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# *Prepaid Forward and Leasing Contracts: A Critical Analysis of a Potentially Useful Form of Financing Employed by Enron*

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***EXECUTIVE SUMMARY***

Prepaid forward contracts, or salams, have existed for hundreds of years and in many places around the world, yet they have probably never been traded in organized markets. An interesting example of the use of salams is provided by Enron. Enron's utilization of the contracts was unfortunately abusive in a way that got the company and others into trouble. We explain what Enron and its bankers should have done as a better use of these prepaid forward contracts.

The primary purpose of this chapter is to discuss the securitization of the salam and leasing contracts in a way that alleviates their abuse and to provide a reasonable alternative to financial debt to raise capital. Furthermore, the chapter discusses the possibility of using the resulting instruments for conducting fiscal and monetary policies. The essential feature of salam certificates (SCs) and leasing certificates (LCs) is the issuer's obligation toward the investor, not different from what the market in the real sector pays on the due date of payment. Because the investor's income is not guaranteed and is geared to a specific commodity or project, SCs and LCs seem to be self-financing; there is no need for further debt to finance their payment. The instrument holder has an uncertain, confined claim against the issuer. Hedging in the case of SCs and the near annuity-bond feature in the case of LCs, on the one hand, and liquidity via the securitization of both, on the other, should make these instruments attractive for both real and financial investors.

## INTRODUCTION

Both governments and businesses frequently need external financing to continue in operation and expand. The typical means of financing is the issuance of securities that promise, or provide the potential to make, future cash payments in return, either in the form of promised interest and principal, or in the form of dividends from the residual income of the organization. A somewhat unusual alternative is the *salam*, an ancient form of financing that is essentially a forward contract, with the cash payment for the spot commodity or asset underlying the contract made up front instead of at the time of delivery. Enron provides and example of a company that has used a form of the salam in recent history. Essentially, the company used forward contracts to obtain financing from J. P. Morgan & Company (Sapsford and Raghavan 2002). In particular, Morgan, having set up an offshore company called Mahonia Ltd. to deal in energy forward contracts, would pay Enron $150–250 million up front for the periodic future delivery of natural gas or crude oil. Although the transaction had similarities to a collateralized loan, with the repayment being in kind instead of in cash, the transaction was treated as a trade instead of as a loan. As a result, Enron was able to keep the liability for delivery of the commodity from being treated as a loan on its balance sheet; instead, the liability to delivery the energy commodities apparently was listed as a deposit in the liability section of the balance sheet.

Once delivery of the commodities occurred, the gain or loss had to be booked into the income statement. If Enron hedged its obligation to deliver the commodity through some forward contract with a third party or through the futures market, it would automatically suffer a loss every time it delivered on its forward contract liability with Morgan (as the cash paid up front by Morgan would have to be at a discount to the forward market price to give Morgan a profit margin that would reflect the effective interest rate on the up-front financing). However, Enron was able to postpone delivery, and thus any gains and losses, into the future any time it wished by simply entering into a new forward contract to deliver the energy the next year. This scheme created the apparently legal possibility of smoothing or inflating income as Enron chose, as well as a way of deferring taxes on any gains indefinitely. Doug Carmichael, a professor of accounting at New York's Baruch College stated, "It certainly makes sense as a tax strategy" (Sapsford and Raghavan 2002).

J. P. Morgan was willing to maintain the scheme with Enron for about a decade, because it earned between 7 percent and 8 percent from the difference between the cash paid up front and the actual forward price prevailing at the time. As time went, and as Enron's situation worsened, J. P. Morgan asked for guarantees of delivery on the contracts; Enron offered "surety bonds" through some insurance companies and a line of credit from a German bank (Sapsford and Raghavan 2002). When Enron filed for bankruptcy, the insurers refused to honor their commitments, "alleging that Mahonia was a fabrication meant to dis-

guise loans in the form of Commodity trade" (Sapsford and Raghavan 2002). J. P. Morgan's bad debts from these deals mounted to $2.6 billion.

While the overall financing concept was a good one, Morgan did make some mistakes in its implementation. In particular, Morgan should not have rolled over the forward contracts at Enron's wishes. In addition, Morgan could have securitized the forward contracts in the market to reduce its exposure to Enron's debt.

The purpose of this chapter is to evaluate two financial instruments that may satisfy some of the financing needs of governments and corporations. Salam and leasing certificates are the suggested alternatives. Although the forward and leasing contracts have existed for hundreds of years, and in many places around the world, they are still not traded in organized financial markets. Consequently, textbook treatments of salam and leasing certificates are rare. Our purpose is to discuss first the economics of the securitization of salams and leasing contracts and second their use not only by the private sector but also by governments.[1] The essential feature of salam and leasing certificates (SCs and LCs ) is the fact that the issuer's obligation toward the investor is not different from what the market in the real sector pays on the due date of payment. Because the investor's income is not guaranteed and because it is geared to a specific commodity or project, SCs and LCs are self-financing. There would be no need for further debt to finance their repayment. The instrument holder has an uncertain, confined claim against the treasury.

## SALAM CERTIFICATES

Salam certificates can be issued against the future delivery of a commodity, product, or service. The certificates represent a sort of forward contract. A government that controls a major natural resource, such as cotton, copper, iron, petroleum, or the like, issues certificates for the future delivery of such products, which are fully paid for on the spot by investors, who receive certificates of purchase in return. For example, a country that produces oil may want to expand its refining facilities. Instead of borrowing on the basis of interest, it may sell salam (forward) contracts of refined oil products to an American company based in Houston. Each contract is five thousand barrels, for $18 per barrel, to be delivered in Houston, one year after the date of payment of the full value of the contract (5,000 × $18). The buying company may choose to hold onto the SC and receive the shipment on the designated date, or it may elect to sell its contract before the date of delivery at whatever possible market price, to another investor. An SC may change hands between the beginning of the contract and its date of maturity. Actual delivery and receipt, and not just paper settlement, are binding on the salam issuer and the final holder of the certificate. Net realized income to the buyer of the salam would be the difference between the current spot price paid now and the spot price in the future. The difference may be positive, zero, or negative. Salam contracts can be

nonstandardized, but in order to securitize them, they should be standardized. The certificates can be of different denominations and of different maturity periods. (See appendix 6.1 for some jurisprudence elements of salam.)

The basic attraction of salam certificates to a government (or to any issuer) is the fact that they do not represent a financial debt burden on the government, and no interest has to be paid on their nominal principal. Since salam certificates tie finance, production, and sale into one contract, the risk of changing prices of the commodities, products, or services represented by SCs is transferred to those who invest in them. The basic attraction of salam to an investor (buyer) is the provision of the required hedge against price increases, in addition to liquidity via securitization. A mathematical evaluation of the pricing of salams is provided in appendix 6.2.

### Salam Certificates Compared to Swaps

Myers (1992) explains that a *swap* is an agreement whereby one party replaces one cash flow (or commitment) by another that is indexed to some price or interest rate. A country that obtained a conventional loan from a bank, for instance, exchanges its fixed debt obligation with another firm that undertakes to assume these obligations toward the bank in exchange for payments based on the price of some commodity. The country benefits from a price fall, while the firm hedges against a price rise. Thus both parties are better off.

In spite of the expected benefits of swap agreements, they may not be among the best instruments, for the overall transaction costs associated with them may be very high. First of all, there are the costs of searching for, negotiating, and drafting a loan contract. Second, there are also costs when it comes to selling (swapping) a loan contract. Third, the time lag between the two contracts may not be short, especially if domestic or international economic conditions are not favorable. Fourth, the swap does not eliminate debt; it only transfers it from one party to another, and there is a limit to how much debt a firm or country can absorb.

A salam contract can bring about the benefits of the swap at a lesser cost. As a forward contract, it gives the buyer the required hedge against possible future price increases in addition to liquidity via securitization. The salam contract gives the seller the required "downside price protection." Salam reduces the need for a banker, since the seller can get financing directly from buyers. Needless to say, a bank can participate as a buyer of salam. However, salam does not eliminate the need for a commodity exchange if it is to be securitized. However, for a simple salam, a commodity exchange may not be needed. Also, salam eliminates fixed interest payments. Needless to say, the transaction costs associated with a salam contract are likely to be much lower than those of a swap. The salam contract also avoids any predetermined cash debt on either party.

