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THE IMPACT OF THE BRADY PLANS ON DEBT REDUCTION AND SHORT-TERM GROWTH

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1. Introduction

The announcement of the commercial debt plan by the U.S. Secretary of the Treasury, Nicholas Brady, in 1989, marked a new era in the debt crisis management. The Brady Initiative differed from most previous official plans by explicitly considering debt reduction as a useful mean to solve the debt crisis; debt relief was legitimized. Moreover, in the Brady Plan, the IMF and the World Bank have an increased role. These institutions provide financial means for guaranteeing a substantial portion of bonds issued in exchange of old debt and for repurchasing part of it at a discount. Some creditor governments (in particular Japan) provide additional financial means in this context.

Many authors have focused their analysis on the Mexican accord, which, being the first Brady deal, has been considered as a test case [1]. At present four more countries (Costa Rica, the Philippines, Uruguay and Venezuela), could benefit from a Brady deal. It may be useful to compare the various Brady experiences. A number of other countries are candidate to the Brady scheme (e.g., Argentina - which reached an agreement in principle in April 1992 - Brazil, Morocco), and it seems that this rather strong demand for Brady deals is due to the fact that everyone bases his assessment of such deals on the rather successful Mexican experience. Our contention is that an assessment based solely on the Mexican case may be biased, and therefore somewhat irrelevant for policy evaluation.

A special feature of the Brady Plan is that there is no hard and fast blueprint for tackling the problem. Each country receiving different treatment since the terms of all agreements differ. The commercial banks could normally choose between several options determined by the debtor country and its Bank Advisory Committee. The only precondition is that most - if not all - banks participate in the accord, so that the traditional free-rider problem is avoided. As a consequence, it is essential to define common indicators to compare the deals implemented by the various debtors. In this respect, the calculations we present in this paper show that the first five Brady countries have not performed similar negotiations with creditors.

Section 2 starts with a presentation of the basic characteristics of the debt reduction packages and estimates the debt reduction obtained using several different approaches. Our calculations show that, with the exception of Costa Rica and Mexico, the Brady Plan did not bring substantial debt reduction.

Moreover, we provide in section 3 an estimate of the direct short term effects of the Brady

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1. See, e.g., Van Wijnbergen (1990, 1991), Reisen (1991), Bulow and Rogoff (1991a). A recent attempt to study all implemented Brady plans in Bacha (1991).

accords on the domestic economies. According to our computations, the short run effects of Brady deals on growth appear to be limited.

2. Brady Accords Characteristics and Impact on Debt Reduction

2.1 *Basic Characteristics*

Since the U.S. Secretary of the Treasury's 1989 speech, debt reduction deals have been concluded with Mexico, the Philippines, Costa Rica, Venezuela, and Uruguay. A detailed description of the Brady accords for different countries can be found in [Appendix I] of Berthélemy and Lensink (1992). Table 2.1 provides a summary of these different Brady accords, and shows the amounts of debt treated by the different options. The figures refer to the options chosen by the commercial banks.

Table 2.1

Brady Accords of the Different Countries (US$ millions)

	Buy-back	Par Bond	Discount Bond retired	Discount Bond issued	Money
Costa Rica	991 (84)	465	-	-	-
Mexico	-	22846	19693	12800	1600
Philippines	1337 (50)	-	-	-	715
Uruguay	628 (44)	535	-	-	89
Venezuela	1411 (55)	7400	1795	1257	1200
		2919			

