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Sweder van Wijnbergen

Secondary market prices on debt don't reflect the insurance value reserves have for debtors (but not creditors)—so a country buying back debt with reserves may end up worse off in terms of welfare.

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Bulow and Rogoff (1988) have shown that auction-based purchases of debt may not be an effective way to capture the secondary market discount, since the purchase pushes up the secondary market afterward. (The problem is that marginal debt is bought back at an average price, while the marginal price is substantially below the average if more debt reduces creditworthiness.)

Van Wijnbergen points out another problem with cash debt buybacks — one that arises because terms-of-trade-contingent instruments do not exist in international capital markets, and because of the differences in risk aversion that one may plausibly assume to exist between commercial creditors and the developing countries that are their debtor clients.

Under such circumstances, secondary market prices fail to reflect the insurance value reserves have to debtors but not to creditors — since, after all, the secondary market reflects mostly intrabank transactions.

Since a country can always opt not to use its reserve for debt service, reserves have an insurance value that is specific to the cou ry. This insurance value will thus not be reflected in the price at which the country can buy back debt in the secondary market using its reserves.

As a result, the country buying back debt with reserves clearly ends up worse off (in terms of expected utility), even if it succeeds in capturing the full secondary market discount prevailing *before* the buyback — because the buyback reduces the insurance possibilities open to the country.

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Cash Debt Buy Backs and the Insurance Value of Reserves

by
Sweder van Wijnbergen

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I am indebted to Ricardo Martin and Ken Rogoff for helpful discussions.

1 Introduction

The debt crisis in 1982 was followed by deep discounts in the secondary market for LDC debt. These discounts have ever since held out the tantalizing possibility of relatively painless debt relief through cash debt buy backs, in which a debtor buys back discounted debt for cash (foreign reserves). Through such a transaction a debtor would effectively prepay its debt and in return receive the discount on principal implied by the secondary market price. Bankers would presumably not object since the secondary market price of their claims on LDC debtors reflects the market's assessment of the value of those claims.

While such cash buy backs have indeed taken place, their use as an instrument of debt relief has remained controversial. For example Bulow and Rogoff (1988) point out that auction based purchases of debt may not be an effective way of capturing the discount since the purchase pushes up the secondary market afterwards; since the alternative to taking part in the auction is selling at the "post-deal" secondary market price, only the "post-deal" secondary market discount is captured by the debtor, while creditors make a capital gain on the debt not sold (see also Dooley (1988) on this point). The basic problem is that marginal debt is bought back at average price, while the marginal price is substantially below the average if more debt reduces creditworthiness.

They also argue that banks will be worse off after such purchases if reserves would have been available for debt service anyhow, but better off (and the country correspondingly worse off) if reserves now used for the buy back would have remained out of reach of the creditors otherwise. But it is of course at the discretion of the country how to use its reserves

when not used for debt buy backs. It is thus somewhat unsatisfactory to leave reserve use exogenous (beyond the decision to use them for a buy back of discounted debt). Thus endogenizing reserve use is the starting point of this note.

But the main point of this note is, to draw attention to another problem with cash buy backs, a problem that is related to the non-existence of terms of trade contingent instruments in international capital markets. To bring out this point clearly we abstract from the problems with cash buy backs discussed in the literature; they have been adequately covered elsewhere. Instead we focus on a different problem, one that arises from the non-existence of terms of trade contingent instruments in international capital markets and differences in risk aversion that one may plausibly assume to exist between commercial creditors and their LDC debtor clients. Commercial creditors are by and large companies with stockmarket quotation; and theory has established that under fairly general conditions managers of quoted companies should simply maximize the expected value of discounted net cash flow. In such circumstances secondary market prices fail to reflect the insurance value reserves have to debtors but not to creditors, since, after all, the secondary market mostly reflects intra-bank transactions. We show that, as a consequence, the country buying back debt with reserves ends up unambiguously worse off in expected utility terms even if it succeeds in capturing the full secondary market discount.

2 The Model

Consider a simple two period, one good world where a country faces

uncertain income streams (in a multi-good extension, the uncertainty could be related to random variations in the terms of trade). Random income in period 2 equals θ. The set of all possible θ is denoted by $\{\theta\}$. For the purpose of this note, it is not necessary to explicitly consider the intertemporal allocation of consumption; we simply assume that consumers have made their optimal decisions in period 1 given all the information available at that time. After these decisions, plus the realization of income in period 1, the country enters period 2 with debt service obligations D and a stock of reserves R. Thus in the absence of default or debt buy backs, consumption in period two equals:

$$(1) \quad C(\theta) = \theta+R-D, \ \theta \in \{\theta\}$$

Without a default, the consumer's expected welfare W_{ND} equals

$$(2) \quad W_{ND} = E_\theta U(\theta+R-D),$$

with $U'>0$, $U''<0$ for all values of C. E_θ is the expected value operator defined over $\{\theta\}$.

