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Policy Towards Commodity Shocks in Developing Countries

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Abstract

On the basis of a comparative study of 23 episodes involving commodity price shocks we find that both the public and private sectors typically save around half of a windfall gain resulting from a price rise. We argue that private windfalls should be left with the private sector rather than taxed. The focus of policy towards windfalls should be monetary rather than fiscal. The central bank should accommodate aggregate changes in the demand for financial assets. The private sector will initially wish to increase its claims on the central bank as it saves the windfall, but will then reduce them as portfolios are switched into real assets.

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POLICY TOWARDS COMMODITY SHOCKS IN DEVELOPING COUNTRIES

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Summary

Twenty years ago the policy advice of the international financial institutions on commodity shocks was that governments should use stabilizing taxation. On the basis of a comparative study of 23 episodes involving commodity price shocks we argue that usually governments have proved themselves to be rather bad at coping with the revenue volatility that such a policy entailed. By contrast, private agents respond much more appropriately than the argument for a custodial role of government presumed. In particular, they have remarkably high saving rates from windfall income. However, the case for custodial fiscal policy is generally weak, if the windfall is left with the private sector there is an important role for an active monetary policy. During windfalls the private demand for real money balances first rises and then falls, reflecting predictable portfolio changes in response to transient income. Public policy should focus on accommodating these private sector asset choice responses rather than confiscating the windfall. Despite generally high public and private saving rates out of windfalls, this has not translated into sustained increases in output. We consider whether it would be better to reverse the custodial role argument and transfer public shocks to the private sector. We conclude that the difficulties of such transfers make them only partially appropriate.

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I. INTRODUCTION

Commodity prices are volatile. Although the long-term trend in commodity prices has been downwards, large price shocks are more commonly spikes than crashes.² For the past two years African coffee exporters have been experiencing such a spike due to a frost which damaged the Brazilian crop. The last time this happened on a similar scale was in the late 1970s. Between these two major coffee booms the economic analysis of shocks, and the implications for policy, have changed considerably.

The appropriate response to a price shock depends upon its duration. Permanent shocks should change consumption, transient shocks should change savings. Unfortunately, while it is clear that commodity prices are highly volatile, the nature of this volatility remains controversial. Until recently most econometric studies found commodity prices to be indistinguishable from random walks, an implication being that shocks should be treated as persistent. However, for short-time series it is often not possible econometrically to distinguish between difference stationary and trend stationary processes (Deaton and Miller (1996)). Recent work using long-time series has found more evidence of price reversion (Deaton and Miller (1996) and Leon and Soto (1995)). Some shocks are clearly temporary: for example, the coffee booms induced by Brazilian frosts in 1975 and 1994. Even in these cases there was uncertainty as to the duration of the price boom with forecasts ranging between one and three years. However, this sort of range of uncertainty does not have substantial implications for the key decision as to the savings response. Windfalls which last for only a few years can only be converted into sustained increases in consumption if the savings rate out of them is radically higher than out of normal income. For example, if the rate of return on savings is 10 percent, a windfall which persisted for seven years would require a savings rate of around 50 percent for the consumption increase to be sustainable.

We have compared windfall savings rates in 23 external shocks. The measurement of savings rates out of windfalls involves two choices. Windfall episodes have to be identified in some way, and counterfactual behavior has to be specified. Different approaches to the identification of windfalls are analogous to those taken in the study of trade liberalization. The phenomenon can be defined as a continuous variable, namely a change in a relative price, or as a discrete event. For example, some studies of trade liberalization have used the parallel exchange rate premium as their measure, whereas others, such as Sachs and Warner (1995) consolidate a number of characteristics into a binary measure. Each approach has its advantages. The binary approach sacrifices information but avoids the analysis being dominated by high frequency small changes. The major study of trade liberalization by Michaely et al. (1991) adopted a compromise, selecting 18 liberalization episodes characterized by the country specialists on the study as large liberalization events. Our approach to the identification of shocks was somewhat similar to the approach taken by

²This may reflect an asymmetry in inventory holding: stocks can be increased without limit but cannot be reduced below zero, see Deaton and Laroque (1992).

