Teaching Notes: The Privatization of Companhia Vale do Rio Doce

SYNOPSIS

Companhia Vale Do Rio Doce (CVRD) is one of the world's largest producers of Iron Ore and other precious metals and Brazil's largest exporter. In August 1996, the Brazilian government decided to privatize its 51% equity stake in three stages:

- A first stage that would involve at least 40% of the total voting capital and would define the company’s controlling group
- A second stage that would involve 4.45% of common and 6.3% of preferred shares and would be sold to Vale's employees; the CVRD employee group was expected to use both their severance pay fund and their social contributions to finance the purchase
- A third stage that would involve the remaining common shares (25-30%) and would be sold in pulverized form in Brazil and abroad (through Level 3 ADR’s)

In addition to the companies and investors that actually participated in the CVRD auction, the case introduces Dunmore Capital, a fictional private equity firm located in Calgary, Alberta and focused primarily on the natural resource sector. Dunmore had recently raised a $2.1 billion fund that Evan Heisler, a Dunmore partner, is intent on leveraging for a hostile bid. The case details Heisler's insights about the company's attractiveness as an acquisition candidate as well as tracks the thought process of the Dunmore associate (Marc Lewis) who is tasked with developing the foundation of the firm's valuation efforts. Lewis considers the best way in which to make a plethora of assumptions that will be essential to building a well-functioning and unbiased valuation model. In addition, Lewis leads the student through a discussion of those risk factors - both Brazilian and transaction-related - that serve to provide a sense of the context within which any investment in an emerging market must be considered.

The key questions facing Dunmore Capital are as follows:

- What is CVRD worth and what are the assumptions that underlie this valuation, i.e. forecasted revenues, margins, depreciation, and capital investments
- What cost of capital should be used to discount CVRD's future after-tax cash flows and what is the most appropriate way to calculate it considering the significance of the project’s risk factors
- Does Dunmore Capital expect any short-run fluctuation in the R$/US$ exchange rate and, if so, how will it affect the company's valuation
• How dependent will Dunmore be on the fixed income market to finance its bid and will it be able to meet its interest and principle obligations
• What is the hurdle rate for Dunmore's return on invested equity and what factors will determine if the CVRD investment clears it

PEDAGOGICAL OBJECTIVES

The case's four primary objectives are as follows:

1. To provide the student with an opportunity to forecast free cash flows and calculate an unbiased discount rate within the context of uncertain commodity prices, expense margins, capital investment needs and country and transactional risk factors.
2. To provide the student with a detailed discussion of the economic evolution of an emerging market and an illustration of the long-term effects of Central Bank policy on social, economic and political conditions.
3. To provide the student with a sense of the way in which private equity firms determine their investment strategy based on the ability of an asset to deliver compounded annual equity returns that sufficiently cover the implied risk of highly leveraged transactions.
4. To provide the student with an opportunity to think critically about valuing an asset that operates in a region defined by an overvalued currency.

The case is intended for students who have a relatively advanced background in corporate finance (two MBA-level classes) and an understanding of macroeconomic principles.

This teaching note is designed to impart to the professor the methodology used by the authors to "crack the case". The following discussion will analyze some ways in which students could be guided to answer the above-referenced questions.

FORECASTING CVRD'S FINANCIAL STATEMENTS

As the value of a going concern can be estimated by determining the discounted net present value of its future free cash flows, the foundation of the CVRD valuation effort resides in the assumptions which underlie the valuation model's forecasts. As a first step, the authors established those line items which are used to calculate free cash flow and developed unbiased ways in order to project each one for a period of five years. A "sanity check" was established to test whether our assumptions were overly optimistic. It should be noted that the selection of a relatively short five-year forecast does not reflect on the uncertainty of CVRD's operations but instead on the volatility of exchange rates, particularly due to the prevailing overvaluation of the R$ in late 1996.

