Inflation, tax shields and borrowing: Why is the balance sheet of the corporate sector becoming vulnerable?

N.Biger
Department of Business Administration, University of Haifa, Haifa, Israel 31999

Accepted 2 March 1987

The en-masse bankruptcies of many corporations in high inflation countries in recent years is attributed partially to the pre-recession high-risk financial planning. This paper elaborates on the type of considerations which govern the financial decisions of local firms in an inflationary environment and shows that the real cost of borrowing, even index-linked or hard currency funds may be very low and even negative. This might happen due to common tax laws. This phenomenon lead many business firms to prefer debt over equity financing. The analysis indicates the kind of risk assessment which South African firms might have to conduct when they formulate their credit and financial policies in a high-inflation environment.

Die hoë getal bankrotskappe onder maatskappye in lande wat onder groot inflasiedruk verkeer, word gedeeltelik toegeskryf aan hoërisiko finansiële beplanning vóór resessie. Hierdie artikel brei uit op die tipe oorwegings wat die finansiële besluite van lokale firmas beheer in inflasionêre omgewings. Dit toon dat die werklike koste van lenings, selfs van indeksverwante- en kontantfondse nog laag of selfs negatief mag wees. Dit mag toegeskryf word aan gewone belastingswette. Hierdie verskynsel lei menige besighede om skuld bo surplusbate-finansiering te verkies. Hierdie analise toon die soort van risikowaardering wat Suid-Afrikaanse firmas mag bedryf wanneer hulle krediet en finansiële beleid formuleer binne 'n hoë inflasionêre omgewing.

Introduction

The year 1983 was considered by many as the year of the financial crunch in the developing countries. External debt of many Latin-American countries has reached unprecedented levels and the international banking community is expressing growing concern as to the ability of many countries to pay back their debt. Multinational business firms with strong presence in these countries are taking various measures to minimize potential losses which are the direct results of several measures taken by governments in an effort to partially alleviate the burden of their external debt. Import restrictions, fast devaluations and rising levels of unemployment are among the factors which cast severe doubts on the ability of the multinational firms to recover outstanding loans which they have granted to local business firms. The international debt crisis continued and the prospects for 1987 are not encouraging.

Discussions of the international debt crisis usually focus on the amount of outstanding loans of different countries and especially the non-performing loans. The loans however must be divided into two categories: those granted to sovereign governments and government-owned enterprises, and those extended to private sector enterprises. It is the latter which is the subject of the present paper.

Loans to private sector enterprises were, in many cases, granted to local banks who, in turn, used the funds to finance local non-bank private corporations. Other loans were directly granted to local non-financial private enterprises. The economic recession which many Latin-American countries experience since 1982 caused en-masse bankruptcies of local business. These bankruptcies were not only attributable to the falling operating income of private enterprises, but also to the extremely high levels of debt of these enterprises during the pre-recession period.

Multinational as well as local banks have long recognized the erosion of the real value of loans under inflationary conditions. Therefore credit is usually denominated in terms of hard currencies, most notably U.S. dollars. Local banks and financial institutions were granting loans which are indexed to the local rates of inflation. These measures were perceived to provide the lender with an adequate hedge against the adverse effects of inflation on the real value of the funds.

At first glance it seems that local business firms would realize the true cost of such loans and apply caution when they consider the capital structure of the enterprise. Clearly, if debt funds are denominated in a hard currency, or if they are indexed to the local inflation rates, the nominal cost of the loans should rise with inflation. Hence business firms would try to maintain a reasonable balance in their capital structure which will keep their cost of capital low. Such assertions are not necessarily valid. When the real cost of the loans is assessed on an after-tax basis, inflation or fast rates of devaluation may result in negative, rather than positive interest costs, and business firms will seek to finance their operations with extremely high proportions of debt. This leads to a very risky balance sheet of the corporate sector and a down-turn in the economy will then trigger en-masse bankruptcies.