Michael et al. in that the focus was on large changes in the terms of trade and their consequences over subsequent years, rather than on terms of trade fluctuations in general. The sample covered major shocks in Africa, Asia, and Latin America and is shown in Table 1. While the sample is not comprehensive, it includes a sufficiently large number of important shocks that the evidence cannot reasonably be dismissed as reflecting only the idiosyncracies of case studies. The specification of the counterfactual, which is necessary to quantify windfall savings rates, is also open to differing approaches. We calculate the average windfall savings rate based on a counterfactual of pre-shock savings rates. However, pre-shock behavior is itself subject to an element of judgement. Extrapolation from the few years preceding the shock sometimes leads to predictably ridiculous results. For example, the Indonesian and Nigerian oil booms of 1973 were each preceded by exceptionally rapid recovery, the former induced by policy reform and the latter by the ending of civil war. In such cases the specification of a counterfactual involves an irreducible element of judgement. Despite these caveats, the comparative results of the estimates of savings behavior produced by the 19 country teams are of some interest. The average duration of these shock episodes was 5 1/2 years and the savings rate out of the windfall averaged a little over 50 percent³. Hence, while the econometric basis for inferring the duration of trade shocks remains obscure, in practice many important shocks have lasted only a few years and recipient countries appear to have adopted savings rates which were on average broadly appropriate for shocks of such duration. Of course, this should not imply that agents, public and private, correctly anticipated the duration of these shocks.

Large shocks pose two types of decision problem for governments. First, on unchanged tax rates, government revenue will be volatile. Second, incomes of private agents will be volatile and government may seek to modify private responses. Twenty years ago the emphasis of international policy advice was on the second of these concerns. For a variety of reasons discussed below it was believed that it was appropriate for the government to play a custodial role, attempting to smooth private incomes by transferring the volatility to itself. During the coffee boom of the 1970s all governments other than that of Kenya sought to dampen the effect of large swings in commodity prices on private sector consumption and investment spending by transferring the shock to the public sector through windfall taxation. In Section II we mount a critique of this position. In Section III we focus upon the performance of the government as an agent itself facing an income shock. Section IV turns briefly to the transfer of public shocks to private agents.

³ For details of the study see Collier and Gunning (forthcoming).

Table 1. The Case Studies of Shock Episodes

Country	Sector of Shock	Recipient Agent	Sign
Africa			
Kenya	Agriculture	Private	Positive
Ghana	Agriculture	Public	Positive
Cote d'Ivoire	Agriculture	Public	Positive
Malawi	Agriculture	Private	Positive
Mauritius	Agriculture	Private	Positive
Senegal	Agriculture/Mining	Private/Public	Positive
Zambia	Mining	Public/Private	Positive/Negative
Botswana	Mining	Public	Positive/Negative
Niger	Mining	Public/Private	Positive
Cameroon	Mining	Public	Positive
Nigeria	Mining	Public	Positive
Egypt	Remittances/Mining	Private/Public	Positive
Latin America			
Colombia	Agriculture	Private/Public	Positive
Costa Rica	Agriculture	Private	Positive
Bolivia	Mining	Private/Public	Negative
Venezuela	Mining	Public	Negative
Mexico	Mining	Public	Positive
Asia			
Thailand	Multiple	Private	Negative
Sri Lanka	Import Prices	Private	Negative
Philippines	Import Prices	Private	Positive
Bangladesh	Remittances/Aid	Private/Public	Positive
Indonesia	Mining	Public	Positive/Negative

II. THE PUBLIC MANAGEMENT OF PRIVATE SHOCKS

The case for a government custodial role during commodity shocks depends upon one or other of four propositions.

A. The Rationale from Asymmetric Public Sector Far-Sightedness

The first is that the government is more far-sighted than the private sector and so is more likely to save a windfall. We find no evidence to support this proposition. Usually, savings rates out of windfalls, and dissavings rates out of negative shocks, were high, around 50 percent, whether the recipient agent was public or private.

Low savings rates tended to be associated with poor information. Public-private transfers coincident with the windfall could obfuscate its true source. Both private and public agents could be misled in this way. First, consider two cases in which private agents may have been confused by public interventions coincident with the shock. In the Colombian coffee boom and the groundnuts boom in Senegal, the boom coincided with fundamental changes in government pricing policy: the government lowered its taxation of the crop. Farmers were thus faced with a double windfall, one due to a change in world prices which was short-lived, and one due to a change in policy which could be regarded as persistent. In each case the private saving rate was estimated to be around 33 percent, high by normal standards, but low in comparison with most other windfalls. The public sector can also be confused by public-private transfers. For example, in Kenya the government was the indirect beneficiary of around half the coffee windfall. Despite having no explicit windfall taxation, it gained revenue from import duties and sales taxes. Possibly because this revenue was not clearly identifiable as being generated by a temporary tax, the savings rate out of it was only around 20 percent. Conversely, public windfalls were sometimes transferred indirectly to the private sector. For example, much of the Mexican oil windfall was transferred by means of subsidies. In these instances the private savings rate was again more likely to be atypically low. One interpretation of these results is that savings rates out of commodity windfalls are most likely to be high when recipients are clear about their true source.