Revenue Growth

CVRD's attractiveness as a candidate was partially reliant on the historic ability of its diversified operations to generate steady cash flows. In estimating the behavior of CVRD's top-line growth going forward, we considered CVRD's financial statements and the way in which the company's prior investments in infrastructure (transportation in particular) would assist in the maintenance of this trend. Conversely, we deliberated the adverse effects that a global economic slowdown would have on the Iron Ore and precious metal industry. Admittedly, our analysis in this regard was subject to a hindsight bias as few economists predicted the decline of the Asian Miracle and the effect that contagion would have on natural resource companies. In the end we developed three five-year scenarios: high growth (15% per year), mid-range growth (7.5% per year) and low...
growth (5% per year). Our ultimate valuation was based (somewhat liberally) on the high growth scenario, however, CVRD had achieved this level over the most recent three-year period.

**Expenses**

In projecting CVRD’s respective Gross Margin and Earnings Before Interest and Taxes (EBIT), we again developed High Margin, Constant Margin (two-year average) and Low Margin scenarios which applied to both Cost of Goods Sold (COGS) and Sales, General & Administrative (SG&A) expenses. In addition, we also attempted to model the effect that exchange rates would have on the company’s expenses. As stated in the case and reflected in our valuation model, CVRD’s cost structure is comprised of both R$ and US$ denominated components. Discussions with management revealed that approximately 70% of all COGS and SG&A expenses are in R$. We found that as the R$ devalued relative to the US$, the amount of expenses denominated in R$ decreases, although not by a material amount. It does, however, offset the margin expansion that is experienced as the exchange rate returns to a state of Purchasing Power Parity.

**Depreciation of Tangible Assets**

Our valuation model’s forecasted Depreciation expense was predicated on the assumption that CVRD’s asset base has, on average, a useful life of 25 years. This contemplates a 35-year useful life for producing properties and a 10-year – 20-year useful life for the associated equipment. In order to project out the effects of Capital Expenditures (CAPEX) on CVRD’s Depreciation expense, we began with 1996 ending PP&E, assumed that additions would be made through CAPEX, and depreciated the total sum of 1996 ending PP&E and 1997 CAPEX according to our useful life assumption. The result was 1997 ending PP&E, whereby this process was repeated throughout the forecasted period.

**Amortization of Intangible Assets**

As Dunmore’s strategy was to merge its acquisition vehicle, Dunmore Brazil S.A., into CVRD upon the completion of its financing efforts, the Goodwill created by Dunmore’s cash bid for 30% of CVRD’s equity was added to both the company’s SG&A (R$ denominated) expense as well as its Depreciation, Depletion & Amortization (DD&A) expense. The net effect was to reduce financial statement taxes (for the purposes of tax collection Amortization of Goodwill is not considered a tax-deductible expense) and, hence, increase cash flows with its eventual addition to Earnings Before Interest and After Taxes (EBIAT). It should be noted that this new Goodwill was added to the company’s existing Amortization expense and the sum was amortized over a 40-year period.

**Additions to Working Capital**

In order to estimate the cash required to support CVRD’s annual working capital requirements, we relied on both historic Balance Sheet information as well as comparable company analysis (Placer Dome, Anglo-American, Noranda, INCO, and American Barrick). In calculating historic working capital, we: (a) assumed that CVRD only required reserves of cash and marketable securities equal to 5% of its current-year revenues and (b) subtracted short-term debt out of the Current Liabilities so as not to double-count the effect of the company’s fixed income obligations in our equity valuation. Our analysis led us to believe that the company maintained working capital equal to approximately 7.5% of current-year sales; CVRD’s additions to working capital
were, therefore, assumed to be the amount that reconciled this fixed ratio at the end of each period.

**Capital Expenditures**

We again relied on comparable company analysis to give us a sense of what level of CAPEX was required to support future growth, however, we made certain adjustments based on the following two assumptions:

- As stated in the case, CVRD had recently completed an intensive program of capital investments, thereby making recent historic data relatively inconsistent with the company’s actual requirements in the near-term
- If given voting control over CVRD’s operations, Dunmore could be expected to reduce its CAPEX within the five-year forecast in order to use the additional cash flow for debt service

Accordingly, we indexed CAPEX to current-year Revenues and assumed that for the first five years following the auction, CVRD would spend only 10% on capital improvements. While this percentage appeared somewhat low relative to the company’s comparables, we used our calculation of terminal growth to reflect the resurgence in capital spending that would eventually be required and the subsequent strain it would have on the company's free cash flows.

