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Second Expert Valuation Report of Prof. Graham Davis and the Brattle Group

April 13, 2016

Bear Creek Mining Corporation v. Republic of Peru

ICSID Case No. ARB/14/21

Quantum of Damages Analysis – Reply Report

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This report was prepared for Sidley Austin LLP on behalf of the Republic of Peru. All results and any errors are the responsibility of the authors and do not represent the opinion of The Brattle Group or its clients.

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I. Introduction and Summary of Conclusions

1. We previously submitted an expert report in this matter, dated March 30, 2015 (First Brattle Report).[1] In the First Brattle Report, we reviewed and commented on the expert report submitted by FTI Consulting (FTI) (the First FTI Report),[2] on which Bear Creek Mining Corporation (Bear Creek, Claimant, or the Company) relied for its calculation of the quantum of damages in this matter. We also addressed several issues in the report submitted by Roscoe Postle and Associates (RPA) (the First RPA Report) as they related to FTI's damages calculations.[3]

2. We have been asked by counsel to the Republic of Peru (Peru or Respondent) to respond to the reply report submitted by FTI (FTI Reply Report),[4] as well as to the reply report submitted by RPA (RPA Reply Report),[5] to the extent it addresses comments in our first report.

3. FTI calculated damages for two projects: Santa Ana, which was the subject of Supreme Decree 032 that revoked the declaration of public necessity under which Bear Creek was developing the Project, and Corani, which was not the subject of Government action but Claimant asserts was affected indirectly.

A. Santa Ana Damages

4. FTI estimated the fair market value (FMV) of the Santa Ana Project on June 23, 2011 (the FTI Valuation Date) at $224 million, using a discounted cash flows (DCF) model. We showed in our first report that FTI's DCF estimate could not be reconciled with the market-based information available in Bear Creek's share price, which was traded in a liquid market on a major Canadian stock exchange. A market benchmark based on Bear Creek's share price indicated a range of $42 million to $149 million for Santa Ana's FMV on that date, well below FTI's estimate.

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1 Expert Report of Graham A. Davis and Florin A. Dorobantu, October 6, 2015.

2 Expert Report of Howard N. Rosen and Chris Milburn, FTI Consulting, May 29, 2015.

3 RPA Technical Review of the Santa Ana Project and Corani Project, Puno, Peru, May 29, 2015.

4 Reply Expert Report of Howard N. Rosen and Chris Milburn, FTI Consulting, January 4, 2016.

5 RPA Response Report on the Santa Ana Project and Corani Project, Puno, Peru, January 6, 2016.

5. Furthermore, we explained that FTI's DCF model was not reliable even aside from the absence of reconciliation. The simple DCF method was not well suited to value a mining project such as Santa Ana. FTI's implementation did not account for several relevant economic factors and relied on technical inputs that were disputed by Respondent's engineering expert. Therefore, FTI's claim that its DCF method was more reliable than a market approach based on Bear Creek's share price could not be supported.

6. In reply, FTI argues that Bear Creek's share price cannot be used to estimate or to benchmark Santa Ana's FMV because it does not reflect the FMV of the Company's assets. We strongly disagree with FTI's extraordinary proposition, which is based on misapplications of finance theory and empirical evidence. This is a principal difference between our reports and our reply report focuses on rebutting FTI's three main arguments against using the share price.

7. First, FTI argues that a hypothetical buyer of the Project, or the entire Company, would pay a substantial acquisition premium above the value reflected in Bear Creek's share price, reflecting the higher value that this hypothetical buyer would be able to extract from the Project. But FTI's only concrete example of such potential synergies is the lower cost of capital available to major mining companies, who would be likely buyers of the Project. Buyer's cost of capital, however, merely reflects the average risk of its projects and cannot generate synergies. Buyers pay based on each project's risks, not based on how cheaply they can obtain financing for their other projects. This is a fundamental tenet of finance.

8. FTI does not identify any other synergies that could motivate an acquisition premium. If markets perceived the possibility of such synergies, their expected value would in any case be reflected in Bear Creek's share price, because each trader of the shares would stand to benefit from the acquisition premium, if and when it should arise.

9. Second, FTI argues that share prices are unreliable indicators of FMV because they reflect the trading of retail investors who are naïve, irrational, and trade according to investor sentiment. We discussed this issue in our first report and noted that it led to the implausible conclusion that the stock price of virtually any company is unrelated to the value of its business activities. FTI's reply does not address this. Instead it makes unsupported statements about the lack of market efficiency in Bear Creek's shares.

10. Stock market efficiency does not require that all investors be identical, perfectly rational, or uniformly sophisticated, as FTI claims. It only requires that some investors be rational and sophisticated. Bear Creek's investors included sophisticated players with mining expertise.

If Bear Creek's shares were as substantially underpriced as FTI's result implies, these and other investors would buy the underpriced shares and help drive the price up, making a sustained substantial gap between share price and FMV implausible. Moreover, if Bear Creek's share price were affected by investor sentiment, we provide evidence that shows it is more likely that the result would be *overpricing*, not underpricing.

11. The third reason FTI offers for its dismissal of Bear Creek's share price is that it may reflect the impact of Respondent's alleged treaty breaches. But FTI's approach goes beyond excluding the potential impact of the specific acts Claimant asserts were unlawful. FTI assumes away *any* impact of the intense community protests and social opposition that Santa Ana was facing. FTI thus assumes that any social opposition that could impact the project would constitute a treaty breach.

12. This assumption ignores the critical role played by the social license to operate in the mining industry. Mining companies understand they have a major responsibility to obtain the social license to operate, which entails the support and acceptance of communities impact by the mining development. Analyses of mining projects that faced community opposition demonstrates the significant impact that failure to secure the social license to operate can have on a project, including increased costs, delays, and failure to develop the project altogether. FTI's damages estimate ignores this impact.

13. Bear Creek's share price reflected the real-world difficulties the Company was facing in securing community support for Santa Ana. If the impact of specific government actions should be excluded from the valuation of Santa Ana as a matter of law, it is possible to do so without abandoning the market approach in favor of a less reliable method. Indeed, we note that FTI took such an approach to calculate damages in this case for Corani.

14. FTI's remaining objection to a valuation based on Bear Creek's share price is that apportioning the combined value revealed by the stock market between Bear Creek's projects is problematic. Yet FTI's calculation of damages to Corani relies on just such an apportionment to support a substantial damages claim for that project.

15. In any case, we acknowledged that the apportionment of value could be imprecise, particularly as FTI implemented it, using valuations conducted by investment bank analysts that shared some of the flaws in FTI's own DCF model. We noted in our first report that an alternative approach would be to value both projects using a more appropriate, modern DCF method, and calibrate those valuations to market transactions.

16. FTI's reply notes that although we stated a modern DCF valuation method would be more reliable, we did not implement it. That led FTI to speculate that the modern DCF method would not work or would yield results higher than FTI's own estimate. This is incorrect. We did not implement it because we were not asked to do so. We implement our proposed valuation approach here to address FTI's concerns and show that it comes to the same conclusion as the benchmark valuation we showed in our first report: FTI's simple DCF, lacking calibration to market prices, overstates the FMV of Santa Ana.

17. The DCF valuation of both Santa Ana and Corani requires calibration to market prices. Santa Ana is subject to the unique impact of community opposition, which Bear Creek's share price reflects and whose value impact cannot be estimated reliably without such calibration. Corani is subject to its own unique risk, because it is a very low-grade silver-zinc-lead deposit, and there is a significant possibility that extraction of silver and the base metals cannot be achieved. This possibility also would be reflected in Bear Creek's share price, and any income approach valuation of Corani would need to be calibrated to the market so as to estimate the market's perception of this risk.

18. To estimate the impact of both risks, we take a four-step approach.

    - First, we use Bear Creek's purchase of a 30% interest in Corani in March 2008 to estimate the likelihood of technology failure at Corani. To do so, we estimate a modern DCF model for Corani and calculate the implied probability of technology failure that makes the DCF result equal to Corani's FMV as revealed by that market transaction.
    - Second, we use this market-calibrated DCF model to estimate Corani's FMV in 2011, on the date before Respondent's alleged treaty breaches occurred.
    - Third, we subtract Corani's FMV on this calibration date from the FMV of Bear Creek's assets, as measured from its share price, to obtain Santa Ana's FMV on this date. This allows us to estimate Santa Ana's risk of social license failure before any alleged unlawful acts taken by Respondent.
    - Finally, we use this estimated probability of social license failure to calibrate our modern DCF model for Santa Ana and use it to value Santa Ana on the Valuation Date, June 24, 2011.

19. As with any DCF approach we have a range of values, shown in Table 1. Which range applies depends on whether we calibrate the Santa Ana DCF model on May 27, 2011, before the suspension of Santa Ana's Environmental and Social Impact Assessment (EIA) process (if this action is deemed a treaty breach) or on June 23, 2011, before news of the

issuance of Supreme Decree 032 became public (which assumes the EIA suspension was not a treaty breach).

Table 1: Santa Ana Market-Based FMV Range vs. FTI's Estimate (US $ Millions)

		Market-Based DCF		FTI
		Low End	High End	
		[A]	[B]	[C]
If EIA Suspension Is Deemed a Treaty Breach	[1]	40	113	224
If EIA Suspension Is Not Deemed a Treaty Breach	[2]	32	119	224

Notes and Sources:
[1][A], [B]: Table 3.
[2][A], [B]: Table 2.
[C]: First FTI Report, Figure 2.

20. As Table 1 shows, FTI's estimate is well above even the high end of the market-based range of FMV estimates. This difference is explained in part by FTI's lack of accounting for social license failure risk, and in part by other problems with its DCF model, which we discuss in the body of the report.

21. We were asked also to calculate the amount that Claimant had invested into the Project as of the Valuation Date, which Respondent considers is the appropriate measure of damages in this case. Based on the acquisition and exploration costs that Bear Creek allocated to Santa Ana in its financial statements, we calculated the amount at $21.8 million. FTI considers that the amount invested is not an appropriate measure of damages under the treaty. This is a matter of treaty interpretation as to which we do not express a legal opinion. FTI notes also that the reported exploration costs exclude certain indirect costs, which Bear Creek did not allocate to any of its projects. Our view is that Bear Creek's decision not to allocate these costs indicates the Company's view that they were not sufficiently closely related to Santa Ana. Whether a part of the indirect costs should be included in damages is ultimately a legal question.

B. CORANI DAMAGES

22. Claimant asserts that the cancellation of Santa Ana's public necessity declaration has caused an ongoing loss to the value of its Corani project. FTI was asked to quantify the claimed loss to date. Yet FTI's calculation of damages to Corani, which relies on changes in Bear Creek's share price from May 27 to June 27, 2011, ignores any information during the subsequent

four and a half years. As a result, FTI's damages estimate cannot be said to estimate the losses to date. FTI's reply has not addressed this fundamental flaw in FTI's approach.

23. FTI assumes that Corani lost value for three reasons arising from the Santa Ana events: an increase in the cost and difficulty of financing Corani, a delay in its development, and an increase in the market's perception of project risk. Our first report showed that only one of these events has been realized, a delay in development, and none can be linked to Santa Ana.

24. Bear Creek explains the alleged increase in the cost of capital by the presumed need to raise more external funds because the internal cash flows from Santa Ana, which was assumed to start production before Corani would be built, could no longer be counted on. FTI did not question this logic, even though basic finance teaches that a project's cost of capital depends on its risk, not on the source of capital. Although we pointed out this fact in our initial report, FTI did not address the financial arguments and instead simply quoted Mr. Swarthout's repeated assertion of a financing cost increase.

25. If financing difficulties had affected the project to the extent implied by the $170 million loss calculated by FTI, Bear Creek could have sold Corani to mitigate this loss. Since the acquiring company would have not been burdened by this increased cost of financing, an arm's length sale in an open and unrestricted market would have resulted in a transaction at the project's FMV. FTI responds that such a sale would be a forced sale and reflect a discount to FMV, but this in incorrect. A forced sale occurs when the seller is forced by circumstances to liquidate an asset quickly, without the necessary time to attract enough buyers and allow them to perform due diligence. Bear Creek has had ample time to conduct an orderly sale, had it been necessary to mitigate an ongoing loss of value.

26. While there is no dispute that Corani's development was delayed relative to the timeline projected in 2011, FTI has not shown that the delay was linked to Santa Ana. We pointed out that such a causal link is inconsistent with Bear Creek's repeated public statements, both immediately after the issuance of Supreme Decree 032 and later, that Corani's development was unaffected by the events at Santa Ana. FTI did not address this inconsistency in its reply.

27. We showed also that commodity prices fell substantially since 2011, which often causes mining companies to delay projects as they wait for the cycle to recover. Consistent with this interpretation, Bear Creek decided to conduct an updated feasibility study, which required it to amend environmental impact assessment (EIA) study that had been approved

in 2013. FTI rejects this interpretation of the events based on Mr. Swarthout's statements that Bear Creek conducted optimization work that was envisioned by the 2011 feasibility study. The 2011 feasibility study, however, did not recommend an updated feasibility study. When the 2011 feasibility study was released, Bear Creek stated that the only remaining step to achieve bankable feasibility study stage (which indicates the project is ready to seek financing and commence construction) was the EIA approval, which Corani obtained in 2013.

28. Finally, Claimant's assertion that market perception of project risk increased is undermined by market evidence. We showed that the negative market reaction following the Santa Ana Supreme Decree was short lived. Within a month, by the time the political uncertainty from the June 5, 2011 election results was reduced, Bear Creek's share price returned to levels close to those before the Santa Ana events. Thus, the loss in Bear Creek's share price, which drives FTI's damages calculation for Corani, was erased within a month of FTI's estimation date. Yet FTI claims that its measure reflects ongoing damages to date.

29. FTI attempts to justify this contradiction by noting that after Bear Creek's share price recovered, it fell again. FTI overlooks, however, a critical flaw in its logic: the fall in price to which FTI points accompanied a market-wide decline, so it cannot be attributed to the Santa Ana events.

30. In any event, the claim that the presumed market perception of increased project risk persist today is inconsistent with the lack of any adverse action taken by the Peruvian government against Corani. Corani has received strong government support, as admitted repeatedly by Bear Creek. FTI's reply did not explain how the market could still fear adverse government actions against Corani despite the demonstrated actions of the government to the contrary and repeated Company assurances that Corani was unaffected by the events at Santa Ana.

II. Santa Ana Damages

31. Respondent believes that damages should equal at most the amount that Claimant had invested in the Santa Ana project by the date of Supreme Decree 032.[6] We were asked to

[6] First Brattle Report, ¶ 16.

calculate this amount in our first report.[7] We also were asked to evaluate FTI's analysis of the FMV of the Project, but we were not asked to estimate FMV.[8]

32. FTI argues that awarding damages based on the amount invested is not consistent with the Canada-Peru Free Trade Agreement (FTA).[9] We express no opinion on this legal question, and to be clear, we did not equate Claimant's amount invested with the Project's FMV. As we explained, the amount invested is "an alternative measure of damages."[10] FTI's Figure 2 misleads the reader by including our calculation of the amount invested among what it describes as "Santa Ana FMV Indicators."[11] The Project's cost of investment is distinct from its FMV.

33. In our first report, we explained that FTI's DCF estimate was inconsistent with Bear Creek's share price.[12] This market-based benchmark, which FTI itself developed and used to calculate damages to the Corani project, shows that FTI overstated the FMV of Santa Ana on June 23, 2011, FTI's Valuation Date, by between 50% to 431%.[13] Thus, FTI used Bear Creek's share price for one purpose (estimating damages to Corani), but dismissed it as unreliable for Santa Ana and replaced it with its substantially higher model-based DCF estimate.

34. FTI can only respond with the striking proposition that Bear Creek's share price does not reflect the FMV of its assets - the Santa Ana and Corani projects. We explained in our first report why the arguments FTI provided initially to support this view were ill-founded and could not justify FTI's view.[14] FTI's Reply Report contains a discussion of our analysis and raises some new issues. Because this is a principal difference of opinion between us and FTI, we address it first, in Section II.A, where we explain why FTI's reply fails.

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7 First Brattle Report, ¶ 39.

8 First Brattle Report, ¶ 15.

9 FTI Reply Report, p. 24.

10 First Brattle Report, ¶ 181.

11 FTI Reply Report, p. 21.

12 First Brattle Report, ¶ 17.

13 First Brattle Report, Table 4.

14 First Brattle Report, Section II.B and II.C, ¶¶ 178-179.

35. The market-based benchmark we used to show that FTI overstated Santa Ana's FMV used the relative value of Santa Ana and Corani implied by analysts who followed Bear Creek's stock.[15] We explained that in principle this benchmark could be refined further by replacing analysts' DCF valuations with estimates calculated using a modern DCF technique, also called the "real options" method.[16] Modern DCF estimates for each project can provide a more reliable way to establish relative value and, when combined with the FMV of the Company as reflected in its share price, yield reliable FMV estimates for Santa Ana and Corani.[17]

36. FTI does not agree that a modern DCF method can improve upon the simple DCF method it used. FTI provides a superficial discussion of the method and speculates that because we did not implement it, either it required data we could not obtain or it would have generated a result even higher than FTI's estimate.[18] We discuss in Section II.B why FTI's rejection of the modern DCF is misguided. Following a brief discussion of the appropriate valuation date in Section II.C, we implement the modern DCF method to value Santa Ana and Corani in a manner consistent with the FMV of their combined value as reflected in Bear Creek's share price (Section II.D).

37. We conclude the discussion of Santa Ana's FMV by addressing FTI's response to several errors in its implementation of the simple DCF method (Section II.E). We then discuss FTI's critique of our calculation of the amount that Bear Creek invested in Santa Ana (Section II.F).

A. FTI'S REJECTION OF THE SHARE PRICE APPROACH HAS NO MERIT

38. Estimating the FMV of Santa Ana based on Bear Creek's share price is a two-step process:

- First, the FMV of the Company is determined from the price of its shares observed in market transactions on the valuation date,[19]

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15 First Brattle Report, Table 4.

16 First Brattle Report, ¶ 59.

17 First Brattle Report, ¶¶ 60-61.

18 FTI Reply Report, ¶ 7.16.

19 Because there is no debt, the value of the Company is the same as the value of its equity.

- Second, the FMV of the Company is apportioned between its two assets,[20] the Santa Ana and Corani mining projects, after subtracting the value of cash, which is not subject to uncertainty.

39. FTI rejects both steps. It argues that the market's enterprise value (EV) of the Company understates the FMV of the Company.[21] It also considers that the allocation of the EV between the two projects is "a major flaw" of the share price approach.[22] We discuss and rebut each of FTI's reasons below, after addressing FTI's general comments on the approach.

