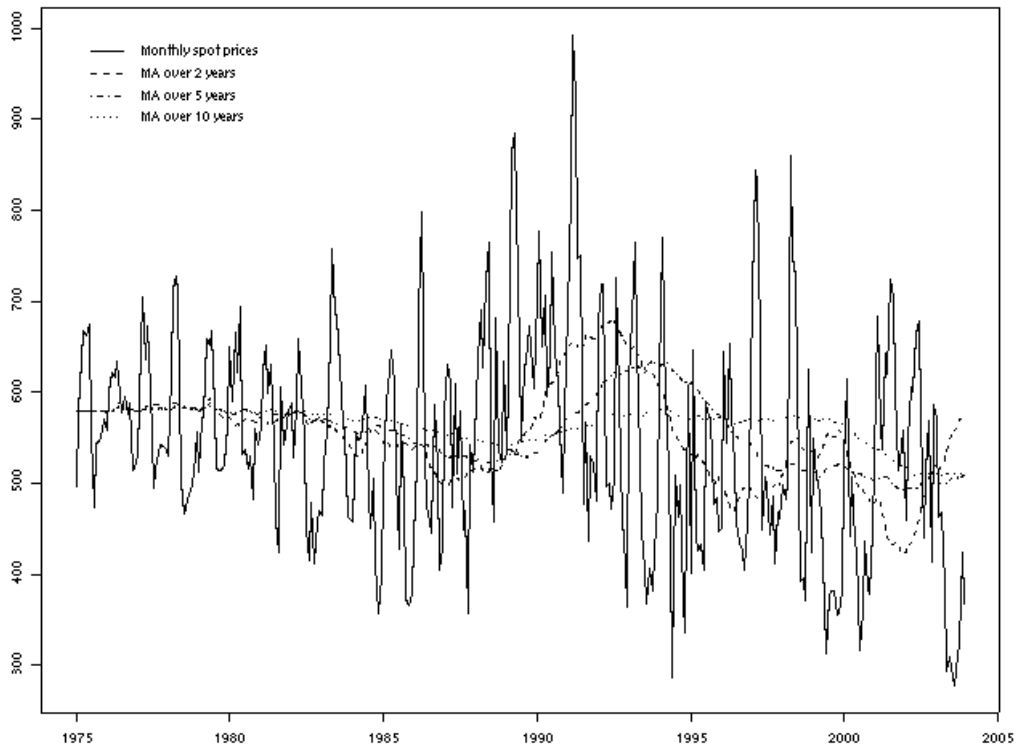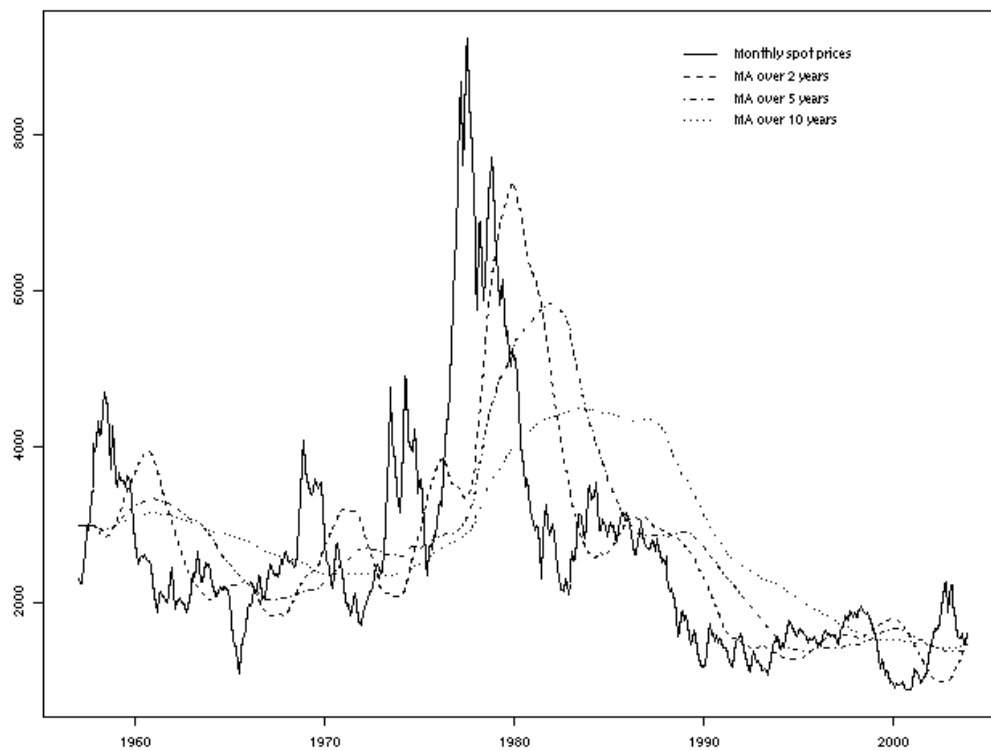
Figure 1. **Bananas**