**COST OF CAPITAL**

In calculating the value of a company, one of the most important factors to consider is the way in which its weighted average cost of capital (WACC) will be calculated. As valuations are highly sensitive to the discount rate employed, a company’s value can vary significantly based on the methodology that is chosen to compute the WACC. The correct determination of WACC is a particularly challenging problem for companies located in emerging markets. Most of the methods used in practice to calculate the Return on Equity do not adequately represent the risk factors associated with emerging markets; this is because they were created to be used in developed economies, which present completely different economic, social and political circumstances. The sections below provide a brief discussion of some of the models available to calculate the correct discount rate to use when valuing assets located in emerging markets. We will also suggest an appropriate methodology for calculating CVRD's cost of capital.

**The World Capital Asset Pricing Model (CAPM)**

The Capital Asset Pricing Model was initially applied in the US market. Later, its concept was extended to the international setting simply by substituting the World Market for the US Market as the benchmark to determine the risk factor. While there is evidence that this model works when considering developed markets, there is also evidence that CAPM is inadequate for use with emerging markets. The World Capital Asset Pricing Model assumes that Markets are efficient and perfectly integrated, which is not necessarily the case when dealing with emerging markets and their largely closed economies and unstable financial markets. Harvey illustrates that, in the case of emerging markets, the returns predicted by the model are unreasonably low.

**The Country Spread Model (Goldman, Sachs Model)**

When regressing the returns of emerging market securities against either the world market return or the US market return, one finds very low or even negative values for the Beta. According to
CAPM, this implies that the expected returns for those securities should be the even lower than the risk free rate. The Country Spread Model attempts to compensate for the low predictions CAPM provides by adding the spread between the country’s government bond yield and the US Treasury Bond to the result of the multiplication of Beta and the US Market excess return. While this model provides a more reasonable prediction of emerging market security returns, it has some fundamental problems including the fact that the addition to the CAPM equation is the same for every security. In addition, it appears as if the addition itself has no clear economic interpretation.

The Ibbotson Model

The Ibbotson model regresses a security’s excess return on the world market’s excess return. Both the Beta as well as the regression’s intercept are estimated. The model uses the usual CAPM equation result plus half the value of the regression intercept. Again, there is no clear economic explanation for this addition and no clear reason why it uses half instead of another fraction of the regression intercept.

The Erb-Harvey-Viskanta Model

Erb, Harvey and Viskanta (1996) demonstrate that there is a strong relation between country returns and country credit ratings. They have developed an equation that relates the log of the country credit risk to equity returns.

Country credit ratings are the result of surveys conducted in the banking community. Industry experts are asked to classify countries according to their default risk. Typically, banks have analysts who conduct research to estimate the probability of the default of their bank extensions. Among other factors, they take into account political risks, inflation and exchange rate volatility and controls. In addition, as lenders are concerned with future risk, a country credit rating is forward looking rather than based only on historic information.

The Suggested Method

We suggest that the Erb-Harvey-Viskanta Model be used in the estimation of the equity returns of emerging market companies. As detailed above, the World CAPM is not adequate for emerging markets, as it clearly provides returns that are too low. The Country Spread Model and the Ibbotson Model are not adequate either. While providing higher estimations for equity returns, they fail to provide economical fundamental to the “addition factors” they have in their expressions.

In contrast, the Erb-Harvey-Viskanta Model fits very well in the data and is based on a variable that is a proxy for many of a country’s fundamental risks. Besides, its variable looks forward rather than backward, which is an advantage over most of the traditional methodologies.

The Calculation of CVRD’s WACC

Brazilian equity returns represent the returns of a theoretical portfolio of companies that form the Brazilian market. However, those companies each bear significantly different risks. The average Brazilian company collects only 2% of its revenues from abroad. Accordingly, their risks are solely related to Brazil. As such, it would be a mistake to use the Brazilian equity rate to calculate CVRD’s WACC due to the fact that CVRD’s revenue structure makes it an
atypical Brazilian company. It is in the export business and most of its revenues (and some of its costs) originate outside of Brazil. CVRD's cash flows are, therefore, not exposed to the same risks as those of an average Brazilian company. We reason that that CVRD's cost of equity should be a blend of the costs of equity of the countries that originate CVRD's cash flows.

