EXCHANGE RATE RISK MANAGEMENT IN INTERNATIONAL CONSTRUCTION VENTURES

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ABSTRACT: This paper identifies the financial risk factors associated with international construction ventures from an integrated perspective. It examines the most effective mitigation measures adopted by construction professionals in managing these risks for their construction projects and suggests other means of risk aversion. A case study of forward exchange contracts versus borrowing strategies is presented. The paper is an attempt to present strategies to minimize foreign exchange risk and to better manage foreign exchange dealings.

INTRODUCTION

This paper considers financial management for international business from the perspective of an international construction company, focusing on exchange risk management. Exchange risk results from fluctuations in currency exchange rates or conversion restrictions beyond the control of an individual firm. For example, if a company contracts to provide services (with dollar expenses) but with payment in a foreign currency, then a 10% drop in the exchange rate would result in a 10% reduction in the value of the contract revenues. Similarly, maintaining balances of foreign currency runs the risk of value reductions as foreign exchange rates vary.

A wave of foreign purchase and expansion of multinational firms into new markets suggests the growing importance of this topic. Even the United States domestic firms with foreign ownership or foreign suppliers can face problems of foreign exchange risks.

Included within the scope of financial management are three sets of related decisions:

1. Investment decisions about what activities to finance.
2. Financing decisions about how to finance those activities.
3. Money management decisions about how to manage the firm’s financial resources most efficiently.

In international business, investment, financing, and money management decisions are complicated by the fact that countries have different currencies, tax regimes, regulations concerning the flow of capital across their borders, norms regarding the financing of business activities, levels of economic and political risk, and so on.

Good financial management can be an important source of competitive advantage. Some large business corporations rely upon aggressive trading in the forward foreign exchange market. By trading in currency futures, the firms can provide overseas customers with stable long-term prices for three years or more, regardless of what happens to exchange rates. For example, a firm may expect to receive revenues in a foreign currency in each of the next three years. By purchasing a future currency exchange contract, the firm could agree to sell these revenues in advance at a fixed exchange rate. As a result, the firm is shielded from the possibility of adverse exchange rate shifts. We provide a numerical example of this strategy below.

INTERNATIONAL RISK MANAGEMENT ISSUES FOR CONSTRUCTION

Because of the complex nature of construction, the participants are widely exposed to a high degree of risk (Hendrickson 2000). Typical risks include socioeconomic factors (environmental protection, public safety, economic stability), organization relationships (contractual relationships, attitudes of participants, communication), and technological problems (design assumptions, site conditions, construction procedures). However, risk management techniques are not well developed in the construction industry, and almost all participants approach risk management in terms of intuition, judgment, and experience gained from previous contracts (Bing 1999). In this section, we present a brief summary of relevant issues.

Capital Budgeting

Capital budgeting quantifies the benefits, costs, and risks of an investment. The firm must first estimate the cash flows associated with the project over time and discount the cash flows to determine their net present value using an appropriate discount rate. Among the factors complicating the adoption of capital budgeting techniques for an international construction business are these:

- A distinction must be made between cash flows to the project and cash flows to the parent company.
• Political and economic risks, including foreign exchange risk, can significantly change the value of a foreign investment.
• The connection between cash flows to the parent and the source of financing must be recognized.

Project and Parent Cash Flows

Cash flows to the project are not necessarily the same thing as cash flows to the parent company. The project may not be able to remit all its cash flows to the parent. For example, cash flows may be blocked from repatriation by the host-country government; they may be taxed at an unfavorable rate; or the host government may require a certain percentage of the cash flows generated from the project be reinvested within the host nation. While these restrictions do not affect the net present value of the project itself, they do affect the net present value of the project to the parent company, because they limit the cash flows that can be remitted to it from the project.

When evaluating a foreign investment opportunity, the parent company should be interested in the cash flows it will receive, as opposed to those the project generates, because this will determine the cash liquidity at the headquarters.

Adjusting for Political and Economical Risk

When analyzing a foreign investment opportunity, the firm must consider the political and economic risks that stem from the foreign location.