### Salam Certificates Compared to Commodity-Indexed Bonds

Myers also explains that in the case of commodity indexed bonds (CIB), both the principal and coupon payments are indexed to the price of some commodity. Payments rise and fall according to a predetermined schedule as the price of the commodity fluctuates. This is less risky to the producer than a conventional loan at a variable interest rate, because payments in the latter case are unrelated to the profitability of the borrowing business. Interest-indexed payments may be sticky or even rising when commodity prices and profits are falling. A supply shock (such as a crop failure) may cause prices to go up but lower overall revenues and hence weaken the borrower's ability to meet his obligations. Linking the debt service to the commodity's revenue may reduce the risk for the producer. There is, however, a moral hazard problem here—the borrowing country has a disincentive to increase (and an incentive to underreport) production levels (Myers 1992).

Obviously, while revenue-indexed bonds may reduce the risk for the borrower, they may increase it to the lender both because of a greater variation in payments and because of the increased default risk. The salam contract converts a cash debt into an in-kind debt, not some fixed or variable amount of cash. This provides the required price hedge for the buyer, while at the same time it protects both the buyer and seller from the respective risks of revenue and price-indexed debts. There is less incentive on the part of the seller to transfer more risk to the buyer by manipulating his reported revenues. Part of the variation in revenue has been already transferred to (and accepted by) the buyer in the form of a predetermined price, and the other (quantity) part is contractually fixed. The manipulation of actual or reported production by the seller only delays and increases the fulfillment of his obligations but does not bring him any reduction in these obligations.

### Salam Certificates Compared to Options

Myers describes an option bond as another commodity-linked instrument, except for the fact that it has the usual principal and interest payments. At maturity, the holder has an option to buy (a call option) or sell (a put option) a predetermined quantity of a specific commodity at a predetermined price (the strike price). This added feature makes option bonds either sell at a premium to conventional bonds or have lower coupon rates, thereby lowering the cost of servicing the debt to the issuer. The "payment [of debts] occurs, however, at a time when commodity prices are high and the producer can best afford to pay. The producer has forgone the opportunity to reap the gains above the strike price in exchange for lower interest payments" (Myers 1992).

The attraction of the option feature should not blind us to the fact that an option bond is essentially a debt instrument and thus has the ramifications of

any debt. As is shown in appendix 6.2, it should be very easy to design a salam certificate coupled with an option with no cash debt element involved. The ramifications and policy implications of salam and the other suggested instrument, leasing certificates, is discussed toward the end of the chapter.

## LEASING CERTIFICATES

Leasing certificates may be issued as original financial instruments for projects to be started afresh, or they could be issued against already-existing projects.

Suppose a government would like to build an airport but it is short of the necessary funds. The government will sign a contract with a contractor to build the airport, but at the same time, it will lease the airport to the public. The value of the lease (equal to or greater than the cost of construction) will be divided over a large number of "shares" of different denominations and maturities, and called "leasing certificates." In other words, different investors may participate in the lease contract for different periods. The government will pay the contractor from the proceeds of the lease. Holders of LCs will sublease the airport, through some government agency, to whatever companies and industries are using the airport. LC holders will accept whatever variable income is received on a monthly, quarterly, or annual basis. The government is not obliged to pay investors anything different from actual income from the facility.

Leasing certificates are in a way similar to revenue bonds in the United States in the sense that they are backed by expected revenues from the project to be financed.[2] However, the return from LCs is absolutely variable, with no guarantee on the part of the government of any interest income or principal. Like salam certificates, LCs have the important feature of avoiding any predetermined financial debt in government finances. Certificates of different maturities can be issued to satisfy different investors' preferences. The longer the maturity of a certificate, the more coupons it carries and hence the higher its price (other things being equal). At the time of distributing revenues, all certificate holders, regardless of the length of time to maturity, share equally in the project's revenues. Naturally, the government prices a certificate below the nominal sum of all expected future coupon payments, in order to generate a positive rate of return to the investors. At the end of the lease the government has the right to collect whatever salvage value the physical asset may retain.

Income from LCs can be either out of the project's net income or out of total revenue. The first scheme implies that investors are, indirectly responsible for the profitability of the physical assets and hence is more risky.

If the issuing agency finances its operations partially by stocks and partially by LCs side by side, equilibrium requires that a stock and a perpetual LC should have the same price and also that the rate of return on any LC (of any maturity period) be equal to the rate of return on a stock that is held for the same period. Otherwise there would be an opportunity for arbitrage.[3] Whether

this is the case or not remains an empirical matter.[4] The absence of data precludes any empirical testing. A theoretical analysis of leasing certificates is provided in appendix 6.3.

### Types of Risk Associated with LCs

Because of the direct relationship between revenue (or dividends) of an LC and its price, the price risk and the revenue reinvestment risk tend to reinforce each other (as in stocks).[5] This is contrary to the case of bonds, where the price risk and the coupon reinvestment risk tend to offset each other. The absence of any data on LCs makes it difficult to judge how risky LCs are relative to bonds and stocks. Empirical research on stocks and bonds in the United States tells us that stocks have a much higher average rate of return but a higher standard deviation than those of bonds (Ibbotson and Sinquefield 1982). While returns from both common stocks and LCs are variable and not guaranteed, common stocks have an added advantage in that they represent a claim against real physical assets. Since this is not the case with LCs, it may be reasonable to conclude that, generally speaking, LCs are more risky than either stocks or bonds.[6] But because of different maturity periods of LCs, one wonders if there is a term-structure problem similar to that in the case of bonds.

### The Term Structure of Returns on LCs

The term structure of interest rates on bonds describes the relationship between the yield and maturity of securities, holding other things (including prices) constant. The case of LCs in this regard is somewhat more complicated, for more than one reason. First, a LC does not carry a fixed coupon payment. Second, realized revenues are shared equally between holders of different maturity certificates. This implies that while the "coupon payments" may be variable over time, they are equal at any point in time for different outstanding denominations. Third, and because of the previous point, longer maturities (which carry more coupons) should command higher prices. Consequently, it can be inferred that the term-structure problem of LCs (if any) involves three variables at the same time—yield, maturity, and price.

As the problem in question is more complicated than it first appears, we may ask the following question: What is it that the theory of the term structure of interest rates tries to explain? It tries to explain the behavior of what is essentially intended to be a contractually fixed rate of return—the coupon rate. Market forces, however, influence the interest rates on subsequent issues of debt and thus change the prices of outstanding debt and hence the actual rate of return—the yield—on these instruments. The function of a debt contract of a longer maturity is thus to reflect expectations about, and guard against, future changes in contractually fixed rates of return. The theory of the term

structure implicitly discusses the structure of contractual incomes over time. Since there is no contractually fixed income in the case of LCs, an LC yield reflects no such attempt to deal with uncertainty of coupon payments. It can be concluded that there is a term structure problem with LCs only to the extent that there is such a problem with stocks where average holding periods serve as proxies for maturity periods.[7]

### Duration

It may be argued that since a LC has a specific maturity date, a measure of the duration for the LCs ought to be possible to calculate. This is not accurate, however. In order to calculate a duration measure, the value of the "coupon payment" must be known in advance. Since this is not the case with LCs, no duration measure can be calculated. One could argue that the average of expected "coupon payments" could be used as a proxy for the fixed interest payments. But this implies that there will be as many duration measures for an LC as there are expectations about its "coupon payments." The best that can be done, then, is to estimate the probability distribution and parameter values for an LC's duration.

## SOME POLICY IMPLICATIONS OF SALAM AND LEASING CERTIFICATES

John Hicks (1939) explains that uncertainty about changes in wants and resources represents the "limiting factor" against the spread of futures contracts (p. 136). But we may also note that it is uncertainty itself that motivates forward trading. In many cases a country's (or firm's) delinquency on payment does not necessarily stem from inability to produce but more often from inability to sell. Hicks explains that there are objective reasons why the market for forward trading tends to be one of net hedging. This is because "technical conditions give the entrepreneur a much freer hand about the acquisition of inputs than about the completion of outputs. Thus while there is likely to be some desire to hedge planned purchases, it tends to be less insistent than the desire to hedge planned sales" (p. 137). In spite of the importance of technical conditions, one may argue that we can imagine their removal in the long run through invention and innovation. The psychological factor may loom large and highly unpredictable. The relative weakness on the demand side of commodities, products, and services may create a shortage of liquidity that is aggravated by the very nature of conventional financial debt—the fixity of debt may not respond to changing economic conditions.