The policy implication is that the government should attempt to enhance the quality of information available both for itself and private agents rather than transfer private windfalls to itself. The government can enhance its own information by making realistic estimates of windfall tax revenue from all sources. Commonly, when 'stabilization funds' are set up, only that part of tax revenue directly attributable is assigned to them. For example, the revenue from an export tax might be assigned to the fund, but not the revenue from the import duties on boom-financed imports. The government can enhance the information available to private agents by broadcasting world prices. Where windfalls are received by peasant farmers with limited access to world news this is particularly important. For example, during the coffee boom of 1976-79 the Kenyan government used the network of coffee cooperatives to explain why prices were high. During the coffee boom of 1994-95 the Ethiopian government broadcast auction prices on the radio.

B. The Rationale from an Abnormally Low Cost of Taxation

The second proposition supporting a government custodial role is that during windfalls the social cost of taxation is atypically low. The rationale for this is that because the income is unanticipated, its taxation does not give rise to harmful incentive effects. This argument is doubly mistaken. Although any particular price shock will be unanticipated, if the government repeatedly taxes price spikes private agents will anticipate that their incomes from producing the commodity will be correspondingly lower than without windfall taxation. For example, once farmers learn the policy rule that the government imposes a windfall coffee tax when prices are high, they will plant fewer coffee trees even in years when there is no tax. During the windfall they will use less fertilizer and labor. Hence, output will be reduced by the tax even though the windfall itself is unanticipated. This would suggest that the social cost of taxation is not atypically low during windfalls.

In principle, governments could avoid this effect by using the revenue from windfall taxation to subsidize prices in other years. For example, the government of Cote d'Ivoire followed this policy until the fiscal costs proved unsustainable and it halved support prices in 1989/90. One rationale for such a strategy is that by making production less risky it might increase investment. The example of Cote d'Ivoire shows that the source of the price risk is changed rather than necessarily reduced. However, even if successful in reducing risk, the *tax-then-subsidize* strategy removes the incentive for farmers to organize their production for flexibility, shifting resources into whichever crop currently has a high world price. The tendency to see price volatility as a curse rather than an opportunity has resulted in the standard policy recommendation concerning the structure of the economy to be diversification rather than flexibility. An economy facing volatile prices should concentrate its resources in activity-interchangeable assets, multiple skills for the labor force, a high degree of mobility permitted by contracts, and such like. Cumulatively, these responses enable the economy to specialize in the high price export activity, whichever activity this happens to be, and to shift resources into and out of the export activities in aggregate. The strategy of suppressing the price signals which alone will induce economic agents to position resources in this way thus permanently worsens the terms of trade.

A further consideration suggests that the social cost of windfall taxation is atypically high. In many developing countries there is too little private investment: if the government could transfer income from itself to private investment it would choose to do so. That is to say, the shadow price of private investment is above unity (treating public expenditure as the numeraire). The shadow price of private consumption must be less than unity, otherwise, given that taxation is costly, the government would not be justified in raising it. The shadow price of private expenditure as a whole is the average of these two shadow prices weighted by the shares of investment and consumption in private expenditure. If the level of taxation is appropriate then in a normal year the shadow price of private expenditure will be less than unity by an amount which just reflects the costs of tax collection. As noted above, private agents tend to have high savings rates out of windfall income: We find that in 11 directly received private windfalls the savings rate out of windfall income ranged between 33 percent and close to 100 percent. For example, in the Kenyan coffee boom peasants had savings rates

of over 60 percent out of windfall income compared with around 3 percent out of normal income. Since high private savings tend to translate into high private investment, the expenditure pattern out of windfall income is atypically weighted towards investment. As a result, the shadow price of private expenditure is atypically high during windfalls so that arguments based on allocative efficiency point to a *lower* rate of taxation of windfall income than of normal income.