40. FTI states that "[s]hare price and FMV consider different transactions"[23] and notes the distinction between the share price, which reflects a transaction in Bear Creek's shares, and the hypothetical transaction of the Company's underlying assets envisioned by the FMV standard. We agree that the two transactions are different but do not see the relevance of that fact. The fundamental idea behind the market approach to valuation is that the value of an asset can be inferred from the price of transactions in *other* assets.[24] For example, the price of comparable properties observed in arm's length transactions is sometimes used to estimate the FMV of the valuation subject, a "comparison sale" approach.

41. What matters is that there be a meaningful and measurable relationship between the asset we need to value and the asset for which a market price is observed. Here, the shares of the Company derive their value entirely from the cash flows that the Company's assets are expected to generate. That is a direct and meaningful relationship. It also can be measured reliably.

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[20] In addition to the productive assets a company owns at a point in time, the company embeds some value from the possibility that it may come across value creating projects in the future. Accounting for these "growth options" would slightly reduce the total value allocated to the two main projects.

[21] FTI Reply Report, pp. 34-38.

[22] FTI Reply Report, p. 43.

[23] FTI Reply Report, p. 31.

[24] CIMVal states that under the market approach, "[t]he Mineral Property being valued is compared with the *transaction value* of similar Mineral Properties, *transacted in an open market*." *CIMVal Standards and Guidelines for Valuation of Mineral Properties*, Prepared by the CIM Special Committee of the Canadian Institute of Mining, Metallurgy, and Petroleum on Valuation of Mineral Properties, February 2003 ("CIMVal 2003") (FTI-4), G3.1.

42. FTI points also to CIMVal, the Canadian Institute of Mining (CIM) Mineral Property Valuation Committee, to support its assertion that share prices undervalue the FMV of a Company's assets. CIMVal states that valuation methods of Mineral Properties based on a company's market capitalization are "[m]ore applicable to Valuation of single property asset junior companies than to properties."[25] If FTI's view were correct that the market capitalization of a company understates its FMV, the method would never be applicable. There is nothing special about single-property companies that would make a market capitalization approach acceptable to CIMVal, if indeed the market capitalization of a company always understated the FMV of the company's assets. It is clear that CIMVal refers to the general difficulty of carving out the value of a single property from the value of the overall company that has many assets, which is an apportionment problem, and not a problem of understatement (or overstatement) of value.

43. Nor is there anything in the CIMVal Committee's subsequent public declarations that supports FTI's conclusion. A letter to the International Valuation Standards Council (IVSC) by the CIMVal Committee makes that clear. In responding to the IVSC's question "How often do you assess or use (if it is readily ascertainable) the value of an extractive business as a starting point for the valuation of reserves and resources?" they said "[a]ll the time."[26]

44. CIMVal suggests that relying on Bear Creek's share price to estimate FMV is appropriate, as long as the EV of the Company can be allocated to its assets. As we discuss below, this condition is met. There need be no dispute about this, because FTI itself performed just such an allocation of Bear Creek's EV (for purposes of its calculation of damages to Corani).

1. The Enterprise Value of Bear Creek Is Equal to the FMV of Bear Creek

45. Originally, FTI listed three reasons for a possible disconnect between Bear Creek's share price and its FMV: sentiment and momentum, illiquidity and trading ease, and the impact

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25 FTI Reply Report, ¶¶ 6.12.

26 CIMVal, Answers Submitted October 22, 2012 in Response to Questions in the IVSC Discussion Paper – Valuation in Extractive Industries (BR-155). The answer continues "Very often for producing properties. Sometimes however, we usually approach it the other way around. The valuation of resources and reserves is the starting point for valuing a business. We start from reserves and resources rather than applying company values to assets."

of Respondent's actions.[27] We explained in our first report why none of these factors can justify FTI's decision to ignore Bear Creek's share price.[28]

46. The FTI Reply Report no longer lists illiquidity as a concern,[29] and FTI does not respond to our arguments showing that its initial concerns about illiquidity had no merit. FTI maintains its concerns about sentiment and momentum and the impact of Respondent's actions, and raises a new issue, "the acquisition premium a buyer of 100% of Bear Creek's shares would have to pay over the traded share prices."[30]

a. Acquisition Premium

47. FTI seems to believe that equating a company's EV with its FMV requires that a potential buyer of the company would be able to acquire 100% of the company's shares by placing orders on the stock exchange.[31] FTI then spends some effort showing that doing so would be impractical or run against trading restrictions or regulations.[32] This is beside the point. A share-based valuation does not require that a buyer acquire the company one share at the time. A buyer could, for example, acquire the entire company. Owning shares in a public company gives the shareholder the right to the eventual cash flows generated by the company, which are paid out either as dividends or as share repurchases. If one owns 1% of Bear Creek, one has the right to 1% of the stream of all the cash flows that the Company's assets are expected to generate over time. Multiplying the market price of that 1% share by 100 yields the present value of the entire stream of cash flows, which is the same as valuing that stream of cash flows using the DCF method with proper accounting for all risks.

48. FTI argues that Bear Creek's FMV is higher than what its share price implies because a buyer of the company would pay a substantial premium over the prevailing share price.[33] FTI's conclusion about an acquisition premium for Bear Creek does not follow from the evidence:

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27 First FTI Report, ¶ 7.69(ii).

28 First Brattle Report, ¶¶ 67-80.

29 FTI Reply Report, ¶ 4.3(i).

30 FTI Reply Report, ¶ 4.3(i).

31 FTI Reply Report, ¶ 6.17.

32 FTI Reply Report, ¶ 6.17-6.21.

33 FTI Reply Report, ¶ 6.22.

- An acquisition premium might occur if the buyer expects the acquisition to yield synergies. But FTI has not provided credible explanations as to what would generate the substantial synergies its valuation implies.
- The chance that some synergies are possible is already reflected in Bear Creek's share price, because each shareholder would benefit from the acquisition premium.

49. Acquisitions at a premium reflect perceived synergies created by the merger. The average premium paid reflects specific acquisitions with sufficiently large synergies to justify paying the transaction costs of the acquisition. But synergies do not always exist and when they do, they are specific to each target and acquirer.[34] Unless there is evidence that a buyer exists for Bear Creek who is willing to pay a substantial acquisition premium, there is no basis to assume that synergies automatically exist, let alone to include them in the FMV of Bear Creek.

50. An acquisition premium also might be paid if new management can add more value with the same asset even absent synergies. Inefficiently run companies are likely targets for acquisitions because the acquirer can create value by replacing the incumbent, incompetent, management. But Claimant's position is that Bear Creek's management was competent, had substantial experience in the industry, and had overseen mining operations at all stages of development and production.[35] If so, a buyer would not be willing to pay to gain control of the Company so that it could improve operations.

51. FTI attempts to argue that an acquisition premium would apply to Bear Creek because it could be acquired by larger mining companies "who … enjoy a lower cost of capital than BCM."[36] In other words, the synergies would arise from the buyer's access to a lower cost of capital. This argument demonstrates a serious misunderstanding of fundamental finance.

52. The cost of financing a project depends on how risky the project is, and a company's cost of capital reflects the average risk of all its projects. It is not the appropriate benchmark

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[34] FTI seems to understand this when it attributes acquisition premia in part to "some other 'synergy' that can uniquely be enjoyed by the buyer." FTI Reply Report, ¶ 6.22.

[35] Rebuttal Witness Statement of Andrew T. Swarthout, Bear Creek Mining Corporation, Claimant, v. The Republic of Peru, Respondent ("Swarthout Second WS"), ¶ 4-6; Witness Statement of Catherine McLeod Seltzer, Bear Creek Mining Corporation, Claimant, v. The Republic of Peru, Respondent ("McLeod Seltzer WS"), ¶ 11, 13; Witness Statement of Peter M. Brown, Bear Creek Mining Corporation, Claimnt, v. The Republic of Peru, Respondent ("Brown WS"), ¶ 8-10, 15.

[36] FTI Reply Report, ¶ 6.22.

against which to evaluate individual projects, unless they happen to be average risk projects. For example, this principle is clearly laid out in *Principles of Corporate Finance*, the worldwide leading graduate-level corporate finance textbook:

> The company's cost of capital is … the opportunity cost of capital for investment in the firm's assets, and therefore the appropriate discount rate for the firm's average-risk projects …
>
> The company cost of capital is not the correct discount rate if the new projects are more or less risky than the firm's existing business. Each project should in principle be evaluated at its own opportunity cost of capital. This is a clear implication of the value-additivity principle …
>
> The opportunity cost of capital depends on the use to which that capital is put.[37]

53. It is misguided to argue that because a company has a low cost of capital, it can create synergies and increase value simply by investing in high-risk projects or acquiring high-risk companies. By that rationale, conversely, a company should never finance its low-risk projects, because that would destroy value. Consider how the same textbook describes FTI's logic in the context of a hypothetical Johnson & Johnson (J&J) project:

> It is clearly silly to suggest that J&J should demand the same rate of return from a very safe project as from a very risky one. If J&J used the company cost of capital rule [i.e., evaluate projects using the company-wide cost of capital], it would reject many good low-risk projects and accept many poor high-risk projects. It is also silly to suggest that just because another company has a low company cost of capital, it is justified in accepting projects that J&J would reject.[38]

54. There is no basis for FTI's suggestion that an acquirer's lower cost of capital creates synergies and would induce the acquirer to pay a premium for junior mining company assets. FTI has identified no other sources of substantial synergies.

55. Nevertheless, to the extent that the possibility of a synergistic acquisition exists and is relevant to estimating Bear Creek's FMV, it is already reflected in Bear Creek's share price. A buyer of the shares would stand to benefit from any subsequent acquisition at a

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[37] Brealey, Richard, Stewart Myers and Franklin Allen, Principles of Corporate Finance, 10th ed. (BR-151), p. 214. Emphasis added.

[38] Brealey, Richard, Stewart Myers and Franklin Allen, Principles of Corporate Finance, 10th ed. (BR-151), pp. 214-215. Emphasis added.

premium. He would therefore be willing to pay up to the expected value of that premium. Likewise, a seller anticipating receiving a premium in an acquisition would not sell shares for a price that did not reflect that expectation. If the share price reflects no acquisition premium, then the market participants trading those shares do not anticipate one either. This logic is not controversial and is laid out, for example, in a textbook author who is elsewhere cited by FTI:[39]

> There is a widely held misconception that control is an issue only when you do acquisitions. To the contrary, we would argue that the stock price of every publicly traded firm includes an expected value for control, reflecting both the likelihood of that management of the firm will be changed and the value of making that change.[40]

56. Finally, FTI suggests that its $224 million FMV estimate for Santa Ana, which is outside the wide benchmark range indicated by the market approach ($42 million to $149 million as of the FTI Valuation Date),[41] can be reconciled with that benchmark after considering the 64% average acquisition premium reported by Mergerstat for metal mining transactions as of the first quarter of 2011.[42] The use of an average control premium for a specific company is controversial and FTI has performed no analysis to show that that average is at all relevant to Bear Creek.

57. Whether the value of a 100% ownership interest in a public company is higher than the value reflected in the price of non-controlling interests is a matter of debate among valuation professionals. The latest edition of Shannon Pratt's *Business Valuation - Discounts and Premiums* compendium describes that debate and concludes as follows:[43]

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39 First FTI Report, ¶¶ 7.69, A5.10 – A5.17.

40 Damodaran, Aswath, *Damodaran on Valuation*, 2nd ed. (Wiley, 2006) (BR-152), p. 484. Emphasis added.

41 First Brattle Report, Table 4.

42 FTI Reply Report, ¶¶ 6.23-6.25, 6.52-6.53.

43 We do not necessarily agree with or endorse all the views expressed in this book. We provide it as a reference because it contains a factual summary of the debate among professional valuators about the applicability of acquisition or control premiums.

> In any case, it is obvious that, given the current state of the debate, one must be extremely cautious about applying a control premium to public market values to determine a control level of value.[44]

58. As one of the articles quoted in the book concludes, "the existence of an acquisition premium and its magnitude is a 'facts and circumstances' test for each individual valuation."[45] FTI has not explained how the average premium reported in the Mergerstat control premium study applies to Bear Creek's specific circumstance. As we discussed above, for Bear Creek there is no good reason to expect a substantial premium.

59. Moreover, FTI's application of the Mergerstat industry average displays a lack of due diligence with respect to the underlying data. FTI does not discuss any attempt to identify which, if any, of the companies included in the study are comparable to Bear Creek or own projects similar to Santa Ana. The range of premiums reported in the study is very wide, and it includes negative premiums.[46] FTI uses the average reported premium, which is much higher than the median premium.[47] Such a discrepancy typically indicates the presence of outliers at the high end of the range, which require investigation. Had FTI checked, for example, the highest reported premium of 281%, it would have discovered that its inclusion was an error because the target company in that transaction was a French real estate company with no relationship to the mining industry.[48]

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44 Pratt, Shannon P., *Business Valuation Discounts and Premiums* (Wiley, 2009) (BR-153), pp. 29-35.

45 Pratt, Shannon P., *Business Valuation Discounts and Premiums* (Wiley, 2009) (BR-153), p. 35.

46 Reported premiums range from -11.3% to 281.3%. FTI also misrepresents the 63.7% premium as reflecting "transactions in Q1 of 2011" (FTI Reply Report, ¶ 6.24). This is incorrect because the average includes transactions for the preceding twelve months. The average premium for the seven transactions in Q1 of 2011 is 23.9%, with a range from -11.3% to 93.1%. Excluding negative premia, the average for the five transactions in Q1 of 2011 is 35.8%. Mergerstat, "Control Premium Study 1st Quarter 2011" (FTI-65), pp. 6-7.

47 The median premium for the preceding twelve months is reported as 45.0%. Mergerstat, "Control Premium Study 1st Quarter 2011" (FTI-65), pp. 6-7.

48 Compagnie la Lucette is "a leading French office property company, the portfolio of which…is principally composed of high quality office properties located in key business districts in the Paris region." "Combination between Icade and Compagnie la Lucette – Morgan Stanley Real Estate Fund to become shareholder of Icade," Icade, December 23, 2009 (BR-211).

b. Sentiment and Momentum

60. In our first report, we explained that there is no reason to doubt the market's ability to value Bear Creek's assets, given the extensive information that was available to investors and Bear Creek's status as a publicly traded company listed on a major stock exchange.[49] FTI's cursory dismissal of the share price in its first report could apply to any company listed on a major stock exchange, and we noted it was inconsistent with the relevance and central role of public equity markets in all developed economies.[50] FTI has not responded.

61. FTI does not dispute that adequate information was available to investors in Bear Creek's shares.[51] FTI now argues instead that, because the price of Bear Creek's shares is determined by retail investors who suffer from behavioral biases and may be unaware of or misinterpret the available information, the share price must be assumed to understate the FMV of the Company's assets.[52] FTI states that our reliance on Bear Creek's share price assumes a "perfectly efficient" or "strong form efficient" market and assumes that "all investors in the market have the same level of interest, risk tolerance, and investment sophistication to immediately and flawlessly price securities."[53] These statements encompass several misconceptions and errors, and once again, if correct, would dismiss that the share price of *any* company can be used to value its assets under a FMV standard.

62. First, FTI is simply wrong that efficient markets require that all investors are identical or that they are all sophisticated. Markets can be efficient even if some market participants trade randomly or irrationally (financial economists refer to such investors as "noise traders"), so long as informed, sophisticated investors also participate in the market.

63. The sophisticated and informed investors have a corrective effect on share prices by buying when shares are underpriced and selling when they are overpriced. Thus, if uninformed or naïve retail investors underprice Bear Creek's shares, informed investors can take advantage of that opportunity, acquire more shares, and drive the price up toward an equilibrium level at which additional purchases no longer yield substantial expected

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49 First Brattle Report, ¶ 68-70.

50 First Brattle Report, ¶ 69.

51 FTI Reply Report, ¶ 6.47.

52 FTI Reply Report, ¶¶ 6.42, 6.44, 6.47. If the share price overstated the FMV of Bear Creek's assets, it would imply an even larger discrepancy between market prices and FTI's DCF estimate.

53 FTI Reply Report, ¶ 6.45.

returns. Such corrective effects can also drive share price downwards. Mr. Swarthout notes that "the market understood" the impacts of Supreme Decree 032 on Bear Creek's asset value.[54] FTI relied on the market understanding this effect to calculate damages to the Corani project. FTI cannot have it both ways; either the market can correctly price a firm's assets and the impacts of events on the changing value of those assets, or it cannot.

64. As we noted in our first report, among Bear Creek's investors were first-tier institutional investors who are active in the market for mining stocks, such as Sprott Asset Management and Oppenheimer Funds, and knowledgeable players in the mining industry, such as Silver Wheaton.[55] Mr. Peter Brown, the founder of Canaccord Genuity and a fact witness put forward by Claimant, notes that Bear Creek raised $130 million from "sophisticated institutional investors" in an equity placement.[56] Mr. Swarthout notes that Cannacord Genuity, which was also one of the institutional investors in Bear Creek, is "one of the most respected names in mining financing worldwide."[57] FTI did not explain what would prevent these investors, who are "some of the most sophisticated mining investors in the world,"[58] and others with similar investment objectives and expertise, from buying additional Bear Creek shares away from unsophisticated sellers and helping drive their price to FMV if they thought that the shares were undervalued.

65. Indeed, FTI's view that "[i]t is common in junior mining companies for insiders and institutional investors to make long term investments in shares of the company, with a view to hold the shares and not trade them on an active basis"[59] implies exactly this corrective mechanism. If FTI were right that Bear Creek's share price substantially undervalued the Company's assets, these sophisticated long-term investors would buy, helping drive the price up. FTI seems to believe that these investors, including institutional investors who trade stocks as their main activity, are leaving money on the table in substantial amounts by foregoing the opportunity to earn large returns from buying Bear

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54 Swarthout Second WS, ¶ 48.

55 First Brattle Report, ¶ 54. S&P Capital IQ, Bear Creek Mining Corp. Public Ownership History, June 30, 2011 (BR-112).

56 Brown WS, ¶ 14.

57 Swarthout Second WS, ¶ 7.

58 Swarthout Second WS, ¶ 51.

59 FTI Reply Report, ¶ 6.42.

Creek's underpriced shares and enjoying the higher cash flows that would ultimately come from its projects. We see no basis to believe that to be the case.

66. Second, FTI also is wrong that our view implies reliance on what economists refer to as "strong form" market efficiency. The distinction between strong form efficiency and semi-strong form efficiency is whether market prices reflect private information.[60] But in this case, FTI did not point to any significant piece of relevant information that is not publicly known about Santa Ana. To the contrary, the Company had completed and published an updated feasibility study for Santa Ana shortly before the valuation date.[61] If anything, FTI seems to argue that the share price reflects *too much* information because it is impacted by news about the community protests facing the Project.[62]

67. Finally, research contradicts FTI's assumption that sentiment or behavioral factors lead to underpricing. In fact, most deviations from rational behavior are driven by biases such as overconfidence, optimism, and loss aversion, which may cause traders to *overinvest* in risky assets and hold on to overpriced stocks. Combined with limited ability to sell stocks short (which is the means through which informed investors can put downward pressure on prices), investor sentiment generally results in *overpricing*, not *underpricing,* relative to fundamental values.