This paper provides an analysis of the financial considerations of business firms in inflationary environments. It then considers a tax environment which was designed to mitigate the effects of inflation on corporate real value of equity. This system, introduced in Israel in August 1982 was designed to neutralize the effects of inflation on corporate financial decisions but the effects are attained at a considerable cost in terms of lost revenues to the government.

The cost of debt

The modern theory of finance recognizes the benefits which business firms obtain from the deductibility of interest expenses for tax purposes. In a one-period framework, interest expenses are defined as the difference between the amount returned by the borrower and the amount of the loan. Recognition of interest deductibility for tax purposes is reflected either in the computation of the firm's weighted average cost of capital or in the competing approach to capital budgeting theory, namely the adjusted present value approach. Both accept the cost of debt to equal the amount of interest paid, times one minus the corporate tax rate, as long as the firm's operating income exceeds the amount of interest payable. In the adjusted present value framework, the tax shield of interest is the amount of interest times the corporate tax rate. The tax shield of interest is at the heart of Modigliani and Miller's propositions which state the value of a levered firm to be equal to the value of the same but unlevered firm plus the present value of the future interest tax shields[1]:

$$(1)\ V_L = V_U + T \times D.$$

This proposition has been modified to account for the cost of financial distress[2]:

$$(2)\ V_L = V_U + T \times D - \text{PV of cost of financial distress.}$$

Thus finance theory concludes that an optimal capital structure which maximizes the value of the firm is attainable. The specific optimum may vary among firms and it depends upon their tax position, the risk and asset type.

Many of the conclusions were developed without due regard to the effects of inflation and the reality by which taxes are imposed on nominal income and nominal expenses are deductible. Since it is customary to assume that corporate decisions are motivated by real rather than nominal considerations, some of these conclusions must be modified.

Consider first the effects of inflation on the real rate of interest on debt on an after-tax basis. Assume that the firm obtains a one-year loan which is fully indexed to the rate of inflation (both interest and principal) and the real contractual rate of interest is R^*. At the end of the period, the firm must pay back the principal and interest, multiplied by one plus the realized rate of inflation. Denote the rate of inflation by P, and the year-end payment per unit borrowed, Y is:

$$(3)\ Y = (1 + R^*)(1 + P).$$

Hence, the nominal rate of interest paid for the loan is:

$$(4)\ R_n = (1 + R^*)(1 + P) - 1.$$

Denote by T the corporate tax rate. Assuming the borrower has sufficient operating income (in excess of the nominal payment of interest), the after-tax effective nominal rate of interest is:

$$(5)\ Rn_{AT} = Rn(1 - T) = [(1 + R^*)(1 + P) - 1](1 - T).$$

Assume now that the borrower's prediction of the rate of inflation actually materialized (i.e. $E(P) = P$)[3]. This borrower considered the cost of the loans in terms of the start of the period, or the decision point. In terms of the original purchasing power of the funds, or in real terms, the after-tax cost of the loan is:

$$(6)\ R^*_{AT} = \frac{1 + [(1 + R^*)(1 + P) - 1](1 - T)}{1 + P} - 1$$

It should be clear then that the real after-tax cost of debt may be positive or negative, depending on the contractual rate of interest (pre-tax), the tax rate and the rate of inflation.

Table 1 displays the effects of inflation on the real cost

Table 1 The effects of inflation on the real cost of debt (T = 0,46)

Actual inflation Rate, P(%)	After-tax real cost of debt (R_{AT}%)	
	When R^* = 5%	When R^* = 10%
0	2,70	5,40
5	0,51	3,21
10	-1,48	1,22
15	-3,30	-0,60
20	-4,97	-2,77
25	-6,50	-3,80
30	-7,92	-5,22
35	-9,23	-6,53
40	-10,44	-7,74
100	-20,80	-17,60
200	-27,97	-25,27
400	-34,10	-31,40