Using the International Cost of Capital and Risk Calculator (ICCRC), which is a software program based on the Erb-Harvey-Viskanta model, we calculated the excess returns on the markets that originate CVRD's cash flows. We used such percentages to calculate the excess return on the market for CVRD's costs and the excess return on the market for CVRD's revenues. Following this exercise, we averaged both to estimate the total excess return on the market for CVRD.

The country returns we used were calculated using the Erb-Harvey-Viskanta model. As inputs, we used the 3-year average of Institutional Investor's country credit ratings; we believe that this data would be more conservative than current credit ratings, as the ratings have improved as of late. Averaging also provides more stability, which is important since we are interested in the long-term. For the calculation of the excess returns on the "European Union" market, we averaged the excess returns of Italy, Germany, France and United Kingdom (the most important economies in that region). Similarly, to calculate the excess return on "Other Emerging Markets" we used an average excess return of the most important emerging markets in Asia and Latin America.

We used an asset beta of 0.9 to calculate CVRD's return on equity. We discovered that for an iron ore mining company exposed directly to the global economy, which depends on steel to grow, an asset beta of 1.0 would be adequate. Based on such asset beta and on our projected long-term capital structure D/V= 30%, we found an Equity Beta of 1.34.

CVRD's cost of equity was then calculated using the Beta and excess return on the market we estimated above and adding a risk free rate of 5%. The number we found for the company's cost of equity was 30%. Finally, using CVRD's cost of debt, capital structure and the estimated cost of equity, we calculated CVRD's WACC in 23.6%.

EXCHANGE RATE SCENARIOS

As stated in the case, the majority of CVRD's revenues are US$ denominated (85% in US$ and 15% in R$), while the majority of the company's costs are R$ denominated (70% in R$ and 30% in US$). This asymmetric cost/revenue structure makes the company more valuable in scenarios in which the Real is weak in relation to the Dollar. As presented in the case, the pegged system adopted by the Brazilian government had caused an overvaluation of the Real in relation to the US$.

It is a generally accepted economic principal that, over the long term, relative Purchasing Power Parity (PPP) holds. This implies that exchange rates should adjust to reflect inflation differentials in two countries. As Brazilian inflation was higher than American inflation during the first two years of the Real Plan and the exchange rate variation was not high enough to account for the inflation differential, the Real became overvalued by 50% according to our calculations.

There is a big assumption that must be made when estimating one currency's fair value. The PPP calculation is valuable only when the exchange rate of the base year is also correct. In our model, we assume that the exchange rate used when the Real was first implemented was correct,
however, that may not be the case. Perhaps the conversion factor the government used created an initially undervalued currency. If this was in fact true, the overvaluation of the Brazilian currency was not as high as our estimation. We believe, however, in the assumption that the Real was initially set at its correct level.

In this sense, the 1996 exchange rate level of 1.05 was very unfavorable to CVRD; the good news for the company was that this level was not sustainable as the market was exerting pressure on the Real to assume its fair value. As Brazilian inflation was expected to fall to 7% in 1997 (and to even lower levels afterwards) while the American inflation was expected to stay at 3.5% a year, the government's policy of devaluing the Real by 7.5% a year would decrease the Real's overvaluation. The question that remained was whether the market would wait for the government to bring its currency to its fair value.

Based on this situation we considered three exchange rates scenarios for the next five years. The first scenario assumes that the Central Bank will be capable of containing the market pressures and, hence, be able to maintain its devaluation policy. In 1998, the Brazilian inflation rate would fall to American levels but the Central Bank would still devalue relative to the Real. With such a devaluation rate, the Brazilian Real would be at fair value in 2001. The scenario considers that exchange rates will be in relative PPP equilibrium after 2001.

### Scenario 1 - Maintenance of 7.5% Annual Devaluation Rate

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<tbody>
<tr>
<td>INPC (BR)</td>
<td>0.81%</td>
<td>0.45%</td>
<td>0.68%</td>
<td>0.60%</td>
<td>3.00%</td>
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<tr>
<td>CPI (US)</td>
<td>0.29%</td>
<td>0.25%</td>
<td>0.21%</td>
<td>0.16%</td>
<td>2.37%</td>
<td>3.50%</td>
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<td>R$/US$</td>
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<td>Diff. PPP</td>
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The second scenario considers a crash in 1998, with a one-time devaluation of the Real of sufficient scale to make the currency undervalued in relation to the Dollar. We considered a greater than necessary devaluation because in such situations the market tends to overreact, causing the attacked currency to fall to quite low levels very quickly. During such crises, inflation also tends to increase, as imported goods become more expensive. However, we considered that inflation would not be as high as the devaluation because of the following: the currency was originally overvalued and of a recession would undoubtedly accompany such a large crash. Over time, the country recovers from the crisis, inflation slowly decreases and the currency appreciates back to its fair value. The table below shows our assumptions for such scenario. This scenario also considers that exchange rates will be in relative PPP equilibrium after 2001.