68. A recent study examined 11 anomalies (*i.e.*, stock price behaviors that appear inconsistent with the efficient markets hypothesis or with commonly used asset pricing models), finding that "each of the 11 anomalies is stronger following high levels of investor sentiment."[63] As opposed to investor sentiment lowering share prices, the study finds evidence that "[t]o the extent such mispricing exists, overpricing should then be more prevalent than underpricing, and overpricing should be more prevalent when market-wide sentiment is

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60 FTI Reply Report, ¶ 6.45 and fn. 118. Strong-form market efficiency requires that stock prices reflect all available information, both public and private. Semi-strong form efficiency requires that only publicly available information be reflected in stock prices.

61 Bear Creek Mining Corporation Revised Feasibility Study Santa Ana Project – Puno, Peru NI 43-101 Technical Report Update to the 21-Oct-2010 Report, April 1, 2011 (C-61) ("Santa Ana 2011 FSU").

62 FTI Reply Report, ¶ 6.51; First FTI Report, ¶ 7.69.

63 Robert F. Stambaugh, Jianfeng Yu and Yu Yuan, "The short of it: Investor sentiment and anomalies," *Journal of Financial Economics* (2012), 104(2) (BR-144), p. 2.

high."[64] On this basis, FTI should be concerned that the share price sets too high a value for Bear Creek and its assets, not too low.

69. There also are Project-specific reasons to infer that if investors could not process or understand the technical information disclosed by Bear Creek, they would have overvalued the Project (rather than undervaluing it, as FTI claims). The First SRK Report concluded that the low cut-off grade used by the FSU in its resource calculation resulted in a "gross *overstatement* of Mineral Resources."[65] An overstatement of Mineral Resources would lead to an overestimate of value. While a sophisticated investor may have been able to reach the same conclusion as SRK and discount this misleading information, the naïve retail investor that, in FTI's view, determines Bear Creek's share price could have taken it at face value and increased his or her willingness to pay for a share of Bear Creek. This would bid the share price up, not down.

70. In summary, FTI's reference to investor sentiment to dismiss the public share price approach does not withstand scrutiny. The presence of informed, sophisticated investors in the market for Bear Creek's shares suggests that the share price will not deviate persistently and substantially from FMV. Even if these informed investors could not completely eliminate the impact of irrational, sentiment-based traders, the latter in general cause share price to overstate FMV rather than to understate it.

c. Impact of Respondent's Actions

71. FTI listed the "impact from the Respondent's actions, or other factors (i.e., protests)" on Bear Creek's share price as another reason why share price may not reflect the FMV of Santa Ana.[66] We explained that community opposition can cause delays, increase costs, or prevent a project from being developed altogether.[67] Those affect the Project's expected cash flows and therefore its FMV. Using the share price to estimate the Project's FMV has the distinct advantage that it captures market participants' valuation of the impact of

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64 *Ibid.*, p. 2. Emphasis added.

65 Expert Report of Neal Rigby, SRK Consulting, October 6, 2015 ("First SRK Report"), ¶ 67 (emphasis added). SRK maintains its opinion in its reply (Expert Report of Neal Rigby, SRK Consulting, April 13, 2016 ("SRK Reply Report"), ¶¶ 17-18).

66 First FTI Report, ¶ 7.69(ii)(3).

67 First Brattle Report, ¶ 79.

community opposition, which is otherwise difficult to quantify separately.[68] To the extent certain actions by Respondent ought, for legal reasons, to be separated from general community opposition and excluded from consideration, the impact of those actions can be excluded without abandoning reliance on market prices. For example, a method called "event study analysis" can provide an appropriate adjustment that extricates the impact of those specific actions on Bear Creek's share price.[69] Alternatively, as we show in Section II.D, we can estimate the Project's FMV before any alleged unlawful actions are taken and then adjust that FMV, using a modern DCF method, for subsequent market movements unrelated to those actions.[70] FTI used a similar approach to adjust its estimate of Corani's market value from May 27, 2011, the day before the first alleged FTA breach occurred, to June 27, 2011, the trading day after Supreme Decree 032 was issued.

72. FTI responds that "the protests we referenced in the FTI Report would not have a direct impact in the Santa Ana project's FMV (i.e. its ability to generate cash flow), but had obvious negative consequences on Bear Creek's share price."[71] FTI is wrong – community protests do have an impact on a project's cash flows: protests can make cash flows disappear completely, if the Company fails to obtain the social license; can affect the timing of the Project's cash flows, if they cause delays; or can affect the level of cash flows, if they lead to increased costs.

73. Social license, which entails obtaining the agreement of the community to a mining company's plans to develop its project, has become necessary in most societies to develop and operate mining projects.[72] A study by KPMG aimed at measuring the impact of community investments states:

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68 First Brattle Report, ¶ 79.

69 The event study is a standard, well-accepted tool of economic analysis, used in many contexts including in litigation and investor-state arbitration. It involves estimating a statistical model of share price behavior as a function of relevant market factors, such as commodity prices or a broad-based stock market index, and for the day or days when a news event that requires exclusion occurs, using that model to predict the share price. Because the model uses market data for the day of the excluded news event, it reflects relevant market data. But because the model price is used instead of the actual price, the impact of the excludable news event is not reflected.

70 First Brattle Report, ¶ 80.

71 FTI Reply Report, ¶ 6.51.

72 First SRK Report, ¶ 90.

> Developing and maintaining a social licence to operate is rapidly becoming core business for resources companies and community investments are now a vital part of viable resource project development …
>
> Resource companies throughout Australia and the world openly acknowledge the importance of maintaining social licence to operate and are devoting substantial resources to the task.[73]

74. The industry does not view obtaining the social license as the government's responsibility. In the foreword to its *Understanding Company-Community Relations Toolkit*, the International Council on Mining & Metals (ICMM), an organization that promotes responsible mining and includes the world's largest mining companies, puts it this way:

> Responsible mining and metals companies recognise that the long-term success of their operations critically depends on building and maintaining positive relationships with communities. They recognise that 'community support' is a key factor in a 'social licence to operate' …[74]

75. As BHP Billiton, one of the world's largest mining companies, noted in its 2007 sustainability report:

> For society to grant us our 'licence to operate', we must demonstrate to our host communities and governments that we can, and will, protect the value of their environmental and social resources and that they will share in our business success.[75]

76. The task of obtaining social license thus rests with the mining company. In contrast, FTI assumes, it appears upon instruction from counsel,[76] that "the protests were not related to the Santa Ana project and could only impact its cash flows by influencing the Respondent to take actions to breach the Treaty."[77] If this is a legal position, we express no opinion as to whether it is appropriate. Respondent's position is that it is not appropriate. We note

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[73] KPMG, "The Community Investment Dividend: Measuring the value of community investment to support your social licence to operate," 2013 (BR-162), pp. C, 5. Emphasis added.

[74] "Understanding Company-Community Relations Toolkit," International Council on Mining and Metals, 2015 (BR-160), p. 3. Emphasis added.

[75] BHP Billiton Sustainability Report, Summary Report 2007 (BR-159), p. B. Emphasis added.

[76] FTI prefaces its statement with "we understand that," which to us indicates an instruction from counsel.

[77] FTI Reply Report, ¶ 6.51.

however that it is contrary to the accepted industry view that the company must persuade the community to accept its development plans, as documented in the examples above.

77. FTI raises concerns specifically about the suspension of the ESIA process for Santa Ana, which Claimant considers a breach of the FTA.[78] We noted that this assumption does not invalidate the share price approach and does not imply that a less reliable method should be used instead (as FTI proposes to do).[79] The impact of the ESIA suspension on Bear Creek's share price can be quantified and excluded from the valuation, preserving the ability of the share price to reflect all other relevant market developments.[80] FTI's reply does not address this possibility, choosing instead to focus on our other suggestion, to change the valuation date "if legally appropriate."[81] Whether this is appropriate is a matter of law. FTI argues that using an earlier date would be inconsistent with the FTA.[82] FTI's view is especially puzzling, because FTI elsewhere advocates doing exactly that to account for the potential impact of news of the upcoming issuance of Supreme Decree 032. We discuss this more in Section II.C.

2. The FMV of Santa Ana Can Be Separated from Bear Creek's Enterprise Value

78. FTI argues that "allocating share price between multiple projects is a major flaw in using share price as a measure of Project FMV."[83] In its first report, FTI nevertheless relied on just such an allocation to calculate damages for Corani. This is the second attempt by FTI to have its cake and eat it too.[84] Either allocating the total Company value to each project cannot be done reliably, and FTI should not use the share price approach for any purpose

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78 FTI Reply Report, ¶ 6.50; First FTI Report, ¶ 4.13.

79 First Brattle Report, ¶ 80.

80 First Brattle Report, ¶ 80. A method called "event study analysis" is often used for this purpose. FTI itself used a similar approach for its Corani damages calculation, when it adjusted the market value of that project down by 7.3% to account for the general drop in a global index of mining companies. First FTI Report, ¶ 8.5.

81 First Brattle Report, ¶ 80.

82 FTI Reply Report, ¶ 6.49.

83 FTI Reply Report, ¶¶ 6.37-6.40.

84 The first being FTI's view that share prices are at the same time useful signals of Bear Creek's asset values (when estimating Corani damages) and are not useful signals of asset values (when estimating Santa Ana damages).

(including Corani damages), or the allocation can be done reliably, and it can be applied equally well to value Santa Ana.

79. We explained that the rule used by FTI to allocate the Company's EV to each project was imprecise but useful in determining a benchmark for FTI's estimated FMV for Santa Ana.[85] We explained also that a more precise allocation could be achieved by applying a DCF valuation to both assets, Corani and Santa Ana, and then calibrating the resulting estimates to ensure that, in total, they add up to Bear Creek's EV.[86]

80. FTI claims that our application of the allocation rule that FTI itself designed is misguided because it only works on May 27, 2011, before actions taken by Peru affected Bear Creek's share price.[87] Two responses are in order. First, we also applied the method on May 27, 2011 and still reached the same conclusion: FTI's FMV estimate of Santa Ana ($244 million) could not be reconciled to Bear Creek's EV ($544 million, of which $104 million is allocated to Santa Ana).[88] Second, if the value of Santa Ana was disproportionately affected by Peru's actions between May 27 and June 23, 2011, making the apportionment derived from the analysts' prior valuations unreliable, then the approach of assuming that Santa Ana still represented the same fraction of Bear Creek's total value at June 23 as at May 27 *overstates* Santa Ana's FMV as of June 23. Applying a correction, would lower the fraction of EV allocated to Santa Ana on June 23 and further magnify the discrepancy between the Project FMV estimate based on Bear Creek's share price ($89 million on average) and FTI's DCF estimate for Santa Ana ($224 million).[89]

81. FTI's objection is potentially relevant only if Santa Ana's FMV on June 23 (or June 24), 2011 should be determined excluding the impact of the ESIA suspension that occurred on May 30, 2011. In that case, Bear Creek's EV on subsequent dates would not offer an appropriate benchmark for damages. However, Bear Creek's share price remains a useful benchmark – one can just as well use the share price on May 27, before the ESIA suspension to determine Santa Ana's FMV, and then apply adjustments that reflect market

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85 First Brattle Report, ¶¶ 60-61.

86 First Brattle Report, ¶ 59.

87 FTI Reply Report, ¶ 6.39.

88 First Brattle Report, ¶¶ 56-57.

89 First Brattle Report, Table 4.

changes (but not Respondent's actions) between that date and the June 23 or June 24 valuation date. FTI followed these same steps to estimate Corani damages and there is no reason one could not do the same for Santa Ana.

B. THE MODERN DCF METHOD IS MORE RELIABLE THAT FTI'S SIMPLE DCF METHOD AS A VALUATION METHOD FOR BEAR CREEK'S PROJECTS

82. FTI disagrees that the simple DCF method it used for Santa Ana is inferior to a modern implementation of the DCF method, sometimes called the real options method.[90] FTI's critique of the real options method is limited to vague statements about subjectivity and denotes a lack of understanding of the method and its credentials.

83. FTI's discussion of the modern DCF centers on three themes:

    a. The modern DCF is not consistent with relevant mining valuation standards.

    b. The modern DCF method is not widely understood or used in practice.

    c. The modern DCF is more dependent on subjective inputs than the simple DCF.

84. None of these is accurate.

1. Mining Valuation Standards

85. FTI suggests that applying the modern DCF method is somehow inconsistent with professional valuation standards and mining valuation guidelines.[91] There is no basis for this suggestion. We agree that an appropriate valuation method should be consistent with valuation standards and have been subjected to adequate scrutiny, and the real options method meets these requirements. It is a primary valuation method under CIMVal,[92] the main principles of which FTI indicates it followed in its valuation.[93]

86. FTI notes that CIMVal, which dates back to 2003, described at that time the real options method as "not widely used and not widely understood but gaining in acceptance."[94] This is not the latest statement from CIMVal in reference to the real options method. A 2011

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90 FTI Reply Report, ¶ 4.3(iii).

91 FTI Reply Report, ¶¶ 4.3(iii), 7.21.

92 CIMVal 2003 (FTI-4), G3.5.

93 First FTI Report, ¶ 3.8.

94 FTI Reply Report, ¶ 7.11.

article authored by CIMVal's co-chairman updates the description of the real options method to "rapidly gaining acceptance."[95] Through Mr. Rosen's affiliation with the International Valuations Standards Committee (IVSC) Working Group on the IVSC Extractive Industries Project,[96] FTI would be aware of this more recent opinion, now five years old.

87. In response to IVSC's request to identify "the valuation methods that you most commonly use or encounter," the CIMVal committee, which includes a Principal of RPA, Claimant's technical experts in this case, in 2012 left no doubt that the Certainty Equivalent DCF approach, which is another name for the modern DCF or real options method, is a well-established and reliable valuation method:

> The Discounted Cash Flow ("DCF") method is used to adjust cash flow for risk and timing. However, these adjustments may be applied in one of two means. The first follows a standard DCF adjustment where net cash flow is adjusted for risk and time through a discounting process that relies on an aggregate discount rate. The second is a Certainty Equivalent ("CeQ DCF") approach where a risk-adjusted net cash flow is calculated by applying a targeted risk adjustment to particular cash flow component (e.g., a pure copper risk adjustment applied to a copper based revenue stream). This risk-adjusted net cash flow is then adjusted for the time value of money and possibly a residual risk adjustment for uncertainties not explicitly accounted in the cash flow model. Note that the CeQ Dcf approach is also used to value financial derivatives and has its own terminology (e.g., risk neutral valuation) in this context …
>
> We note that the CeQ DCF approach was not discussed in the Exposure Draft of the IVSC Technical Information Paper titled "The Discounted Cash Flow (DCF) Method – Real Property and Business Valuations" even though this method is a recognized DCF method for fair value estimates under accounting guidelines and well supported in valuation and finance theory literature. CeQ DCF is one of the valuation approaches described in IFRS 13. We would highlight that the structure of the CeQ DCF approach is comparable to

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95 Spence, K. "Canadian Standards and Guidelines for Valuation of Mineral Properties – An Update" (BR-157), Table 2.

96 First FTI Report, ¶ 1.8.

> derivative valuation methods used to value many financial assets and is used for select types of real assets such as natural resource projects.[97]

88. FTI's suggestion that the modern DCF approach can be ignored without full appraisal in the valuation of Santa Ana because FTI "must adhere to professional practice standards and international valuation standards which indicate the DCF is the preferred valuation methodology" is thus nonsensical.[98] The CIMVal standards and guidelines cannot be called on to support an unexamined preference for the simple DCF method. According to Standard S7.1 of CIMVal, establishing that preference is the job of the valuator once evaluating other methods:

> The Qualified Valuator has the responsibility to decide which Valuation approaches and methods to use. The choice of the specific approaches and methods used, or excluded, must be justified and explained by the Qualified Valuator. The limitations of each method must be explained.[99]

89. FTI did not even consider the modern DCF method in its initial report.[100] In its Reply Report, FTI has not provided justification for the simple DCF or explained the limitations of the modern DCF method, other than to misrepresent the modern DCF/real options approach as unused and subject to purely subjective assumptions, neither of which is true.

2. Acceptance and Usage

90. FTI asserts that the modern DCF approach is not used as a valuation method in practice, stating that it "may be useful in an academic context or as a tool for assessing different investment alternatives,"[101] and that FTI is "not aware of any market participants that considered real options in their valuations of the Santa Ana project."[102]

91. It is our experience that real options is now a mainstream approach to valuation in both academic circles and in valuations by large mining companies and royalty companies. Professor Davis, through the Office of Special Programs and Continuing Education at the

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97 CIMVal, Answers Submitted October 22, 2012 in Response to Questions in the IVSC Discussion Paper – Valuation in Extractive Industries (BR-155), pp. 5-6. Emphasis added.

98 First FTI Report, ¶ 3.8.

99 CIMVal 2003 (FTI-4), ¶S7.1.

100 First FTI Report, ¶¶ 7.12-7.58.

101 FTI Reply Report, ¶ 4.3(iii).

102 FTI Reply Report, ¶ 7.12.

Colorado School of Mines, co-teaches an executive course on real options annually to dozens of mining industry geologists, engineers, and managers. The other teacher of the course is a mining industry practitioner, Michael Samis at Ernst & Young, who has guided real options approaches to mine valuation and evaluation at Ernst & Young. Dr. Samis is a member of the CIMVal committee.

92. FTI provides no evidence that industry practitioners do not use or understand the real options method. The evidence for a decade is to the contrary. Consider a 2005 article published in *The Mining Journal*, the world's leading weekly newspaper devoted to mining, which states:

> Most industry specialists have been aware of the limitations of DCF, and, for a number of years, most have been aware of the advantages of real-options valuation methodologies.[103]

93. Similarly, in a 2007 presentation before Australian regulators, a BHP Billiton executive highlighted the real options method as necessary to reflect correctly an owner's option to delay investments.[104] Equity research analysts covering the mining sector have also recognized the advantages of real options methods. For example, CIBC World Markets introduced the method to investors in gold mining companies in 2002 in a report titled "Eureka! A Better Valuation Method."[105] An HSBC 2003 report on the gold mining sector used the real options method alongside the simple DCF to value all companies that HSBC was covering at the time.[106] Professor Davis has worked with major mining companies in valuing their projects using a real options approach. As a final example, a 2006 Special Volume on Valuation Standards published by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) includes a paper outlining the real options approach.[107]

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[103] Worcester, Chris and Oliver Willoughby, "Using Real Options to value mining projects," *Mining Journal*, July 15, 2005 (BR-163), p. 26.