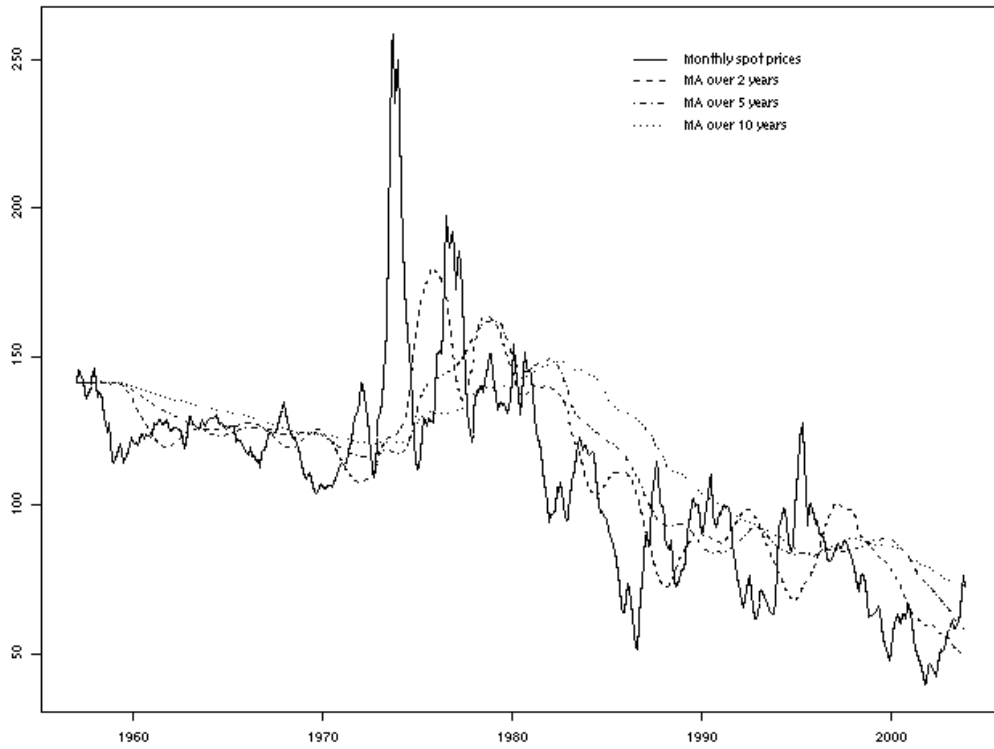
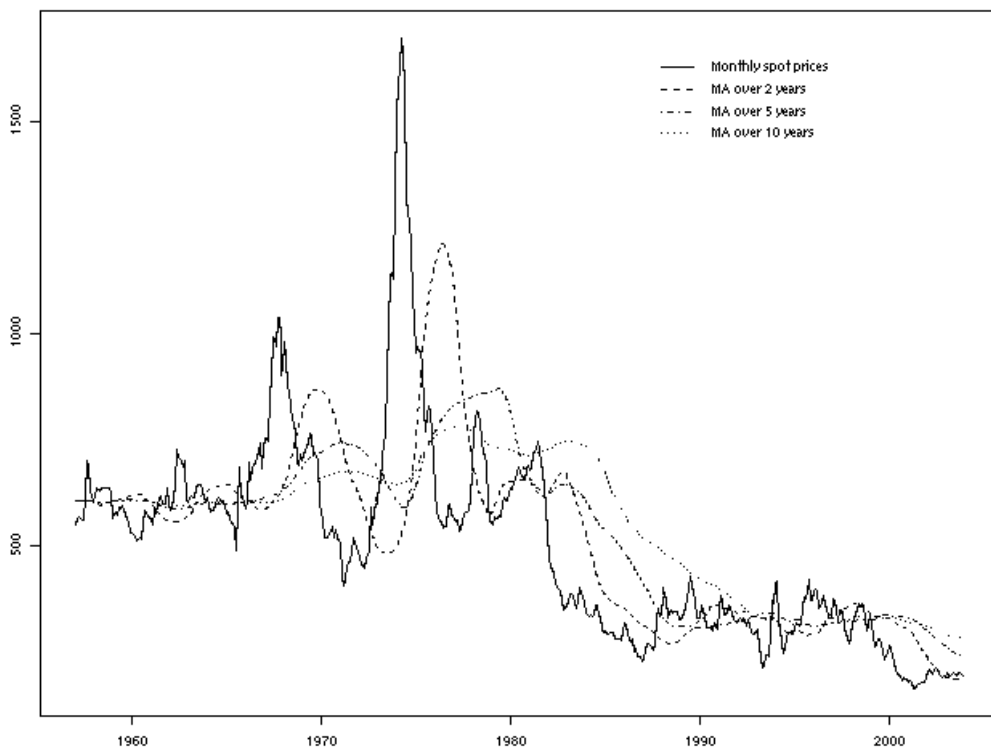Figure 2. **Cocoa Beans**