At the microeconomic level, a firm that finances some physical assets with a loan will record the value of the asset on the assets side of the balance sheet, and the value of the loan on the liability side. From an accounting point of view the two entries tend to balance each other. From an economic point of

view, however, the firm actually winds up with two fixities—a sticky asset and an unforgiving debt. The implied risk of investment is definitely higher, if not doubled. From an economic point of view, then, there is an underaccounting of actual costs. Compare this to another method of finance, such as equity. It makes tremendous difference whether the owners of the asset owe its financing to themselves or to outsiders. There is only one fixity here—the value of the asset itself. It is the increased degree of risk associated with debt that forces firms to ask for a higher minimum attractive rate of return in order to embark on investment.

> The more advanced an economy is, the more specialized is labor [and capital], and hence the more specific would become the firm's assets. In an advanced economy, asset specificity is the rule and not the exception. In such an economy, and in accordance with Williamson's [1988] rule (of using more equity the more specific the assets are), equity financing, contrary to Williamson's conclusion, should be the rule and not the last resort. . . . Because there is more discretion in profit sharing arrangements, there is necessarily more provision (safeguarding) for unforeseen contingencies. . . . What we see, then, in debt finance (of leveraged buy-outs) is a market mechanism that may facilitate opportunistic tendencies. (Uthman 1994, 3–4, 6)

Leijonhufvud (1981) discusses a theory of "Effective Demand Failures" and observes that "Realized sales appear (i) as a proxy for expected income, (ii) as a constraint on current purchases, and (iii) as a constraint on the demand signals" (p. 115). He asks the following question: "when would we then expect to observe effective demand failures, sizable multiplier coefficients and the rest? In brief, when liquid buffer stocks have been squeezed out of the system" (pp. 122–123). Salam and leasing certificates provide liquidity not only in terms of finance but also in terms of sales. This is especially true once they are securitized.

The irony is that while conventional futures contracts provide a means of generating sales if actual delivery ever takes place, they are neither genuine investment nor finance. Since margin requirements are usually a fraction of a price to be paid in the future, a conventional futures contract is more risky to the producer than a salam contract. It is no wonder that a buyer of salam commands a higher "coordination return" in the sense of a lower price paid to the issuer of salam relative to both a spot-payment/spot-delivery price and a conventional futures price.

There are, however, several ramifications with salam certificates. First, the number of certificates that can be issued is governed by the extent of the reserves of those natural resources (or crops) available for sale and the state of the market for these particular commodities. In contrast, government bonds are not constrained by any natural limit and are dependent on no particular market. Second, since most commodities markets are usually (but not always) short-term markets, the maturities of the SCs can be mostly short ones. This weakens the case for use of SCs to finance long-term government projects.

Government bonds, on the other hand, can be issued for a wide variety of maturity periods, including in perpetuity. But one should hasten to say that different products may facilitate the issuance of different maturities, including long-term ones.[8] Third, SCs pay earnings (and the principal) only once—at the maturity date. Expected earnings are the difference between the spot price paid and the expected future price. Accordingly, SCs are in a way like discount (zero coupons) bonds, but since the earnings are absolutely variable, they are in another way like common stock. Fourth, due to their nature as described above, SCs may be useful mostly as short-term tools for the conduct of monetary policy. In general, however, the fiscal and monetary uses of SCs depend on the elasticity of demand and market structure of the commodity in question. Needless to say, that the use of SCs in monetary policy is contingent upon the development of a reasonably effective domestic market of financial instruments.

Leasing certificates can be used not only to finance governments' and companies' expenditures but also by central banks to influence the money supply via open-market operations. One may ask what the impact is of the issuance of SCs and LCs on the market interest rate and the price level. It may be argued that if the private sector is not buying bonds or paying taxes, it will be buying future contracts. Thus the budget constraint is equally affected. In other words, whatever the instruments issued by the government, they represent a demand for loanable funds in the face of a constant supply of funds in the short run. Nevertheless we can explain why the proposed instruments could have a different effect on the interest rate and the price level. Interest, whether it is explicit (as in bonds) or implicit (as in SCs and LCs) increases the cost of production and the minimum required rate of return (the hurdle rate). The major difference between conventional debt and our proposed instruments is that under the former, the risk of change in price is transferred to the producer–borrower, while under the latter the risk of change in prices is transferred to the buyer–lender. Furthermore, the economic process under conventional debt can be represented by the following flow diagram.

Finance (cash received by the borrower) ⟶ production
⟶ sale ⟶ fixed and guaranteed cash repayment

The financier may be, and mostly is, a different entity from the buyer, and cash has to be generated to complete the cycle. Under our instruments—this is especially clear under SCs—the buyer and the financier are one and the same entity. Sales are generated at the same point in time of finance. Under LCs the economic responsibility of investors for sales is generated at the same point in time of finance. We have to remember that LCs are akin to common stocks. The economic process under salam and LCs (and any other instruments like them) can be stated as follows:

Finance and sales (or responsibility for sales) ⟶ production ⟶
fixed in-kind repayment in case of Salam
(or variable nonguaranteed cash payment in case of LCs)

The coupling of finance and selling in one entity and at one point in time in our instruments reduces transaction costs in terms of search for information and negotiation and thus improves welfare.

There may be a moral hazard problem associated with leasing certificates—those in charge of the leasing assets may not do their best to maximize the present value of future lease payments. One way to go about it is for some of the major investors to sit on the board of directors, involved in day-to-day management. We should remember that the securitization of LCs provides a way for people to get in and out of an investment. Should the rate of return go well below the expected rate, and as people sell their certificates, there will be reputational pressures on the management to improve its performance. One can always relate the payment and raises of management to some minimum standard of performance. Still another method is to stipulate that managers should have the last access to lease payments should the return go below some minimum level. The bonding mechanisms that can be designed are a function of what the law allows and what it does not.

It should be remembered that under conventional finance, the fixity of financial debt and the risk of foreclosure make the hurdle rate required by producers even higher. (Sovereign states risk the foreclosure of their foreign assets and deprivation from further borrowing should they borrow abroad [Myers 1992]). Hedging to the producers and the removal of financial fixity should reduce the hurdle rate. If we believe in the neoclassical theory of the interest rate (Ricardo, *The Principles of Political Economy*, 1817), it is the profit rate that determines the interest rate in the long run, not the rate of growth of money supply. Since salam implies the acceptance of a lower rate of return by producers, it should be expected that pervasive salam-like contracts that are used for a long period of time should lead to a lower discount (interest) rate. The reduction in hurdle and interest rates should lead to a lower price level.

Reverting to Hicks, a salam contract may lead to a lower general price level not only because hedging via salam results in a lower price (relative to a spot price), but also because salam provides a coordination mechanism of finance, purchase of inputs, production, and sales that is absent in the interest-based finance. Moreover, the conversion of a cash commitment into an in-kind obligation softens the pressure on the producer's cash flow. These factors together provide for greater stability in economic activity and contribute to a lower general price level.

The effect of salam and salam-like contracts will be felt even more when the budget deficit tends to grow. Under conventional debt, the growth of deficit calls for more debt, more taxes, or both. Salam and salam-like contracts

reduce the urgency for further borrowing or taxes in subsequent periods, in that previous obligations have been, or will be, paid for in kind; no more cash from taxes or borrowing will be needed to pay for them. This is how the pressure on the cash flow of government and the private sector is reduced. This should place less pressure on interest rates to go up. Furthermore, the reduction in the government's financial obligations improves the credit rating of the country and thus should lower the interest rate it would be charged should it borrow internationally. Imagine what would have happened to interest rates and investment in a country like the United States had the American Government not had to pay the equivalent of 3.1 percent of U.S. GDP in interest on government borrowing in 1990, or the projected 3.2 percent of GDP in 1997. When we consider the cost of rolling over a debt, salam could be a cheaper way of finance. The same argument is applicable for leasing certificates; non-revenue-generating projects are helped indirectly by the proposed instruments, since the government's revenue from the sale of these certificates releases funds for other projects.