Notes to table 2.1: Buy-back refers to debt retired as a result of a cash buy-back. Figures in parentheses refer to the discount percentage of the buy-back. Par bond refers to debt exchanged at par with reduced interest rates. For Venezuela the figure of US$2919 refers to the "step-down, step-up" bonds. The figure for Costa Rica refers to the total swapped interest payments and principal. Discount Bond retired and discount bond issued refer to the swap of old debt (discount bond retired) against new debt at a discount (discount bond issued). The difference is the decline in the facevalue of debt as a result of the discount bond. Money refers to new money coming available. For Mexico it equals 25 percent of the current exposure of creditors choosing for the new money option, i.e., 25 percent of US$6397 million. For Uruguay it equals 20 percent of the current exposure of creditors choosing for the new money option, i.e., 20 percent of US$447 million. For Venezuela it is 20 percent of the exposure of creditors choosing for this option, i.e. 20 percent of US$6000 million. For Costa Rica the Brady plan includes treatment of the interest arrears: the buy-back includes US$223 million past due interest; in addition to the debt reduction shown in the table, there has been a down-payment of 20 percent of past due interest non tendered to the buy-back (US$29 million); finally, an amount of US$114 million of past due interest is converted into 15 year bonds.

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Table 2.1 clearly shows that the debt reduction packages differ substantially between countries. For Mexico, Venezuela and Uruguay the Brady Plans contain a menu of different options for the creditors, whereas the greater part of the Philippines' deal, and to a lesser extent that of Costa Rica, consists of buy-back only. The menu of options for Mexico consist of a par bond, a discount bond, and a new money commitment[2]. For Mexico, contrary to the other countries, there is no buy-back option. The deal of Venezuela consists of a buy-back option, a par bond option, a discount bond option and a new money option. Moreover, the deal of Venezuela contains an option of swapping old debt into new debt with a six year rising interest rate (the so-called "step-down, step-up" bonds). The deal of Uruguay consists of a cash buy-back, a par bond and a new money option.

An important feature of the Brady accords is the financial contribution of the international financial institutions (IFIs) and other foreign official creditors to the financing of the deals. Table 2.2 presents the domestic and foreign financial contribution to the Brady Plans. It is worth noting that the official contribution to the financing of the deal is much lower for Uruguay than for any other Brady countries.

Table 2.2

The Financing of the Brady Agreements (US$ millions)

	Total	IMF	IBRD	Other	Own	Ratio
Costa Rica	216	51	35	102	28	0.87
Mexico	7000	1697	2010	2050	1243	0.82
Philippines	670	170	150	107	243	0.64
Uruguay	463	34	65	38	326	0.30
Venezuela	2380	880	500	600	400	0.83

Notes to table 2.2: Ratio refers to the foreign contribution to the financing of the Brady deal ((IMF + IBRD + OTHER)/ Total). Total refers to total financing requirements of the package. For Uruguay a part of the deal is financed with new money (US$89 million), which is included in Own. The figures for Venezuela are taken from World Bank (1991c). The figure for the total costs of the Mexico deal is taken from IMF (1991, p.77). The figures for Uruguay are taken from World Bank (1991a). The other figures are taken from World Bank (1990a).

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2. A par bond is a bond without discount but with a lower interest rate. A discount bond is a bond with a discounted principal but with a marked-based interest rate.

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2.2 *Impact on Debt Reduction*[3]

There are several ways of measuring the impact of the Brady deals on debt relief. Table 2.3 presents some possible indicators. A simple measure is the commercial debt reduction, defined as the reduction of the face value of debt owed to commercial banks (including the effect of new money provided by the banks)[4]. The total decline in commercial debt appears to be about US$9 billion. In terms of the 1989 commercial debt the total decline amounts to 11 percent. For Venezuela the percentage reduction in commercial debt appears to be modest, whereas it is substantial for Costa Rica, which reduced its commercial debt by some 62 percent.

One should, however, take into account the fact that foreign borrowing to support the operation increases the face value of debt. The reduction of face value of debt owed to banks and official creditors (total gross debt reduction) appears to be much smaller than the commercial debt reduction. For Mexico and Venezuela, total gross debt even increased, whereas commercial debt decreased by some US$5.5 billion and US$0.8 billion respectively. The total decline in gross debt of the 5 Brady countries appears to be very small, some US$0.5 billion only.[5]

Another indicator of the effect of Brady is the change in net debt, defined as total debt reduction plus the value of the collateral minus own resources used to finance the deal. This takes into account the fact that a purchase of foreign assets to be used for collateralizing newly issued bonds increases the real net wealth of a country. Using own resources to finance the operation, on the other hand, reduces net wealth. As compared with 1989 total gross debt the decline in net debt ranges from 0 percent for Venezuela to 22 percent for Costa Rica.