C. The Rationale from Fears of Inflation

The third proposition supporting a government custodial role is that if windfall income is allowed to accrue to the private sector the result will be inflationary. Whether this is the case depends upon exchange rate policy. With a fixed exchange rate the supply of base money will be augmented (unless the government sterilizes) and this will enable the banking system to increase inside money, the result being an increase in the price level. With a flexible exchange rate and no central bank intervention, increased private expenditures will raise the transactions demand for money, but with no increase in supply the exchange rate will appreciate, lowering the price level. Where the private sector perceives the shock to be temporary the demand for money will also rise as the result of an increased demand for financial assets. Thus, in the initial phase of a commodity boom, there is likely to be a temporary increase in the demand for base money and an associated decline in the velocity of circulation. For example, in Uganda during the first twelve months of the coffee boom, which started in mid-1994, holdings of base money grew in real terms by 32 percent--equivalent to almost half of the terms of trade windfall. In the next seven months, despite a continuation of the commodity boom, this monetary accumulation started to unwind--holdings of base money fell by around 8 percent relative to GDP. Facing such changes in money demand, the central bank should attempt to facilitate the portfolio plans of the private sector. The latter can always achieve the real money balances which it wants, but without appropriate central bank action this can be at the expense of large changes in the price level. During the phase of increasing demand for real money balances the central bank should accumulate reserves, matching this asset accumulation against the liability of increased real money balances. This may require bold action. For example, in Uganda which is a flexible price economy with a floating exchange rate, in the first four months of the coffee boom the exchange rate appreciated so strongly that the price level fell by 7 percent. Because the central bank had not accommodated the increased demand for real money balances, the private sector had satisfied its demand by driving the price level down. Such a fall in the price level constitutes a hidden increase in the liabilities of the government, which the private sector will attempt to call once it shifts its portfolio from the initial acquisition of low yielding financial assets to higher yielding fixed investments. Conversely, if the central bank fails to sell foreign exchange in response to the subsequent phase of a decline in the demand for money, the price level will rise so that the central bank would be defaulting on its liabilities, frustrating the attempt by the private sector to switch from financial to real assets. In order for the private sector in aggregate to accumulate and then decumulate liquid assets, the economy must accumulate and then decumulate foreign assets. Since private agents are often ill-placed to hold foreign assets directly, the government or the central bank must do so on their behalf. However, using taxation is an inappropriate mechanism for this accommodation. Unless the extra taxation is

subsequently returned to the private sector by temporary tax cuts, the private sector loses the income altogether, and so cannot invest. Even if the income is returned through tax cuts, there is liable to be a loss of information so that the eventual recipients do not regard the income as temporary and so do not save it. The more appropriate policy is for the central bank to accommodate the temporary extra demand of the private sector for base money by intervention in the foreign exchange market and reserve accumulation.

The increase in base money itself is not inflationary since it meets an increased asset demand for money. However, were the increase in base money to generate a proportionate increase in the supply of credit this would be inflationary. Some expansion in credit is warranted since total expenditure is increased by the windfall. But since the windfall is disproportionately saved initially in base money, the latter increases relative to expenditure. Except in cases of severe financial repression, the credit expansion enabled on unchanged policies will greatly exceed the warranted expansion.

In some developing countries credit expansion is held in check not by a binding cash ratio but by lack of creditworthy borrowers. In effect, the high costs of information and of contract enforcement prevent banks from intermediating incremental funds. In such a case the banks will themselves go much more liquid, holding claims on the government. For example, during the Kenyan coffee boom of the late 1970s the actual cash ratio rose from 18 percent to 37 percent whereas the legally required ratio was only raised from 18 percent to 21 percent. If the government provides the banks with no incremental assets other than currency, then the banks may follow either or both of two socially costly courses of action. First, they might become reluctant to take incremental deposits. For example, in Kenya during the late 1970s there were cases of banks refusing deposits, and in Uganda in 1995 the major banks raised their minimum deposit requirement. Second, the banks may be tempted to relax creditworthiness requirements and lend these surplus funds imprudently. This is especially a danger if the windfall occurs in the context of a newly liberalized banking system with many new and inexperienced banks. In both the Kenyan boom of the late 1970s and the current Ugandan boom, fringe banks rapidly accumulated non-performing loans. Since the central bank is earning income on the foreign assets which it holds as a counterpart to its increased liability to the banking system, it can afford to offer the banks a corresponding return on their incremental assets. This avoids quasi-taxation of the windfall through increased financial repression. Such taxation is doubly undesirable: that is, both for the reasons which apply to windfall taxation in general, and to the specific effects it may have on bank behavior. Even if the central bank provides incremental interest-bearing assets, commercial bank lending may deteriorate, and so either greater than usual bank supervision, or the introduction of double indemnity legislation may be advisable.