Of course, one could argue that the U.S. Government spends far more than salam and leasing certificates could raise. The point is that salam-like contracts may help to reduce financial debt. The elimination of the deficit requires far more economic reform than just these two instruments, especially the tax system and the Social Security system. Such instruments are more helpful if politicians are willing to reduce or hold constant government spending. The state of Texas owns petroleum resources on state-owned lands; thus Texas might even be a more natural user of salam-like contracts than the federal government.

LCs can be used in any country, rich or poor, by government or business. Only governments that control the major part of production can use SCs of goods and commodities. The private sector can definitely use them too. However, SCs can be issued by any government, developed or developing, to finance public projects, such as public utilities, unless the production in such areas is delegated to the private sector. People receive a service, such as some number of kilowatt-hours of electricity, instead of cash payments.

The expected government income stabilization using the Salam contract may be compared to some historical experience. We may ask, how does a combination of traditional debt financing plus a price-stabilization fund compare to a forward contract? Since governments of industrial countries are not in direct control of major economic assets, they are not expected to issue forward contracts, so industrial countries are not covered by the question. When it comes to developing countries, Dunn and Ingram (1996, 222–224) explain that international commodity-price-stabilization programs assume that the industrial importing countries are willing to provide initial finance and that "a normal" target price can be agreed upon. They explain however, that "such programs have a very poor track record. . . . Target prices have been . . . always too high. The fund . . . soon runs out of money. . . . If quotas are agreed upon,

countries frequently cheat. . . . A recent World Bank study concluded that only five major programs have been set up in recent decades and that four of these had ceased operating, leaving only the rubber program as of 1993. The four that failed covered the markets for coffee, cocoa, tin and sugar." In other words, since price-stabilization programs have been deemed a failure, they have not helped governments' budget deficits. Our proposed forward contracts stabilize prices, generate sales, provide finance, and convert a financial debt into an in-kind debt, and thus soften the pressure on the government cash flows.

It may be worth reemphasizing the significance of SCs and LCs. A bondholder is always assured (at least by the intent of the contract, but not in the case of bankruptcy and liquidation) of a total nominal sum that is higher than the par value. The government has a specific, predetermined obligation toward the bondholder, who has a claim against the government's treasury at large.[9] The payment of debt will have to come either from tax proceeds or from further issuance of debt (assuming no moneytization of the outstanding debt). What the government cannot generate from one sector must be supported by other sectors or ways and means.

When it comes to salam and leasing certificates, the holder accepts the possibility that he may wind up getting a total nominal sum that is less than the par value of the instrument. There is no specific, predetermined income from the government. There is more risk acceptance on the part of the investor and hence more relief for the treasury. The essential feature of SCs and LCs is that the government's obligation toward the investor is not different from what the market in the real sector pays on the due date of payment. Because the investor's income is not guaranteed and because it is geared to a specific commodity or project, salam and leasing instruments are self-financing, and there is no need for further taxes or debt to finance their payment. The instrument holder has an uncertain, confined claim against the treasury.

## SUMMARY

Budget deficits of many governments and the wave of the latest corporate scandals that started with Enron's bankruptcy highlight the difficulties associated with the existing ways and means of financing public and private expenditures, and call for the search for new instruments. Salam certificates are instruments issued against the future delivery of a particular commodity or product.

A major factor that may contribute to the superiority of Salam as a financial instrument to the conventional debt and futures contracts is that salam combines genuine financing of production along with marketing and sales. Because salam is riskier to investors than conventional futures, goods sold on a salam basis command a lower price and a higher rate of return. The only case where the two contracts are of equal value is when the risk-free rate of return in the market is zero (see appendix 6.2).

Leasing certificates represent another financing tool. The issuer guarantees no interest or principal whatsoever. At one extreme, a single-payment LC is in a way similar to a pure discount bond. At the other extreme, a perpetual LC is in a way like common stock. An LC price converges to the expected value of the last coupon payment, while that of a regular bond converges to the par value of the bond. The time path of an annuity bond is a mirror image of that of an LC, converging to the annuity value (see appendixes). The price risk and the revenue reinvestment risk in LCs (as in stocks) tend to reinforce each other. Since the return from LCs is absolutely variable while not entitling the investor any claims against physical assets, LCs may be more risky than both stocks and bonds.

The price of an LC increases with the length of time to maturity and hence cannot be assumed to be constant. Consequently, the term-structures problem of LCs, if any, involves three variables: yield, maturity, and price. The term structure problem in bonds involves only the first two (holding other things, including price, constant). The calculation of duration of a LC is another difficulty with LCs, for the coupon payments are variable.

Why should these instruments be desirable by investors? Stated very briefly, hedging and the near annuity-bond feature, on the one hand, and liquidity via securitization, on the other, should make these instruments attractive for both real and financial investors. Also, the new instruments expand the choice set to investors in terms of risk and return preferences.

SCs and LCs will help to lower the interest rate through two channels. First, they reduce the need to borrow in the future to pay back previous debts. Second, a lower rate of return to producers because of hedging should lead to a lower interest rate. Ricardo (1817) argued that the interest rate in the long run is regulated by the profit rate. A lower interest rate should lower hurdle rates and thus the price level.

Once again, salam and leasing certificates are financing instruments that replace financial debt with an "in kind" debt, one that is more geared to the productivity of the real sector. The essential feature of a SC and a LC is that the government's obligation toward the investor is not different from what the market in the real sector pays on the due date of payment. Because the investor's income is not guaranteed and because it is geared to a specific commodity or project, salam and leasing instruments appear to be self-financing and not to require further taxes or debt to finance their payment. The instrument holder has an uncertain, confined claim against the treasury.

One may ask why these instruments have not existed before. Salam (forward) and leasing contracts existed in many places around the world, but only in the private sector. They have never been securitized, however, anywhere either for the use of the private sector or for the government. In Western economies, the fact that governments have much less direct control over real assets of the economy may explain the resort of governments to debt finance. In third world economies, where government's control over economic assets is

much larger, weak financial systems may have prevented the evolution of new instruments. Myers (1992) explains that sovereign risk is the most important problem in the securitization of any form of government-issued instruments. This may lead to high-risk premiums, which adds another barrier. Myers then asks a very important question: "Would commodity-linked securities help developing countries overcome the restrictions on lending arising from sovereign risk?" He answers that the default problem will always exist: "What changes however, is the probability of default. Because commodity-linked securities provide a hedge against movements of commodity prices, debt service is positively correlated with the ability to pay." We have to remember, however, that Myers's proposed instruments are financial debt instruments. It has already been discussed in this chapter how the proposed instruments may provide the same benefits of those of Myers's while at the same time avoiding the problems of financial debt.

Salam in commodities can be issued mainly in countries where governments control major natural resources, commodities, or products. Leasing certificates can be issued in almost any country to finance public services. But both instruments may be used for the purpose of conducting monetary policy anywhere in the world. It should not be difficult, however, to design salam certificates to finance public utilities. The economics of salam in utilities, however, is not exactly the same as that in commodities and products. It deserves treatment in a separate paper.

## APPENDIX 6.1: SOME ELEMENTS OF THE JURISPRUDENCE OF THE SALAM CONTRACT

1. Definition: Salam is the exchange of a price (capital of salam) paid on the spot for a good to be delivered in the future.
2. Salam is a sale and the general conditions of selling are applicable to it. The object (good) of a sale is a debt.
3. Collateral and guarantees are permissible.
4. The general conditions of salam are
   a. The object of exchange (the good) must be clearly describable in terms of weight, size, volume, color, quality, grade, and the like in a way that avoids disputes in the future.
   b. The object has to be delivered in a specific date in the future (see m, below).
   c. The place of delivery must be known.
   d. The price must be specified and paid in full in advance.
   e. Foods cannot be exchanged for each other in salam or money.
   f. The capital (price) of salam is money, but it could be a service.
   g. Capital cannot be paid in installments.
   h. Debt of the buyer against the seller cannot be used as a capital of salam.
   i. Debt of the buyer against a third party cannot be used as a capital of salam.

j. After capital is received by the seller, it can be redeposited by the buyer.
k. The price of salam cannot be made conditional upon a market price in the future.
l. The time to maturity should be long enough that prices may change.
m. Installments in delivery of a good are permissible.
n. Salam cannot be in a particular existing unit of a good or asset.
o. The object of salam can be an agricultural, industrial, or natural good or a service.
p. Salam has to be in goods that customarily exist in markets.
q. The seller of salam does not have to be an owner or a producer of the good.
r. The salam contract is conclusive and final. It cannot be optional.
s. Salam can be abrogated with the consent of both parties.
t. The seller of salam can rebuy his contract before maturity for the same price he received or less, but never for more.
u. Salam can be delivered before the date of maturity if it does not cause the buyer inconvenience (Omar 1992).