A drawback of the above mentioned methods is that they consider the impact of the decrease in face value of debt only. They do not take into account the benefits resulting from lower interest rates. A present value approach might gauge debt relief in terms of the combined effect of changes in the face value of debt and lower interest rates. Table 2.3, therefore, also presents a measure of the net debt stock relief, which equals net debt stock

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3. The detailed calculations of the figures presented in this section can be obtained from the authors on request.
4. A discounted value of this new money is used in order to take account of its partly delayed disbursement. A discount rate of 9.1 percent has been adopted. This rate is used throughout the paper.
5. For the Philippines we have assumed that about US$500 million would have been provided by the banks anyway through a standard refinancing of interest payments falling due (see Claessens and Diwan (1990)). In calculating the effects of the Brady plan, this amount is stripped from total new money obtained in the rescheduling/refinancing agreement.

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reduction calculated with the financial value (face value net of grant element) of debt, i.e., the decline in discounted value of future debt service.[6] The table shows that total net debt stock relief amounts to US$18 billion.

Table 2.3

Effects of the Brady Plan on debt stocks and flow volumes (US$ billions) and ratios (between brackets)

country	commercial debt reduction (a)	total gross debt reduction (b)	total net debt reduction (b)	net debt stock relief (b)	net transfer relief (c)
Costa Rica	0.99 (62)	0.80 (22)	0.81 (22)	0.94 (26)	0.28 (51)
Mexico	5.55 (11)	-0.21 (-0)	5.55 (7)	13.54 (17)	4.10 (32)
Philippines	1.13 (12)	0.70 (3)	0.46 (2)	0.46 (2)	0.11 (4)
Uruguay	0.54 (33)	0.40 (10)	0.28 (7)	0.32 (8)	0.06 (12)
Venezuela	0.81 (4)	-1.17 (-5)	-0.06 (-0)	2.70 (11)	2.20 (39)
Total	9.02 (11)	0.53 (0)	7.03 (5)	17.96 (13)	6.76 (30)

Notes: The ratios are calculated (a) as a percentage of commercial debt; (b) as a percentage of total gross debt; (c) as a percentage of pipeline total debt service 1990-1993, i.e., from the projected service payments on existing debt ostanding, including undisbursed. Commercial debt, total gross debt and pipeline debt service are obtained from World Bank 1990b.
Source: authors' calculations.

A final yardstick that can be used is the net transfer relief, defined as the yearly reduction in contractual flows of interest and principal repayments owed to all creditors, net of consumed own reserves and of associated foregone interest income, plus new money.[7] On average for the 1990-93 period, it appears that total net transfer relief is about US$6.8 billion, that is 30 percent of contractual total debt service. However, without the Brady plan, these countries would have received some transfer relief anyway, through standard rescheduling agreements. Therefore, our net transfer figures do not indicate the specific effect of the implementation of the Brady plan on transfer relief. For instance, if we assume that all principal repayments, but none of contractual interests, would have been resched-

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6. Debt relief from the "par' bonds equals: (1-new interest rate/old interest rate) x value of bonds exchanged. Debt relief from "discount" bonds and buy-backs equals debt retired minus new debt issued. The value of the "recapture clauses", i.e., a clause which links debt-service payments to economic development of the debtor country, is not considered.
7. it refers to the net transfer per year over the period 1990-93. An interest rate of 9.1 percent is used for the calculation of interest foregone, interest payments on foreign contributions and interest payments on pre-Brady deal debt. The reduction of principal payments is the annual average contractual principal payments previously due on debt which has been repurchased or exchanged against new bonds benefiting from a grace period. The effect of new money is assumed to be spread over the four years 1990-93.

