Should corporates issue inflation-linked bonds?


LIONEL MARTELLINI AND **VINCENT MILHAU** LOOK AT INFLATION-LINKED BONDS IN THE CORPORATE WORLD.

A recent surge in inflation uncertainty has whetted investor appetite for appropriate hedges. Inflation hedging is now of critical importance to pension funds (pensions are often indexed to consumer price or wage indices) as well as private investors.

Inflation-linked debt is still most closely associated with sovereign states, but state-owned agencies, municipalities and corporates – utilities and financial services companies, in particular – are also expressing interest in it. In fact, intuition suggests that if revenues grow with inflation, then issuing some inflation-linked debt can be a natural hedge.

Yet some large corporates still do not issue inflation-linked bonds, in part perhaps due to the common belief that debt management should be governed by the desire to reduce the cost of debt financing. In particular, the standard argument suggests that a company should seek to issue fixed-rate debt if it expects an increase in interest rates and floating-rate debt otherwise. A similar intuition suggests it should issue nominal bonds if it expects an increase in inflation and inflation-linked bonds if it expects a decrease.

In this context, inflation-linked bonds would not seem attractive from the issuer's perspective, since the cost of debt servicing would be expected to increase with inflation. This seemingly straightforward line of reasoning suffers, however, from one fatal flaw: the difference between fixed and floating (versus real) rates merely reflects market expectations and a risk premium. Consequently the only non-trivial impact may come from the chief financial officer's active views if they deviate from market expectations. In the end, the purpose of a company is arguably not to make profits by trading in financial markets.

THE RELEVANCE OF DEBT MANAGEMENT

In recent research[1], we introduced a general framework to help a company subject to default risk to make optimal debt management decisions. We attempted to answer the following question: given an exogenous revenue process for a company, what is the optimal liability structure when the issuer faces such instruments as fixed-rate debt, floating-rate debt and inflation-linked debt? In fact, this problem is the exact counterpart of the standard asset/liability management problem for a pension fund, in which liabilities are exogenously given while it is the allocation decision that is optimised.

Although the theory of asset allocation decisions is relatively well understood, the understanding of liability management is comparatively limited. Our research presents an initial joint quantitative analysis of capital structure and debt management choices in a unified framework.

A FORMAL CAPITAL AND DEBT STRUCTURE MODEL We show that debt management decisions can be formally analysed in the context of a dynamic capital structure model, with a trade-off between the (bankruptcy) costs and (tax shield) benefits associated not only with leverage but also with debt structure decisions. To do so, we abstract away from problems of agency and asymmetric information, and consider competing forms of liability classes (fixed-rate bonds, floating-rate bonds and inflation-indexed bonds, as well as equity) in a relatively rich stochastic environment involving interest rate and inflation risks.

Although the non-independence of default risk and interest rate risk turns out to be a great complication, we have been able to obtain quasi-closed-form expressions for the price of both indexed and non-indexed defaultable bonds by focusing on a setting in which the distance to default is a log-normal process. The presence of these quasi-analytical expressions allows us to generate computationally efficient estimates for the optimal debt structure.

Our research shows that if they are to increase shareholder wealth the company's managers should seek to immunise debt servicing from exposure to interest rate and inflation risk. In fact, what matters is not so much the variability of debt servicing as the volatility of corporate cashflows net of debt payments.

On the one hand, decreasing the share of fixed-rate bonds increases uncertainty about debt servicing since interest payments on floating-rate and inflation-linked bonds are uncertain. On the other hand, the increase in the volatility of the promised repayment may lead to an increase in the correlation between changes in liability and asset values if the correlation of asset values and interest rates or inflation is positive.

In other words, issuing floating-rate or inflation-linked bonds may increase risk from the perspective of pure debt management, but may decrease risk from the perspective of integrated asset/liability management. From this trade-off emerges an optimal debt structure, and it can be shown that under (mild) simplifying assumptions, minimising the volatility of assets net of liabilities is equivalent to minimising the (risk-adjusted) probability of default, which is in turn equivalent to maximising the value of the company.

NUMERICAL ESTIMATES OF DEBT MANAGEMENT BENEFITS We therefore find that the optimal share of floating-rate bonds increases with the correlation between changes in interest rates and changes in the revenues of the company. When the correlation of a company's operating cashflows (before interest expenses) and interest rates is positive, its floating-rate debt should be made to account for a greater share of its total debt to avoid the high (bankruptcy) costs associated with low cashflows and high debt servicing. When, on the other hand, this correlation is negative, floating-rate debt should account for a smaller share of total debt. Similarly, the optimal share of inflation-linked bonds increases when the correlation of changes in inflation rates and changes in the revenues of the company rises.