Political risk is the likelihood that political forces will cause drastic changes in a country’s business environment, which would hurt the profit and other goals of a business enterprise. Political risk includes inconsistency in policies, changes in law and regulations, restriction on fund repatriations, and import restrictions. In less extreme cases, political changes may result in increased tax rates, the imposition of exchange controls that limit or block a subsidiary’s ability to remit earnings to its parent company, the imposition of price controls, and government interference in existing contracts. The likelihood of any of these events impairs the attractiveness of a foreign investment opportunity.

Economic risk is the likelihood that economic events or mismanagement will cause drastic changes in a country’s business environment that can hurt the profit and other goals of a business enterprise. In practice, the biggest problem arising from economic mismanagement is inflation, especially for a foreign firm with assets in a country. With high inflation, the value of the cash flows received from assets will fall as the country’s currency depreciates on the foreign exchange market. The likelihood of this occurring decreases the attractiveness of foreign investment in the country.

Risk and Capital Budgeting

In analyzing a foreign investment opportunity, the additional risk that stems from its location can be handled in several fashions. First, one can treat all risk as a single problem by increasing the discount rate applicable to foreign projects in countries where political and economic risks are perceived as high. The higher the discount rate, the higher the projected net cash flows must be for an investment to have a positive net present value. Second, one can analyze alternative scenarios with forecasts of probabilities in a decision analysis framework (Au 1983; Lopez 1998).

Financing Decisions

When considering its options for financing a foreign investment, an international contractor must consider two issues. First, how will the foreign investment be financed? If external financing is required, the first must decide whether to borrow from sources in the host country or elsewhere. Second, how will the financial structure of the foreign affiliate be configured?

Source of Financing

If the firm is going to seek external financing for a project, it will want to borrow funds from the lowest-cost source of capital available, such as global capital markets. Use of global capital markets can result in financing from anywhere in the world at the lowest overall cost. However, host-country government restrictions may rule out this option. The governments of many countries require, or at least prefer, foreign multinationals to finance projects in their country by local debt financing or local sales of equity. In countries where availability of capital investment funds (or “liquidity”) is limited, local financing raises the cost of capital for a project.

The firm may wish to consider local borrowing (or debt financing) for investments in countries where the local currency is expected to depreciate on the foreign exchange market. However, if foreign debt obligations must be served, the amount of local currency required to do this will increase as the currency depreciates, and this effectively raises the cost of capital.

Financial Structure

There is wide variation in the average debt ratios of firms and hence the financial structure of firms based in different countries. One possible explanation is that different tax regimes determine the relative attractiveness of debt and equity in a country. An international business should adopt a financial structure for each foreign affiliate that minimizes its cost of capital, irrespective of whether that structure is consistent with local practice.

Global Money Management: Efficiency Objective

Money management decisions attempt to manage the firm’s global cash resources (its working capital) most efficiently. This involves minimizing cash balances and reducing transaction costs.
Minimizing Cash Balances

A firm needs to maintain a minimum cash balance at all times for serving any accounts and notes payable during that period and as a contingency against unexpected demands on cash. Typically, a firm invests cash in low interest money market accounts to earn interest, because they provide the flexibility of easy cash withdrawal. In contrast, the firm could earn a higher rate of interest if it could invest its cash resources in long-term financial instruments where the firm cannot withdraw its money before the instruments mature without suffering a financial penalty.

Reducing Transaction Costs

Transaction costs are the cost of exchange. Every time a contractor changes cash from one currency into another currency, it must bear a transaction cost. These costs would include the commission fee paid to foreign exchange dealers and bank charges for moving cash from one location to another. Different financial institutions may impose different amounts of transactions costs.

Global Money Management: Tax Objective

Different countries have different tax regimes. Many nations follow the worldwide principle that they have the right to tax income earned outside their boundaries by entities based in their country. Double taxation occurs when the income of a foreign subsidiary is taxed both by the host-country government and by the parent company’s home government. However, double taxation is mitigated to some extent by tax credits, tax treaties, and deferral of taxes until profits are actually returned to the home country.

Techniques for Global Money Management

Centralized depositaries and multilateral netting are common management techniques firms use to manage their global cash resources in an efficient manner.