[104] Monkhouse, Peter H.L., "The Costs and Benefits of Part IIIA," Presented at the Australian Competition and Consumer Commission, July 26, 2007 (BR-164), p. 10.

[105] "Eureka! A Better Valuation Method," CIBC World Markets Analyst Report, February 1, 2002 (BR-165).

[106] "The Senior Gold Books – Strategies and options," HSBC Analyst Report, February 2003 (BR-166), p. 1.

[107] Samis, M., and Davis, G. A., "Using Dynamic DCF and Real Options Methods to Value and Assess Flexible Mine Project Design," in Mineral Resources/Reserves and Valuation Standards, CIM Special

Continued on next page

94. FTI's discussion of real options is either misleading or indicative of the authors' lack of understanding of a primary valuation method under CIMVal. FTI states: "[c]onfirming CIMVal's determination that the real options methodology is not widely accepted, other than the *Principles of Corporate Finance* textbook, the only sources referenced by Brattle are papers co-authored by Professor Davis himself."[108] There are hundreds of research articles about the real options method published over the past 40 years,[109] it is mentioned in most general-purpose finance textbooks,[110] and there are entire textbooks dedicated specifically to real options.[111] There is an annual Real Options conference at which both academics and practitioners present research papers and share their experiences using the real options approach.[112]

95. We cited papers written by Professor Davis because these are intended to communicate the idea simply and transparently to a practitioner audience. The literature on real options is extensive, and we see no point in burdening the tribunal with hundreds of additional citations that should have been familiar to any valuation expert.

96. FTI also misrepresents our report as making "attempts to marginalize the importance and reliability of the DCF methodology."[113] We did not say that DCF is not an important methodology, and we were careful to point out that the modern DCF is more reliable than

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Continued from previous page

Volume 56, Montreal: Canadian Institute of Mining, Metallurgy and Petroleum (2009), 632-50. (BR-154).

108 FTI Reply Report, ¶ 7.13.

109 For example, a search for finance and economics research articles in English containing the phrase "real options" in their title or abstract on JSTOR, a database of research articles, yields 216 results since 1990 (BR-223). As JSTOR does not include all major finance and economics journals, does not typically cover recent years, and many articles do not have abstracts, this understates the number of research articles on this topic.

110 We referred to *Principles of Corporate Finance* because it is the leading textbook used in business school graduate corporate finance courses.

111 An example is Graeme, Guthrie. *Real Options in Theory and Practice* (Oxford University Press, 2009) (BR-167).

112 The conference is titled "Real Options: Theory Meets Practice." See Real Options – Theory Meets Practice Papers from Past Conferences <http://www.realoptions.org/abstracts.html>, accessed 4/9/2016 (BR-208).

113 FTI Reply Report, ¶ 7.4.

the simple DCF "for a mining project like Santa Ana,"[114] and more generally for mining projects where commodity markets provide reliable market inputs:

> This is an important distinction – while the modern DCF can be more reliable than the simple DCF, it needs more market inputs. If market signals about the risk of the major cash flow components are not available, then the improvement in precision does not occur.[115]

97. We stated that the simple DCF can be unreliable and explained why. FTI responds by asserting, without basis, that our suggested adjustments are *ad hoc*.[116] FTI then suggests that its simple DCF method was reliable because FTI "confirmed" the DCF valuation result by reference to objective based market indications of value including valuations of Santa Ana performed contemporaneously by industry analysts covering Bear Creek prior to the Valuation Date.[117]

98. FTI's claim that it reconciled its valuation against market-based information is incorrect. Industry analysts are not market participants and do not provide market-based indications of value. The analysts whom FTI refers to conducted DCF analyses similar to that employed by FTI.[118] Reconciling a DCF result against other DCF results, subject to similar drawbacks and flaws, is not market reconciliation.[119]

3. Subjectivity and Market Signals

99. FTI's discussion of the shortcomings of the real options method is superficial and exposes misconceptions about how it works.

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114 First Brattle Report, ¶ 82.

115 First Brattle Report, fn. 64.

116 FTI Reply Report, ¶ 7.4.

117 FTI states that they "confirmed the reasonability of our conclusion by reference to valuations of the Project that were prepared contemporaneously by the industry analysts that covered the Company in the period leading up the valuation date." FTI Reply Report, ¶ 2.10.

118 First FTI Report, Appendix 8.

119 The DCF valuation method, regardless of who employs it, is an income approach to valuation, not a market approach. In its discussion of valuation methods, CIMVal does not indicate or suggest that valuations performed by analysts are market-based valuation methods. CIMVal 2003 (FTI-4), section G3.5.

100. First, as presented clearly by CIMVal in its response to IVSC that we quoted above, the real options method *is* a DCF method.[120] It is not a fundamentally different approach to valuation. That is why we used the term "modern DCF" to describe it.

101. Therefore, FTI's concerns about the subjectivity inherent in estimating the potential options available to management are misplaced.[121] If the information necessary to value the options that the simple DCF ignores (such as the option to delay investment, or to abandon the mine early) is not available, the real options method is still applicable. It can be applied without incorporating any options, just as the simple DCF method is implemented.[122] The inability to value the real options does not invalidate the method.

102. The main strength of the modern DCF method lies in its better ability to reflect market-based projections of prices and costs and the risk of those cash flows components, as we described at length in our first report.[123] Because a mining project's revenue stream and various cost components do not typically have the same exposure to market risk factors, if one is able to risk-adjust these components separately, the resulting estimate is more reliable.

103. In many valuation situations, market inputs for price and cost risk may not exist, and in those situations the simple DCF may be the best one can do.[124] But for mining projects, in particular metal mining, for which commodity futures markets exist, market signals allow the valuator to improve upon the simple DCF. We discussed in principle how that can be done in our first report[125] and demonstrate it in this report specifically for Santa Ana and Corani (Section II.D).

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120 CIMVal, Answers Submitted October 22, 2012 in Response to Questions in the IVSC Discussion Paper – Valuation in Extractive Industries (BR-155).

121 FTI Reply Report, ¶¶ 7.16-7.20.

122 This is explained in Samis, Michael, Graham A. Davis, David Laughton, and Richard Poulin, "Valuing uncertain asset cash flows when there are no options: A real options approach," *Resources Policy* 30 (2006) (BR-123), pp. 285-298.

123 First Brattle Report, ¶¶ 90-92.

124 First Brattle Report, fn. 64.

125 First Brattle Report, ¶¶ 93-94.

104. FTI's remarks about the imprecision of the real options approach apply to any income approach, including its own simple DCF method.[126] This is why we prefer market-based approaches, like the traded share price. For FTI to suggest that there are not many assumptions embedded in the simple DCF method, many of which we critiqued in our original report, and to assert that the simple DCF method is preferred on that basis, is misleading. In fact, the real options approach requires fewer assumptions in this case, as it replaces FTI's assumptions about metal prices and the project discount rate with market-based forecasts of metal prices that already embed market-based risk discount factors.

105. FTI speculates that we have made no attempt to produce a real options valuation because it would produce a value higher than the simple DCF result.[127] We have already noted that we did not produce a valuation because we were not asked to do so.

106. FTI rejects our critique of a uniform discount factor in the simple DCF method by suggesting that such discounting is correct because it is a mathematical result of compounding, which reflects a commercial reality.[128] In fact, as was pointed out as early as 1966,[129] this is exactly the problem with the DCF technique: in real asset cash flows, risk does *not* tend to compound in the way that the DCF approach mathematically assumes. The time value of money compounds, as reflected in the compounding of interest rates, but it is separate from risk, which does not necessarily compound over time. The modern DCF method addresses this issue by treating these two compounding issues separately.[130]

C. VALUATION DATE

107. The declaration of public necessity that authorized Bear Creek to acquire mineral rights for the Santa Ana Project in the border zone was revoked on June 25, 2011, when Supreme Decree 032 was issued. Accordingly, because the FTA states that the market value of the

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126 FTI Reply Report, ¶ 7.17.

127 FTI Reply Report, ¶ 7.16.

128 FTI Reply Report, ¶ 7.22.

129 Robicheck, Alexander A., and Stewart C. Myers, "Conceptual Problems in the Use of Risk-Adjusted Discount Rates," The Journal of Finance, Vol. 21, No. 4 (1966), pp. 727-730 (BR-126).

130 IVSC question 6.2 asks specifically about using multiple discount rates to reflect a changing risk profile and CIMVal responds that it does sometimes do this, explaining that the real options (CeQ DCF) method is a way of implementing this. (CIMVal, Answers Submitted October 22, 2012 in Response to Questions in the IVSC Discussion Paper – Valuation in Extractive Industries (BR-155), pp. 10-11.)

expropriated investments should be calculated "immediately before the alleged expropriation took place," we concluded that the appropriate valuation date is June 24, 2011.[131]

108. The FTA states also that the market value calculation "shall not reflect any change in value occurring because the intended expropriation had become known earlier."[132] We explained that the valuation method should therefore exclude the impact of news released before the valuation date, but simply using an earlier valuation date is not appropriate because doing so ignores other market changes, unrelated to the news of the impending expropriation, that may affect the market value immediately before expropriation took place.[133]

109. FTI states that our interpretation "is inconsistent with [our] insistence that the FMV of Santa Ana is inexorably tied to Bear Creek's share price," and that under our method "the decline in share price as a result of the alleged expropriation would have been incorporated into the valuation, inappropriately reflecting the impact of the early knowledge of the alleged expropriation."[134] This is not true. As we explained above,[135] one can simply start with the share price before news of the alleged expropriation affected the share price (in this case, on June 23, 2011), and then make any necessary adjustments to reflect only market changes between that date and the Valuation Date.

110. FTI is aware such adjustments can be performed because it applied one to estimate Corani damages using Bear Creek's share price. Specifically, FTI started with Bear Creek's share price on May 27, 2011, derived Corani's market value on that date, and then adjusted it downward by 7% to reflect the change in the TSX Global Mining Index between May 27 and June 27, 2011 (which is the trading date following the issuance of Supreme Decree 032).[136] FTI does not explain why a similar approach would be invalid for Santa Ana.

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131 First Brattle Report, ¶ 44.

132 First Brattle Report, ¶ 43.

133 First Brattle Report, ¶¶ 44, 46.

134 FTI Reply Report, ¶ 5.4.

135 See paragraph 71.

136 First FTI Report, ¶ 2.6, 8.5.

111. As we noted in our first report, the one-day change in market factors between June 23 and June 24, 2011 was small,[137] so for practical purposes FTI's lack of adjustment for this change did not materially impact its damages estimate. Neither does it impact our damages estimate, as shown in Section II.D below. As a matter of principle, however, the distinction is important. Had the news of the alleged expropriation been made public weeks or months before Supreme Decree 032 was issued, changes in market factors would have been substantial and an adjustment would have had material effects on damages.[138]

D. THE FMV OF THE PROJECT ON THE VALUATION DATE

112. Our approach to estimating the FMV of Santa Ana relies on apportioning Bear Creek's EV across its two projects. The approach has three important advantages over other methods:

- It relies on our own valuations of Corani and Santa Ana, as opposed to third party models.
- Our valuation of both Santa Ana and Corani is based on a modern DCF approach that maximizes the use of market inputs to forecast cash flows and to quantify the risks that impact the valuation of those cash flows.
- The valuation is calibrated to Bear Creek's FMV, which can be measured directly from the Company's publicly traded share price.

113. All elements are critical to obtaining a reliable estimate of Santa Ana's FMV. The calibration to Bear Creek's share price is particularly important, because Santa Ana was subject to rising community opposition that created the possibility that the Project could not be developed. Since any income approach is forward looking, the probability that the Project's cash flows may not be realized must be taken into account. Community opposition introduces such a risk and its varying impact on value over time is taken into account in Bear Creek's share price. We discussed this community opposition in Section II.A.1.c above, where we established two things:

- Obtaining the social license to operate is a critical step in developing a mining project, and it is viewed by the industry as the mining company's responsibility.

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137 First Brattle Report, ¶ 46.

138 As demonstrated, for example, by FTI's own 7% downward adjustment for Corani to reflect market changes between May 27 and June 23, 2011.

- FTI's DCF analysis excluded the impact of this risk following Claimant's counsel's instruction that it could only affect the Project by causing Peru to breach the FTA. That is, FTI valued the project as if it were certain to go forward.

114. We understand that Respondent's position is that social license risk *should* be reflected in the determination of Santa Ana's FMV for the purpose of calculating damages. To the extent this risk includes the possibility of government acts that would violate the FTA, we are instructed that such a general possibility should also be reflected in the valuation analysis. Our analysis excludes however the impact of knowledge of the specific government acts that Claimant alleges violated the FTA.

115. Without using the information reflected in Bear Creek's share price, it is not possible to obtain, through the income approach, an estimate of the market's assessment of the social license risk facing Santa Ana.[139] Our delay analysis, which considered the impact of social opposition on six projects that had faced community opposition as of the Valuation Date,[140] provides a measure of likely delays but cannot capture the likelihood that the Project would be stopped entirely. To do so, we rely on the market information provided by Bear Creek's share price.

116. To use Bear Creek's share price as a calibration tool, it is necessary to value Corani as well, because the share price reflects the combined value of both projects. In our first report, we used FTI's method to apportion Bear Creek's EV to the two projects. The apportionment factor relied on the values for each project calculated by seven analysts who covered Bear Creek's stock.[141] We noted that the method, while imprecise, was nevertheless useful, because analysts appeared to use consistent assumptions across their models for Santa Ana and Corani. While their models overvalued both projects, the error in the relative value was likely less than the absolute error in each DCF result alone.[142]

117. In this report, we calculate directly Corani's FMV using the modern DCF approach. We can do this because Corani was not subject to community opposition, so we do not have the

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[139] Recall that FTI assumed away the impact of community opposition in order to implement its DCF model.

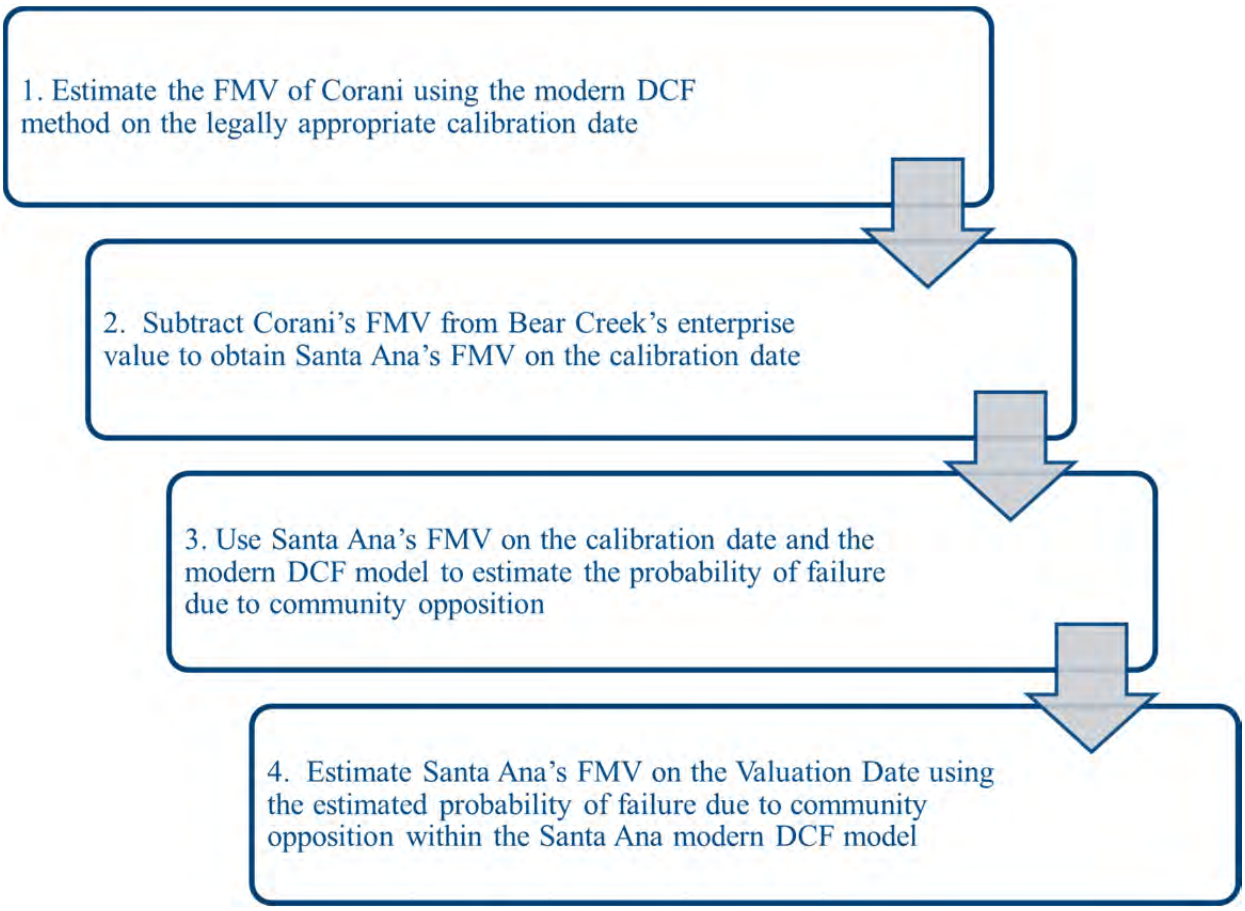
[140] First Brattle Report, Table 5.

[141] First Brattle Report, ¶¶ 60-61; First FTI Report, Figure 26.

[142] First Brattle Report, ¶ 61.

same difficulty as with Santa Ana of estimating this risk independently. This is the first step illustrated in Figure 1.

Figure 1. The Valuation of Santa Ana



118. Step 2 is to deduct Corani's FMV from Bear Creek's EV to obtain the FMV for Santa Ana at a calibration date before the impact of Respondent's alleged unlawful actions affected Bear Creek's share price. Bear Creek claims Respondent took two unlawful actions: issuing Supreme Decree 032, which revoked the declaration of public necessity under which Bear Creek owned the rights to Santa Ana, and the earlier suspension of the EIA process for Santa Ana. Accordingly, we consider two calibration dates:

    a. June 23, 2011, which is the date before the issuance of Supreme Decree 032 was announced, and

    b. May 27, 2011, which is the date before news of the EIA suspension became public.