Figure 3. **Cotton**

Figure 4. **Rice**

Table 2. **Endowment and Default Risk of a Commodity Fund**

Default risk	50%	10%	5%	1%	0%
Bananas	0.39	1.12	1.36	1.87	2.68
Cocoa	0.78	1.80	1.97	2.19	2.68
Cotton	0.65	1.26	1.40	1.62	2.68
Rice	0.93	1.75	1.90	2.11	2.68

Note: Endowments are measured as a fraction of yearly volumes.

For example, the line for cocoa refers to price stabilisation for cocoa beans. With an initial endowment of 1.8 times the annual value of trade, the Fund will remain always positive with a 90 per cent chance. With an initial endowment worth 2.68 times the volume of trade, the Fund will never become negative, even at an infinite time horizon. This is in fact a general statistical property: it never takes more than 2.68 times the flows of trade volume to stabilise commodities along the lines of our proposal. The intuition is in fact quite simple. The worst case scenario is one in which the price of the commodity collapses to zero indefinitely. In that case the Fund has to pay the exporters one full year of exports during the first year, then 0.75, then 0.5 then 0.25 then nothing. That makes 2.5 years, given the interest on the Fund borrowed, that makes a bit more.

Clearly, however, the numbers in Table 2 are worst case scenarios. In average, the Fund is much less costly. Ups and downs usually alternate, around the moving average, so that the Fund sometimes recaptures part of the transfers. The median cost of the Fund is simulated, when it is allowed to run for a period of 50 years. The results are shown in Table 3 below.

Table 3. **Median Cost Needed to Stabilise Prices**
(Over a 50-year life)

Commodities	Median Cost
Bananas	0.30
Cocoa	-0. 14
Cotton	0.65
Rice	0.58

Note: Endowments are measured as a fraction of yearly volumes.

The table shows that stabilizing the income of Cotton and Rice produces would take about less than 6 months of exports in 50 per cent of cases. The corresponding cost would be around 4 months for bananas. In the case of Cocoa, the cost would actually be negative: in average one would gain by offering this scheme to exporters.

Other Options

Two other alternative options were also tested. One is the operating cost of a Fund which would pool all five commodities together. In the case of a 10 per cent default risk and for a five-year moving average, a cost corresponding to 0.88 times the volume of trade to be insured is required. This is quite significantly less than the amounts obtained for each individual fund, which varied from 1.12 to 1.80 times the trade flows and shows that there would be some merit to form a "mega Fund" rather than individual ones.

Another simulation is to calculate how large should be the endowment of a Fund that would stabilise commodities on an asymmetric basis, that is which would transfer resources in case of a bad shock but not to collect them in case of a positive one? Table 4 presents the results corresponding to a 10 per cent default risk.

Table 4. **Endowment Needed to Stabilise Prices
with Asymmetrical Payments**

Bananas	2.22
Cocoa	6.56
Cotton	1.87
Rice	3.67

Note: As a fraction of trade volumes, with 10 per cent default risk.

The asymmetrical scheme is clearly much more expensive than the symmetric one. In the case of cocoa, for instance, the Fund would need to be endowed with six times the corresponding volume of trade, while, under the symmetric case, the amount was only 1.81 times the flows involved.

One important point should also be noted. As Fally (2004) demonstrates theoretically, one should not seek to protect the entirety of the producers' income. Indeed, in that case, the scheme would be open to manipulation. In year *t* for instance the producers could reduce production so as to let prices go up and then in year *t+1* flood the market at the stabilised price. If instead they receive a protection for only the first *x* tons of their output, then the incentive to manipulate prices disappear.