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uled anyway, the remaining transfer relief of the Brady plans is much smaller, about 4 percent of contractual debt service.[8] Then, the main component of the net transfer relief appearing in table 2.3 comes from principal rescheduling associated with the grace period (from 7 to 29 years) of new bonds issued in exchange for old debt.

To conclude, it appears that the impact of the Brady deals on debt reduction, debt relief and transfer relief, as a percentage of 1989 debt of debt service, was greatest for Costa Rica according to all the indicators used. For all other countries the effects of Brady deals on debt stocks appear to be much smaller, with the exception of Mexico which has received a significant net debt stock relief. With respect to debt service, two countries, namely the Philippines and Uruguay, have received very little relief, whereas Mexico and Venezuela obtained more significant transfer relief, corresponding to the rescheduling of principal repayments.

3. The Impact on Short Term Growth

In order to have a rough estimate of the impact of the Brady debt packages on economic growth, we calculate in this section the direct, short term, transfer effects on the domestic economies of the different countries. We only treat the direct liquidity effects of the different accords, which implies that the debt overhang effect is not considered in the calculations. According to, e.g., Krugman (1988), and Sachs (1989) a large debt overhang reduces the incentive to make necessary macroeconomic adjustments. A debt reduction, therefore, may stimulate macroeconomic reform. Moreover, a debt reduction may stimulate the repatriation of flight capital. The impact of the different deals, especially in the long run, might therefore be much stronger than shown in this section. Our decision not to include the debt overhang effect is based on the fact that empirically this argument is rarely confirmed.[9]

The calculations are made with a simple two-gap model (see Appendix 1)[10]. The macroeconomic impact of the Brady deals for the different countries is shown by the difference between a so-called base case (Base) and a case in which the debt reduction package of the deal, as described in section 2, is considered (Brady).

In the Brady deals the "par" bonds, "discount" bonds and new money options all have grace

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8. Net interest relief, defined as net transfer relief net of principal rescheduling, equals (in US$ billions; between brackets in percentage of contractual debt service) 0.08 (15), 0.61 (5), 0.03 (1), -0.04 (-7), 0.31 (6) and 1 (4) for Costa Rica, Mexico, Philippines, Uruguay, Venezuela and Total, respectively.
9. See Hofman and Reisen (1990) for an empirical discussion.
10. For an explanation of the two-gap models see, among others, Bacha (1990).

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periods of over 7 years and maturities of over 15 years. Principal repayments on these debt issues are therefore shifted to a year outside the projection period. We assume that principal repayments on money from official creditors, used for the financing of the Brady deals, are also shifted outside the projection period, which is reasonable if one considers the usual borrowing terms on debt owed to these creditors. Hence principal repayments on "new"debt to private and official creditors are not taken into account.

To make a comparison between both scenarios an assumption with respect to debt service payments for the Base and Brady cases had to be made. We first make the rather extreme assumption that contractual obligations are paid in full (scenario (a) in table 3.1).

In addition, we investigate the impact of the Brady deals for the more realistic case where debt service obligations are not paid in full (scenario (b) in table 3.1). For this scenario an assumption with respect to the debt service payments to IFIs relative to the private creditors (banks) had to be made. In this respect it is important to know whether IFIs are treated as junior or as senior lenders. In the case where they are senior lenders, any resource transfer that come out of the country go first to pay off the official creditors. In the case where they are junior lenders private creditors are paid first. On the basis of several recent papers, including Bulow and Rogoff (1991b), Berthélemy and Vourc'h (1991) and Berthélemy and Lensink (1992), we assume that IFIs are considered as junior lenders. Berthélemy and Vourc'h (1991) have shown that IFIs are probably treated in recent years as senior lenders since they had to refinance, through new money, the whole debt service obtained from their debtors. Berthélemy and Lensink (1992) calculate predicted secondary market price increases which are compatible with the Brady deals under the assumption that IFIs are senior lenders, IFIs are junior lenders and IFIs and private creditors have an equal status. The calculations show that the only scenario consistent with the empirical evidence is the one in which the IFIs are considered as junior lenders. Bulow and Rogoff (1991b) prove through an econometric test on secondary market price data that the IFIs are not considered as senior by the market. In line with our assumption of relative seniority of private creditors we use the ex-ante and ex-post secondary market price (see table A2) as an approximation of the probability of default on debt service payments to private creditors for the Base and Brady case respectively. Hence, private creditors are paid the ex-ante, ex-post secondary market price per dollar of debt service owed in the Base and Brady cases respectively. Official creditors, on the other hand, are paid the marginal value (see again table A2) per dollar of debt owed, for both the Base and Brady cases.[11]