Where the expansion in bank credit beyond that which is warranted is not held in check by constraints of creditworthiness, the reserve bank needs to raise the minimum cash or liquidity ratios so as to reduce the enabled expansion in credit to the warranted expansion. This may be institutionally problematic since the income windfall may be deposited in a non-uniform way among banks. The central bank cannot apply bank-specific minimum ratios since this destroys the principle of competition on a level playing field, yet the increase in the ratio

indicated as necessary by the aggregate numbers may leave some banks able to expand credit unconstrained, while others are pushed into financial distress for no good reason. The extent to which this is a problem depends upon how sectorally distinct are bank deposit bases, and upon how integrated is the inter-bank market. Where financial liberalization is recent, the banks will have little experience of inter-bank lending. For example, in Uganda the banking system though liberalized, is segmented into at least three groups: the government-owned bank, the new private banks, and the traditional private banks which have little trust in either of the other groups. In these circumstances the central bank may need to curb lending by the more liquid banks through its supervisory role, giving greater attention to the quality of loan portfolios.

We have suggested that the central bank will need to respond to the first phase of an income windfall by four interventions. First, in the foreign exchange market it should make net purchases so as to increase the supply of base money. Second, it should increase the minimum liquidity ratio so as to prevent credit expanding at more than the warranted rate, subject to the possible constraint imposed by the need not to push into financial distress banks which have not shared in windfall deposits and are not able to borrow on the inter-bank market. Third, it should supply the banks with incremental reserve assets at non-penal interest rates. Fourth, where the liquidity ratio is not binding, or where it is not possible to raise the ratio sufficiently because of variation between banks, it should intensify supervision of loan portfolios.

There are parallels between the monetary response to an income shock and the monetary response to a private financial capital inflow, although the two are not identical. With a capital inflow the foreign sector wishes to acquire a claim on the domestic private sector which may or may not wish to acquire a matching asset (the inflow may finance private consumption). With an income shock the domestic private sector wishes to acquire real assets. However, the parallel is that in each case the increase in the supply of base money, which meets changes in the demand for financial assets, enables an increase in credit not matched by a change in demand. Hence, in both cases there is a need for an increase in reserve requirements, and this will involve quasi-taxation unless interest-bearing reserve assets are supplied.⁴

D. The Rationale from Fears of Real Appreciation

The final proposition supporting a government custodial role is that government reserve accumulation is necessary to avoid Dutch disease (appreciation of the real exchange rate) and so the government should tax the windfall and put the revenue in reserves. However, private responses will automatically moderate real appreciation. Private agents will wish to accumulate financial claims on the government, and as the counterpart of this the central bank should indeed temporarily accumulate reserves.

⁴See Reinhart and Reinhart (1995).

The policy question is whether there is any justification for intervention to reduce real appreciation over-and-above that implied by private savings behavior. If the economy is ever to benefit from the windfall it must eventually be spent: a windfall indefinitely held in reserves would have no effect beyond an insurance role. When the windfall is spent it will inevitably cause temporary real appreciation. A strategy of reserve accumulation (over-and-above that implied by private asset behavior) merely shifts this appreciation into the future. There are two reasons why such a shift would be undesirable. First, reserves constitute low-yielding assets. Private agents will already be balancing the gross costs of delaying real asset acquisition against the benefits, and the central bank has neither the information to improve on these decisions nor reason to regard them as systematically biased in the direction of excessively rapid acquisition of real assets. Reserve accumulation beyond that implied by private asset behavior is thus inefficient. Of course, there is a prudential argument for holding reserves which adds a premium to the return, but the level of reserves appropriate on prudential grounds does not increase because of a favorable income shock. Only if the economy initially has insufficient reserves for prudential purposes should they be increased, but this has nothing to do with policy towards a windfall: reserves should in that case be increased irrespective of whether there is a windfall. Second, if the central bank shifts the real appreciation into the future by temporarily building up excess reserves, it causes uncertainty and confusion for the private sector analogous to the obfuscation caused when a shock and a policy change are contemporaneous. If the real exchange rate is allowed to appreciate during the shock, the private sector can readily interpret that the event is attributable to the shock and so can anticipate that it will be reversed as the shock ends. Investments can therefore be planned to be profitable at post-shock relative prices rather than at the relative prices which are briefly prevailing during the boom. By contrast, if the real appreciation is deferred, the private sector cannot tell with certainty when, or indeed, whether, the real appreciation will occur. The prediction of coffee prices after a frost may be difficult, but it is subject to less uncertainty than the prediction of central bank and government reserve behavior.