What happens to the debtor in the case of default is an unsettled issue (see Eaton, Gersovitz and Stiglitz (1986) for a discussion). Since this is only of peripheral importance for the points raised in this note, we simply assume that welfare is lowered by λ in the case of a default. Thus in case of default, second period expected welfare equals:

$$(3) \quad W_D = E_\theta U(\theta+R) - \lambda,$$

The net effect of a default on W is of course ambiguous. Welfare increases because after default debt service payments D will not be made, but it falls because of the default penalty λ. We assume, once again for simplicity, that the default penalty is all or nothing; thus partial defaults will not take place.

Whether default takes place for a given value of θ depends on whether W_D exceeds W_{ND} for that value of θ or not. We can partition the range of θ in an area where this will be the case and in an area where it will not:

$$(4) \quad \theta \in \{\theta\}_D \rightarrow W_D > W_{ND};\ \theta \in \{\theta\}_{ND} \rightarrow W_D \leq W_{ND};\ \{\theta\}_D + \{\theta\}_{ND} = \{\theta\}$$

Define $\tilde{\theta}$ as the value (or values) of θ for which W_D equals W_{ND}:

$$(5) \quad H(\tilde{\theta}) = U(\tilde{\theta}+R) - \lambda - U(\tilde{\theta}+R-D) = 0$$

Clearly the following holds:

$$(6) \quad \frac{\partial H(\theta)}{\partial \theta} = U'(\theta+R) - U'(\theta+R-D) = U''(\theta+R-D+\Delta(\theta)) < 0$$

for all θ and, by application of Rolle's theorem (Apostol (1974)), for at least one $\Delta(\theta)$. The curvature conditions imposed on U plus the inequality in (6) imply:

$$(7) \quad \{\theta\}_{ND} = \{\theta \mid \theta \geq \tilde{\theta}\},\ \{\theta\}_D = \{\theta \mid \theta < \tilde{\theta}\};$$

Thus the probability of there NOT being a default, π, equals:

(8) $\pi = Pr(\theta > \bar{\theta})$

Lenders are of course aware of all this. Furthermore lenders are assumed to be risk neutral. The rationale for this assumption is that bank managers can raise funds in international stock markets where their share holders can diversify country specific risk by properly structuring their portfolios. The secondary market evaluation of the claim on the debtor therefore equals:

(9) $V_S(D) = \pi D$

One final assumption before we turn to the analysis of cash debt buy backs. We would like, for better focus, to eliminate the problems due to buying marginal debt at average prices highlighted by Bulow and Rogoff (1988) and Dooley (1988) from the analysis. This problem will in fact disappear if the distribution is such that average and marginal prices become equal. One example of such a distribution is:

(9) $Prob(\theta=\theta_H) = \Pi_H$, $Prob(\theta=\theta_L) = 1-\Pi_H$; $\Pi_L+\Pi_H=1$, $\theta_H + R - D > \bar{\theta} > \theta_L + R$.

Equ. (9) implies:

(10) $\pi = \Pi_H$.

or the probability of default equals the probability of a bad state of nature, L.

3 Cash Debt Buy Backs

In the case of a cash debt buy back, the country spends some of its reserves to buy back debt from its creditors at the secondary market price. Since the choice of distribution for θ guarantees that the post-deal secondary market price will equal the pre-deal price, we might as well assume the use of all reserves R; this does not lead to any loss of generality. Thus reserves fall by R and the debt declines by R/π. Define the remaining debt as D_r:

$$(11)\quad D_r = D - R/\pi$$

Since the buy back is executed at the end of period one, nothing happens to first period welfare; it suffices to look at second period welfare. Consider first welfare without a debt buy back, W_N. Since

$$\theta_L < \tilde{\theta} < \theta_H,$$

default occurs in state L but debt will be fully serviced in state H. Thus expected welfare equals:

$$(12)\quad W_N = \pi U(\theta_H+R-D) + (1-\pi)(U(\theta_L+R) - \lambda)$$

$$= \pi U(\theta_H-(1-\pi)R/\pi-D_r) + (1-\pi)U(\theta_L+R) - \lambda'$$

using (11) and with $\lambda'=(1-\pi)\lambda$ defined for notational convenience.