On the whole, optimising the debt structure leads to a smaller probability of default and so to a higher company value. One of our key conclusions is that debt management decisions have a strong positive impact on a company's value. Another is that, for reasonable parameter values, companies should issue a non-zero share of inflation-linked bonds.

We also find that the opportunity costs associated with failing to issue inflation-linked bonds are substantial. From an implementation perspective, derivatives could also be used to adjust interest rate and inflation risks, but derivatives would not be the natural approach for long horizons in the presence of counterparty risk.

RISK AND ASSET/LIABILITY MANAGEMENT FOR CORPORATES From the normative standpoint (ie. the perspective of a company seeking to maximise its value), the hedging motive is the key determinant of debt management decisions given the relationship between the debt structure that explicitly maximises company value and that which minimises the volatility of assets net of liabilities. Hence, the main benefit of optimising the debt structure is to let companies reduce the variability of their net cashflows and therefore lower the probability of default.

In other words, the main motive for debt management is not to lower the cost of debt financing but to hedge exposure to interest rate and inflation risks. In fact, by matching the interest rate and inflation exposure of the liabilities to that of the assets, a company can lower the variability of cashflows. This lowers the likelihood of default – as well as the cost of debt – and increases equity value.

To understand why specific risk factors in asset returns matter, consider the optimal issuance of inflation-indexed bonds. Issuing inflation-indexed bonds reduces the cost of debt since the issuing party is selling insurance against inflation and receives the associated premium. On the other hand, issuing inflation-indexed bonds rather than nominal bonds increases uncertainty in financing costs because of the greater uncertainty in coupon payments. This cost/risk trade-off is the liability management counterpart of the risk/return trade-off in asset allocation.

THE OPTIMAL DEBT STRUCTURE SHOULD STEM NOT SOLELY FROM MINIMISING THE COST OF DEBT BUT ALSO FROM HEDGING THE RISKS TO A COMPANY'S REVENUES.

Taking into account the assets of the company, however, changes matters. Because operating cashflows are often positively related to changes in inflation, inflation hikes do not necessarily lead to falls in net revenues for the issuer. In other words, issuing inflation-indexed bonds may increase risk from a liability perspective, but not necessarily from an asset/liability management perspective.

Inflation-indexed debt appears to have risk-and-return properties superior to those of nominal debt, and the optimal composition of a debt portfolio will be affected accordingly. In other words, intuition suggests that the optimal debt structure should stem not solely from minimising the cost of debt but also from hedging the risks to a company's revenues.

THE FINDINGS Our understanding of liability management decisions barely extends beyond the capital structure decision (equity versus debt allocation), and when it addresses the debt structure decision (fixed- versus floating-rate debt allocation) it relies mostly on qualitative insight. Our research provides a joint quantitative analysis of capital structure decisions and debt structure decisions in a standard continuous-time model in the presence of interest rate and inflation risks.

Our main findings are that debt management decisions affect capital structure decisions, and that substantial increases in company value can be induced by optimising debt structure. We also find that a number of companies would benefit from issuing inflation-linked bonds.

Our analysis could be extended to include other instruments, such as convertible bonds, preferred shares and other equity-linked structures in the liability mix. However, an explicit analysis of the optimal liability structure including such ingredients might prove technically challenging.

On a different note, our model considers the liability allocation problem from the standpoint of the original owners of the business, who are assumed to be risk-neutral about the (diversifiable) source of uncertainty impacting the value of their business. In practice, however, the managers of the company, unlike the owners, make the corporate risk management and liability allocation decisions. Several papers have documented the role of conflicts of interest and managerial incentives in the design of corporate debt structure programmes (Smith and Stulz[2], Stulz[3], and Chava and Purnanandam[4]), and incorporating these aspects would also be desirable.

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Footnotes

[1] L Martellini and V Milhau (March 2011). Optimal Design of Corporate Market Debt Programmes in the Presence of Interest-Rate and Inflation Risks. Available for free download at www.edhec-risk.com

[2] C Smith and R Stulz (1985). The Determinants of Firms' Hedging Policies, in Journal of Financial and Quantitative Analysis 20 (4), 391-405.

[3] R Stulz (1984). Optimal Hedging Policies, in Journal of Financial and Quantitative Analysis 19 (2), 127-140.

[4] S Chava and A Purnanandam (2007). Determinants of the Floating-to-Fixed Rate Debt Structure of Firms, in Journal of Financial Economics 85 (3), 755-786.