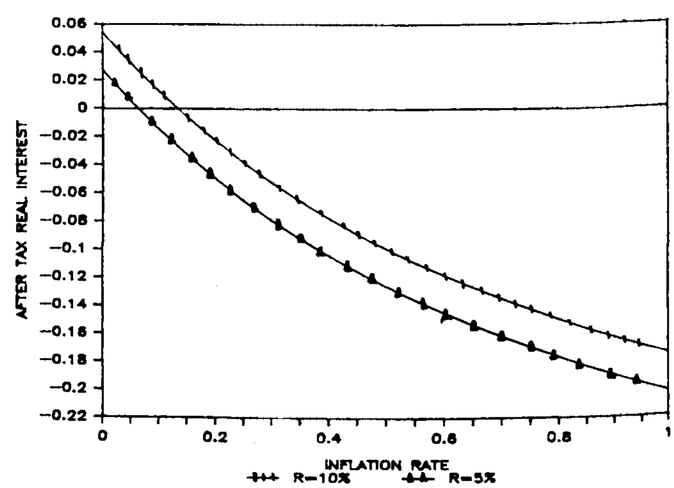

Figure 1 Real after-tax rates of interest as a function of the inflation rate

of debt. Figure 1 presents the same graphically.

The real cost of debt can thus be negative as long as the tax shield of interest payments can be obtained. This will be the case if the operating income of the firm rises with inflation, although there need not be a strictly perfect correlation between inflation and nominal operating income at least in the short run.

Given these considerations, and in order to emphasize the point, it is possible to develop the relationship between the real contractual rate of interest and the rate of inflation which render a zero real cost of debt. Equating the right hand side of equation (8) to zero and solving for R^*, we obtain:

$$(7)\ R^*_0 = \frac{(1-T)+P}{(1-T)(1+P)} - 1$$

where R^*_0 is the real contractual rate of interest at which the real cost of debt to the firm is zero.

With a corporate tax rate of 46%, Table 2 provides the contractual rate of interest at which the real cost of debt to the business firm is zero. Figure 2 displays these rèsults graphically.

The figures in Table 2 indicate the real rates of interest at which firms can allow themselves to borrow while their real effective cost of debt is zero, for example, if inflation rate is expected to be 25% next year, any fully index linked loan at a contractual real rate of interest below 17,04% will imply a negative rate of interest to the corporate borrower. If inflation is expected to be 200% next year, a loan at a contractual real rate of interest below 56,8% will have a negative real effective cost to the firm, as long as it is expected that the firm's operating income will rise sufficiently so that the firm can use the entire tax shield of interest.

The effective real after-tax cost of debt may also be negative if the loan is granted for a period of more than one year. The effects of the tax shield are diminished with the duration of the loan. Thus, for example if the loan is at 10% real rate of interest for two years, and inflation is expected to be 25% in each of the next two years, the real after-tax cost of the loan is –3%[4]. A one-year loan would have cost a negative 3,8% under such conditions. (The calculations assume a corporate tax rate of 48%.)

Table 2 Contractual real interest at which the cost of debt is zero

Inflation rate (%)	Contractual R^*_0 (%)	Inflation rate (%)	Contractual R^*_0 (%)
0	0,00	30	19,66
5	4,06	35	22,09
10	7,74	40	24,34
15	11,11	100	42,59
20	14,20	200	56,79
25	17,04	400	68,11

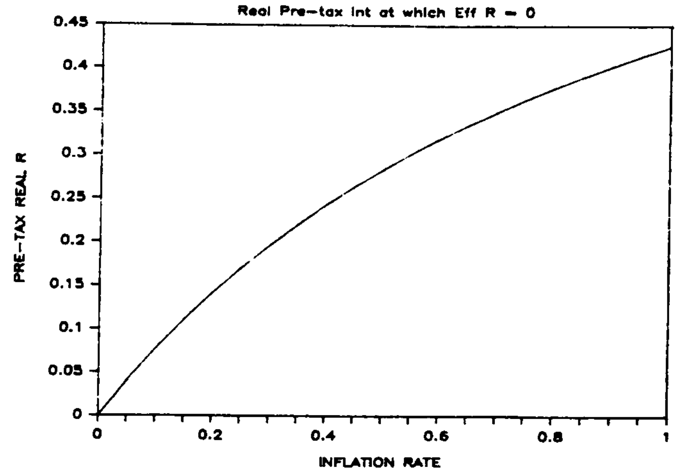

Figure 2 Real pre-tax interest at which Eff $R = 0$

The real after-tax cost of debt can be derived by solving equation (8) for R^*_{AT}[5]:

$$(8)\ 1 = R^*_{P.T.}(1-T)\sum_{t=1}^{N}[1+R^*_{A.T.}]^{-t} + \frac{1+[(1+P)^N-1](1-T)}{(1+P)^N[1+R^*_{AT}]^N}$$

The term R^*_{AT} is the effective after-tax yield, or the effective real after-tax rate of interest on the loan. The longer the term to maturity of the loan, the higher the real cost of debt. The real cost of debt approaches $R^*(1-T)$ as N, the term to maturity approaches infinity.

Table 3 presents the real after-tax cost of debt for loans at a real contractual rate of interest of 10% for different durations, assuming various (constant) annual rates of inflation. The figures are obtained by solving equation (8) for different P's and N's.

It follows that from the view point of the borrower, short rather than long term loans are preferred. Borrowers would prefer to roll over short-term debt in order to take full advantage of the tax shield provided by paying interest and principal amount early[6].

Table 3 The real after-tax cost of fully indexed loans in per cent

Loan duration (year)	Annual inflation rate 20%	50%	100%	200%
1	-2,77	-9,93	-17,60	-25,27
2	-1,69	-7,91	-13,05	-16,94
3	-1,13	-6,07	-9,35	-11,14
4	-0,61	-4,69	-6,49	-7,27
5	-0,11	-3,10	-4,32	-4,66
6	0,35	-1,94	-2,67	-2,81
7	0,71	-0,97	-1,40	-1,46
8	1,16	-0,16	-0,41	-0,44
9	1,52	0,53	0,37	0,36
10	1,85	1,10	1,01	1,00
∞	5,40	5,40	5,40	5,40

Borrowed at a real contractual rate of 10%; Tax rate 46%

Similar effects are obtained if instead of an index-linked loan the company borrows at nominal rates of interest which retlect inflation expectations. It is generally recognized that nominal rates of interest reflect some real component and a conpensation to lenders for the expected erosion of the real value of the funds lent[7]. Thus if inflation expectations are reflected in the cost of funds, and if actual inflation is even roughly the same as the inflation expected when the loan was granted and obtained, the real after-tax cost of the loan may be negative. Again, the higher the rate of inflation the lower the real effective cost of debt will be.

Capital structure implications

It was mentioned above that capital structure theory states that the value of the firm is enhanced by the present value of the tax shield of its interest payments and reduced by the increasing probability that it will be unable to utilize the tax shield and by the present value of financial distress, as the firm raises the proportion of debt in its capital structure (Equation 2). These conclusions also imply that optimal capital structure is the binding constraint and optimality is reached before the firm faces its debt capacity constraint.

The present value of the tax shield however is not independent of the rate of inflation, in real terms. Consider the case of a series of one year index-linked loans which are renewed periodically. These loans rise nominally at a rate of P (the expected rate of inflation). Alternatively we may consider a series of one period loans at an interest rate which reflects inflation expectations. The real value of the tax shield of interest per one unit of currency, TS^*, is not $R^* \times T$ but:

$$(9)\ TS^* = R^* - \left[\frac{1 + [(1 + R^*)(1 + P) - 1](1 - T)}{1 + P} - 1 \right]$$

We have shown that the real effective rate of interest is a decreasing function of the rate of inflation. Furthermore, it might be negative. Therefore the tax shield of interest may even exceed the contractual real rate of interest on debt. The real tax shield will be a rising function of the rate of inflation.