Centralized Depositories

The critical issue for an international contractor is whether each foreign subsidiary should hold its own cash balances or whether cash balances should be held at a centralized depository. In general, firms prefer to hold cash balances at a centralized depository for three reasons. First, by pooling cash reserves centrally, the firm can deposit larger amounts in liquid accounts, such as overnight money market accounts. Second, if the centralized depository is located in a major financial center (e.g., London, New York, or Tokyo), it should have access to information about good short-term investment opportunities that the typical foreign subsidiary would lack. Third, by pooling its cash reserves, the contractor can reduce the total size of the cash pool it must hold in highly liquid accounts, which enables the firm to invest a larger amount of cash reserves in longer-term, less liquid financial instruments that earn a higher interest rate.

However, a firm’s ability to establish a centralized depository that can serve short-term cash needs might be limited by government-imposed restrictions on capital flows across borders. Also, the transaction costs of moving money into and out of different currencies can limit the advantages of such a system.

Multilateral Netting

Multilateral netting allows a multinational firm to reduce the transaction costs that arise when many transactions occur between its subsidiaries. For example, one project may have a revenue of 100,000 while another has a cost of 60,000 units of a local currency. These transactions can be combined, so that only $100,000 - 60,000 = 40,000 of the foreign currency need be converted. Netting reduces transaction costs by reducing the number and amount of transactions.

Managing Foreign Exchange Risk

Changes in exchange rates alter the profitability of trade and investment deals. Also forward exchange rates and currency swaps enable firms to insure themselves to some degree against foreign exchange risk, and relative inflation rates determine exchange rate movements. An example of fluctuations in annual rates appears in Fig. 1, showing the United States dollars versus the Swiss franc for the period 1992–1999. Daily rates would vary more substantially. We shall now focus on the various strategies international contractors can use to manage their foreign exchange risk.

TYPES OF FOREIGN EXCHANGE RISK EXPOSURE

Foreign exchange exposure refers to the risk that future changes in a country’s exchange rate will hurt a firm. Foreign exchange exposure can be divided into three categories: transaction exposure, translation exposure, and economic exposure.

Transaction exposure is typically defined as the extent to which the income from individual transactions is af-

FIG. 1. Example of Exchange Rate Fluctuations
fected by fluctuations in foreign exchange values. Such exposure includes obligations for the purchase or sale of goods and services at previously agreed prices and the borrowing or lending of funds in foreign currencies.

Translation exposure is the impact of currency exchange rate changes on the reported consolidated results and balance sheet of a company. Translation exposure is basically concerned with the present measurement of past events. The resulting accounting gains or losses are said to be unrealized. They are “paper” gains and losses, but they are still important. Translation exposure can have a very negative impact on a firm.

Economic exposure is the extent to which a firm’s future international earning power is affected by changes in exchange rates. Economic exposure is concerned with the long-run effect of changes in exchange rates on future prices, contracts, and costs. This is distinct from transaction exposure, which is concerned with the effect of exchange rate changes on individual transactions, most of which are short-term affairs.

**Tactics and Strategies for Reducing Foreign Exchange Risk**

A number of strategies and tactics can help international contractors reduce their foreign exchange exposure. The tactics are best suited to alleviating transaction exposure and translation exposure (Christoffersen 1998).

*Reducing Transaction and Translation Exposure*

Future currency exchange contracts (called “buying forward”) and netting currency transactions (as described above) are important sources of insurance against the short-term effects of foreign exchange exposure. Buying forward involves a currency contract for future sale or purchase of a foreign currency at a predefined exchange rate rather than the market rate at the time of the transaction. Terms of these forward contracts are set by the forward market itself and will vary with expectations of currency movements and the demand and supply of the currency transaction requests. The forward contracts may be firm commitments for transactions or may be options in which the purchaser can decide at the time of maturity whether or not to exercise the future contract. Future options have the advantage that favorable foreign exchange movements might result in extra profits, but the options will normally have a corresponding charge. Firms can also reduce their foreign exchange exposure through managing the timing of payables and receivables. A firm might collect and pay early or late depending on expected exchange rate movements. This timing involves accelerating payments from weak-currency to strong-currency countries and delaying inflows from strong-currency to weak-currency countries.