## APPENDIX 6.2: THEORETICAL ANALYSIS OF SALAMS

### The Rate of Return on a Salam Contract

Bodie and Rosansky (1980) analyzed the performance of conventional commodity futures over the period from 1950 through 1976. They found that commodity futures are quite similar to common stocks in terms of risk and return. While it seemed that the two types of investment were equally attractive, a combination of the two would perform better. The lack of data about salam contracts precludes empirical comparison. A theoretical comparison may be possible, however. It may be argued that on the demand side, commodity-linked instruments such as salam are relatively illiquid in comparison to financial securities. As a result, there could be a cost premium that could drive up the required rate of return. However, the above-mentioned research of Bodie and Rosansky shows that such illiquidity problems may not actually arise, especially in well-organized markets.

For a conventional futures contract, we usually assume that a speculator in a long position in futures invests the price of the futures, $P^f$, in a riskless security first, until the investment in the futures is closed at time T, when settlement of futures is due. Income from the riskless asset is $(1 + r_f) P^f$. The actual holding period rate of return is

$$1 + r_a = 1 + r_f + \frac{[P^T_s - P_f]}{P^f} \qquad \text{(A6.2-1)}$$

where $P^T_s$ is the commodity's spot price at time T, $r_f$ is the riskless rate of return, and $r_a$ is the actual rate of return.

The actual rate of return can be split into two components, simply because investment is composed of two steps.

By contrast, such a breakdown in the case of salam is not possible, simply because salam is a one-step investment—a full payment today for delivery in the future. Investment by the buyer in a riskless asset prior to the delivery date is not possible. The relationship between the salam spot price paid today, $P^0_s$, and the spot price at time T is

$$P^T_s = P^0_s (1 + r_a), \tag{A6.2-2}$$

where $P^T_s \gtreqless P^0_s$.

The distinguishing case of salam is when $P^T_s = P^0_s$. We are tempted to conclude that $r_a = 0$—that is, when the investor breaks even (in an accounting sense), his rate of return is zero. But in an economic sense his *loss* is equal to $r_f$. By contrast, in the conventional futures contract, if the expected spot price equals the futures price, the investor will expect to earn only the riskless rate (in an accounting sense). Furthermore, the attainment of $r_a = r_f$ under a salam contract may take place only by mere coincidence. We may conclude that the opportunity cost of investing in a salam contract is higher and thus should command a higher rate of return than a conventional futures contract. The attainment of a higher rate is contingent upon a lower equilibrium price.

One may note here that on the demand side there are two risks associated with salam. First, there is the risk of default on the part of the seller. But such risk exists with any commodity-linked instrument; it is not specific to salam. (See earlier parts of the chapter for more detail on this point.) Second, there is the risk that the price at period T is less than the prepaid salam price at period zero. But we have to remember that the buyer hedges against the up side of the market (See earlier parts of the chapter for more detail on this point.)

### A Digression: The Inclusion of Carrying Costs

The analysis to this point assumes zero carrying costs for both futures and salam contracts. Herbst, Kare, and Marshall (1993) have shown that for a direct hedger, the relationship between the future and spot prices is affected by the carrying costs and the time to maturity of the futures contract. This in turn affects the minimum risk-hedge ratio (the ratio of futures to spot position).

Carrying costs can be included in the rate of return of futures and salam contracts. We want to keep the assumption of an investor in a long position. The following observations can be made.

First, salam involves no cash settlement. Actual physical delivery is a must. This has the important consequence that if the buyer is a mere speculator, the contract in his hand becomes like a hot potato that he must get rid of before maturity. Time is less crucial in this respect for active (actual) users of the product. For a mere speculator the saving in inventory-carrying cost is zero.

Second, salam has to be in things that usually exist in markets but are not in the possession of the seller at the time of contracting. The buyer either cannot find the product in the market at the time of contracting or it is inconvenient for him to buy it at that time. This implies that in one case the buyer's saving in inventory-carrying cost is zero; in another it is positive. Third, for both speculators and active users of goods, the contract carrying cost may include the opportunity of forgone profits from other ventures. But for the active buyer, if the forward price is less than the spot price at the maturity of the contract, he may be compensated for that loss. However, if at the time of maturity the spot price turns out to be less than the forward price paid, he loses that much.

A futures contract for the buyer implies a saving in inventory carrying cost if the buyer is an actual user of the commodity; otherwise his inventory carrying cost is zero. The term $r_a$ in both of equations (A6.2-1) and (A6.2-2) above can be thought of as the net rate of return.[10] The carrying cost in salam for an active user is

$$P^0_s(r_f - n),$$

where n is the storage cost rate as a fraction of the spot price paid in salam. The net actual rate of return is

$$\frac{p^T_S - P^0_S}{P^0_S} + n - r_f = r^s_a.$$

If $P^T_S = P^0_s$ in equation (A6.2-2) above, the salam holder may be profiting or losing depending on whether n > or < rf. In case of the futures contract, the actual net rate of return to the actual user is

$$\frac{p^T_S - P^f}{P^f} + n - r_f = r^s_a.$$

The general formula for a minimum risk hedge ratio is not different from that developed by Herbst et al. (1993).

### What Price Should a Buyer of Salam Be Willing to Pay?

If an investor is offered the choice of paying for and receiving an asset immediately, on the one hand, or paying on the spot but receiving the asset in the future (i.e., buying a salam contract), he will take the latter only if he expects to make a rate of return equal at the minimum to the riskless rate, such that

$$P^0_S = \frac{P_O}{(1 + r_f)^T}, \qquad \text{(A6.2-3)}$$

where $P_o$ is the current price paid in a spot-payment/spot-delivery transaction, assuming zero carrying and storage costs, and $P^0_s$ is the salam price. Relation (A6.2-3) can be called the current salam spot prices parity relationship. Also, if the spot transactor holds his asset until period T and requires (expects) a rate of return K, he should not pay a price more than

$$P_o = \frac{E(P_T)}{(1+K)^T} \qquad \text{(A6.2-4)}$$

where $E(P_T)$ is the expected spot price at period T, and $K \geq r_f$, is the required rate of return.

But if he is going to buy on salam basis and requires a rate of return L, the price he pays should not be more than

$$P^o{}_S = \frac{E(P_T)}{(1+L)^T} \qquad \text{(A6.2-5)}$$

Since the opportunity cost of buying salam is higher than buying on spot, L must be greater than K. From (A6.2-3) and (A6.2-4), we get

$$P_O = P^o{}_S\ (1+r_f)^T = \frac{E(P_T)}{(1+K)^T}$$

$$P^o{}_S = P^o{}_S\ = \frac{E(P_T)}{(1+r_f)^T\ (1+K)^T} \qquad \text{(A6.2-6)}$$

Equation (A6.2-6) gives us an expression of the price the buyer of a salam contract should be willing to pay. It implies that when the spot required rate of return is K, the expected spot price in the future, E (PT), in the salam contract, should be discounted by a factor greater than (1 + K). By contrast, assuming the required rate of return in a conventional futures contract is also K, the futures price is

$$F_o = E(P_T)\left[\frac{1+r_F}{1+K}\right]^T \qquad \text{(Bodie et al. 1989, p.650)(A6.2-7)}$$

In equation (A6.2-7), $E(P_T)$ is discounted by a factor smaller than (1 + K). Obviously, this says that $F_O$ (equation [A6.2-7]) should always be greater than $P^o{}_S$ (equation [A6.2-6])—the price of a conventional futures contract is always greater than the price of a Salam contract. The differences between the two prices (and rates of return) are natural results of differences in opportunity cost. If we substitute for $P^o{}_S$ from equation (A6.2-5) into equation (A6.2-6), we get

$$(1 + L) = (1 + r_f)(1 + K) \qquad \text{(A6.2-8)}$$

Equation (A6.2-8) implies that the buyer should require a rate of return on salam, L, that is equal to the required rate of return on the conventional futures, compounded by the riskless rate of return. In order for the two prices to be equal,

$$F_o = E(P_T) = \frac{(1 + r_f)}{(1 + K)} = \frac{E(P_T)}{(1 + r_f)(1 + K)}$$

Rearranging, we get $(1 + r_f)^2 = 1$, which implies that $r_f = 0$. In other words, for the prices of the futures and salam contracts to be equal, the riskless rate of return must be zero, and the two contracts must be of equal opportunity cost. The example below may help to explain further the contrasts and comparisons between the two contracts.