For an initial level of debt D, the real periodic tax shield is $D \times TS^*$. Discounted to present value using the firm real borrowing rate of interest, the present value of the tax shield is:

$$(10)\ PV = \frac{D}{R^*} \left[R^* + 1 - \frac{1 + [(1 + R^*)(1 + P) - 1](1 - T)}{1 + P} \right]$$

Only when $P = 0$ we get $PV = T \times D$. For any positive rate of inflation the present value of the tax shields of interest exceeds the Modigliani and Miller value of $T \times D$.

In the classical Modigliani and Miller framework, the maximum value of the firm would be limited to Max $V_L = V_U(1 + T)$ in the absence of financial stress considerations. However, the value of the firm which is granted tax shields on the basis of nominal interest payments might reach higher values, depending upon the rate of inflation. In the extreme case where the entire capital of the firm consists of debt, the value of the firm will be equal to Max $V_L = V_U$ + (the value of equation 10 with V_U replacing D). This expression can be simplified to:

$$(11)\ \text{Max } V_L = V_U + V_U\,[1 - R^*_{AT}/R^*].$$

Table 4 The maximum value of the levered firm

Inflation rate, P (%)	Maximum V_L (\$)	Inflation rate, P (%)	Maximum V_L (\$)
0	1,460	30	2,522
5	1,679	35	2,653
10	1,878	40	2,774
15	2,060	100	3,760
20	2,277	200	4,527
25	2,380	400	5,140

V_U=\$1,000; R^*=0,10; T=0,46

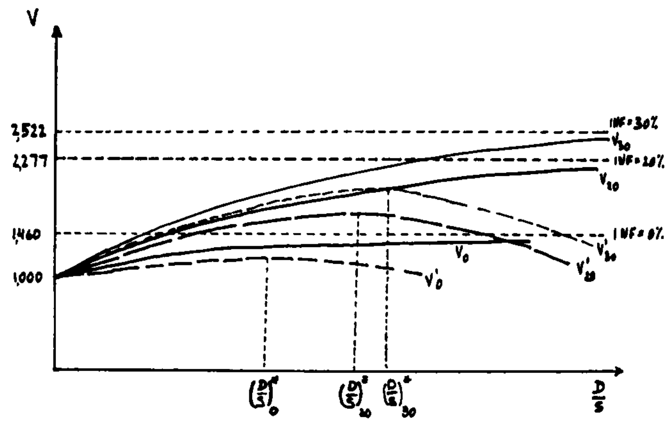

Figure 3 Optimal capital structure for alternative inflationary scenarios

Table 4 displays the maximum value of a levered firm under such conditions, where the value of the unlevered firm is \$1000. Loans are at $R^* = 0{,}10$ (index linked) and the corporate tax rate is $T = 0{,}46$.

This of course is only valid if the cost of financial distress is ignored. When this cost is being considered, there seems to be no reason why the real present value of the future cost of financial distress should be affected by inflation. If it is assumed that the firm's real operating income is inflation-immune, the real implicit cost of the financial distress would not be affected by the presence of inflation, and the real present value of this cost need not change. Thus, the schedule of the cost of financial distress as a function of the firm's debt to equity ratio can be postulated not to be affected by inflation.

The graphical interpretation of the above conjectures is presented in Figure 3. With an inflation rate of zero per cent, the optimal debt to equity ratio is $(D/S)^*_0$. With higher rates of inflation, the graphs describing the value of the firm are V_{20}, V_{30} etc. With each, the optimal capital structure is attained with a higher level of debt to equity.

It should be noted that under such inflationary circumstances, the firm will not necessarily reach its debt capacity. The present value of financial distress might still dictate optimal capital structures with less than full debt capacity utilization. However, higher rates of inflation would lead to overall increase in the amount of debt of the corporate sector.

The wisdom of borrowing in a foreign currency

The Interest Parity Theory implies that the rates of interest on domestic and foreign currencies tend to be equal when adjusted for future exchange rate expectations. From the vantage point of the borrower, this relationship also holds for the after-tax real rates of interest. Hence, local firms might be quite willing to borrow in hard currencies and promise high rates of interest on such loans.