The rationale for reserve accumulation is thus neither to avoid real appreciation altogether, nor to shift it into some unspecified future, but rather to accommodate the desired response of the private sector.

III. THE PUBLIC MANAGEMENT OF PUBLIC SHOCKS

Even if the government does not take upon itself a custodial role for what would otherwise be private shocks, unless taxation rates are actively reduced during windfalls the government will itself receive windfall income. We now consider how governments have used these windfalls. Governments have typically made one of five errors in managing their own windfall income. First, sometimes they have failed to save. Second, sometimes they have subsequently dissaved. Third, they have sometimes invested prematurely, while the boom is still in progress. Fourth, they have sometimes invested in very low return projects. Fifth, they have often increased their fiscal deficit.

A. The Public Savings Response

Despite the increase in government revenue during windfalls, the fiscal deficit has often deteriorated. Schuknecht (1995) compared the fiscal response in 17 beverage booms. On average during these potentially private sector booms, revenue rose by 2.2 percent of GDP. Despite this gain in revenue, the fiscal deficit *increased* during the boom by 2.1 percent of GDP. In the post-boom period revenues fell while expenditures continued to increase, so that the deficit widened by a further 1.6 percent of GDP.

This fiscal response is compatible with a high public sector savings rate if the government increases its expenditure mainly on capital goods, and this was indeed a common response. However, governments often followed a period of saving during the boom with dissaving after the boom. Here we give two examples of this pattern, the two being generated by radically different processes.

The government of Ghana increased foreign exchange reserves during the cocoa boom by almost the entire amount of the windfall. This remarkable savings behavior may have been an almost inadvertent consequence of the control regime. With an elaborate system of foreign exchange rationing already in place prior to the shock, policy continuity maintained the level of imports broadly constant despite the increase in exports. The windfall was transferred to the public sector by the monetary effects of the control regime. Incremental export earnings were exchanged for extra base money, which, as it came to be spent, increased the price level. The transfer to the public sector was thus achieved by the inflation tax. In the first post-boom year the reserve accumulation was entirely reversed, financing only incremental public and private consumption. Superficially, the response of the Ghanaian government was appropriate: there was an initial phase of increasing base money matched by reserve accumulation, and a subsequent phase in which this was reversed. However, because in aggregate private choices with respect to both the timing of expenditures and their composition were severely restricted by the control regime, the windfall was not transformed into sustained asset accumulation.

The government of Kenya spent its windfall during the boom. Since part of this expenditure was on capital goods, during the boom itself there was a public sector windfall savings rate of around 20 percent. However, part of the increase in public expenditure had been recurrent. After the boom these increases in recurrent expenditures proved difficult to reverse and so capital expenditures were cut to below their pre-boom level to accommodate them. The estimate of the public sector savings rate is therefore lower the more of this post-shock period that is considered to reflect a consequence of choices made during the boom, rather than being due to new influences upon policy. If the first three post-shock years are included in the calculation of windfall savings, the overall rate of savings from the public sector windfall falls to zero.

At the opposite extreme to the behavior of the Ghanaian government, several governments used the opportunity of the windfall to increase foreign borrowing, using the proceeds to increase both capital and recurrent expenditures. In principle, foreign borrowing

during a windfall need not be inappropriate if the government is initially credit constrained. However, in practice, the governments which geared up windfalls by borrowing, such as Cote d'Ivoire and Mexico, were to face subsequent debt crises. Public investment during the windfall yielded too low a return to sustain repayment. This could be because investment rates were too low, investments were poorly selected, or because the increase in public investment coincided with a decline in private investment. For example, in Cote d'Ivoire, at the same time as the public sector was borrowing, the private sector was acquiring foreign assets. Table 2 summarizes foreign reserve responses to the shocks. Foreign assets could initially be accumulated or decumulated, and if accumulated, subsequently decumulated during or after the shock, or maintained. Of these four responses, only one enables the investment windfall to be shifted and stretched beyond the income boom, which might be thought appropriate for enhanced investment efficiency. Only four countries actually used reserves in this pattern, and of these one was Ghana, where, as discussed above, the reserve accumulation was not in the event used for investment. The most remarkable feature of the table is that country responses are not concentrated. Central bank responses to external shocks do not follow much pattern.

