Case Study
Bidding for Antamina

In June 1996, the UK based mining company RTZ-CRA had to decide whether to bid for the Antamina copper and zinc mine in Peru. The mine was being offered for sale through an auction as part of Peru’s privatization program. RTZ had to determine the mine’s value and its optimal bidding strategy for the upcoming auction. This true case illustrates real options valuation in an auction and privatization context. As such, it introduces three key issues that arise in infrastructure project finance and, more importantly, their interaction.

The Antamina mine itself should be thought of as a real option where the winning bidder has the right to develop the deposits after exploration to ascertain the amount of ore. Moreover, the auction’s rules explicitly acknowledge the real option nature of the project. Finally, the auction creates incentives for the bidders that need to be examined in light of the real options valuation.

You have been called in by RTZ-CRA as a consultant to help with the preparation of bids and the preceding valuation exercise. Before you write your memo to senior management or prepare your presentation on the issues, you might want to discuss the following questions and issues in your group.

1. Analyze the uncertain environment surrounding the project.
   (a) What are the sources of uncertainty? How do they influence the value of the mining project?
   (b) Draw a timeline of the bidding, exploration and operating process and explain at what stage the different types of uncertainty will be resolved.

2. Describe the real option(s) embodied by the development of the Antamina mine.
   (a) Where does the option nature of the project come from? In what way is the development of the Antamina mine a real option?
   (b) How does the bidding structure put in place by the Peruvian government create an option?

3. What is the correspondence between the real options (development, auction) and financial options? What other real options does the owner of Antamina have?

4. Analyze the parameters required to value the real option(s). Carry out a real options valuation of Antamina making suitable assumptions and documenting them.
   (a) What is the underlying?
   (b) What else is important?
(c) Which parameter are readily available in the case? Which ones need to be estimated?

5. Investigate are the incentives that the various auction rules would provide to bidders. Are they consistent with the perceived goals of the Peruvian government?

(a) Describe the government’s objectives in selling Antamina. Are they appropriate? What else could the government strive for?

(b) What incentives does the up-front payment with investment commitment rule breed for potential investors?

(c) Given the auction and exploration rules, what could go wrong for the government? Where does it expect to make money form?

(d) Analyze the following alternative auction scheme: for a constant up-front payment of USD 20m, the winner is the bidder with the highest investment commitment. What could go wrong? Why?

6. Formulate bidding strategies for Antamina on the basis of the three scenarios (low, expected, high).

(a) How would you bid? What is the biggest danger in bidding for such a project in a first bid sealed auction? Is it any different from other auction under uncertainty?

(b) How does the fact that you are bidding for a real option affect your bidding strategy?

(c) What would your next steps be if you were to win the bid? How would the evolution of world copper and zinc prices affect your exploration and operating strategy?

7. What was the auction outcome and what has happened since then? Report on events since the bidding and carry out a post-mortem analysis of the project.

1 Groups 1, 3, 5, 7

Working for a premier investment bank, you advise the Peruvian government on its privatization program. In designing the auction procedure, your clients and you know how important it is to strategically anticipate on the bidders’ behavior. To this end you have analyzed the economics of copper mining in Peru and, focusing on questions 1, 2, 4 and 5, you are presenting your findings to the Ministry of Finance.

2 Groups 2, 4, 6, 8

You are a senior economy at BIAS, Inc. (Bold International Auction Strategies), a that company specializes in advising clients on bidding in government sponsored auctions. As the lead consultant to an interested bidder you are charged with a rough valuation exercise and bidding recommendations (questions 3, 4, 6, 7).

Please note the following ground rules for the case write-ups:

- the maximal group size is 5; every group member gets the same grade
- at most 2 pages of analysis and 6 pages of technical appendices;
• show your work, staple the pages together and be professional;

• late write-ups will not be accepted for any reason; they are due at the beginning of class for which the discussion is scheduled;

• graded write-ups will be available a week later.