Consider a firm who contemplates borrrowing in a hard currency, e.g. in dollars. The spot exchange rate is LC 50 per \$. Inflation is expected to be 40% and the expected exchange rate in one year is LC 70 per \$[8]. The dollar interest rate on the loan is 20% and the corporate tax rate 46%.

If the firm is optimistic about the operating income which might emanate from the borrowed fund, its assessment of the real cost of the loan must take into consideration the expected rate of inflation and the future exchange rate. If it were to borrow \$1,000 or LC 50,000, the payment at the end of the year is expected to be LC 84,000 (the expected equivalent of \$1,200). For tax purposes, its interest expense is LC 34,000 which implies an after-tax expense of LC 18,360. Thus the effective amount paid back is LC 68,360. Evaluated in terms of LC at the point of decision, this amounts to only LC 48,829. Hence, the real after-tax cost of the loan is –2,94%. It would therefore be quite reasonable to take such a loan and have foreign currency denominated debt at hard currencies as part of the debt structure of the firm.

Purchasing power parity might not hold in the short run. The exchange rate may change faster or slower than the differential inflation rate. If the home currency should devalue slower, the real effective cost of the loan will be lower. However, even if the rate of devaluation exceeds the differential inflation rate, the real cost of the loan to the borrower might still be low. Suppose the firm anticipates the future exchange rate to reach LC 80 per \$, i.e. a 60% devaluation. In this case the real effective cost of the loan is still only 6,9%, not $20(1–0,46) = 10,2\%$ which is the standard calculation of the effective cost of the debt[9].

It would be noticed that lenders, and in particular foreign lenders who extend loans in dollars, have different perceptions of the performance and profitability of their loan portfolios. Since they are dealing in financial intermediation, they pay taxes on their operating income which reflects their margins. Thus, if they charge high dollar interest rates on their loans, they may assess these rates to appropriately reflect the proper premia on the business risk of the borrowing firm. Thus, a 20% intersst on a dollar loan might be considered attractive to lenders, while the effective cost of the loan to the borrower might be very low or even negative in real terms.

These tax considerations thus lead to potentially risky balance sheets of the corporate sector, especially in periods of strong economic performance and optimism. It would not take a major slowdown in economic activity to trigger bankruptcies in such an environment.

There are several instances where local governments recognized the effects of inflation on corporate behaviour and took some measures to restore more prudent practices of financial management. One such example was set by the Israeli government. A brief description of this system is reviewed below.

The Israeli tax code

In August 1982, the Israeli government approved a new tax code which was designed to overcome the possible misallocation of financial resources in this high inflation economy[10]. The following section provides the gist of the tax code and shows how the new tax treatment of income and costs might potentially bring about more prudence in financial decisions of the corporate sector.

The basic idea of the taxation scheme has been to introduce measures which should attain two basic objectives:

a) Prevent the erosion of equity capital caused by taxation of nominal taxable income;

b) Re-establish the relative cost of debt and the cost of equity, in real terms, on an after-tax basis. Put differently, to prevent the distortion of inflation and its effects on the real cost of debt as shown above.

Of course, the scheme was not meant to neutralize the effects of inflation, only the taxation effects of inflation. For the purpose of the Act, the definition of equity of the corporation includes all balance sheet items which are not debt.

The assets of the corporation can roughly be classified into two broad categories: a) Assets which are immune to inflation, i.e. assets whose market value tends to rise roughly by the rate of inflation; b) Assets whose value tends to stay fixed in nominal terms. The real value of these assets tends to fall proportionately to the inflation rate.

Assets of the first category are termed 'immune assets'. Assets of the second category are 'exposed assets'. A detailed list of the immune assets was prepared (e.g. land, structures, index-linked financial instruments held by corporations, trucks, etc.). In order to provide incentives to the industrial sector, considerations were given to the exclusion of machinery and equipment from the 'immune assets' category. All assets not defined as 'immune' are treated as 'exposed assets'.