119. Step 3 involves using Santa Ana's FMV on the calibration dates to calibrate our DCF model for the estimated probability that Santa Ana fails to overcome community opposition. To do so, we determine what value of this parameter, when incorporated into the modern DCF simulation together with all other inputs, yields the FMV calculated in Step 2. Because we perform this calibration before the alleged unlawful acts were reflected in Bear Creek's share price, the estimated probability of social license failure does not reflect the impact of these unlawful acts.

120. Finally, we use our calibrated DCF model to value Santa Ana on the Valuation Date. To reflect the impact of market changes between the calibration date and the Valuation Date, we estimate the DCF model using market inputs as of the Valuation Date. This last step results in our estimated FMV of Santa Ana as of the Valuation Date.

121. Table 2 shows the results of applying each step under the legal position that the EIA suspension was lawful (*i.e.*, the calibration date is June 23, 2011). Because Corani's FMV depends on that project's substantial likelihood of technology failure, which we estimated from market signals to lie in the range of 46% to 57%, our estimate for Santa Ana's FMV is also a range: $32 million to $119 million.

Table 2. Santa Ana's Estimated FMV on the Valuation Date Assuming Lawful EIA Suspension – June 23, 2011 Calibration Date

			Low End	High End
Bear Creek Enterprise Value on the Calibration Date	*US $ millions*	[1]	464	464
Corani Probability of Technology Failure	%	[2]	46%	57%
Corani FMV on the Calibration Date	*US $ millions*	[3]	432	346
Santa Ana FMV of the Calibration Date	*US $ millions*	[4]	32	118
Santa Ana Probability of Failure Due to Social License Risk	%	[5]	80%	27%
Santa Ana FMV on the Valuation Date	*US $ millions*	[6]	32	119

Sources and Notes:
[1]: S&P Capital IQ.
[2]: Table 4, [6].
[3]: Corani Modern DCF Model (Exhibit BR-230), Table 1, evaluated using probability of technology failure in [2] as of 06/23/2011.
[4]: [1] - [3].
[5]: Workpaper R-8, [44] and [46].
[6]: Santa Ana Modern DCF Model (Exhibit BR-229), Table 1, evaluated using probability of social license failure in [5] as of 6/24/2011.

122. The range of estimates for Santa Ana's FMV reflects the difficulty in estimating the impact of technical risk on the FMV of Corani, which we use to apportion Bear Creek's EV

between the two assets. We note that FTI's estimate of the FMV of Santa Ana in the absence of social license risk also covered a large range when considering sensitivity analyses to the underlying parameters.[143] But FTI did not calibrate its DCF estimates of FMV to market expectations arguing that (a) FTI could not find any comparable transactions,[144] and (b) FTI did not accept Bear Creek's share price as reflective of the FMV of its projects.

123. Table 3 shows the same calculations under the legal position that the EIA suspension was unlawful (*i.e.*, the calibration date is May 27, 2011). The resulting range for the FMV of Santa Ana is $40 million to $113 million.

Table 3. Santa Ana's Estimated FMV on the Valuation Date Assuming Unlawful EIA Suspension – May 27, 2011 Calibration Date

			Low End	High End
Bear Creek Enterprise Value on the Calibration Date	*US $ millions*	[1]	543	543
Corani Probability of Technology Failure	%	[2]	46%	57%
Corani FMV on the Calibration Date	*US $ millions*	[3]	489	391
Santa Ana FMV of the Calibration Date	*US $ millions*	[4]	54	152
Santa Ana Probability of Failure Due to Social License Risk	%	[5]	75%	30%
Santa Ana FMV on the Valuation Date	*US $ millions*	[6]	40	113

Sources and Notes:
[1]: S&P Capital IQ.
[2]: Table 4, [6].
[3]: Corani Modern DCF Model (Exhibit BR-230), Table 1, evaluated using probability of technology failure in [2] as of 05/27/2011.
[4]: [1] - [3].
[5]: Workpaper R-8, [44] and [46].
[6]: Santa Ana Modern DCF Model (Exhibit BR-229), Table 1, evaluated using probability of social license failure in [5] as of 6/24/2011.

124. Under both liability scenarios, Bear Creek's share price reflected a substantial risk of Project failure due to social license risk, ranging from 27% to 80%. While high, this

[143] First FTI Report, Figure 23.

[144] First FTI Report, ¶¶ 7.64 – 7.67. Even if FTI could find market transactions in similar properties, unless those projects were subject to community opposition, they would not be useful as a valuation benchmark.

likelihood of failure is in line with empirical evidence about other projects that faced community opposition. For example, a study conducted under the Corporate Social Responsibility Initiative at the Harvard Kennedy School and the Centre for Social Responsibility in Mining at the University of Queensland, Australia found that of 13 South American projects that faced significant company-community conflict, 4 (31%) were suspended or abandoned.[145] The ratio is similar for all 50 worldwide projects included in the study.[146] The low end of our range is slightly below the average rate of failure due to community opposition among the projects included in the study. This indicates that the market's assessment of the risk to Santa Ana was likely higher than the average project facing community opposition. This is not necessarily surprising given the intensity of the protests related to Santa Ana. In the study, for example, the likelihood of failure was higher among the South American projects for which protests resulted in deaths, as they did at Santa Ana:[147] 3 of 7 projects, or 43%.[148] Industry participants in that study also confirmed the potential for poor community relations to reduce project value.[149]

125. We now describe the steps involved in applying the modern DCF method to Santa Ana and Corani, which are summarized in Figure 2. At each step, we describe the inputs necessary for our calculations and how we determined them.

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145 Rachel Davis and Daniel Franks, "Costs of Company-Community Conflict in the Extractive Sector" Corporate Social Responsibility Initiative Report No. 66, 2014. (BR-156), pp. 50-51. In the table, projects that were suspended or abandoned are indicated by the letter "a" or "s" in the column labeled "Stage," which also indicates the stage at which the mine was when it faced community opposition. See Workpaper R-1 for calculations referred to in this paragraph.

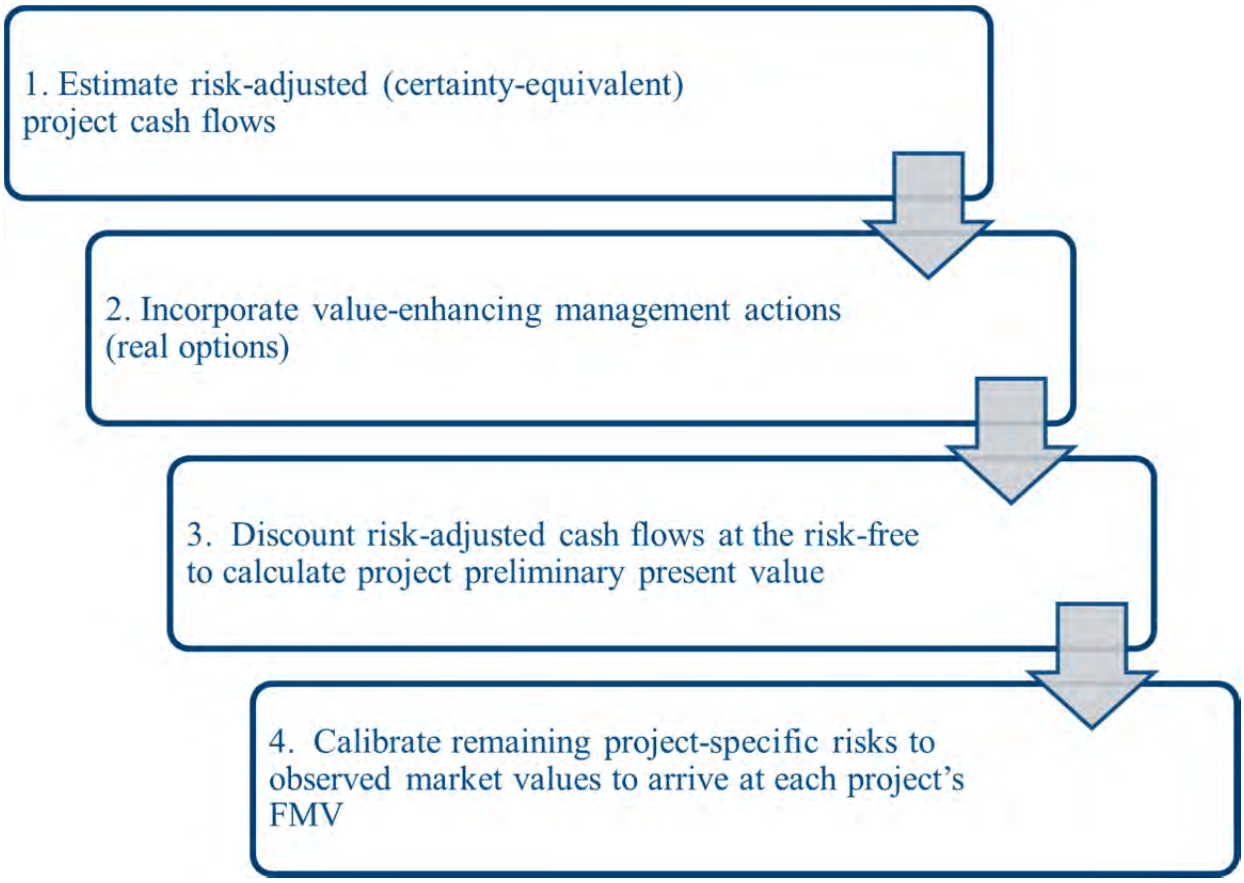
146 Rachel Davis and Daniel Franks, "Costs of Company-Community Conflict in the Extractive Sector" Corporate Social Responsibility Initiative Report No. 66, 2014. (BR-156), p. 17.

147 "Peru's president blames deadly clashes on 'dark political interests'," CNN, June 25, 2011 (BR-193).

148 See Workpaper R-1.

149 As one interviewee noted: "[w]hat a lot of juniors don't seem to realize is that if at the time they're doing that drilling, reducing the technical risk, they increase the social license risk by doing things that promote conflict, they can severely reduce the value that they could ever hope to sell a project for, or maybe not be able to sell it at all. In the case of [Project X], the junior mining company that was doing that had hopes of selling out to a big company like [Company Y]. But nobody was interested because of the conflict situation." Rachel Davis and Daniel Franks, "Costs of Company-Community Conflict in the Extractive Sector" Corporate Social Responsibility Initiative Report No. 66, 2014. (BR-156), p. 36.

Figure 2. Steps in Applying the Modern DCF Method to Santa Ana and Corani



126. Like the simple DCF method, the modern DCF method relies on free cash flows as the ultimate source of value. Free cash flows are the net amount of cash that accumulates to the owners of the project. The main drivers of value are revenues and costs, which together determine the inherent value of the project. A key improvement brought by the modern DCF method is its use of market signals as to future revenues, costs, and how the market adjusts or discounts these cash flows for their risks. We discuss how future revenues, costs, taxes, and the associated risks are measured in Section II.D.1.

127. Because future cash flows are uncertain and because unusually high cash flows can affect project value differently from unusually low cash flows, we simulate a large number of possible paths for the most important cash flow elements. The simulations are also useful for anticipating how the project owner would react to uncertain events. Such reactions, referred to as real options, mainly mitigate downside risks and thereby enhance project value. This is illustrated in step 2 in Figure 2, described in Section II.D.2.

128. The resulting net cash flows, adjusted for all risks except for those that require specific calibration, and reflecting the value of project management, are discounted for time and averaged across the simulated scenarios to calculate the project's preliminary present value

(PPV), as described in Section II.D.3. We refer to this number as PPV rather than FMV or net present value (NPV) because it does not take into account the value impacts of two project-specific risks: failure due to community opposition at Santa Ana and technology failure at Corani. The final step includes estimating the actual project values by incorporating the impact of these risks by reference to market transactions in either the project being valued (for Corani) or Bear Creek's share price (for Santa Ana). We describe this step in Section II.D.4.

1. Developing Risk-Adjusted Projections of Main Drivers of Project Value

129. The main drivers of project value and sources of uncertainty are prices and production quantities, which make up project revenue, and capital and operating costs. The first step of the modern DCF analysis is to develop models for each that provide unbiased, risk-adjusted projections that reflect not only market expectations about average or mean future values but also the possible movements away from those means (known as volatility).

130. Modern DCF tries to make use of market information as much as possible when discounting the commercial cash flow components for time and risk. Most importantly, forward commodity prices are used to calibrate the models of commodity spot prices, because they reflect market pricing of commodity risks. Historical evolutions of commodity prices are also useful as they provide information about price volatility.

a. Net Revenues

131. Gross revenues are the product of prices and quantities. Santa Ana would produce silver and a small amount of gold, while Corani would produce silver, lead, and zinc.[150] Each of these metals is traded in international commodity markets, and the revenue that Bear Creek would obtain would be driven by the prices prevailing in these markets. The revenue stream from each metal is estimated separately.

132. While the eventual output of each mine would be the respective metals, Bear Creek would only produce an intermediate product that can be transported easily for further refining, as is typical in the industry. Bear Creek's net revenues from selling this output are calculated by subtracting transportation, treatment and refining charges from gross revenues. Santa Ana's output would be doré bars, which would be transported to the United States for

[150] Corani 2009 PFS (BR-199), Table 1.4.

further refining and final sale.[151] Corani's output would be two types of concentrate, zinc concentrate and lead concentrate, each containing silver in addition to the respective base metal. The concentrate would be shipped and sold to a smelter, which would extract the pure metals from each concentrate.

i. Prices

133. All metals produced by Santa Ana and Corani are traded in various international commodity markets, including several futures exchanges. Metals sold for immediate delivery are referred to as "spot" transactions at "spot" prices. Sales for future delivery are called "forward" transactions at "forward" or "futures" prices.[152]

134. As of May and June 2011, prices for silver futures contracts traded on COMEX for delivery up to five years into the future were available. For lead and zinc futures, which trade on the London Metals Exchange (LME), prices for futures contracts with delivery dates up to five years into the future were available as well.

135. We use these prices, which reflect investors' expectations and degree of risk aversion to price volatility, and historical spot prices, which provide information about volatility, to calibrate for each metal a generalized model of risk-adjusted price evolution developed by Laughton and Jacoby (1993) and which has become widely used.[153] The model reflects mean reversion in prices, which has been documented in the academic literature and which the industry often refers to as the commodity price cycle. The model's method of applying a risk adjustment to prices is consistent with the Capital Asset Pricing Model (CAPM). In this case the risk adjustment is observed in forward market data. The resultant

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151 Santa Ana 2011 FSU (C-61), pp. 112, 127-128. A doré bar is a semi-pure alloy of gold and silver.

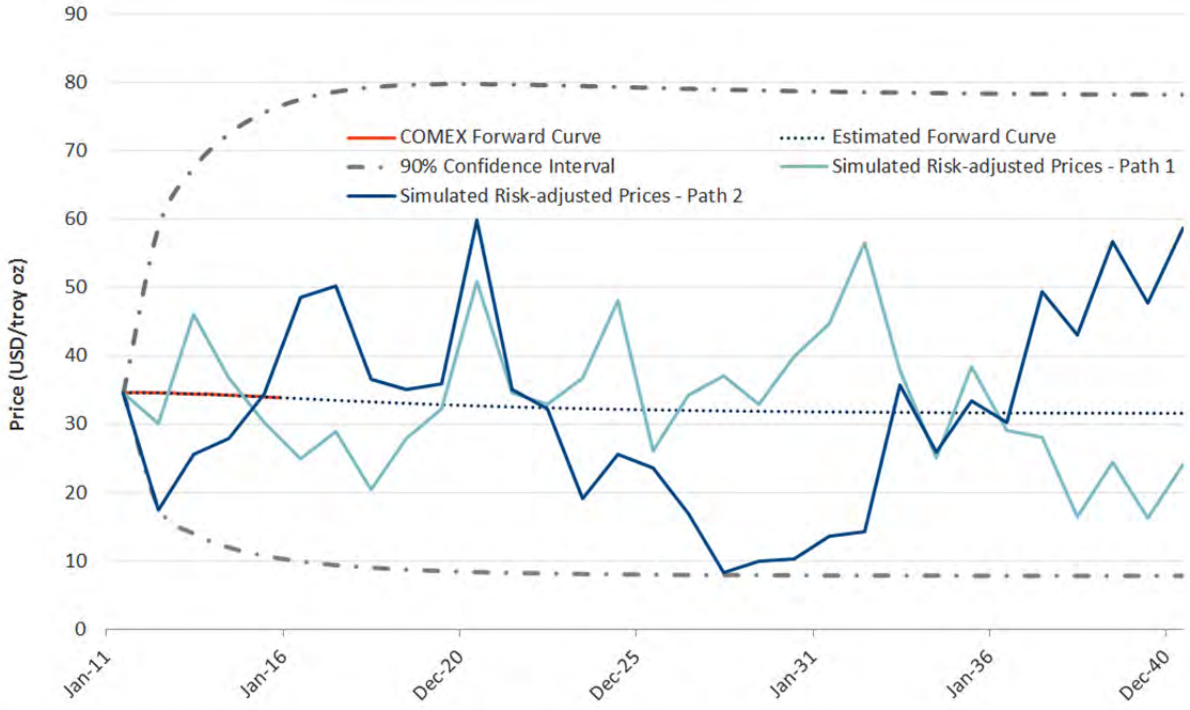
152 Futures contracts, which are exchange-traded instruments, are a special type of forward contract. Futures differ from over-the-counter forward contracts in several ways, but the most important is that they are exchange-traded and are in essence settled and rewritten every trading day, with one side of the contract collecting its gains and the other side paying its losses. As a result, whereas the parties to a typical forward contract anticipate a single payment at the time of delivery, the parties to a futures contract anticipate a series of random payments, some positive, some negative, as the forward value of the commodity changes. For the purposes of our valuation, futures and forward prices are essentially the same thing.

153 Laughton, David G., and Henry D. Jacoby (1993), "Reversion, Timing Options, and Long-Term Decision Making," *Financial Management,* 22(3): 225-240 (BR-148).

model for forward prices is also mean reverting. As discussed in Appendix B, this feature is consistent with historical data on forward prices.

136. The result for silver is shown in Figure 3, in which the red curve is the market forward curve on June 24, 2011, our Valuation Date, and the dotted blue curve is the calibrated forward curve using the Laughton-Jacoby model. Because of the model's sophistication and because the model is calibrated to match market information, it matches the observed forward curve almost perfectly, incorporating up-to-date market information into the model.

Figure 3. Risk-Adjusted Silver Price Projection



Source: Bloomberg L.P., Workpaper 18, and Workpaper 19.

137. Figure 3 also shows two possible future paths for the risk-adjusted price using simulation. The simulation process entails generating a very large number of such price paths, applying a set of mathematical formulas described in Appendix B. The average across all the simulated price paths is approximately equal to the forward price depicted in the chart, with the approximation becoming better as the number of simulations is increased.