Policy Implications

There is a wide array of institutions and issues implicated in this problem. The relevant institutions – whether IDA (the branch of the World Bank lending to the poorest countries) or the IMF or other members of the international donor community – could lend support to Commodity Funds. Currently, LIC government finances absorb alone the risks and shocks associated with a range of economic, geopolitical, epidemiological and climatic uncertainties.

One could first think of creating new debt instruments that explicitly take account of exogenous risks. In September 1999, the World Bank introduced risk management products linked to its loan exposure. These hedging products are: interest rate swaps, caps and collars; currency swaps; and commodity price-linked swaps. The Bank decided not to offer specific commodity-based loans at that time because it would have been difficult to undertake the commodity-based funding and liability management to match the disbursement periods of Bank loans while managing associated risks.

The approach in this paper would help to overcome these difficulties. One idea would be to set up a Fund aimed at smoothing the payments made by the debtors to IDA for instance. (Gilbert *et al.,* 2004) have calibrated similar ideas). The mechanism described here would not extinguish the debt in case of the prices falling to zero. It would simply give time to adjust. On the other hand, this would not be very costly. For a loan of 100 whose repayment is 5, all that would be needed is a Fund endowed with say 15 (see Cohen and Reisen, 2006, on a similar idea). The fact that the Funds have limited liabilities has the merit of putting a specific limit to the commitment of the donor community.

Making ODA counter-cyclical is another way of addressing the problem. Although this has long been a theme of donor agencies, they often fail to recognise that "counter-cyclicality" does not mean much when shocks are either long lasting or permanent. The idea developed in this brief allows to give a more precise content to this idea and to measure the corresponding cost of implementing it. ODA could include a component that allows to smooth commodity exporters incomes. Donors would commit a given amount of resources to a Commodity Fund, whose endowments could be directly counted as ODA at the time when they are granted by the donor.

Conclusion

This paper has presented a scheme which could be used in a variety of fashions: either directly to help producers protect themselves against adverse shocks, or to calibrate ODA to a government to dampen the impacts of price volatility on GDP. The scheme could also help tailor new loans to commodity dependent countries, smoothing their repayment pattern accordingly. The orders of magnitude presented should give some indication of the costs of supplying a revenue-smoothing mechanism.

Notes

1. We thank David O'Connor for stimulating our interest on this topic and extremely useful comments as well as to participants to seminars organised by the World Bank and the IMF, and especially to Vikram Nehru.

2   PSE : PARIS-Jourdan Sciences Economiques, unité mixte CNRS-ENPC-ENS.

3. Brooks *et al.* (1998). As one example, an 11 per cent decline in export earnings in 1999/2000 added 20 percentage points to Uganda's Net Present Value-of-debt-to-export ratio that year.

4. "Export crop liberalisation in Africa: a review" FAO Agricultural services bulletin, n° 135.

5. Technical details of the analysis are presented in a companion working paper.

Bibliography

Borenzstein, E., M. Kahn and C. Reinhart (1994), "The Macreoecomic Determinant of Non-Oil Commodity Prices", *IMF Occasional Paper* No. 112.

Brooks, R., M. Cortes, F. Fornasari, B. Ketchekmen and Y. Metzgen (1998), "External Debt Histories of Ten Low Income Developing Countries", *IMF Working Papers* International Monetary Fund, Washington, D.C.

Brun, J.-F., G. Chambas and J.-B. Laporte (2001), "Stabex versus IMF Compensatory Financing: Impact in Fiscal Policy", *Journal for International Development,* 13, p. 571-81.

Cashin, P. and C.J. McDermott (1998), "The Long Run Behavior of Commodity Prices: Small Trends and Big Variability", IMF Staff Papers, Vol. 49, No. 2, pp. 175-99.

Cohen, D., P. Jacquet and H. Reisen (2006), "After Gleneagles: What Role for Loans in ODA?" OECD Development Centre *Policy Brief* No. 31, October.

Collier, P. and J. Dehn (2001), "Aid, Shocks, and Growth", World Bank *Policy Research Working Paper* No. 2688, October.

Cuddington, J. (1992), "Long-run trends in 26 primary commodity prices: a disaggregated look at the Prebisch-Singer hypothesis" *Journal of Development Economics,* 39, 207-227.

Deaton, A. and G. Laroque (1992), "On the Behaviour of Commodity Prices", *The Review of Economic Studies,* volume 59(1), January, 1-23

Fally, T. (2004), « Réflexions théoriques à propos d'un schema de stabilisation du cours des matières premières », Ecole normale supérieure.