### A Comparison of a Futures and a Salam Contracts for a Seller

The following examples should give us an idea about the rate of return to the sellers of futures and salam contracts. The two examples are not related. They merely show the mechanism of return from two contracts.

#### *Basic Information*

Spot price of oil/barrel (for immediate delivery) is \$18.00.

Spot price of oil/barrel (for immediate payment but delivery in one year) is \$17.00.

Futures price (for delivery in one year and payment in one year) is \$18.50. Seller sells oil he owns at t = 0 and simultaneously buys a futures contract.

Interest rate is 10%.

Transaction cost is 3%.[11]

| Futures | Salam |
|---|---|
| At t = 0, sell 5,000 barrels paying 3%. Transaction cost @ \$18.00 | At t = 0, sell 5,000 barrels for future delivery @ \$17.00 and receive proceeds on spot |
| Receive (5000 × \$18 × .97) = \$87,300 | 5000 × \$17.00 = \$85,000 |
| Invest proceeds @ 10% | Use proceeds to expand refinery |
| Buy 5,000 barrels for delivery in one year (futures contract) @ \$18.50 | Saving in interest payments @ 10% per year = \$8,500 |
| At t = 1 collect invested proceeds 5,000 × \$18X.97 × 1.1 = \$96,030 | At t = 1, deliver 5,000 barrels (no proceeds from buyer) |
| Accept delivery of oil and pay 5,000 × \$18.50 = \$92,500 | Actual revenue from salam sale = 5,000 × \$17.00 × 1.1 = \$93,500 |

Net proceeds = \$96,030 - \$92,500
= \$3,530.

or \$85,000 + \$8,500 = \$93,500

Value of contract on t = 1 @ \$18.50 (spot price in 1 year) = 5,000 × \$18.50 = 92,500

Net gain = \$93,500 – \$92,500 = \$1000 to seller.

The difference in net gain between the two contracts should not give the impression that a futures contract is a better strategy. Numbers can be manipulated quite easily to make salam more profitable. More important, the futures contract does not by itself finance real production, and gains in futures can be driven down to zero in efficient financial markets. When it comes to salam, even though the seller in this particular example may have sacrificed (\$18.50 – \$17.00 = \$1.50, or 8.1%), he has guaranteed sales, reduced his risk against the down side of the market, increased his net worth, and reduced his debt/asset ratio, which should reduce his risk further, as well as the cost of financing in the future.

For the buyer, as long as his opportunity cost is less than his explicit expected rate of return from salam (\$1.50/\$17.00 = 8.82% in the above example), he should be willing to go for it. But even if his explicit rate of return is less than the market interest rate (8.82% < 10%), the implicit benefit to the buyer is to hedge against the upper side of the market, guaranteeing supplies and making the task of planning his production and marketing easier if he is to keep the contract to maturity.

It may seem from the salam example that there is a positive relationship between the seller's net gain, today's spot price, and the interest rate, but a negative relationship between his net gain and the spot price in the future. The opposite is true for the buyer of salam.

But the seemingly positive impact of a higher interest rate on the seller's net gain should not mean that the seller would welcome a rise in interest rates. On the contrary, a higher interest rate may force the seller to accept a lower spot price, in order for salam to offer a better substitute to investors. At the same time, higher interest rates increase the opportunity cost to the buyer of salam and thus may entice him to offer a lower spot price and/or build a strategy around a higher expected spot price in the future. Whenever that is not possible, the process of exchange between buyers and sellers becomes more difficult.

Imagine a situation under which interest-based financing is not available, for whatever reason. The immediate result of such a situation is the removal of the urgency for the seller (buyer) of salam to accept (offer) a lower spot price. The spread between the expected sacrificed return by the seller and expected rate of return by the buyer is reduced. In addition, the pure forces of supply and demand in the real sector are much in line with the rate determining the rate of return to both parties.

### Salam Certificates with Options

Myers (1992) argues that high-risk premiums and weak awareness about the usefulness of commodity-based instruments are major reasons behind the limited trade in such instruments. An important forward step would be to explain to governments and businesses the attractive features of such instruments relative to the ramifications of conventional debt. A second step is the issuance of small denominations of instruments that make them accessible to laymen. A variety of instrument designs should make them attractive for both the issuers and the investors. In case of delinquency in delivering (and in contrast to financial debt), the value of the in-kind salam debt is not compounded over time. Consequently, if SCs are to be sold at some discount rate to attract investors, the issuing agency may still want to do that even if the discount rate is higher than the interest rate on a conventional loan. The equilibrium point between the two methods of finance will be where the discount rate on a SC is equal to interest rate plus the expected cost of rolling over the financial debt. Needless to say, the cost of rolling over a debt, rod in equation (A2.2-9), in terms of increasing the number or amount of payments, will raise the effective interest rate. The issuing agency can afford a discount rate L such that

$$(1 + L)^T \leq (1 + r_f)^T (1 + \text{rod})^T \qquad \text{(A2.2-9)}$$

To put it differently, considering the cost of delinquency and assuming the two debts are of equal maturities, salam is expected to be cheaper to the issuer than conventional debt. To see this, we have from equation (A2.2-6):

$$(1 + L)^T = (1+r_f)^T (1 + k)^T \leq (1 + r_f)^T (1 + \text{rod})^T$$
$$(1 + k)^T \leq (1 + \text{rod})^T$$

This implies that $K \leq \text{rod}$, which means that the cost of rolling over a debt could also exceed the required rate of return by the investor in a conventional futures contract.

Another feature of SCs that should increase their marketability is to include the option of inflicting a penalty on the issuer in case of delinquency—either the stated price is reduced or the quantity to be delivered increased. Both would imply a reduction in the effective per-unit price. Such a penalty should increase the value of an SC, which at the same time implies a reduction in the risk premium required by investors and makes an SC more liquid. Needless to say, it is up to the instrument holder to exercise the penalty option.

It may be argued that the penalty option is in the nature of rolling over the in-kind debt in-kind terms. This is true despite the benefits explained above of such a penalty. But it is also true that in many cases a country's (or a firm's) delinquency on payment does not necessarily stem from the inability to produce; more often it stems from the inability to sell. Furthermore, even if an in-kind penalty has to be inflicted, there is a reduction in transaction costs by

eliminating the need to search for a buyer of the commodity first, securing cash receipts from sales, and then paying for the debt. Moreover, creditors are paid in kind at whatever price the market may fetch.

It may be useful to analyze the value of a salam contract. Rubinstein (1987) explains that the present value (pay-off function) of a forward contract is

$$V(C^*) = V(S^* - F) = V(S^*) - V(F), \qquad \text{(A2.2-10)}$$

where $S^*$ is the price of the underlying asset (a stock for example) on the delivery date, and F is the previously agreed-upon forward price to be paid, for certain, on the same delivery date.

Assuming that r is one plus a riskless discount rate and t is the period to maturity,

$$V(C^*) = V(S^*) - Fr^{-t} \qquad \text{(A2.2-11)}$$

When it comes to the salam contract, since the price of the underlying asset (commodity) is paid on the spot, the present value of the Salam forward contract is

$$V(Csc) = S^*_{sc}\, r^{-t} - P^o_s \qquad \text{(A2.2-12)}$$

where $P^o_s$ is the salam spot price, and $S^*_{sc}$ is the expected price of the commodity on the delivery date.