Depreciable immune assets are granted index-linked depreciation. For example, if a certain truck was purchased at the beginning of the year for \$10,000, depreciation rate is 30% and during the year the rate of inflation was 50%, total depreciation for tax purposes will be:

$0,30 \times 10\,000 \times 1,5 = \$4\,500.$

Depreciable assets which are not defined as 'immune' are depreciable at the regular rate without indexation.

Define the difference between the total book value of equity of the firm and the total book value of its 'immune assets' as the 'erodable value'. This value may be positive or negative. Define the product of the 'erodable value' and the realized (*ex-post*) rate of inflation during the taxation year, expressed in decimal form, as the 'erosion of value' during the period.

At the end of the taxation year, the 'erosion of value' is subtracted from the taxable income of the firm. If this value is negative, it is added to the taxable income of the firm for tax purposes.

Under the said system, most of the considerations concerning the real cost of debt referred to above evaporate. This is demonstrated as follows:
Consider the replacement of $1 equity with $1 debt. It was shown that under the standard treatment of expenses the real after-tax cost of debt is a decreasing function of the inflation rate, even when the loan is fully index-linked. Therefore, as long as the firm's operating cash flow is expected to exceed the interest charges, such a replacement would always be advantageous to the corporation.

With the new scheme, the tax implications of such a replacement are: a) Interest payments are tax deductible and provide a tax shield; b) The replacement lowers the total outstanding amount of equity, or the 'erodable value' by the same amount. Therefore, the corporation loses the tax shield provided by the scheme.

The combined effects can be examined by reference to the notations used above. The tax shield obtainable by paying interest R^* (real) on a $1 loan is:

$$(12)\ TS(R) = [(1 + R^*)(1 + P) - 1] \times T.$$

The fall in equity by $1, with an inflation rate P during the period, causes the firm to lose the tax shield of its erodable value by:

$$(13)\ TS(E) = P \times T.$$

Therefore, the net effect of the tax shield of the replacement proposal is:

$$(14)\ TS = [(1 + R^*)(1 + P) - 1] \times T - P \times T = R^*(1 + P)T.$$

The amount in (14) is the change of the tax shield of the replacement proposal. The real change in the tax shield is:

$$(15)\ TS^* = \frac{R^*(1 + P)T}{1 + P} = R^*T.$$

Therefore, the real after-tax cost of debt to the firm is:

$$(16)\ AT(R^*) = R^* - R^*T = R^*(1 - T).$$

Hence, the distortion caused by the inflation is eliminated, and the real after-tax cost of debt is equal to the contractual real cost of debt, times one minus the tax rate.

The following example demonstrates the argument. In Table 1 it was shown that a loan at a real rate of interest of 10%, with an annual inflation rate of 25% and a coporate tax rate of 46%, has an after-tax real cost of 3,8%.

With the tax code just discussed and the same figures the real after-tax cost of the loan is:
(a) The firm pays nominal interest of 37,5% or $0,375 per $1 debt.
(b) The firm gets a tax shield of $0,1725. Therefore the cost of the loan is only $0,2025 before other considerations.
(c) Since the $1 loan replaces $1 equity (i.e. the money is used to buy back $1 shares from the shareholders or to pay dividends), it reduces the erodable amount of the firm by $1. The erosion of value thus falls by $1 × 0,25, or by $0,25. This causes a loss of tax shields by the amount of $0,25 × 0,46 = $0,1150.
(d) Therefore the net overall cost of the loan is: 0,2025 + 0,1150 = $0,3175.
(e) The cost of the loan in real terms is thus:

$$ART^* = \frac{1,3175}{1,25} - 1 = \$0,054, \text{ or } 5,4\%,$$

which is exactly $0,10 \times (1 - 0,46)$.

A tax code similar to the one described above is thus capable of restoring more prudent financial management practices by corporations operating in inflationary circumstances.