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11. This can be explained by using a simple formula for the secondary market price. Assume that there are only two states of nature. In the bad state of nature, the debtor pays only T. In the good state of nature the debtor is able to

For the Base cases contractual principal repayments for official and private creditors are exogenously taken from World Bank (1990b)[12]. For the Brady scenarios an estimate of the decrease in principal repayments to private creditors has to be made. We approximate the remaining principal repayments to private creditors by multiplying the annual contractual principal repayments to private creditors for the Base case to the ratio between the post-deal commercial debt and the pre-deal commercial debt. The post Brady deal commercial debt, used for the calculation of the ratio, only refers to "old" commercial debt. It does not contain the value of the converted debt instruments, such as new money, "par" bonds and "discount" bonds, since principal repayments on "new" debt are transfered outside the simulation period. For scenario (b) where debt service payments are not made in full annual principal repayments on "old" debt to private and official creditors are simply calculated as the total contractual principal repayments multiplied by the relevant secondary market price or the marginal value of debt.

Contractual interest payments are endogenously determined by multiplying debt to official and private creditors by the relevant interest rate (for both the Brady and Base case). For scenario (b), where debt service payments are not made in full, actual interest payments are calculated by multiplying the total required interest payments by the relevant secondary market price of debt or the marginal value of debt.[13]

For some countries "new" debt is enhanced by a collateral. The guarantees with respect to interest payments are taken into account in the scenarios where the debtors default by assuming that interest payments are made in full for the period the interest payments are guaranteed. For the rest of the simulation period interest payments are calculated as described above. The collaterals with respect to principal repayments are not considered since all amortization on "new" debt has been shifted to a year outside the simulation period.

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pay exactly what it owes. This implies that $p = \pi + (1-\pi) T/D$, where p is the secondary market price of debt, π is the probability of the good state of nature (the marginal value of debt) and D is the debt stock. The country is able to pay back all its contractual debt service with a probability of π. If the country is not able to pay back all of its contractual debt service the banks are paid a net transfer T and the IFIs are paid nothing, in the case where IFIs are treated as junior lenders. Hence, IFIs are paid the marginal value per dollar of debt owed.

12. The World Bank provides projections of contractual principal repayments, excluding the effects of the Brady plan, under the heading "projections on existing pipeline of long-term debt".

13 Interest payments are calculated as the previous period debt stock times the interest rate. The debt stock used for this calculation equals the previous period debt stock plus new lending minus total pricipal payments due. We used total pricipal payments due instead of the actual principal payments since in this way the total present value of the actual debt service payments during the simulation period divided by the present value of total debt service obligations during the simulation period exactly equals the secondary market price. The same applies to the interest payments on remaining (old) debt to private creditors in the Brady scenario.

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New money is assumed to become available in four years. Interest foregone on own resources is also taken into account in the calculation of resources available in the balance of payments in the Brady cases. Finally, the impact of the "value recovery provisions" is not taken into account.