138. Gold futures contracts were trading on COMEX for maturities up to six years into the future. For longer maturities, the London Bullion Market Association (LBMA) determines

and distributes a ten-year gold forward curve based on quotes from member banks.[154] Unlike the other metals, the gold price does not exhibit evidence of mean reversion and instead shows evidence of an upward trend, as discussed in Appendix B. We therefore use a model that assumes the gold price follows a random process consistent with the observed historical characteristics of the gold price called Geometric Brownian Motion (GBM). We describe this model and how it is calibrated to the market data in Appendix B. In this model the risk-adjusted prices also follow a GBM, only with a drift that is adjusted downwards for risk. As before, this risk adjustment does not have to be estimated via CAPM – it is embedded in the gold forward curve and reflects market participants risk aversion to gold price volatility.

ii. Quantities

139. At Brattle's request SRK produced a life of mine plan scenario for Santa Ana based on cost and price assumptions supplied by Brattle and on the resource information that would have been available to buyers and sellers at the Valuation Date.[155] We asked SRK to include Measured, Indicated and Inferred blocks of resource in the mine plan scenario. SRK produced this mine plan scenario using Maptek software and the data files provided to them by RPA. The mine plan reflects a silver price consistent with our average projected silver price over the life of the mine and is consistent with RPA's intent of including Mineral Resources in excess of Mineral Reserves, but corrects a number of unreasonable assumptions in RPA's Extended Life Scenario:

- Unit mining costs are increased to $2.50/tonne of material moved.[156]
- Unit processing costs are kept at the same level RPA assumed in its Revised Base Case: $5.36/tonne of ore.[157]

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[154] London Bullion Market Association & London Platinum and Palladium Market (2008), A Guide to the London Precious Metals Markets. <http://www.lbma.org.uk/assets/market/OTCguide20081117.pdf>, accessed 04/07/2016 (BR-194). For maturities that overlap the LBMA forward prices are consistent with the COMEX futures prices.

[155] Exhibit BR-219. This is the same mine plan we used in our first report to show the impact on FTI's DCF result of correcting the errors in RPA's Extended Life Scenario (First Brattle Report, ¶ 126).

[156] First SRK Report, ¶ 11.

[157] Santa Ana 2011 FSU (C-61), Table 17.5; RPA Reply Report, Table 6-1. SRK states that "there cannot be any justification whatsoever for reducing the unit process cost" in the RPA Extended Life Case relative to the RPA Revised Base Case (SRK Reply Report, ¶ 22). The RPA Revised Base Case is a mine plan

Continued on next page

- Metal recovery is 70%, lower than RPA's assumed 75% recovery rate, which SRK believes is unreasonably high, and the same as in the Santa Ana 2011 FSU.[158]
- Ore grade and stripping ratios are the result of a Whittle Pit Optimization mine plan that reflects a realistic mining scenario.

140. As in our first report, we apply a 50% probability factor to Inferred Resources to reflect their substantially higher level of uncertainty than Measured and Indicated Resources. In other words, we assume that there is a 50% likelihood that the Inferred resources do not materialize and a 50% likelihood that they do. This treatment is consistent with the CIMVal guidelines, which state that when used in the income approach, Inferred Resources should be "treated appropriately for the substantially higher risk or uncertainty."[159] We discuss this issue more in Section II.E.1.c below in the context of FTI's comments on this topic. The 50% factor is a norm used in the industry.

141. For production quantities at Corani, we use the most recent production profile estimates available as of the Valuation Date, which are from the Corani Prefeasibility Study dated October 2009 (Corani 2009 PFS).[160] The mine plan is roughly the same as the mine plan in the December 2011 Corani Feasibility Study, the latter having 13% more ore and 21% more waste than the 2009 study because it was planned at higher metal prices.[161] Higher metal prices allow additional marginal ore to be mined at a profit. Because the additional ore is marginal it does not substantially affect the value of the asset.[162] What does affect the value of the asset are the higher prices at the Valuation Date in 2011, which we take into account and apply to the 2009 Prefeasibility Study mine plan.

Continued from previous page

developed by RPA based on the Santa Ana 2011 FSU base case mine plan. It assumes a higher silver price, higher silver recovery, and 9 million tonnes more Reserves are mined than in the FSU base case.

158 First SRK Report, ¶ 83. Santa Ana 2011 FSU, p. 45.

159 CIMVal 2003 (FTI-4), G4.8.

160 Vector Peru S.A.C with Independent Mining Consultants, Inc., Resource Development, Inc. and Samuel Engineering, Inc: Prefeasibility Study Corani Project, Puno, Peru NI 43-101 Technical Report, October 14, 2009 ("Corani 2009 PFS") (BR-199).

161 Corani 2009 PFS (BR-199), Section 23.1.6 and Table 23.1. Corani Project Form 43-101F1 Technical Report Feasibility Study, Puno Peru, M3 Engineering and Technology Corporation, December 2011 ("Corani 2011 FS") (C-66), Table 16-1.

162 To verify this, we implemented the Corani DCF model using the 2011 Feasibility Study mine plan as well. Doing so does not alter the resulting valuation of Corani substantially.

142. Like the Corani 2011 Feasibility Study, the Corani 2009 Prefeasibility Study defines Mineral Reserves and provides a mine plan that extracts these quantities. The Mineral Resources in addition to reserves may, in general, have economic value, but were excluded from the Prefeasibility Study and from our analysis. The zinc and lead grades at Corani are very low even for the Mineral Reserve portion of the deposit, creating a significant technical risk to the project. We discuss this risk in Section II.D.1.c and the SRK Reply Report provides further analysis.[163] SRK believes the grades of the additional Mineral Resources are so low as to be virtually certain not to be technically extractable.[164] If they are not extractable, they have no economic value.

iii. Treatment, Refining, and Transportation Costs

143. The Santa Ana 2011 FSU estimated treatment charges of $0.29/oz and transportation costs of $0.34/oz.[165] We project future transportation inflation based on our WTI crude oil risk-adjusted projections and treatment charge inflation based on expected inflation reflected in inflation swaps.[166]

144. The Corani 2009 PFS provides estimates of the smelter payment terms that would determine Bear Creek's net revenue from selling the concentrate. Specific terms would apply to each concentrate, which were estimated based on inputs from experts in the area of concentrate marketing.[167] We apply those terms and apply expected inflation rates to unit charges based on market forecasts of inflation from inflation swap prices.

145. While the Corani 2009 PFS considered transportation costs,[168] it did not provide explicit estimates. Therefore we use the Corani 2011 FS estimates of these costs, $127 per wet metric tonne, adjusted to the valuation date based on changes in the WTI crude oil spot

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163 SRK Reply Report, Section 3.4.

164 SRK Reply Report, ¶¶ 92-100.

165 Santa Ana 2011 FSU (C-61), Table 23.8.

166 Inflation swaps are financial instruments where one party pays a fixed rate on a principal amount, and the other a floating rate linked to an inflation index like the CPI. They are available for various maturities up to 50 years into the future. Accordingly, there is no single expected inflation rate but rather a schedule.

167 Corani 2009 PFS (BR-199), p. 257.

168 Corani 2009 PFS (BR-199), p. 226.

price.[169] To project future inflation, we use the expected inflation based on risk-adjusted WTI crude oil price projections.

b. Costs

146. Costs for a mining project fall into three broad categories: capital costs; operating costs; and costs for closure of the mine at the end of operations.

i. Capital costs

147. For Santa Ana, we use the capital cost estimates from the Updated Feasibility Study, adjusted upward by 14% to reflect our estimate of the average cost overrun relative to feasibility study estimates. We discussed the rationale for this adjustment in our first report,[170] and respond to FTI's concerns about the need to make the adjustment in 2011 in Section II.E.1 below.

148. For Corani, we start with the estimates provided by the Corani 2009 Prefeasibility Study. Because those estimates rely on 2009 cost levels, we must update them to the Valuation Date. We use a cost index provided by Infomine that tracks open-pit capital costs for mines located in the U.S.[171] While the cost index is not specific to Peru, capital costs for a mining project are largely driven by international markets. For example, mining equipment is manufactured by global companies like Caterpillar or Komatsu. Equipment used in the milling process, tailing pipelines and large process pipes would also be imported from international markets. We then apply the same 14% adjustment for expected cost overruns as we did for Santa Ana.

149. Because these capital expenditures will be incurred several years into the future and the cost estimates are as of the Valuation Date, we must estimate expected inflation to obtain nominal projections. We use expected inflation obtained from U.S. dollar inflation swaps,

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[169] Corani 2011 FS (C-66), p. 218. See Workpaper R-9 for the adjustment calculations. The WTI (West Texas Intermediate) is a type of crude oil frequently used as a market benchmark. Fuel cost, which is driven by oil prices, is a major element of transportation costs and the most variable.

[170] First Brattle Report, ¶ 101.

[171] Industry Standard for Mining Cost Estimating – Mining Cost Service < http://costs.infomine.com/miningcostservice/>, accessed 04/07/2016 (BR-197). See Workpaper R-9 for the calculation.

which are market instruments that provide a profile of expected inflation rates for maturities extending up to fifty years into the future.

150. Costs are uncertain and must also be adjusted for systematic risk to obtain certainty-equivalent values. Mining capital costs however do not have a substantial systematic risk component. Using the Infomine index discussed above, we estimated the beta, a standard measure of systematic risk,[172] for open-pit mining capital costs. The resulting beta estimate is effectively zero, which indicates that the lack of a systematic risk component and the absence of a need for a risk adjustment under this model.[173]

ii. Operating costs

151. For Santa Ana, we rely on the costs estimated by RPA based on the Santa Ana 2011 FSU, as adjusted by SRK.[174] The adjustments consist of increasing unit mining costs to $2.50/tonne and maintaining processing costs at a level consistent with the FSU of $5.36/tonne of ore.[175]

152. For Corani mining and processing costs, we use the Corani 2009 PFS estimates in U.S. dollars, adjusted to the Valuation Date based on the Infomine U.S. cost indices for surface mining and milling costs respectively.[176] We adjust general and administrative (G&A) costs by the U.S. dollar consumer price index (CPI) inflation between the date of the Corani 2009 PFS and the Valuation Date.[177]

153. The cash flow models require nominal cost projections for the life of each project as well as adjustments for systematic risk exposure to arrive at certainty-equivalent projections. Energy costs are a major component of operating costs, primarily due to the fuel needed to operate mining equipment. Energy costs are driven by oil prices, for which market prices can be used to drive risk-adjusted projections. To capture the correlation with oil prices, we estimate the proportion of operating costs that reflect primarily energy costs and project

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172 FTI also used this measure of systematic risk to discount its cash flows for Santa Ana.

173 See Workpaper R-2.

174 First SRK Report, ¶ 11, RPA Reply Report, Table 6-1. SRK Reply Report, Section 2.2.

175 SRK Reply Report, ¶¶ 22, 28.

176 See Workpaper R-9. We note that the resulting mining cost as of 2011, $1.76/tonne of material moved, is consistent with SRK's adjustment to the Corani 2011 FS costs, which results in a mining cost of $1.75/tonne (First SRK Report, ¶ 19).

177 See Workpaper R-9.

those using risk-adjusted crude oil price projections.[178] We use the same type of mean-reverting price process discussed above for silver, zinc, and lead, calibrated using WTI crude oil futures market prices observed on the Valuation Date. Appendix B provides details of our projections.

154. For the remaining fraction of operating costs, we apply an expected inflation adjustment based on inflation swaps. This does not include a risk adjustment for systematic risk. However, as we did for capital costs, we estimated the beta of both mining and processing costs at a low level of approximately 0.1,[179] which indicates that systematic risk factors are not substantial drivers of operating costs for a mining project. Because the Infomine cost indices reflect all components of operating costs (including those correlated with oil prices), the beta reflects to some extent the correlation between fuel costs and the overall market, which we already account for by indexing a substantial portion of operating costs to crude oil risk-adjusted price projections. It is not necessary therefore to apply additional discounting for systematic risks.

iii. Closure costs

155. For Santa Ana, we rely on the closure costs estimated by RPA for its Extended Life Case, which are based on extrapolating the closure costs estimated in the 2011 FSU.[180] These are expressed in 2011 dollars. We develop projections using the expected inflation rates at the Valuation Date.

156. For Corani, because the 2009 PFS does not provide closure cost estimates, we use estimates included in the 2011 Corani FS.[181] We apply expected inflation rates derived from inflation

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178 See Workpaper R-3. We estimate that 34.20% of mining costs and 9.42% of processing costs are energy costs for Santa Ana, based on cost breakdowns for a typical heap leach operation estimated by Infomine. For Corani, the 2011 Feasibility Study provides a detailed cost breakdown, which we use to estimate that 58.00% of mining costs are fuel-driven (representing costs associated with drilling, loading, and hauling) and 23.64% of processing costs are energy costs. Corani 2011 FS (C-66), Tables 21-2, 21-4.

179 See Workpaper R-2.

180 RPA Technical Review of the Santa Ana Project and Corani Project, Puno, Peru, May 29, 2015 ("First RPA Report"), Appendix B. RPA adds closure costs of $0.23/tonne of ore in addition to the tonnage in the FSU. See row 167 in worksheet "CF Summary" of the native file that underlies Appendix B of the First RPA Report (BR-218).

181 Corani 2011 FS (C-66), Table 22-14.

swaps to obtain nominal dollars projections until the end of the mine life, when closure costs would be incurred.

c. Adjustments for Remaining Estimated Cash Flow Risks

157. The revenue and cost projections described above account for systematic risk, that is, the risk arising from correlation of each cash flow component with overall market movements. There are other risks, however, which do not arise from co-movements with the market but affect the timing and magnitude of cash flows. To obtain unbiased cash flow projections, these risks must be quantified and incorporated into the cash flow model.

158. Our analysis of the Santa Ana and Corani projects identified the following sources of risk:

- Technical or environmental failure during operations.
- Country-specific political factors.
- Delays during project development.
- Technology failure during development for Corani.
- Failure due to social opposition (social license risk), for Santa Ana.

159. We describe below how each of the first three risk factors could affect Santa Ana and Corani and how we estimate its impact. The last two factors, which are specific to each project, require calibration to a market transaction related to the respective project. We discuss how these are incorporated in the DCF framework in Section II.D.4.

i. Technical or environmental failure during operations

160. Extracting the metal from the low-grade ores typical of open-pit mining operations is a complex process that includes risks of technical failure. Each of the technical studies in play as of the Valuation Date, the Corani 2009 Prefeasibility Study and the Santa Ana 2011 FSU, outline these complex technological processes.

161. Some of the risks will be incurred only once production starts and are not likely to be catastrophic. For example the Corani 2009 PFS notes that the 65% of mill feed that is Probable Reserves may not be as predicted, reducing the project economics.[182] There is also the rare possibility of tailings dam deformations and waste rock facility deformations during operations due to seismic events – the Corani mine is located in a region with

[182] Corani 2009 PFS (BR-199), p. 123.

moderate occurrence of seismic events. Such deformations could interrupt production and again reduce project economics.[183] The Santa Ana project also was subject to seismic risks that could damage the mine by deforming the heap leach piles or solution ponds.[184] These failures are so rare and typically of a short enough duration that we do not adjust for them in our cash flows.

162. In some cases operational risks can close a project for an extended amount of time or even permanently. For example, there was a tailings dam failure at the Brazilian iron ore mine Samarco, causing the mine to close; the operation is expected to remain closed until 2019.[185] Failure of the tailings dam at Los Frailes in Spain caused it to close for 17 years.[186] Such closure risk reduces the expected production from the mine, and since a DCF valuation is forward looking and should take all of these risks into account, the cash flows must reflect these risks.

163. We estimate the effect of geological and environmental risk factors for mines in general based on a study of mine closings that analyzed 349 gold mines in North America during the period 1988-1997.[187] Generally, most mine closings occur when reserves are depleted or falling prices or rising costs make mining uneconomic. These factors are already reflected in our modern DCF models for Santa Ana and Corani. Of the 206 mines in the study for which the authors found information and that did not close because of reserve depletion, 14 closed due to non-economic reasons (geological or environmental reasons). The frequency of closings for such reasons implies an annual probability of closure due to geological or environmental issues of 0.8%. The calculation is shown in Workpaper R-4. Our DCF valuation includes this risk of termination in the cash flow simulations.[188]

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183 Corani 2009 PFS, (BR-199), pp. 193-194, 209-210.

184 Santa Ana 2011 FSU (C-61), pp. 120, 124, 126-127.

185 "BHP Billiton's burst Brazilian dam likely to stay shut for years," The Sydney Morning Herald, November 10, 2015 (BR-205).

186 "Controversial Spanish mine to reopen," The Guardian, February 25, 2011 (BR-206).

187 Moel, Alberto and Peter Tufano (2002), "When Are Real Options Exercised? An Empirical Study of Mine Closings," The Review of Financial Studies, 15(1): 35-64 (BR-149).

188 We implement this as a series of independent annual random draws from Bernoulli distributions with mean 0.008. When the outcome of the random draw is 1, cash flows in subsequent years are set to zero and closure costs are incurred immediately.

ii. Country-specific political risk

164. A foreign investment in Peru may be subject to political and macroeconomic uncertainties specific to the country. This type of risk is generally referred to as "country risk."[189] While local macroeconomic economic factors would have a relatively small effect on a mining project such as Santa Ana or Corani, which would derive all its revenues and incur most of its costs from international markets, political factors are relevant. Political risk factors include the possibility of unfavorable changes in government policies, including adverse actions such as expropriation, instability of government policies, weaknesses in the domestic legal system and property rights enforcement, or internal or external conflicts such as strikes or civil war.[190]

165. We estimate the impact of political risk using the "political risk spread" measure developed by a series of two articles published in finance and management journals by the same group of researchers.[191] The political risk spread measure extracts the portion of the sovereign bond spread that is associated with political risk. By isolating only the political risk component, this measure avoids the pitfalls of many other country risk models that rely on the full sovereign spread, which includes global factors already reflected in other systematic risk adjustments and factors unrelated to the risk of an equity investment, such as compensation for illiquidity in sovereign bond markets.[192]

166. Furthermore, instead of applying this spread directly to the discount rate, which would make the incorrect assumption that the project cash flows occur over the same time period and exhibit the same variability over time as the bond coupon payments, we convert the

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189 FTI included a country risk premium in its estimate of the discount rate to reflect this risk. FTI Reply Report, ¶ 7.52.

190 To the extent political risk in Peru at the Valuation Date reflected a risk of actions that would violate the FTA, we are instructed that this general risk should be reflected in the valuation of Santa Ana for the purpose of our damages calculation.