*Reducing Economic Exposure*

Reducing economic exposure requires strategic choices that go beyond the realm of financial management. The key to reducing economic exposure is to distribute the firm’s productive assets to various locations so the firm’s long-term financial well-being is not severely affected by adverse changes in exchange rates.

**DEVELOPING POLICIES FOR MANAGING FOREIGN EXCHANGE EXPOSURE**

The international contractor needs to develop a mechanism for ensuring it maintains an appropriate mix of tactics and strategies for minimizing its foreign exchange exposure. Although there is no universal agreement as to the components of this mechanism, a number of common themes stand out.

First, central control of exposure can help protect resources and ensure that each subunit adopts the correct mix of tactics and strategies.

Second, firms should distinguish between, on one hand, transaction and translation exposure (as defined in the previous section) and, on the other, economic exposure. Many companies seem to focus on reducing their transaction and translation exposures and pay scant attention to economic exposure, which may have more profound long-term implications.

Third, the difficulty to forecast future exchange rate movements cannot be overstated. The best that can be said is that in the short run, forward exchange rates provide reasonable predictions of exchange rate movements, and in the long run, fundamental economic factors—particularly relative inflation rates—should be watched, because they influence exchange rate movements.

Fourth, construction firms need to establish good reporting systems so that the central finance management can regularly monitor the firm’s exposure positions.

Finally, on the basis of the information it receives from exchange rate forecasts and its own regular reporting systems, the firm should produce regular foreign exchange exposure reports. The reports can then be used by management as a basic for adopting tactics and strategies to hedge against undue foreign exchange risks.

**RISK MANAGEMENT EXAMPLE**

As an example of mitigation strategies, we present two alternative methods to a realistic but hypothetical problem which was faced by an international construction firm while bidding for a contract in a foreign country through its subsidiary in a third country.

The XYZ Construction Co., a large international construction company based in the United States had acquired another construction firm, ABC Construction in Switzerland in 1990. The firm is now a subsidiary of the XYZ Corporation. ABC Corporation had long pursued conservative policies in managing its finances and foreign exchange policies. Funds were raised only on the local Swiss Credit Markets. Foreign exchange risk was minimized by entering into forward contracts taken to mature on contract payment dates. With the forward contracts,
ABC knew in advance what minimum exchange rate would be applied.

The firm faced a dilemma while submitting a bid for a project in Russia. During discussions with members of the Russian Department of Transportation (RDOT) it had been established that ABC Corp. stood a great chance in winning the contract. The bid was to be submitted on December 31, 1996, and the RDOT’s decision would be known on February 28, 1997. Work was to commence on October 1, 1997, and the bid would be binding on the company, thus the company is hedging itself against foreign exchange risk.

Faced with the currency scenario, the financial managers must make a decision whether or not to bid, and if they decide to bid, a mechanism to safeguard the company against foreign exchange risk.

### Alternative 1; Forward Exchange Contract Hedges

The company can enter into a forward purchase contract with foreign exchange dealers in Zurich, to sell US$ on the days the company is supposed to receive the payments. By doing so, the company is hedging itself against any risk for the expected appreciation of the CHF with respect to the US$. The firm would thus enter into contract selling rates for the months of June 1997, Oct 1997, Dec 1997, Feb 1998, and May 1998, corresponding to the payment schedule shown above.

The resulting future quotations can be read as shown in Table 2. An example calculation for deriving the table is:

Buy is 2.990 in October 1996, and the discount for 1–3 months is 0.03 per month. Therefore the buy rate for Nov ’96 = buy rate for Oct ’96 − 0.030 = 2.990 − 0.030 = 2.960.

Similarly, the buy rates for Dec ’96 and Jan ’97 are computed as 2.930 and 2.900, respectively. However for the following three months the reduction was 0.027 per month. Thus the buy rate for February would be (2.900 − 0.027) = 2.873.

Over the total duration of the project, the firm would receive a total of CHF 158.8 million, as shown in Table 3. With an 8% corporate discount rate, the value of this cash flow is CHF 164.61 million on May 1, 1998.