### Scenario 2 - Crash in 1998

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<td>INPC (BR)</td>
<td>0.81%</td>
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<td>0.60%</td>
<td>3.00%</td>
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<td>R$/US$</td>
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<td>Diff. PPP</td>
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<td>1.69</td>
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The third scenario we analyzed represents a nightmare scenario and is useful to estimate the minimum possible value of the corporation. Under this scenario, we assume that the exchange rate will stay at current levels. The assumptions for inflation are the same as under scenario 2. For the terminal exchange rate, we consider that PPP will not hold but will also not deteriorate even further. Scenario 3 does not intend to be realistic but to give us a better understanding of the influence of exchange rates in the company's value. In 1997, the government had a clear
devaluation policy and the question would be whether the devaluation rate would increase or stay at the historic levels. It is also unreasonable to expect that the large relative PPP differential would remain constant indefinitely. The table below shows our assumptions.

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<th>Scenario 3 - Constant Exchange Rate</th>
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<td>INPC (BR)</td>
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<td>RS/US$</td>
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<td>Diff. PPP</td>
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VALUING CVRD’S EQUITY

In valuing CVRD’s equity, we used the following equation:

\[
PV = \frac{\text{Forecasted Cash Flows} + \text{PV Terminal Value} + \text{Cash} + \text{Mktbl. Securities} - \text{Debt} - \text{Contingent Liabilities}}{r}
\]

We discounted our forecasted free cash flows by the WACC and obtained a present value of $3.2 billion. The conventional way to estimate Terminal Value is to assume that a company’s current free cash flows will grow perpetually at a constant rate. After consulting associates at various private equity firms, we learned that they adjusted for terminal growth in a slightly different way. Rather than using Free Cash Flow, as the numerator in their perpetuity formula, they employed instead a multiple of EBITDA, as this is the common practice in making presentations on valuation to both senior officers as well as the investment community. In order to balance this assumption with our intuition about the way in which CVRD will grow as a going concern, we developed a formula which revealed the terminal growth rate implied by choice of terminal EBITDA multiple. Based on our multiple of 6.5 times EBITDA in 2001, we were implicitly assuming terminal growth equal to approximately 5%. As we believed that the Real would devalue to the point of Purchasing Power Parity with the American dollar, we estimated terminal inflation in Brazil at slightly more than historic U.S. levels (approximately 3% per year). Due to the fact that CVRD was in a mature business and would have to invest tremendous resources in capital improvements following the period of Dunmore ownership, it seemed appropriate to scale down its terminal growth to reflect this long-term obligation. The present value of our Terminal Value came out to $8.9 billion, representing about 70% of CVRD’s enterprise value.

The next step in our equity valuation was to add CVRD’s cash reserves as of the end of 1996. We then subtracted both long-term and short-term debt as well as the company’s contingent liabilities of approximately $450 million. In the notes to the financial statements, this liability this liability appears to have originated from several class action lawsuits that were pending judgement as well as CVRD’s as yet unmet obligation to improve the environmental conditions surrounding several of its exploration projects. In our esteem, the uncertainty regarding the final amount of these liabilities could materially affect CVRD’s true valuation and, therefore, had to be considered as an additional risk factor when computing the company’s cost of capital.

Since we employed numerous scenarios regarding revenue growth, margin expansion and the RS/US$ exchange rate, we obtained nine different valuations. We chose to use the scenario which implied high sales growth and margins as well as the continuation of the Central Bank’s policy of 7.5% annual currency devaluation relative to the US$. Hence, Dunmore’s bid was based on an equity valuation of $9.2 billion.
Sensitivity Analysis

A critical component of any valuation effort is sensitivity analysis. As the valuation models’ underlying assumptions are grounded on its author’s insights about uncertain events, it is crucial to test these assumptions by determining how much of an impact each has on the ultimate valuation.