Gilbert, C. and P. Varangis (2004), "Commodity Prices", World Bank, mimeo.

Guillaumont, P., S. Guillaumont-Jeanneney, P. Jacquet, L. Chauvet and B. Savoye (2003) « Attenuer la vulnérabilité aux chocs de prix : un rôle pour l'aide internationale », Cerdi, Université d'Auvergne.

Reinhart C. and P. Wickham (1994), "Commodity Prices: Cyclical Weakness or Secular Decline?" *IMF Staff Papers*, June, 41(2), 175-213.

Swaray, R. (2002), "Volatility of primary commodity prices: some evidence from agricultural exports in Sub-Saharan Africa", DP in Economics, University of York, June.

Other Titles in the Series

The Development Centre *Policy Briefs* can be downloaded from: www.oecd.org/dev/briefs
or obtained by e-mail : dev.contact@oecd.org

Pension Reform: Lessons from Latin America (No. 15)
by Monika Queisser (January 1999)

After the Great Asian Slump: Towards a Coherent Approach to Global Capital Flows (No. 16)
by Helmut Reisen (January 1999)

Participatory Governance: The Missing Link for Poverty Reduction (No. 17)
by Hartmut Schneider (April 1999)

Multilateral Tariff Liberalisation and the Developing Countries (No. 18)
by Sébastien Dessus, Kiichiro Fukasaku and Raed Safadi (September 1999)

Health, Education and Poverty Reduction (No. 19)
by Christian Morrisson (October 2001)

The New Regionalism in Sub-Saharan Africa: More Than Meets the Eye? (No. 20)
by Andrea Goldstein (March 2002)

Beyond Johannesburg: Policies and Finance for Climate-Friendly Development (No. 21)
by Georg Caspary and David O'Connor (August 2002)

Strengthening Participation in Public Expenditure Management: Policy Recommendations for Key Stakeholders (No. 22)
by Jeremy Heimans (October 2002)

Corporate Governance in Developing, Transition and Emerging-Market Economies (No. 23)
by Charles Oman, Steven Fries and Willem Buiter (September 2003)

Innovative Approaches to Funding the Millennium Development Goals (No. 24)
by Helmut Reisen (April 2004)

Which Policies Can Reduce the Cost of Capital in Southern Africa? (No. 25)
by Martin Grandes and Nicolas Pinaud (September 2004)

Policy Coherence Towards East Asia: Development Challenges for OECD Countries (No. 26)
by K. Fukasaku, M. Kawai, M.G. Plummer and A. Trzeciak-Duval (June 2005)

Changing Social Institutions to Improve the Status of Women in Developing Countries (No. 27)
by Johannes Jütting and Christian Morrisson (June 2006)

Migration, Aid and Trade: Policy Coherence for Development (No. 28)
by Jeff Dayton-Johnson and Louka T. Katseli (August 2006)

Natural Disaster and Vulnerability (No. 29)
by Jeff Dayton-Johnson (September 2006)

Policies for Migration and Development: A European Perspective (No. 30)
by Louka T. Katseli, Robert E.B Lucas and Theodora Xenogiani (October 2006)

After Gleneagles: What Role for Loans in ODA? (No. 31)
by Daniel Cohen, Pierre Jacquet and Helmut Reisen (November 2006)

DEVELOPMENT CENTRE POLICY BRIEFS

In its research activities, the Development Centre aims to identify and analyse problems the implications of which will be of concern in the near future to both member and non-member countries of the OECD. The conclusions represent a contribution to the search for policies to deal with the issues involved.

The *Policy Briefs* deliver the research findings in a concise and accessible way. This series, with its wide, targeted and rapid distribution, is specifically intended for policy and decision makers in the fields concerned.

Commodity prices are usually very slow to recover from adverse shocks. This is one of the reasons why Commodity Funds have so often failed in the past, and why it is sometimes argued that producers should behave as if shocks were permanent. This *Policy Brief* argues that this would be too extreme a conclusion. Countries should be protected against adverse shocks. The goal of a viable Commodity Fund should not be to stabilise prices, however, but to smooth the income of the producers. Under the scheme that is presented in this *Brief*, countries get protection against deviation of commodity prices from a moving average of past prices. This avoids the pitfalls of past attempts to stabilise prices around a given level, and yet gives countries time to adjust to long lasting shocks. The brief calibrates empirically how much it would cost to create Commodity Funds of this kind. Over a period of a 50-year time horizon, and depending on the commodity, the median cost would be worth about six months of exports.