Table 3.1 presents the simulation results. For the scenario where debt service payments are made in full (scenario a) the impact of the Brady Plan on economic growth appears to range between an increase of the average annual growth rate between 1990 and 1995 of 0.1 for the Philippines and 1.3 for Costa Rica. The increase in this growth rate appears to be modest for Mexico (0.5 percent) and somewhat higher for Uruguay and Venezuela (0.8 and 1.0 percent respectively). The results of this scenario (a) correspond with the findings of Section 2 where it was shown that the impact of the Brady Plan on net transfer relief was greatest for Costa Rica and lowest for the Philippines. With respect to the more realistic scenario (b) where debt service payments are not paid in full it appears that the direct liquidity effects of the Brady operations on domestic growth are very small. For most countries there was even no effect at all. The increase in net transfers to the different countries, taking into account the rise in the secondary market price due to the debt reductions, are too small to have any significant effect on macroeconomic growth.

Table 3.1

The Impact of the Brady Accords on Economic Growth (1989 US$ million; (percentages))

	Y95 (a)	TR95 (a)	Y95 (b)	TR95 (b)
Costa Rica				
Base	5650 (1.3)	-168	6603 (4.0)	176
Brady	6098 (2.6)	-130	6622 (4.0)	177
Mexico				
Base	221677 (1.7)	-5247	241551 (3.1)	1148
Brady	228129 (2.2)	-4847	242180 (3.2)	746
Philippines				
Base	42158 (-0.8)	-3148	46369 (0.9)	-613
Brady	42636 (-0.7)	-3075	46716 (0.9)	-721
Uruguay				
Base	7711 (-1.5)	-365	8725(0.6)	-56
Brady	8077 (-0.7)	-303	8780 (0.7)	-65
Venezuela				
Base	44642 (0.3)	-3917	50325 (2.3)	-1374
Brady	47482 (1.3)	-3268	50475 (2.4)	-1344

Notes: Scenario (a) = debt service payments are made in full; Scenario (b) = debt service payments are not made in full; Y95 = the level of real GDP in 1995; TR95 = transfers in 1995, defined as net capital inflows (gross capital inflows minus principal repayments) minus interest payments; figures in parentheses refer to average annual growth rates between 1989 and 1995. See Appendix 1 for more information with respect to the assumptions made in the model calculations.
Source: authors' calculations.

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The calculations made above are subject to many assumptions. They can therefore be seen only as a very rough estimate of the effects on economic growth. Nevertheless, there appears to be reason to doubt whether the direct liquidity effects of the Brady accords are at all substantial. It should be noted however that the results of the scenarios may be too pessimistic since we assume that the different countries are not able to raise additional funds from multilateral institutions or private creditors during the simulation period.[14] It is likely that in the long run most of the countries under consideration will be able to raise additional funds. The modelling of future capital flows for the Brady countries is therefore highly important, but this lies outside the scope of our paper.

4. Summary and Conclusions

This paper has shown that the Brady accords lead to substantial debt reduction for Costa Rica and Mexico only. Debt reduction for the other countries considered is very modest. Moreover, the short term effects of the Brady accords on economic growth are very small, unless they bring about significant additional effects due to "confidence boosting", like the repatriation of flight capital, or (future) access to the international capital markets. Future research should, however, consider these additional effects.

APPENDIX 1: THE SIMULATION MODEL

To clarify the model it is helpful to present two well known economic identities:

$$I - S = F - J \tag{1}$$
$$M - X = F - J \tag{2}$$

I = investment; S = domestic saving; F = net capital inflows; J = net factor services to abroad; M = imports; X = exports.

Equation (1) is the savings gap: equation (2) is the foreign exchange gap. To keep things as simple as possible the model does not explicitly distinguish between different categories of import goods. Nevertheless, the model implicitly allows for the fact that imports consist of imported capital goods and consumer goods by assuming that total imports depend on investment and GDP (Y).

$$M = F_1(I,Y) \tag{3}$$

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14. The model only considers disbursements of unutilized balances, foreign direct investment and new money as a result of the Brady accords (see Appendix 1).