Key aspects of pursuing this alternative include:

- In this alternative, the company is relying solely on the foreign exchange forward rates to hedge itself against foreign exchange risks.
- This use of forward exchange contracts (rather than options) eliminates foreign exchange risk but also eliminates the possibility of foreign exchange profit.

### Table 1. Example of Forward Dollar Rates for Converting Dollars ($) to Swiss Francs (CHF)

<table>
<thead>
<tr>
<th>Maturity (months)</th>
<th>Forward discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3</td>
<td>0.030 CHFs per $ per month</td>
</tr>
<tr>
<td>4–6</td>
<td>0.027 CHFs per $ per month</td>
</tr>
<tr>
<td>7–12</td>
<td>0.024 CHFs per $ per month</td>
</tr>
<tr>
<td>13–17</td>
<td>0.021 CHFs per $ per month</td>
</tr>
<tr>
<td>18–36</td>
<td>0.018 CHFs per $ per month</td>
</tr>
</tbody>
</table>

### Table 2. Example of Buy and Sell Rates during the Course of the Contract for Swiss Francs and Dollars

<table>
<thead>
<tr>
<th>Month</th>
<th>Buy</th>
<th>Sell</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 1996</td>
<td>2.990</td>
<td>2.995</td>
</tr>
<tr>
<td>November 1996</td>
<td>2.960</td>
<td>2.965</td>
</tr>
<tr>
<td>December 1996</td>
<td>2.930</td>
<td>2.935</td>
</tr>
<tr>
<td>January 1997</td>
<td>2.900</td>
<td>2.905</td>
</tr>
<tr>
<td>February 1997</td>
<td>2.873</td>
<td>2.878</td>
</tr>
<tr>
<td>March 1997</td>
<td>2.846</td>
<td>2.851</td>
</tr>
<tr>
<td>April 1997</td>
<td>2.819</td>
<td>2.824</td>
</tr>
<tr>
<td>May 1997</td>
<td>2.795</td>
<td>2.800</td>
</tr>
<tr>
<td>June 1997</td>
<td>2.771</td>
<td>2.776</td>
</tr>
<tr>
<td>July 1997</td>
<td>2.747</td>
<td>2.752</td>
</tr>
<tr>
<td>August 1997</td>
<td>2.723</td>
<td>2.728</td>
</tr>
<tr>
<td>September 1997</td>
<td>2.699</td>
<td>2.704</td>
</tr>
<tr>
<td>October 1997</td>
<td>2.675</td>
<td>2.680</td>
</tr>
<tr>
<td>November 1997</td>
<td>2.654</td>
<td>2.659</td>
</tr>
<tr>
<td>December 1997</td>
<td>2.633</td>
<td>2.638</td>
</tr>
<tr>
<td>January 1998</td>
<td>2.612</td>
<td>2.617</td>
</tr>
<tr>
<td>February 1998</td>
<td>2.591</td>
<td>2.596</td>
</tr>
<tr>
<td>March 1998</td>
<td>2.570</td>
<td>2.575</td>
</tr>
<tr>
<td>April 1998</td>
<td>2.552</td>
<td>2.557</td>
</tr>
<tr>
<td>May 1998</td>
<td>2.534</td>
<td>2.539</td>
</tr>
</tbody>
</table>