A salam contract can be designed so that it carries a "call option" by allowing the buyer to buy on the maturity date an additional amount at the same unit price of the underlying contract. It should be emphasized that the exercise of the option is contingent upon the commitment to honor the original contract. In other words, the option is not to be bought and sold separately in the market. The present value of the SC becomes

$$V(C^{CO}_{SC}) = S^*_{sc}\, r^{-t} - (P^o_s + m) + V\,\{\max[O, S^*_{sc} - K_{sc}]\} \qquad \text{(A2.2-13)}$$

where $V(C^{CO}_{SC})$ is the value of a salam contract with a call option, m is the premium paid for the option, and $K_{sc}$ is the striking price and $K_{sc} \leq P^o_s$.

Since a salam with a call option is more valuable than a salam without one, it commands a price, $P^o_s + m$, higher than the price of a simple Salam, $P^o_s$. The last term on the right hand side represents the value of the option. Alternatively, equation (A2.2-13) can be rewritten as

$$V(C^{CO}_{SC}) - S^*_{sc}\, r^{-t} - (P^o_s + m) + V\,\{\max[O, S^*_{sc} - \delta\, P^o_s]\} \qquad \text{(A2.2-14)}$$

where $\delta \leq 1$, $K_{sc} = \delta P^o_s$.

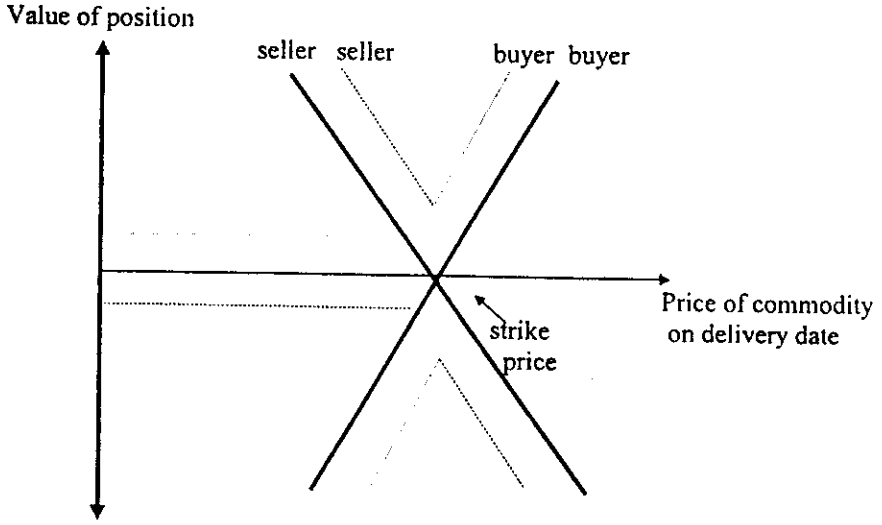
Equation (A2.2-14) implies that the smaller the d, the larger the difference between the spot and strike prices; the larger the difference between the expiration price, $S^*_{sc}$, and the strike price, $K_{sc}$, the larger the value of the option, and thus the larger the value of the SC. This is a composite contract, which

combines forward and option contracts. Rubinstein (1987) explains that in order for an underlying asset to replicate the payoff function of a derivative asset, the required strategy for a forward contract is one of buy-and-hold, while for an option the strategy is a dynamic one that requires investors to change their portfolio at each moment in time. But in our case when we consider the composite contract as a package deal, a buy-and-hold strategy will be the dominating one. Otherwise a dynamic strategy may turn the spot price itself into a stochastic parameter. This implies that while an option may increase the average rate of return from buying an SC, it may also increase its variance too.

Figure 6.1 shows the profits and losses from holding (selling) a pure salam contract (represented by the solid lines) and from holding (selling) a salam-plus-call (put) option contracts (represented by the broken lines). It is assumed that the salam price, $P^o_s$, equals the strike price, $K^s_c$. When the contract price, $P^o_s$ (which is fixed) is less than the price of commodity on the delivery date (which may be variable), a buyer of salam makes a gain and the value of the buyer's position becomes positive. The opposite is true if the ranking of prices is reversed; the position of the seller is a mirror image of the buyer's. An option on salam provides a chance for greater gains and greater losses.

Since a salam certificate actually represents a form of a commodity-linked instrument, it is useful to analytically compare and contrast SCs with other commodity-linked instruments (CLI). Three instruments are analyzed in appendix 6.3.

**Figure 6.1**
**Profits and Losses from Holding (Selling) Salam a**



## APPENDIX 6.3: THEORETICAL ANALYSIS OF LEASE CERTIFICATES

### The Economics of Leasing Certificates

At one extreme, a single-payment LC is in a way similar to a pure discount bond, with the difference that the par value of a pure discount bond is contractually guaranteed, while in the case of a LC no guarantee whatsoever is made. At the other extreme, a perpetual LC is in a way like a common stock; there is no maturity date, stated rate of return, or guarantee of a par value. The difference between stocks and LCs in general is that a common stock entitles the holder to a permanent right of ownership in the real assets of the firm and any capital gains therefrom, in addition to rights in realized income. A nonperpetual LC holder has the last type of rights, and only for a fixed period of time to maturity, plus any possible capital gains from holding the certificate.

Because holders of certificates share equally in whatever variable revenues are realized in any period, the longer the maturity of a certificate, the larger the number of its coupons, and the higher the price it should command (assuming the same expected rate of return and degree of risk). The closest proxy in this case is the amortized (constant annuity) bond that can be represented by the following formula:

$$P = C\left[\frac{1-(1+i)^{-n}}{i}\right]$$

where P = the price of the amortized bond
C = the constant coupon annuity
i = the discount rate
n = the number of periods.

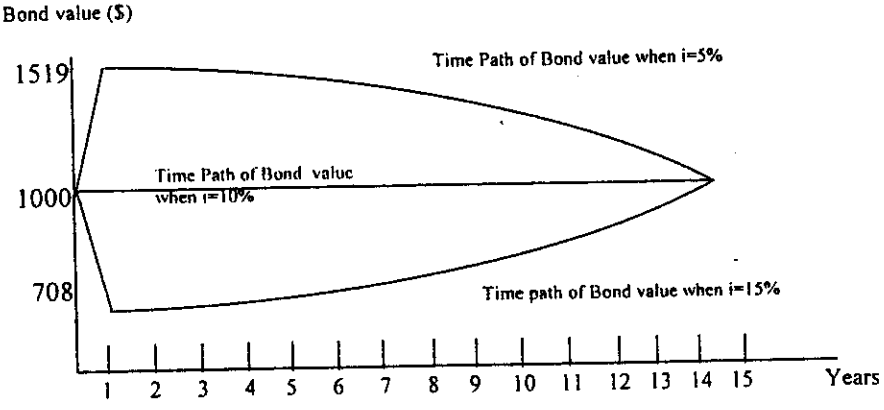
Differentiating[12] P with respect to n (holding C and i constant), we get

$$\frac{\partial P}{\partial n} = \frac{-C}{i}\left[\frac{-\log(1+i)}{(1+i)^n}\right]^2 > 0$$

This should make sense, because if an investor has a choice between two annuity bonds of the same coupon payments and rates of return and risk, he should be willing to pay a higher price for the longer-maturity bond, which entitles him to more coupon payments, assuming rates are not expected to rise. The difference, between leasing certificates and annuity bonds is that in the case of LCs the "coupon payments" are variable and not contractually guaranteed, while in the case of bonds they are constant and guaranteed.

The time path of a LC price can be compared to that of a regular bond (i.e., one that pays interest over a number of periods with the principal paid at maturity). Figure 6.2 illustrates the case of bonds. Assume that the par value of a

**Figure 6.2**
**Time Path of the Value of a 10 Percent Coupon, $1,000 Par Value Bond When Interest Rates Are 5 Percent, 10 Percent, and 15 Percent**




bond is $1,000 and the interest rate is 10 percent. If the interest rate does not change, the price of the bond shall remain at par until the date of maturity. If the interest rate falls (or rises) to 5 percent (or 15%) and remains constant at that level, the bond's price will rise (fall) initially and then decline (rise) over time. Whatever happens to interest rates, the bond's price will converge with its par value as it comes closer to the maturity date.