These outcomes are in marked contrast to what governments assert that they will do with windfalls. Commonly, the stated intention is to accumulate reserves and investment. In practice the build-up in reserves is short-lived. Reserve accumulation by a prudent government ends up as a transfer to an imprudent successor. To an extent, reserve accumulation can even induce this change, since it increases the rewards of imprudence. For example, the high levels of reserves inherited by the post-independence government of Ghana and the three regional governments of Nigeria, to an extent induced deficit spending since they removed the inflation penalty.

B. Windfall Investment and Growth

The effect of windfalls on growth is difficult to measure. During the boom output is usually enhanced. For example, Deaton and Miller (1996) show that in sub-Saharan Africa export price shocks have had substantial contemporaneous effects on output. A likely explanation for this is that when the shadow price of foreign exchange exceeds its market price, as was the case in much of Africa during the 1980s, extra foreign exchange raises growth. However, the extra output generated during booms often fails to persist despite high investment. For the 19 countries with positive shock episodes we ran a pooled growth regression (with country fixed effects) for the period 1964-91. In addition to the investment

Table 2. Foreign Asset Responses to External Shocks

<u>Foreign Assets Accumulated¹ and Repatriated² either:</u>			
<u>During shock</u>	<u>After shock</u>	<u>Never</u>	<u>Shock Amplified³</u>
+Kenya	+Ghana	+Senegal	+Malaysia
+Costa Rica	+Egypt	+Philippines	+Mexico
+Mauritius	+Indonesia	+Botswana	+Malawi
+Niger	+Zambia	-Zambia	+Cote d'Ivoire
+Nigeria	-Botswana	-Bolivia	
+Bangladesh	-Thailand	-Indonesia	
+Colombia	-Sri Lanka		
+Cameroon			

Source: Collier and Gunning (forthcoming), Chapter 1, Table 3.

Note: + positive shock; - negative shock

¹Debt accumulated for negative shock.

²Repaid for negative shock.

³Borrowing during boom, debt repayment during negative shock.

ratio we add dummy variables for the years of the shock and for each of the first three post shock years. Consistent with Deaton and Miller, we find that during the shock output is significantly higher even controlling for investment. However, in each of the three post-shock years it is significantly negative. Finally, we add an interaction term between the average investment rate during the boom period, and the three post-shock dummies. For the first post-boom year this is insignificant, but for the next two it is significant and negative. One interpretation of this interaction effect is that the investment undertaken during the windfall is atypically unproductive, so that the greater is windfall investment, the more does growth fall below that rate predicted by the normal coefficient upon the investment ratio. The regression is reported in Table 3. Overall, the favorable short-term growth effects of shocks are lost in the post-shock period.

Table 3. Investment and Growth: The Effect of Windfalls
(Growth 1964-91, 19 countries)

Variable	Coefficient	T-statistic
Constant	-0.006	0.924
Investment ratio	0.112	3.057
Shock year	0.018	3.065
Post-shock year 1	-0.027	2.074
Post-shock year 2	-0.037	2.833
Post-shock year 3	-0.040	3.010
Shock investment*post-shock year 1	0.155	0.589
Shock investment*post-shock year 2	-0.403	1.525
Shock investment*post-shock year 3	-0.574	2.163

Adjusted $r^2 = 0.104$

Source: Collier and Gunning (forthcoming), Table 5.

This suggests that the quality of investment deteriorates during windfalls. In the public sector there are many instances of white elephant projects being approved during windfalls. For example, the Tanzanian government reintroduced its 'basic industries' investment program during the coffee boom, having previously abandoned it. Less obviously, the control regime may have handicapped private investment. Exchange controls can, unless offset by adept central bank monetary responses, constrain the private investment boom to the period of the savings boom. This prevents the shifting and stretching of windfall investment which is likely

to permit better planning and implementation of projects, and to avoid congestion effects, especially in the market for non-tradable capital goods.

IV. THE TRANSFER OF PUBLIC WINDFALLS TO PRIVATE AGENTS

Consider a windfall such as that received by the government of Nigeria consequent upon the Gulf War. The actual policy was to put the windfall in a special stabilization fund. This was swiftly raided for public expenditure. Would the private sector have used the windfall better? If, on the whole, this seems likely, then should the old 'custodial role' argument be stood on its head? Should public shocks be transferred to the private sector?

There is at once an important caveat to this proposition. As discussed above, if the process of transfer is opaque then the information about the true source of the shock, and with it, *its possible duration, will be lost. Any transfer mechanism must be transparent.* We consider three such mechanisms, the exchange rate, taxation, and the banking system.