### Table 3. Example of Payment Receipts for Alternative 1: Forward Exchange Contracts

<table>
<thead>
<tr>
<th>Month of payment</th>
<th>Payment received (US$)</th>
<th>Projected $ exchange rate</th>
<th>Payment received in Swiss Francs (million CHF)</th>
<th>Discounted payments in Swiss Francs (million CHF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1997</td>
<td>10,000,000</td>
<td>2.776</td>
<td>27.76</td>
<td>29.85</td>
</tr>
<tr>
<td>October 1997</td>
<td>16,000,000</td>
<td>2.680</td>
<td>42.88</td>
<td>44.93</td>
</tr>
<tr>
<td>December 1997</td>
<td>14,000,000</td>
<td>2.638</td>
<td>36.93</td>
<td>38.18</td>
</tr>
<tr>
<td>February 1998</td>
<td>8,000,000</td>
<td>2.596</td>
<td>20.77</td>
<td>21.19</td>
</tr>
<tr>
<td>May 1998</td>
<td>12,000,000</td>
<td>2.539</td>
<td>30.46</td>
<td>30.46</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>158.8</td>
<td>164.61</td>
</tr>
</tbody>
</table>
Suppose the market does not behave as expected and, instead of appreciating, the CHF depreciates with respect to the US$. In this case, the contractor will still be bound by contract to sell dollars at the preset rate, even though the actual rate might be higher. In short, the contractor might get fewer CHF than it would have gotten otherwise without a forward contract.

- Forward contracts have an associated time period, and the contractor is still at risk if the payment receipt from the client (RDOT) is not according to the schedule. The firm would be exposed to the exchange rate prevalent at the time of the actual receipt and not the preset rate.

**Alternative 2: Borrowing in Dollars and Repaying with Project Receipts**

The following alternative is not common practice among firms to hedge themselves against foreign exchange risk. However, given favorable conditions this method can have economic benefits.

If the decision of the RDOT is favorable, the firm borrows money on March 1, 1997, a day after the decision is known. The firm borrows money in the United States, because the interest rates are lower in the United States at 6%. The firm borrows an amount equivalent to the amount that it will receive in the future as per the given payment schedule. The firm converts this amount into CHF and invests in Zurich at an interest rate of 8%. The payments received from the client are used to pay back the U.S. bank.

The present value of the amounts that the firm shall receive as per the payment schedule is the amount that can be borrowed, less any transaction costs. The rate of borrowing in the United States is 6% A.P.R. or 0.5% monthly. The computation of the net present value of the payments to be received from the RDOT is presented in Table 4. Thus, the firm shall borrow a sum of US$57.44 million (NPV of payments) from the U.S. bank and will use the payments received from the RDOT to pay back the loan. If the borrowing fee is 2%, then the net receipts are US$56.92 million.

The firm transfers the borrowed money to Zurich and converts it into CHF at the rate of 2.851, for which it has gotten otherwise without a forward contract.

<table>
<thead>
<tr>
<th>Month of payment</th>
<th>No. of months</th>
<th>Payment amount (US$)</th>
<th>NPV factor(^a)</th>
<th>NPV (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1997</td>
<td>3</td>
<td>10,000,000</td>
<td>0.985</td>
<td>9.85</td>
</tr>
<tr>
<td>October 1997</td>
<td>7</td>
<td>16,000,000</td>
<td>0.965</td>
<td>15.45</td>
</tr>
<tr>
<td>December 1997</td>
<td>9</td>
<td>14,000,000</td>
<td>0.956</td>
<td>13.38</td>
</tr>
<tr>
<td>February 1998</td>
<td>11</td>
<td>8,000,000</td>
<td>0.946</td>
<td>7.57</td>
</tr>
<tr>
<td>May 1998</td>
<td>14</td>
<td>12,000,000</td>
<td>0.932</td>
<td>11.19</td>
</tr>
</tbody>
</table>

\(^a\) Here I is the monthly rate of interest, i.e., 5% or 0.005, and n is the number of months. Total NPV of the payments is US$57.44 million.

The payments received on May 1, 1998 = 160.49* (1 + 0.0066)\(^{14}\) = CHF 175.98 million.

Key aspects of pursuing the above alternative:

- This alternative produces better results but has not been widely adopted in the industry.
- The reason that most construction firms are unwilling to take the risk of hedging themselves against foreign exchange risk in this manner is that it is heavily reliant on the timely payments from the client. Payments in the construction industry from the owner to the contractor are not always as scheduled, and this deters the use of this approach by contractors.
- The other reason that firms are unable to adopt this approach is the lack of access to large financial institutions that shall be able to provide large loans.

**CONCLUSION**

We attempted to present the issues involved in foreign exchange risk management in regard to an international construction company. Two alternatives have been presented with the use of a hypothetical but realistic case study. Both borrowing and foreign exchange futures hedging can reduce exchange rate risk.

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