Consider next the case of a debt buy back in which reserves R are

used to repurchase R/π worth of claims on the country, thus extinguishing those claims. Note that in this case the country succeeds in capturing the full discount in the secondary market. Because $\theta_L < \bar{\theta}$, there will be a default in the bad state of nature. Thus expected welfare in the case of the buy back operation equals:

$$(13)\quad W_{BB} = \pi U(\theta_H - D_r) + (1-\pi)U(\theta_L) - \lambda'$$

The welfare effects of the buy back operation can be assessed by comparing W_N and W_{BB}:

$$(14)\quad \Delta W = W_{BB} - W_N$$

$$= \pi\{U(\theta_H - D_r) - U(\theta_H - (1-\pi)R/\pi - D_r)\} + (1-\pi)\{U(\theta_L) - U(\theta_L + R)\}$$

Once again applying Rolle's theorem allows us to write (14) as

$$(15)\quad \Delta W = \pi U'(\theta_H - D_r - \Delta_1)(1-\pi)R/\pi - (1-\pi)U'(\theta_L + \Delta_2)R$$

$$= (1-\pi)R*\{U'(\theta_H - D_r - \Delta_1) - U'(\theta_L + \Delta_2)\}$$

for at least one pair Δ_1, Δ_2, $0<\Delta_1<(1-\pi)R/\pi$, $0<\Delta_2<R$.

The intuition is straightforward: utility in each state of nature changes after a debt buy back; in the good state of nature, debt service will decline with corresponding increase in consumption. In the bad state of nature, the decline in scheduled debt service because of the debt buy back is of no help since no debt is serviced anyhow. But reserves have

been exhausted by the debt buy back and can thus not be diverted from debt service to consumption anymore.

The net effect can in fact be signed unambiguously by once again applying Rolle's theorem:

$$(16)\quad \Delta W = (1-\pi)RU''(\theta_L+\Delta_2+\Delta_3)*(\theta_H-\theta_L-\Delta_1-\Delta_2-R-D_r) < 0$$

for at least one Δ_3 in the range $(0,\theta_H-\theta_L-\Delta_1-\Delta_2-R-D_r)$. This can in fact be signed unambiguously, because:

$$(17a)\quad 0<\Delta_1<(1-\pi)R/\pi;\ 0<\Delta_2<R;\ \text{and}$$

$$(17b)\quad \theta_H - (1-\pi)R/\pi - D_r > \bar{\theta} > \theta_L + R$$

Combining (17a,b) yields $\theta_H-\theta_L-\Delta_1-\Delta_2-R-D_r > 0$ and thus the inequality at the end of (16). Define A as the relative rate of risk aversion: $A = -CU''/U'$. It then helps to rewrite equ. (16) as follows:

$$(18)\quad \left.\frac{\Delta W}{U'*\Delta D}\right|_{BB} = -\varphi(1-\pi)\pi A < 0$$

$\Delta D = R/\pi$, the amount of debt bought back. and φ is a proportionality constant; $\varphi = (\theta_H-\theta_L-\Delta_1-\Delta_2-R-D_r)/(\theta_L+\Delta_2+\Delta_3) > 0$, using (17a,b).

(18) indicates that a cash buy back of external debt, even if fully executed at the pre-buy back secondary market price, unambiguously lowers the country's welfare. The welfare loss increases with the variance of the stochastic element in the country's income stream ($(1-\pi)\pi$) and with the

country's degree of risk aversion. The interpretation of this result is simple. Reserves, since the country can exercise the option not to devote them to debt service in bad states of nature, have an insurance value that increases with the degree of uncertainty embedded in the country's income stream and with the degree to which the country is averse to carrying such risks. But since the secondary market mainly reflects trade between risk neutral foreign corporations, this country specific insurance value of reserves is not reflected in the price at which risk neutral creditors are willing to exchange debt for cash. Hence the welfare loss when a country trades reserves for debt at the expected value of debt established in the secondary market.[1]/

4 Conclusions

This note has established that, in addition to the marginal debt at average price issue highlighted by Bulow and Rogoff (1988), Dooley (1988) and others, there are other problems with cash debt buy backs. In particular we show that, since a country can always opt not to use its reserves for debt service in bad states of nature, reserves have an insurance value that is specific to the country. This insurance value will thus not be reflected in the price at which the country can buy back debt in the secondary market using its reserves. We show that because of this problem cash buy backs lead to an unambiguous welfare loss to the country even if the marginal debt at average price issue highlighted by Bulow and

[1]Helpman (1989) also focuses on the change in insurance value of foreign liabilities as a result of debt restructuring. He focuses on debt equity swaps, however, and does not discuss the insurance value of reserves or cash debt buy backs.

Rogoff (1988), Dooley (1988) and others does not arise. The reason is that a cash debt buy back reduces insurance possibilities open to the country. Of course this issue is much less important if the debt reduction is so large that no incentive is left for future default under any circumstance; however then the Bulow/Rogoff/Dooley issue comes up whether it is in fact possible to capture the discount through such market based buy backs.

The conclusions should to some extent be qualified by pointing out their dependence on the particular model for a secondary market discount. I am not referring to the restrictive distributional assumptions embedded in (9); these simply serve to eliminate the problem of differences between average and marginal price of debt, an important issue, but one that is adequately dealt with in the existing literature. More important is the assumption, shared in most of the literature (in particular by all the authors listed below) that creditors and debtors have the same prior on the distribution of θ. Asymmetric information opens up a host of other issues, such as the existence of signaling equilibria in which reserve buy backs could possibly play a role.

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