Suppose that instead of reserve accumulation, declared central bank policy was that all the windfall dollars would be sold in the foreign exchange market as they came in. In effect, the government would be repurchasing the base money liabilities of the central bank. In doing this it would be running seigniorage in reverse: the price level would fall and this would transfer the windfall to the private sector through a negative inflation tax. Indeed, such a policy would be the obverse of that of the Ghanaian government during the cocoa boom, by which, it will be recalled, a private windfall was transferred through the inflation tax to the government. Such a mechanism is simple to implement. However, it has several disadvantages. First, except to the extent that private agents directly hold dollars, the economy lacks the possibility of stretching the investment windfall beyond the income windfall. Second, the transfer mechanism, though simple, is not transparent. All agents with positive money holdings receive a small windfall through enhanced real cash balances, but it is difficult for most agents to recognize both the extent and the source of the windfall. Third, the fall in the price level will generate unanticipated intra-private transfers, both between creditors and debtors and between parties to long term nominal contracts such as are found in labor markets.

The second mechanism for transferring a public windfall to the private sector without raising public expenditure, is for temporary reductions in taxation. There are three difficulties with this strategy. First, governments are typically operating with limited credibility and so any statement about future actions will be discounted. To the extent that the announcement that taxes will be raised again as the windfall fades is discounted, the private sector will regard its windfall as permanent and so consume it. Second, to the extent that the private sector fails to understand the rationale for the temporary reduction in taxation, a reduction followed by a reversal may be seen as policy volatility and so add to uncertainty. Third, since taxation is sometimes highly distributionally skewed, the windfall will be passed on to the private sector selectively.

The third mechanism for transferring a public windfall to the private sector is through the banking system. Here the strategy would be to expand credit to the private sector rather than actually to transfer the income. In many developing countries the financial system is insufficiently developed for such a transfer to enhance investment as opposed to credit-financed consumption followed by default.

To conclude, there is no generally unproblematic mechanism of transferring a brief public sector shock to the private sector. However, each of the three mechanisms discussed above may have some feasibility in particular circumstances.

V. CONCLUSION

None of the four apparent foundations of the custodial role of government during windfalls survives scrutiny. Based on the evidence of our case studies, the private sector is not more short-sighted than the government. The social costs of taxation are not atypically low during windfalls, rather they are atypically high. With appropriate exchange rate and monetary policies, privately retained windfalls are not inflationary. There is no rationale for preventing real appreciation over-and-above that implied by accommodating the rise in money demand. The taxation of private windfalls is not, therefore, justified by the notion that the state should play a custodial role. Far from introducing explicitly windfall taxation, the fiscal response to a private windfall should be temporarily to reduce tax rates. The highest rate of return on investment is probably achieved by private rather than public investment of the windfall. Once this has taken place, the government will capture its normal share of the income stream generated by the investment and so be able to finance a sustainable increase in public expenditure proportionate to the increase in permanent income. If, by contrast, the government were to capture the windfall itself and to use it for unproductive capital expenditures, there would be no sustained increase in government revenue. Thus, the government may itself be better off by refraining from taxation of windfall income.

While both the *tax-then-subsidize* and the *tax-and-invest* strategies have proved problematic, there is a crucial role for public policy in response to private shocks. The desire of the private sector to save and invest windfall gains gives rise to a sequence of portfolio choices, beginning with saving in financial assets and gradually switching into real assets. In most of Africa the predominant financial asset that the private sector can in aggregate hold is a claim on the central bank in the form of domestic currency. The resulting large changes in base money, which reflect financial asset demands of the private sector in aggregate, carry the danger of generating proportionate changes in intra-private credit. Such changes in inside money would alter the price level. The ratio of base money to inside money should temporarily increase during a windfall, enabling the private sector in aggregate to acquire a financial claim without a credit relaxation. Thus accommodated by appropriate central bank action, private responses to the windfall automatically moderate real exchange rate appreciation and do not affect the price level.

The case against transfer of a private windfall does not extrapolate to transfers *a outrance* of public windfalls to the private sector. Usually, the process of transfer can be expected to reduce information or otherwise reduce effective utilization of the windfall. However, there is some basis for supporting a *partial* transfer of public windfalls to the private sector, using some combination of all three transfer mechanisms. Possibly by reducing the scale of the windfall remaining with the government, the public use of its retained windfall will also be enhanced.

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