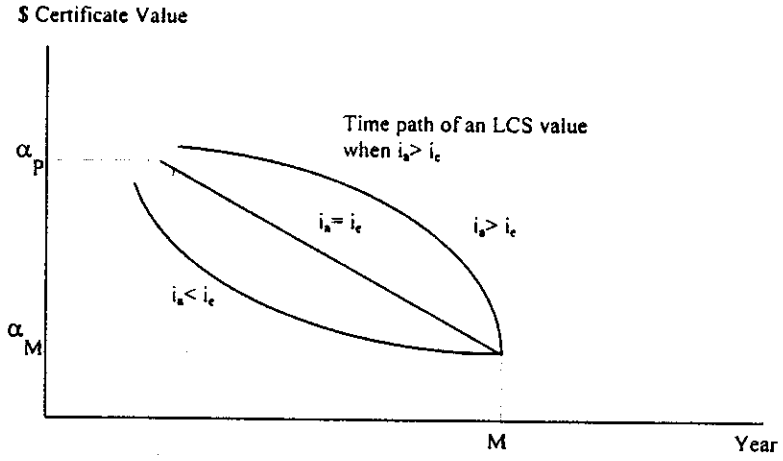
Compare the above to the time path of a LC price. If the initial price of a LC is $P_o$, and if the actual and expected rates of return are equal to each other throughout the lifetime of the certificate, its price will decline steadily until it reaches the expected revenue in the last period. If, however, the actual rate of return, $i_a$, overshoots (undershoots) the expected rate, $i_e$, the certificate's value will overshoot (undershoot) the constant-rate price line. Whatever happens to the actual rate of return, the value of the certificate will converge with the expected value of revenue in the last period as it nears the maturity date. Figure 6.3 illustrates this case.

The time path of a LC price can be represented by the following equation:

$$P_t = \alpha - \beta t \pm \gamma \ [E\,(Ct) - \beta],$$

where $\alpha$ is the IPO (initial public offering) price, which is assumed to represent the PV of all expected future payments; t is the number of expired periods and already-paid coupons; $\beta$ is the equivalent of a risk-free coupon payment per period; $E(C_t)$ is the expected coupon payment in period t; and $\gamma$ (>0) is the adjustment coefficient.

**Figure 6.3**
**Time Path of the Value of an LC (When $i_a \gtrless i_c$)**




In case E (Ct) = β, the time path is represented by a downward-sloping straight line. Otherwise, the time path of the LC prices either overshoots (in case of excess demand) or undershoots (in case of excess supply). In a more complicated situation, β does not have to be a constant—it could be itself a function.

Since the coupon payments from an LC are variable, we can assume that the intrinsic value, $V_o$, (or the IPO value), of an LC has the same general form as a common stock, such that

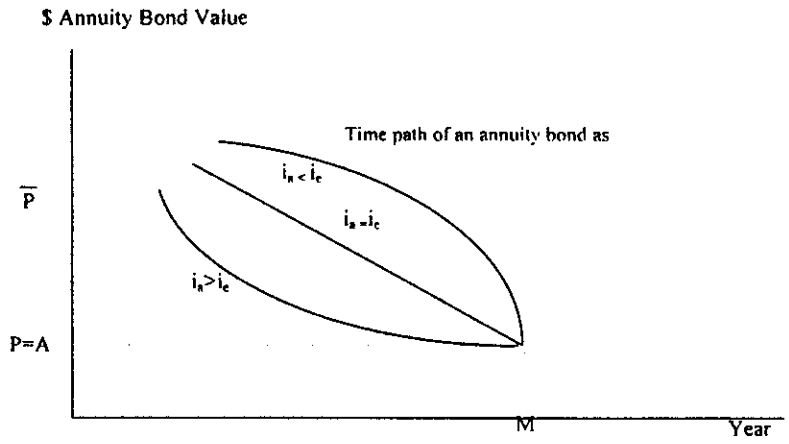
$$VO = \frac{E(C_1)}{1+i} + \frac{E(C)}{(1+i)^2} + \frac{E(C_3)}{(1+i)^3} + \ldots .$$

$$= \sum_{t=1}^{n} \frac{E(C_t)}{(1+i)^t}$$

where $i$ is the market capitalization rate.

An LC resembles a common stock in the sense of a direct relationship between price and earnings. The picture in the case of an amortized (annuity) bond will be a mirror image of that in figure 6.3, simply because of the inverse relationship between the interest rate and the bond's price. The case is illustrated in figure 6.4. No matter what happens to the interest rate, the value of an annuity bond will converge with the value of the annuity as it nears the maturity date.[13]

**Figure 6.4**
**Time Path of the Value of an Annuity Bond (When $i_n \gtrless i_c$)**




## NOTES

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1. Less resource-rich countries may have less chance in using these instruments. Other instruments may have to be developed to meet their needs.

2. LCs may be compared and contrasted with *primes* and *scores*. Jarrow and O'Hara (1989) explain that these are financial derivatives of some underlying common stocks, brought about via the creation of a trust by a private firm. They explain that "the prime component receives all dividend payments and any increase in the stock price up to a termination value. The score receives any appreciation above the termination value. The termination price is set at the beginning of the trust and has generally been at a 20–25 percent premium to the current stock price. A trust may not accept further shares once the stock price exceeds the termination value." In contrast to primes and scores, the issuing agency of LCs relinquishes some (or all) of its proceeds from its own equity for some period of time. In other words, proceeds are *stripped* from the physical productive assets. Accordingly, an LC holder is not entitled to any capital gains in the value of the projects' assets, but he is entitled to any capital gains in his own certificate. There is no termination price for any LC, and its rate of return is absolutely variable. Because of the way in which primes and scores are designed (in terms of the existence of termination price on primes), there are two constraints on the number of primes and scores that can be issued: the termination price itself and the number of shares of the underlying stock. The issuance of LCs is more flexible, however, since the termination-price constraint is absent.

3. A lucid discussion of the arbitrage principle is found in Varian (1987).

4. The same argument is applicable in the case of salam certificates.

5. The same argument may be applicable in the case of salam certificates.

6. Jarrow and Ohara (1989) observed that the sum of primes and scores prices exceeds the price of the underlying stock. They reasoned empirically that a score, which is a five-year option, might be economizing on the transaction costs of dynamic hedging and thus may be the source of overpricing.

7. A similar argument may be made about salam certificates.

8. This is, of course, an empirical matter, for it is known that there is an active market for zero coupon bonds. The difficulty with a long-term SC is that the price risk may be larger for longer maturities.

9. A number of authors (for example, Brayant and Wallace 1979) have argued that under the assumption of perfect substitutability between money and (consumption, for example), the payment of interest on bonds but not on money is a distortion, since money and bonds are both costless to produce. Is the same argument applicable in the case of LCs? While LCs may be costless to produce, yet income from LCs may not be distortionary, simply because the government does not guarantee neither the income from an LC nor its principle value. In other words, while interest from bonds is a purely financial income (from the mere act of finance), income from an LC is related to the actual performance of the real sector.

10. Herbst (1986) explains, however, that in a normal, carrying-charge market for a physical commodity, the futures price is higher than the spot, or cash, price today, because it reflects the costs of storage. The difference between spot price and futures price is the "basis" for the futures contract. Because of either delivery of the commodity, or cash settlement, the basis must vanish as maturity of the contract approaches. A short hedger is short the futures contract, long the cash commodity. The short hedger gains the basis, while the long hedger loses it. (Thus there is no "free lunch" to be gained by trying to use futures contracts as a substitute for inventory in order to save storage costs.)

11. This assumed commission is far higher than one would pay in practice with futures contracts. Typically it is fixed $50 per futures contract. However, if one includes all advisory or consulting fees and administrative costs, this hypothetical amount is not unreasonable. Use of a lower assumed commission would only make the net difference even larger than indicated in this example.

12. This is like $P = \frac{b}{a^x}$ where $b = \frac{-C}{I}$, $a = (1 + i)$,

and $X = n$.

13. Unlike annuity bonds and leasing certificates, the time path of salam certificates does not converge to a particular value toward maturity.

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