FINANCING THE BID

In order to provide the student with a sense of its alternatives with respect to funding the Dunmore bid, the case details the expected sources of financing. From our perspective, there are two critical issues to consider when determining the bid’s debt and equity mix:

- Will CVRD’s cash flows be sufficient to cover the interest charges stemming from the bid’s high degree of leverage?
- Will CVRD’s cash flows be strong enough to allow Dunmore to match its principal repayment obligations?

In order to insure that Dunmore could service its long-term obligations, we included in our analysis a capitalization schedule, which was modeled to alert us if Dunmore defaulted on either its principle or interest obligations. We used this to guide our bidding strategy in the sense that it served as a reminder of what the upper bounds could safely be.

Our assumptions with respect to the debt component of the CVRD bid were as follows: the total debt that Dunmore could raise would be indexed against the market’s perception of 30% of the company’s trailing EBITDA ($1.5 billion) and be set at 7.5 times that amount. Within the fixed income category, the amount of bank and senior subordinated debt that could be accessed was equal to 4 times trailing EBITDA, however, fully 30% of CVRD’s existing long-term debt was counted against the Dunmore bid in the interests of reflecting the true liabilities associated with the equity stake being auctioned. It was also assumed that the high yield market could be counted on for 3.5 times trailing EBITDA.

HOW MUCH SHOULD DUNMORE BID?

In determining Dunmore’s optimal bid strategy we considered several issues. The first was the fair market value for 30% of CVRD’s common equity. As our DCF valuation calculated a value between $9 billion - $9.5 billion and anecdotal evidence suggests that voting control is often worth a 5% premium in the market, we decided that Dunmore should use $3 billion as the foundation of their bid. As Dunmore would have to assume that the CVRD auction would be defined by its competitiveness, it would be critical to develop some way to place an upper boundary on the price it was willing to pay.

Analysis of Compounded Annual Equity Returns

The way that we solved this problem was by designing a model which calculated the compounded annual return on equity for Dunmore and its limited partners given the following assumptions: the actual bid price, the year in which Dunmore could be expected to liquidate its investment and the exit valuation.

In determining an exit valuation, we simply assumed that CVRD’s equity would be worth six times trailing EBITDA, a conservative value consistent with our own unbiased assessment of
CVRD's worth. A second assumption was that Dunmore would look to divest itself of its CVRD investment after five years, in 2001. As we reasoned that the equity holders would require a return at least equal to CVRD's Return on Equity of 26.8%, our sensitivity analysis on the internal rate of return of the CVRD investment was conditionally formatted to distinguish those scenarios which cleared this hurdle rate. According to our assumptions and the necessity to deliver abnormal equity returns, the maximum Dunmore could pay is approximately $4.25 billion.

**Other Considerations**

As a bid this high would contemplate achieving a leverage profile in excess of what the market would bear, Dunmore should scale down this number to a more manageable level. Our analysis of credit ratios and liquidity tests suggests that the most that CVRD could (uncomfortably) afford is $4 billion, however, this would probably require further reductions of capital spending during the five-year forecast. Another important issue is the uncertainty surrounding CVRD's contingent liabilities of $445 million.

**Finally . . . The Bid**

Taking into consideration the above-noted factors as well as the imperative to deliver a bid which would keep Dunmore in contention with other prospective buyers who could rely on strategic synergies to increase CVRD's value, Dunmore offered $3.75 billion for 30% of CVRD's equity.

**How Does the Story Really End?**

In May 1997, after significant litigation delayed the auction for several days, CVRD was privatized in Rio de Janeiro. The auction, which took place in Rio's Stock Exchange, occurred within a the context of violent protests by Left Wing party members and trade unionists and required in excess of 300 policemen to guarantee the security of buyers and other participants. Valepar, a company consortium lead by recently privatized Companhia Siderúrgica Nacional, acquired CVRD's 45% controlling share with a bid of $3.2 billion.

After attaining control of CVRD, Valepar took several actions aimed to cut costs and increase the company's profitability. Of the 15,383 employees the company had in 1996, only 10,865 remained by the end of 1997.