By inverting (3) we get

$$I = F_2(M,Y) \tag{4}$$

Total possible imports are given by the available amount of foreign exchange.

$$M = F - J + X \tag{5}$$

Savings are assumed to be a function of GDP.

$$S = F_3(Y) \tag{6}$$

Savings constrained investment (I_s), and foreign exchange constrained investment (I_f) can now be derived. Rewriting (1) and substituting (6) gives I_s:

$$I_s = F_3(Y) + F - J \tag{7}$$

Combining (4), and (5) gives I_f, or in other words the maximum investment when it is taken into account that investment goods should contain imported capital goods:

$$I_f = F_3(F - J + X, Y) \tag{8}$$

Exports are assumed to be related to the (exogenous) industrial countries' growth rate (y_i):

$$X = X_{-1}(1 + by_i) \tag{9}$$

b = export elasticity

Actual investment is the minimum of I_s; and I_f:

$$I = \min(I_s\ I_f) \tag{10}$$

In the case where I_s is binding, we assume that imports will adjust to a level so as to equilibrate the savings, and foreign exchange gap[15]. if I_f is binding, savings adjust.
Capital inflows are exogenous. We distinguish private bank lending (B), principal repayments (AP), foreign direct investment (FDI) and disbursements of unutilized balances (DB).

$$F = B + DB + FDI - AP \tag{11}$$

All capital flows are exogenous. Bank lending equals private creditors' "new" money in the Brady deals. Principal repayments and disbursements of unutilized balances are taken

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15. A capacity constraint applars in the savings gap. Therefore another way of closing the model is by rationing exorts. In the case where imports adjust we assume that all avaiable foreign exdange will be used. The increase in imports will lead to an increase in imported consumer goods and hence to a decrease in consumer demand for domestic goods.

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from World Bank (1990b). Foreign direct investment grows with an exogenously specified growth rate.

For the net factor services, we divide total debt into commercial bank debt (D_m), paying a market interest rate (r_m), commercial bank debt (D_r), paying a reduced interest rate (r_r), debt owed to official creditors (OD_m), paying a market interest rate, and debt owed to official creditors (OD_r), paying a reduced interest rate (r_o,r), which may differ from the reduced interest rate on commercial debt. All interest rates are exogenous.

$$J = r_m D_{m,-1} + r_r D_{r,-1} + r_m OD_{m,-1} + r_{o,r} ODr,-1 \qquad (12)$$

Finally potential output (Y) is modelled using a conventional Harrod-Domar production function.

$$Y = vK \qquad (13)$$

v is the (constant) marginal productivity of capital (the inverse of the ICOR).

Writing (13) in first differences and some rewriting gives.

$$Y_t = Y_{t-1}(1 - c) + vI \qquad (13a)$$

c is the degree of depreciation.

The import function (3), and the saving function (6) are estimated using a simple least squares regression method. The results are presented in Berthélemy and Lensink (1992) and can be obtained from the authors on request. The coefficient for the production function is obtained from other studies.

The model uses constant 1989 prices. It only needs some coefficients and start values. Table A1 gives the start values.

Table A1

1989 start values (millions of 1989 dollars)

	Costa Rica	Mexico	Philippines	Uruguay	Venezuela
GDP	5221	200729	44342	8418	43836
Exports	1892	35900	12407	2193	15672
Imports	2023	31014	11946	1500	9116
Invest	1275	34816	8265	777	5615
Debt Occ	741	428	5253	68	94
Debt OCNC	1285	21449	8518	846	1863
Debt PC	1593	63470	11181	2360	28904
FDI	116	2241	482	47	213

Notes: Sources: GDP, Exports, Imports, and Investment (Invest) from World Bank (1991b). Imports refer to

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merchandise imports and imports of nonfactor services. Factor services are not included since they are endogenous in the model. With respect to exports factor services are included. Debt OCC = concessional debt to official creditors; Debt OCNC = non-concessional debt to official creditors, calculated as the sum of public and publicly guaranteed non-concessional debt to official creditors and use of IMF credit; Debt PC = debt to private creditors, calculated as the sum of public and publicly guaranteed debt to private creditors plus private non-guaranteed debt. All debt figures are taken from Word Bank (1990b). FDI = (net) foreign direct investment, taken from World Bank 1990b, the figure for Uruguay refers to 1988.