191 Geert Bekaert, Campbell R. Harvey, Christian T. Lundblad, and Stephan Siegel, "Political risk spreads," *Journal of International Business Studies*, 2014, volume 45, pp. 471-493 (Bekaert et al (2014), BR-145); Geert Bekaert, Campbell R. Harvey, Christian T. Lundblad, and Stephan Siegel, "Political risk and international valuation," *Journal of Corporate Finance*, forthcoming, doi: 10.106/j.jcorpfin.2015.12.007 (Bekaert et al (2016), BR-146).

192 See Bekaert et al (2016), Section 2.2.2, for a discussion of the errors involved in other models, including those advocated by Professor Damodaran on which FTI relied. We discuss this more in Section II.E.5.

political risk spread into an annual loss probability similar to that for operational risk described above.[193] We show the details of our calculation, which follows the method outlined in the two articles, in Workpaper R-5. The resulting annual loss probability as of the Valuation Date is 1.38%, which we apply to the simulated risk-adjusted cash flow projections.[194]

iii. Delays during project development

167. In a DCF analysis, the timing of cash flows affects the calculated value, as more distant cash flows are worth less, all else constant. Therefore possible delays must be factored into the analysis.

168. Based on the First SRK Report, we added a delay of one year relative to the Santa Ana 2011 FSU timeline to reflect the possibility that logistic, permitting, or other technical factors would result in production starting later than the date projected in the Santa Ana 2011 FSU.[195]

169. In our first report, we provided also an estimate of typical delays due to community opposition of approximately four years.[196] We use that estimate, which was derived based on the experience of other mines in Peru that had encountered social opposition, in the Santa Ana DCF model.[197] In total, including the one-year delay estimated by SRK, we incorporate into the DCF model an average delay of four years.

170. For Corani, based on the First SRK Report,[198] we apply also a one-year average delay relative to the timeline envisioned in the Corani 2011 FS, which projected construction starting in one year and production in three years.[199] While the Corani 2011 FS was not publicly available at the Valuation Date, the timeline it projected is similar to that disclosed

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193 See Bekaert et al (2016), pp. 24-26.

194 The annual probability corresponds to a political risk spread of 1.38% or 72% of the sovereign spread at the Valuation Date. For comparison, FTI added a 3% country risk adjustment to its discount rate, which was 150% of the sovereign spread. FTI First Report, ¶ A5.29.

195 First SRK Report, ¶ 91.

196 First Brattle Report, Table 5.

197 In Section II.E.3 below we discuss FTI's critique of our estimate of delay due to social opposition. FTI's critique does not change our view of the magnitude of potential delays at Santa Ana.

198 First SRK Report, ¶ 140.

199 Corani 2011 FS (C-66), Figure 24-1.

publicly by the Company before the Valuation Date.[200] The resulting timeline projects on average two years to the start of construction and four years to the start of production.

171. The uncertainty of delay is modeled through simulation, such that on average the delay is four years for Santa Ana and one year for Corani, but it can be lower or higher in particular simulation iterations.[201]

d. Calculation of Risk-Adjusted After-Tax Cash Flows

172. Having developed the risk-adjusted paths for the main value drivers, the free cash flows for each simulated scenario are calculated as they would in a standard DCF analysis. From net revenues, we subtract cash outflows for capital costs, operating costs, and closure costs, as well as changes in the amount of working capital needed to sustain operations. This results in project cash flows before fiscal obligations, which include royalties and taxes.

173. At the Valuation Date, the royalty rates applicable to mining revenues net of smelter charges were: 1% for annual revenue below $60 million, 2% for annual revenue between $60 million and $120 million, and 3% for annual revenue in excess of $120 million.[202] In addition, workers profit sharing of 8% and corporate income taxes of 30% were due on the mine's net income.[203]

174. As we discussed in our first report, however, both royalties and taxes were widely expected to increase after the election of President Humala, who had made increased fiscal terms to the mining industry a major point of his electoral campaign.[204] News reports and analyst coverage following the election focused on several specific aspects of mining fiscal reform: a doubling of royalty rates, a windfall tax of 40-45%, and an increase in corporate income taxes. Appendix C provides a selection of news reports discussing specific mining tax reform proposals. Among the analysts that were covering Bear Creek's stock at the time, the three who issued updated reports after the election results all adjusted their valuation

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200 Swarthout Second WS, p. 20.

201 Specifically, we assume the realized delay is a draw from a Poisson distribution with a mean of 4.0 and 1.0 respectively.

202 Santa Ana 2011 FSU (C-61), p. 144.

203 Santa Ana 2011 FSU (C-61), p. 144.

204 First Brattle Report, ¶ 107. Both candidates in the election favored increased taxation of the mining sector, so a tax increase was expected before the election results were known as well. See, for example, "No Lesser Evil," The Economist, June 2, 2011 (BR-203).

models to reflect the likelihood of increased taxes. Their discussion is also summarized in Appendix C.

175. To reflect the expectation of increased taxes, we assume that the range of royalty rates would double to 2% to 6% and the corporate income tax applicable to mining companies would increase to 40%. These assumptions are consistent with the expectations reported in contemporaneous news coverage and with assumptions made by analysts who covered Bear Creek's stock.[205]

176. We apply also the 8% workers profit sharing tax,[206] and account for the cash flow impact of the value-added tax (IGV).[207] The latter is a tax due on purchases of certain goods and services, which is then recovered, with a delay, once the output of each project is sold. The net effect therefore is only a timing effect, which has a negative net present value because cash outlays occur before the eventual recovery.

2. Capturing the Value from Flexibility

177. The owner of any mining asset, once the asset is in production, has options that enhance project value. One of the most valuable options is the option to abandon the project early if the economic environment moves against the project. A static DCF analysis, such as the simple DCF, cannot reflect this value and instead assumes that the project stays open through both good and bad economic times.[208] This is most evident by the assumption, in the project cash flows, that the full reserve base will be mined.

178. Our implementation of this optionality has the mine closing to prevent ongoing losses in a given price simulation if within that simulation there are a number of years of negative cash flow. There is a closure cost and reclamation cost associated with that closure. To determine after how many consecutive years of negative cash flows it is optimal to abandon

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[205] For example, one of the analyst reports, by Paradigm Capital, makes the same assumptions of an increase to 40% income tax, and a doubling of royalty rates. Paradigm, "June 8, 2011 Report" (FTI-55).

[206] Santa Ana 2011 FSU (C-61), p. 144.

[207] Santa Ana 2011 FSU (C-61), p. 144.

[208] Samis, M., and Davis, G. A., "Using Dynamic DCF and Real Options Methods to Value and Assess Flexible Mine Project Design," in Mineral Resources/Reserves and Valuation Standards, CIM Special Volume 56, Montreal: Canadian Institute of Mining, Metallurgy and Petroleum (2009), 632-50. (BR-154).

the project, we run the simulation using multiple abandonment rules and select the one that yields the highest net present value.[209]

179. Other options that are sometimes examined are expansion options or design options. The technical studies did not mention any design options. We also do not consider any expansion options for Corani, because none are modeled in the technical studies. The Santa Ana 2011 FSU notes that under higher price scenarios an expansion option could lead to a 50% longer mine life than the base case.[210] Since the higher prices envisioned in that scenario were in force at the Valuation Date, we rely on an extended life mine plan that reflects those prices. In other words, because the expansion option was in-the-money at the Valuation Date, we treat it as if were certain to be exercised and include it in our valuation.

3. Calculation of Project's FMV

180. Having calculated the net cash flows for each simulated scenario, two steps remain: discounting each simulation scenario to the valuation date and averaging across scenarios to obtain the present value of cash flows.

181. Because risk adjustments are incorporated into the cash flow calculations, the appropriate discount rate is the risk-free rate, which reflects the time value of money. We use the U.S. Treasury yield curve built from constant maturity rates published by the Federal Reserve, interpolating linearly for maturities for which a rate was unavailable.[211]

182. For each valuation date considered, we simulated 100,000 possible scenarios, combining the random outcomes from the following sources of uncertainty that are explicitly modeled and that were described above:[212]

- Metal prices, which drive project revenues.

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209 The optimal rule depends on the valuation date. For Santa Ana at the Valuation Date, the optimal rule we derived indicates abandonment after 4 consecutive years of negative cash flows. See Workpaper R-8.

210 Santa Ana 2011 FSU (C-61), Section 1.14.1.

211 Rates were obtained from Bloomberg, L.P. The available maturities as of the valuation date were are 1, 2, 3, 5, 7, 10, and 30 years.

212 Because commodity prices exhibit some correlation, within each simulation metal and crude oil prices are assumed to be correlated according to historical correlations estimated from weekly data for the 52-week period preceding each valuation date. The realizations of the other risk factors are independent draws.

- Crude oil prices, which impact the energy portion of operating costs.
- Delay before the start of production, which impacts both revenues and costs through expected inflation.
- Early termination due to the realization of a significant residual risk (geological, environmental, or political), which eliminates all subsequent cash flows.

183. Simulations were implemented in Excel using the @Risk add-in Version 7.0.0 (Industrial Edition).[213] Exhibits BR-229 and BR-230 contain the Santa Ana and Corani modern DCF models respectively. Workpapers R-8 and R-9 in Appendix D contain the inputs into each model.

184. In addition, the risk of technology failure for Corani and social opposition for Santa Ana, which result in an NPV of zero when they materialize, must also be incorporated. We describe these in Section II.D.4 below. To incorporate their impact, we must first evaluate the DCF model without these risks, but including all other inputs and risk adjustments. We labeled that outcome PPV, preliminary present value. The impact of the remaining risks is calibrated by finding the value that makes the PPV equal to the FMV, determined from a market benchmark. We call this process calibration.

4. Adjustments for Calibrated Project-Specific Failure Risk

185. The remaining risks are those that require calibration to a market transaction.

a. Corani - Technology Failure during Development

186. The Corani 2008 preliminary economic assessment (PEA) mentions the ability to technically recover a saleable metal product from the low head-grade ore as the main project risk.[214] Corani is a lead/zinc/silver ore deposit, where the silver is attached to the lead and zinc and will "piggy-back" on the lead and zinc recovery. The unique problem at Corani is that the lead and zinc grades are so low that it is not clear than they can be upgraded in a metallurgical process to a saleable metal.[215]

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213 Palisade Corporation, @Risk - Risk Analysis Add-In for Microsoft Excel, <http://www.palisade.com/risk/> (BR-209).

214 Independent Mining Consultants, Inc., 2008: Technical Report Corani Resource Estimate and PEA, prepared for Bear Creek Mining Corporation, March 3, 2008 (BR-195) ("Corani 2008 PEA"), p. 81.

215 SRK Reply Report, Section 3.4.2. Corani 2008 PEA (BR-195), p. 81.

187. In the Corani 2009 PFS, which was the technical study available at Corani as of the Valuation Date, the metallurgical risks remained.[216] In the Corani 2011 FS, released in December 2011, the same warning paragraph from the 2009 study was repeated, with the additional language that "[b]ench-top flotation tests, whether in batch or in lock cycles, may predict recoveries well but not plant concentrate grades."[217] The implication is that even as of the Feasibility Study the risks that the metals could not be upgraded to an acceptable concentrate grade remained.

188. This risk is a serious concern for the viability of the Corani project. SRK notes that because the zinc and lead head grade is very low, in order to achieve the concentration necessary to achieve a marketable concentrate, it would take a level of performance that "conventional base metal processing plants simply cannot achieve."[218] Therefore, SRK "seriously questions whether marketable concentrates could be produced with such low head grades."[219]

189. By its nature as an unusually low-grade lead and zinc deposit, this metallurgical recovery risk is unique to Corani. To estimate its impact on the project's market value, we need to use market information specific to Corani. This market by its nature as an unusually low-grade lead and zinc deposit, information is provided by the arm's length transaction in which Bear Creek purchased 30% of the Corani project from Rio Tinto, in March 2008. On March 7, 2008, Bear Creek announced that it had reached an agreement with Rio Tinto to purchase the remaining 30% of Corani and extinguish certain obligations for total consideration of approximately $75 million.[220] At that point, Bear Creek had completed a scoping study (including a PEA) that clearly identified metallurgical recovery as a principal project risk.[221] The transaction therefore reflects the impact of this risk on the project's market value, along other risks and the economic environment at the time of the

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216 Corani 2009 PFS (BR-199), p. 125.

217 Corani 2011 FS (C-66), p. 259.

218 SRK Reply Report, ¶ 95.

219 SRK Reply Report, ¶ 94.

220 "Bear Creek Consolidates 100% of Corani Silver Deposit," SEDAR, March 7, 2008 (BR-174). The payment of $75 million included a future installment of $20 million due by December 31, 2008 and another of $25 million due by December 31, 2009. The present value as of the transaction date was $74.1 million. See Workpaper R-10.

221 Corani 2008 PEA (BR-195), p. 81.

transaction. After deducting the value of the extinguished obligations, the transaction implies an FMV for 100% of the Corani project of $223 million.[222]

190. Since a DCF model must include all market risks, including the risk of technology failure, we must incorporate a discount factor to reflect this risk. The appropriate discount factor is reflected in the March 2008 transaction, and we can calibrate our model to reflect this factor by using the transaction price. However, the DCF model we built is based on the Corani 2009 Prefeasibility Study, which was released in October 2009, so to calibrate that model to the transaction value we must first update the transaction value from March 2008 to October 2009. Estimating the probability of technical failure is therefore a two-step process:

- First, use the observed FMV of Corani in March 2008 and adjust it to estimate the FMV of Corani as of October 2009.
- Second, use the estimated FMV of Corani as of October 2009 to calibrate our DCF model for the probability of technical failure.

191. The FMV of Corani between March 2008 and October 2009 changed due to two main factors: (i) changes in market conditions, and (ii) reduction in project uncertainty due to reaching prefeasibility study stage.

192. ***Market conditions.*** Metal prices, costs, and other economic variables such as interest rates and inflation rates vary over time and cause changes in the FMV of a mining project. Silver price, for example, fell by 11.3% between the March 7, 2008 transaction date and October 14, 2009, the release date of the Corani 2009 PFS.[223] Zinc and lead prices declined as well.

193. To estimate the impact of market variables, we evaluate the Corani modern DCF model as of the two dates, excluding the impact of the probability of technological failure, and calculate the percentage change, which is -36%.[224] Other than technology failure risk, all other risk factors and economic variables are reflected in the DCF model, so this percentage change reflects the change in the project's FMV assuming that the probability of technology failure remained constant. This is indeed the case because, as discussed above,

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222 See Workpaper R-10.

223 From $20.22/troy ounce to $17.93/troy ounce. Bloomberg, L.P.

224 See Workpaper R-11.

the Corani 2009 PFS continued to reflect questions about whether a saleable concentrate grade could be produced from the low-grade ore representative of the mine plan.

194. ***Reduced project uncertainty***. By October 2009, Corani had reached Prefeasibility Study stage. In general, as a project advances, the risk of baseline technical failure prior to development diminishes as more engineering is conducted on the project to resolve such issues. As such, advancing to the next stage typically results in an increase in value, reflecting the updated assessment of ultimate success. Such an increase in value is reflected in the value curve diagram in Figure 3 of the FTI Reply Report.[225]

195. While there is general agreement that such a value increment occurs as a project advances, the size of the value increment is not certain. A well-regarded mining analyst concluded, based on comparisons of net asset value (NAV) calculations with mining company market values, that the value increment of reaching the prefeasibility or feasibility study stage can be as high as 100%, depending on the new information revealed.[226] Research conducted by a Colorado School of Mines Masters student under Professor Davis' supervision reports that value changes in early stage mining projects as they move from resource declaration to prefeasibility stage are consistent with a value increase of 25% due to reduced probability of project technical failure (*i.e.*, excluding the impact of other factors, such as changes in metal prices).[227]

196. Consistent with this view, when Bear Creek released the results of its Corani 2009 PFS, Scotia Capital raised its share price target by 23% due to the reduced technical uncertainty.[228] Cannacord reduced its project discount rate from 12% to 8% to account for the advancement in stage, describing the 8% as "consistent with other precious metal

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225 FTI Reply Report, p. 26.

226 Adam Graf, CFA, "Valuation Methodology – An Overview," Cowen Equity Research, May 2014 (BR-158), p. 4.

227 Holman, James. In Search of the Elusive Value Curve: An Investigation of the Evolution of Value in Exploration Mining Properties (BR-196), Table 6.1 and fn. 15. Holman reports that once a projects achieves an initial resource estimate (through an NI 43-101 technical report), the probability that it completes a successful prefeasibility study is 80%. This implies that the value after that geological uncertainty is resolved is 1/0.8 = 1.25 times the value before resolving the uncertainty, *i.e.*, a 25% increase.

228 Turnbull, Trevor, Scotia Capital Analyst Report, September 28, 2009 (BR-201), p. 3. The analyst increased the NAV multiple from 0.65x to 0.80x, a 23% increase.

projects at feasibility stage."[229] For a long-lived project like Corani, a decrease in the discount rate from 12% to 8% can add a substantial amount to the present value of cash flows. As an illustration, for a 27-year constant stream of free cash flows,[230] the 12% to 8% reduction in discount rate would increase the NPV by 38%.[231] The cash flow pattern of a typical mine project however would make the increase larger, because positive cash flows associated with production occur later in the mine life (and are more discounted) than the early (negative) cash flows associated with mine construction. For example, based on the after-tax cash flows projected by the Corani 2011 FS, which are calculated in the technical report,[232] lowering the discount rate from 12% to 8% would result in a 125% increase in NPV.[233]

197. For Corani, considering the estimates above, we use a range of value increments between 20% and 50% to adjust the FMV upwards for the completion of the Prefeasibility Study, all else constant. While a higher upward adjustment is possible, we consider that Corani would likely have experienced these lower adjustments in value because of the remaining metallurgical recovery risk and because the high-end estimates of the analyst assume improvement to feasibility study stage, while Corani had only advanced to prefeasibility study.

198. Based on these parameters, we estimate the probability of technology failure for Corani between 46% and 57%, calculated as shown in Table 4. Starting with the $223 million FMV established in the March 2008 transaction, applying the 20-50% increase for reaching prefeasibility stage and the 36% decrease for changes in market conditions yields the estimated FMV as of October 2009, shown in row [4]. Row [5] shows the PPV of the Corani project as of October 2009, calculated with account for market inputs and all relevant risks except for the risk of technology failure. As expected, it is higher than the estimated FMV, because the FMV is the average of two outcomes: zero project value if the technology fails (with probability p), and the PPV in row [5] if the technology succeeds

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229 Zaunscherb, Eric, Canaccord Adams Analyst Report, October 7, 2009 (BR-200).

230 The Corani 2009 PFS projected a 27 year mine life. Corani 2009 PFS (BR-199), p. 2.

231 See Workpaper R-12.

232 Corani 2011 FS (C-66), p. 240.

233 See Workpaper R-12.

(with probability 1-p). The implied probability of technology failure p is calculated on row [6].