Conclusions

The en-masse bankruptcies of corporations in many Latin-American countries in recent years can partially be attributed to a conbination of slowdown in economic activity and pre-recession high risk financial planning. The paper elaborated on the type of considerations which govern the financial decisions of local firms in an inflationary environment and showed that under existing tax laws which are based on nominal income and nominal expenses, the real cost of borrowing is very low, sometimes negative. Furthermore, the higher the expected rate of inflation, the cheaper it becomes to borrow. This phenomenon has lead many business firms to prefer debt over equity financing. It would also be noticed that the tax code usually does not permit corporations to reflect the true depreciation of assets for tax purposes under inflation. Thus, the real value of the tax shields from depreciation is quickly eroded. Furthermore, if the market value of the firm's assets does not rise fast enough, or does not keep up with inflation, inflation erodes the real value of equity of the firm. Firms therefore try to finance their operation through the use of debt rather than equity capital.

Multinational business firms and foreign lenders should be aware of these considerations when they are considering their financial strategies. The issues are important when credit policy towards customers in high inflation countries are determined. When loan applications are assessed, loan officers must recognize the reasons for local companies eagerness to borrow even at very high rates of interest. Therefore, the analysis of the risk of such loans must contain this additional dimension of the borrower vantage point, before final approval is granted.

Notes

1. This is the well-known Modigliani and Miller's proposition. See Modigliani and Miller (1969).
2. The detailed formulation was developed by Kim (1978), and is not standard in modern textbooks in Finance.
3. The paper assumes throughout that inflation rates are reasonably forecastable. Unexpected inflation, or the uncertainty about future rates of inflation need not significantly change the major conclusions of the article.
4. We continue to maintain the assumption that the business firm who is the borrower expects its nominal operating income to rise in the future so that it would be able to take full advantage of the tax shield of interest expenses. Note that the issue is that of a choice between debt and equity financing, not whether to borrow at all. The assumption is important for the analysis of the motivation of the firm.
5. This equation is derived for the case where future (annual) inflation is assumed to progress at a constant rate, P. When the annual inflation rate in year t is P_t, the term $(1 + P)$ should be replaced by $(1 + P_t)$.
6. Lenders who are tax payers would prefer long-term lending and therefore we might expect to observe a descending real yield curves in periods of long-term high inflation expectations.
7. This notion is well documented, at least as far back as the turn of the century. See Fisher (1907).
8. The firm's expectations are based on the Purchasing Power Parity, attributed to Cassel (1916). Extensive studies have shown that the relationship between the local and foreign inflation rates and the changes in the exchange rate holds in the long run, but not in the short run. See for example Frenkel (1978) and Rogalski & Vinso (1977).
9. The expected end of the year exchange rate at which the real effective cost of debt is 10,2%, is LC 83,55 per $. Thus, it takes a devaluation of 67,1% or two thirds more than the expected local inflation rate for the effective real rate of interest on the loan to be equal to the 'standard' effective cost of debt of $R^*(1 - P)$.
10. The Income Tax Act (Taxation Under Inflationary Conditions), Israel, 1982. See also articles by Kroll (1982) and Biger (1983).

References

Biger, N. 1983. A Note on the Real Tax Effects of the 1982 Israeli Corporate Tax Code. *Econom. Quart.*, April.

Cassel, G. 1916. The Present Situation of the Foreign Exchanges. *Econom. J.*, 26.

Fisher, I. 1907. *The Rate of Interest.* New York. Macmillan.

Frenkel, J.A. 1978. The Purchasing Power Parity: Doctrinal Perspectives and Evidence from the 1920's. *J. Intern. Econom.*, May.

Kim, E.H. 1978. A Mean Variance Theory of Optimal Structure and Corporate Debt Capacity. *J. Fin.*, March.

Kroll, Y. 1982. The Real Tax Effects of the 1982 Israeli Corporate Tax Code. *Econom. Quart.*, September.

Modigliani, F. & Miller, M.H. 1969. Reply to Heins and Sprenkle. *Am. Econom. Rev.*, September.

Rogalski, R. & Vinso, J.D. 1977. Price Level Variations as Predictors of Flexible Exchange Rates. *J. Intern. Bus. Stud.*, Spring-Summer.