Other Assumptions

The assumed export elasticity is based on Fishlow (1987, p. 259) and set at 1.5 for all countries. GDP growth of the industrial countries is assumed to be 2 percent for 1990 and 1991, and 3 percent from 1992 (based on de Marulanda, 1991, p. 101). The (real) interest rate on non-concessional debt to official creditors and on debt to private creditors is assumed to be 8.6 percent (LIBOR of 9.1 percent minus 1989 US inflation of 0.5 percent). The (real) interest rate on concessional debt to official creditors is set at 2 percent. The marginal productivity of capital for the Latin-American countries is set at 0.4 (based on Dittus, and O'Brien, 1991). The marginal productivity of capital for the Philippines is assumed to be 0.286 (based on Taylor, 1990). The rate of growth of foreign direct investment is set at 7.5 percent (based on the continued policy reform scenario of de Marulanda, 1991, p.105).

Additional Assumption with Respect to the Model Calculations

All start values for the Base scenarios are given in table A1.
In the Brady scenarios Debtpc equals the start value of Debtpc minus debt repurchased in the Brady deals plus the value of Discount Bond issued (see table 2.1). Debt OCNC in the Brady scenarios equals the start value of Debt OCNC plus the IMF, IBRD and Other contributions in the financing of the Brady agreements (see table 2.2). In the Brady scenarios debt to private creditors with reduced interest rates equals the value of the Par Bonds (table 2.1).
For Costa Rica the converted past due interest payments (amounting to US$114 million) are not considered. The 20 percent downpayment on past due interest are considered by decreasing the calculated interest payments over the simulation period by an amount equal to the downpayment. For Venezuela an additional debt stock is introduced: the start value of the "step-down, step-up" bonds (US$2919 million). In the first 6 years these bonds pay real interest rates equal to the nominal interest rates as given by World Bank (1990a, p. 60), minus 0.5 percent. In the other years these bonds pay a real interest rate of 8.6

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percent. Foreign contributions of official creditors are assumed to be US$2000 million minus US$630 million.

The ex-ante and ex-post secondary market prices and the marginal values of debt, used for the calculation of debt service payments, are given in table A2.

Table A2

Prices in Brady deals

Country	Ex-ante price	Ex-post price	Marginal value
Costa Rica	0.14	0.22	0.10
Mexico	0.38	0.51	0.14
Philippines	0.49	0.51	0.27
Uruguay	0.47	0.63	0.17
Venezuela	0.44	0.54	0.09

Source: Berthélemy and Lensink (1992)

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Abstract

This paper presents an assessment of the results of Brady plans for debtor countries which have implemented such agreements (Costa Rica, Mexico, the Philippines, Uruguay and Venezuela). We show that the relatively successful Mexican case cannot be generalized, due to the great diversity of the aggrements signed. It appears that the Brady accords lead to substantial debt reductions for Costa Rica and Mexico only. Debt reduction for the other countries considered is very modest. Hence a case-by-case analysis is essential. Moreover, macroeconomic simulations are presented, providing an assessment of the short-term growth effects of the Brady plan. These effects appear to be very limited.

L'IMPACT DU PLAN BRADY SUR LA RÉDUCTION DE LA DETTE ET LA CROISSANCE À COURT TERME

Résumé

Cet article présente une évaluation des accords Brady pour le Costa Rica, le Mexique, les Philippines, l'Uruguay et le Venezuela. Nous montrons que le relatif succès de l'exemple mexicain ne peut pas être généralisé, en raison de la grande diversité de ces accords. La réduction de la dette n'a été substantielle que pour le Costa Rica et le Mexique, et elle a été très modeste pour les autres pays considérés. Ceci montre la nécessité d'une analyse au cas par cas. Nous présentons par ailleurs des simulations macro-économiques qui permettent d'évaluer les effets du plan Brady sur la croissance à court terme. Il apparait que ces effets sont très limités.