Table 4. Corani Estimated Probability of Technology Failure

			Range Start	Range End
Corani FMV as of March 2008	*US $ millions*	[1]	223	223
Value increase due to advancing to pre-feasibility stage	%	[2]	20%	50%
Value change due to market conditions	%	[3]	-36%	-36%
Corani estimated FMV as of October 2009	*US $ millions*	[4]	171	214
Corani preliminary present value (PPV) as of October 2009 excluding technology failure risk	*US $ millions*	[5]	394	394
Implied probability of technology failure	%	[6]	57%	46%

Sources and Notes:
[1]: Workpaper R-10, [9][C].
[2]: Brattle Reply Report. Section II.D.4.a.
[3]: Workpaper R-11, [3].
[4]: [1] x (1 + [2]) x (1 + [3]).
[5]: Corani Modern DCF Model (Exhibit BR-230), Table 1 as of October 14, 2009, excluding proability of technology failure.
[6]: 1 - [4]/[5].

b. Santa Ana - Social License Risk

199. We described the importance obtaining the social license to operate in Section II.A.1.c. Because Santa Ana was subject to intense community opposition, it faced a significant risk that it would fail to obtain its social license.

200. If the Company was unable to overcome community opposition, the Project would not be able to move forward at all. As discussed above, this is a risk that FTI's valuation ignores based on Claimant's counsel's instruction. Because we are instructed this risk should be accounted for when estimating damages, our valuation reflects its impact.

201. We described this step-by-step process of estimating Santa Ana's probability of failure due to community opposition at the outset of Section II.D.[234] Unlike Santa Ana, Corani did not

[234] See Figure 1 for a diagrammatic illustration. Once the FMV on the calibration date is calculated, the probability of failure is the value p that, when used in the Santa Ana DCF simulation, yields an NPV equal to the calculated FMV.

face community opposition at the Valuation Date.[235] Therefore we do not apply an adjustment to that project's DCF for social license risk.

202. Once the probability of social license failure at Santa Ana has been estimated, we evaluate our modern DCF model on the Valuation Date to calculate Santa Ana's FMV. We presented the results of our estimation in Table 2 and Table 3 at the beginning of Section II.D.

E. FTI'S RESPONSE TO OUR CRITIQUE OF ITS DCF IMPLEMENTATION

203. Our report had two principal criticisms of FTI's valuation for Santa Ana under the income approach: that various aspects of FTI's DCF model were unreliable and contained errors,[236] and that a modern DCF method generally provides a more reliable valuation for a mining project such as Santa Ana when the income approach is used.[237] We discussed FTI's failure to even consider a modern DCF in Section II.B above. Here, we focus on the examples of unreliability in FTI's simple DCF approach, including four specific examples that, once corrected, could reduce FTI's own DCF estimate of Santa Ana to $70 million.[238]

204. FTI considers these issues to be professional differences of opinion rather than errors, because they were not calculation errors or improperly applied theoretical considerations.[239] We agree that some, but not all, could be called differences of opinion. Having considered FTI's reply, we maintain our opinion that FTI's assumptions are unreliable. Regardless of how they are labeled, their substantial impact on FTI's result undermines FTI's claim that the simple DCF model it applied is more reliable than a valuation method that accounts for the market value of Bear Creek's shares.[240]

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[235] We discuss the risks facing Corani after the Valuation Date in Section III.E. Corani has not been the subject of community opposition to date.

[236] First Brattle Report, Sections II.D.2 and II.D.3.

[237] First Brattle Report, Section II.D.1.

[238] First Brattle Report, Sections II.D.2 and II.D.3.

[239] FTI Reply Report, ¶ 7.7. FTI includes our view that the modern DCF is more precise than the simple DCF that FTI employed among the concerns we identified as errors (FTI Reply Report, ¶ 7.8 and section immediately following). This is not accurate because we did not call FTI's use of the simple DCF an error (First Brattle Report, ¶ 26 and Section II.D).

[240] First Brattle Report, Table 1 and ¶ 30.

1. Mine Plan and Operating Costs

205. FTI's DCF estimate for Santa Ana's FMV was based on the Extended Life Case mine plan prepared by RPA.[241] RPA developed the Extended Life Case to allow FTI to incorporate the economic value of Mineral Resources in excess to Mineral Reserves into its valuation.[242] We agree with FTI that Mineral Resources in excess of Mineral Reserves can have economic value. Our objections to FTI's analysis focused on the lack of reliability evident in the mine plan that RPA developed to include those Mineral Resources and the uniform treatment of Inferred and Measured & Indicated Resources.[243]

206. RPA's Extended Life Case adds 35 million tonnes of mineral potential into production based on assumptions that SRK deemed "far too simplistic," without estimating year-by-year tonnages, grades, or a breakdown of Inferred versus Measured and Indicated Resources.[244] For these reasons, we considered that RPA's mine plan could not be used as a basis for valuation and asked SRK to prepare a mine plan that reflects RPA's intended goal of assigning economic value to Mineral Resources in excess of Mineral Reserves, but develops an annual schedule that reflects Whittle Pit Optimization, uses operating costs consistent with SRK's opinion, and increases the silver price to reflect our estimated long-term price projection.[245] We used this corrected mine plan to adjust FTI's calculation and showed that it resulted in a 20% reduction in FTI's DCF result.[246]

a. Price and Operating Costs

207. RPA, in its reply report, accuses both Brattle and SRK of being confused over the cutoff grades that RPA applied. RPA could have resolved this confusion by stating clearly how it developed its Extended Life Case. It does not do so. For example, RPA mentions that there is a difference between a mine planning cutoff grade and resource reporting cutoff grade:

> Accepted practice in the industry, as used by RPA, is to first estimate the volume of material that can be mined and processed at a breakeven cut-off

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241 First FTI Report, ¶ 7.26.

242 The Santa Ana 2011 FSU mine plan and economic evaluation model considered only Mineral Reserves. First FTI Report, ¶¶ 7.19-7.26.

243 First Brattle Report, Section II.D.3.

244 First Brattle Report, ¶¶ 121, 125.

245 See description in paragraph ¶ 139.

246 First Brattle Report, Table 1.

> grade (based on all costs, including mining costs). The next step is to report Mineral Resources and Mineral Reserves from within that volume at the internal/milling cut-off grade (based on all costs, excluding mining costs).[247]

208. RPA never reveals what breakeven cutoff grade it uses for the Extended Life Case and only reports an internal cutoff grade.[248] The absence of transparency is important, because a large part of the drop in internal cutoff grade is due to the drop in processing costs from $5.36/tonne to $3.49/tonne.[249] Costs going down generate more tonnes of mineral potential, in this case 35 million tonnes more. If one does not believe that the lower reported processing costs of the Extended Life Case are warranted, as is SRK's position,[250] then the internal cutoff grade in the Extended Life Case becomes higher than the Revised Base Case because the other processing costs have gone up.[251] That is, the extra 35 million tonnes of mineral potential in the Extended Life Case disappear.

209. SRK considered also that RPA's mining costs of $2.10/tonne of material were understated and suggested an upward adjustment to $2.50/tonne.[252] After reviewing RPA's reply, SRK maintains its view that a reasonable mining cost for the Project is $2.50/tonne.[253]

210. To reflect these adjustments and still obtain a mine plan that supports a valuation for the Mineral Resources in excess of Mineral Reserves, we asked SRK to generate one based on reasonable assumptions. We described the inputs into this mine plan in Section II.D.1.a. In our first report, we used it to illustrate the impact of correcting RPA's mine plan, which

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247 RPA Reply Report, ¶ 58.

248 RPA Response Report, ¶ 66.

249 RPA Reply Report, Table 6-1. RPA objects to our statement that lowering the internal cutoff grade is "indicative of a higher price scenario for the life of the mine compared with the base case" (First Brattle Report, ¶ 120), noting that RPA did not increase the metal price for its Extended Life Case (RPA Reply Report, ¶ 202). We agree, and misread RPA's report in this regard. As we understand now, RPA lowered the mineral processing cost, which has the same effect on the internal cutoff grade as raising the metal price.

250 SRK Reply Report, ¶ 22.

251 G&A Cost has gone from $1.33/tonne to $1.45/tonne, TC/RC has gone from $0.40/oz Ag to $0.63/oz Ag, and Royalties have gone from $0.00/tonne to $0.23/tonne. RPA Reply Report, Table 6-1. All of these will increase the internal cutoff grade above 17.5 g/tonne.

252 First SRK Report, ¶ 11.

253 SRK Reply Report, ¶ 28.

SRK viewed as defying reason, on FTI's DCF model.[254] As SRK has made not revised its opinion after reviewing RPA's reply, our calculations remain unchanged.

b. Whittle Pit Optimization

211. Our original report also suggested that RPA did not run a Whittle Pit Optimization on the resource material in the Extended Life Case and as a result did not estimate year-by-year tonnage and grade in its extended life mine plan.[255] We stand by our statement and RPA agrees: "RPA reported tonnes, grade, and stripping ratios as an average *and did not attempt to complete a full design and mine schedule*."[256] RPA's explanation that it ran a Whittle Pit Optimization to obtain those averages was not in dispute and does not respond to our concern.[257] Our concern, and that of SRK, is that in order to effect the overall averages in the Extended Life Case RPA generated a mine plan that took the RPA Revised Base Case mine plan and tacked on constant fictitious grades and stripping ratios for the additional resource material that would create their new average.[258] This can in no way be considered a reasonable mine plan for valuation purposes.

212. RPA's justification for not using the Whittle Pit Optimization mine plan is that the extended life material cannot be scheduled in isolation from the FSU reserve pit in a "real life mining scenario."[259] We agree. The approach that RPA took, however (tacking on average grades and stripping ratios to the end of the FSU reserve pit) is not a real-life scenario either. Our point was and is that the mine schedule from the Whittle Pit Optimization should have been used in the Extended Life Case to properly reflect where in the real-life mining sequence this lower-grade material would show up and to what extent mining it would defer mining of the higher grade material. This additional realism would lower project value as computed by FTI compared to the optimistic case RPA developed, in

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254 See First Brattle Report, Table 6.

255 First Brattle Report, ¶ 121.

256 RPA Reply Report, ¶ 213.3.

257 RPA Reply Report, ¶ 213.

258 First RPA Report, Appendix B.

259 RPA Reply Report, ¶ 213.3.

which this low-grade material implausibly shows up only after the high-grade is mined. As SRK opined, the Extended Life Case as modeled by RPA defies reason.[260]

c. Inclusion of Inferred Resources

213. We noted in our first report that FTI's inclusion of Inferred Resources in the DCF model was controversial, in particular because FTI, relying on RPA's mine plan, treated Inferred Resources and Measured and Indicated Resources identically, despite the former's substantially higher degree of uncertainty.[261] We referred to the NI 43-101 disclosure standards, which prohibit using Inferred Resources in economic analyses, and to the CIMVal standards and guidelines, which discourage their use.[262]

214. FTI's response is that the NI 43-101 disclosure standards are not relevant to FTI's valuation because FTI's engagement was "not to create a revised Feasibility Study."[263] While it is true that NI 43-101 applies directly to evaluation (such as might be included in a feasibility study aimed at deciding whether to continue development of a project) not to valuation, what is considered misleading in evaluation is also misleading in valuation.

215. FTI insists that only the CIMVal standards and guidelines are relevant to valuation, and quotes CIMVal's guideline statement that all reserves and resources should be considered.[264] We agree that all resources, including Inferred Resources, should be considered, but as we pointed out, FTI did not express any evidence of undertaking such consideration. CIMVal suggests that at a minimum, Inferred Resources must be treated appropriately for their higher risk. FTI did not do this.

216. RPA also quotes CIMVal and suggests that we omitted relevant parts from CIMVal's statement about Inferred Resources.[265] Let us examine the quote given by RPA:[266]

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260 First SRK Report, ¶¶ 84-89.

261 First Brattle Report, ¶ 124.

262 First Brattle Report, ¶ 124.

263 FTI Reply Report, ¶ 7.79.

264 FTI Reply Report, ¶¶ 7.79-7.80.

265 RPA Reply Report, ¶ 216.

266 RPA Reply Report, ¶ 216.2. Emphasis added.

> Inferred Mineral Resources should be used in the Income Approach with great care, and should not be used if the Inferred Mineral Resources account for all or are a dominant part of total Mineral Resources.

RPA responds that inferred resources make up only 13% of the extended LOM pit, and that therefore they can be used.[267] We agree.

> Any use of Inferred Mineral Resources in the Income Approach must be justified in the Valuation Report and treated appropriately for the substantially higher risk or uncertainty of Inferred Mineral Resources compared to Measured and Indicated Mineral Resources.

Neither RPA nor FTI make any such treatment, and as such RPA has not followed the guidelines. When we adjusted FTI's DCF model to reflect the impact of using the more realistic mine plan prepared by SRK, we applied a 50% probability of realization to Inferred Resources to reflect their higher uncertainty.[268]

> Inferred Mineral Resources should only be used in the Income Approach if Mineral Reserves are present and if, in general, mined ahead of the Inferred Mineral Resources in the Income Approach model, and/or if Measured and/or Indicated Mineral Resources are used as specified in G4.3 to G4.7 and if, in general, mined ahead of Inferred Mineral Resources in the Income Approach model.

Mineral Reserves are present, and so Inferred Mineral Resources can be used if they are "in general" mined after the Mineral Resources. RPA takes this to mean all Inferred Resources must be mined after Mineral Reserves, which is not the implication. The intent of CIMVal is that the income approach should not be distorted by mining uncertain Inferred Mineral Resources ahead of certain Mineral Reserves. Since Inferred Resources only make up 13% of the total resources there is no need to apply a rigid mining sequence, as RPA does, that places additional Inferred Resources at the end of Reserves in a way that defies all reality. The mine plan that SRK generated for Brattle complies with these CIMVal guidelines and is a more reasonable and realistic mine plan for valuation purposes.

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267 RPA Reply Report, ¶ 217.

268 First Brattle Report, ¶ 127.

217. RPA takes issue with our statement that the inclusion of Inferred Resources in a valuation is controversial.[269] But CIMVal committee member Keith Spence notes, when discussing mine valuation methods:

> The level of available resources or reserves will be key to the valuation, irrespective of the approach that may be chosen. Inferred resources data should be only rarely used in NPV/DCF analysis as they remain subject to a high degree of uncertainty.[270]

218. FTI's uncritical treatment of Inferred Resources remains a material weakness in FTI's valuation analysis.

2. Capital Expenditures

219. We explained in our first report that capital expenditure estimates made at the feasibility stage study tend to understate construction costs, as demonstrated by empirical evidence in published research.[271] Based on this research, we indicated that to obtain unbiased capital cost estimates, an upward adjustment of 14% is needed and showed that making this adjustment would reduce FTI's FMV estimate, all else constant, by about 5%.[272]

220. FTI interprets the fact that we made this correction rather than SRK to mean that SRK disagrees with our assessment.[273] This inference is not correct. We discussed our adjustment with Dr. Rigby and he thought it was reasonable.

221. FTI argues also that the research on which our adjustment was based is dated and reflects feasibility study work conducted before reporting regulations such as NI 43-101 came into effect.[274] FTI asserts that more recent feasibility studies are more reliable but provides no evidence that this is the case. In fact, underestimation of costs remains a problem in the mining industry.

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269 RPA Reply Report, ¶ 218.

270 Spence, Keith. "Stage-based valuation of Mining Projects" Presented at Frontier Securities Annual Conference, Ulaanbataar, Mongolia, June 6 – June 11, 2011 (BR-202).

271 First Brattle Report, ¶ 101 and fn. 75.

272 First Brattle Report, ¶ 101.

273 FTI Reply Report, ¶ 7.37.

274 FTI Reply Report, ¶ 7.38.

222. At a seminar held in Toronto in 2014, Mr. Graham Clow, the chairman of RPA, warned that capital costs overruns in the mining industry averaged 20-25% and had been higher in recent years. [275] Contrary to FTI's view that the accuracy of cost estimates has improved, Mr. Clow stated that "[t]he last time [he] gave this talk was in 1990, when [he] was with Strathcona Mineral Services … how little things have changed." [276]

223. Finally, FTI states that mining duties would be carried out by a contractor and the respective capital costs would "be accounted for in the mine contractor's unit rate costs."[277] We agree but do not see the relevance. Our upward adjustment to capital expenditures was not applied to the mining contractor's unit costs but to the owner's capital costs.[278]

3. Timeline to Production

224. FTI assumed the Project would proceed to construction immediately,[279] despite the need to obtain numerous permits and the considerable community opposition and protests that threaten the progress of the Project. SRK estimated that permitting, contracting, and technical issues, excluding the impact of community opposition, would lengthen the time to construction by one year.[280] SRK maintains its opinion.[281]

225. To evaluate the potential delay caused by community opposition, we identified all other mining projects in Peru that had completed feasibility studies in the previous 10 years and

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275 "RPA's Graham Clow: Red flags investors should heed," The Northern Miner, November 2014 (BR-161).

276 "RPA's Graham Clow: Red flags investors should heed," The Northern Miner, November 2014 (BR-161).

277 FTI Reply Report, ¶ 7.39.

278 See First Brattle Report, Workpaper 20-A1 (without adjustment) versus Workpaper 20-B1 (with adjustment). Mining capital costs were reflected in operating costs through the contractor's rate.

279 In FTI's DCF calculation, the middle of the first model period is indicated as September 26, 2011. FTI Schedules 1 and 2, Produced by FTI on August 31, 2015 (BR-207), Schedule 1, cell F52.

280 First SRK Report, ¶ 92.

281 First SRK Report, ¶ 92. SRK Reply Report, ¶ 50. In the article cited above, Mr. Clow warned about unrealistically low ramp-up times: "Some people may overestimate how fast the mill will ramp up, and there's a lot of literature out there about how fast they do start up…It is beneficial to show revenue coming in sooner…people can get a bit too optimistic." "RPA's Graham Clow: Red flags investors should heed," The Northern Miner, November 2014 (BR-161), p. 7.

then experienced social protests.[282] We found that community opposition lengthened the projected time between feasibility study and the start of production by up to five years, with the typical project being delayed four years.[283] This evidence indicates that FTI's assumption of no delay was unrealistic.

226. FTI faults our approach for not identifying the specific forms of community opposition faced by Santa Ana that would result in delay and evaluating whether they are similar to those facing the other projects in our sample.[284] The criticism is a distraction – of course community opposition at each mine has unique aspects. Our point is that community opposition in general causes substantial delays, and FTI cannot avoid this reality by suggesting that our comparison data may not exactly match the type of community opposition at Santa Ana.

227. FTI's analysis ignores entirely the impact of community opposition, and by assuming the Project would proceed on time inflated its DCF result by over $60 million.[285]

228. FTI states also that "[t]here has been no clear evidence that the social opposition in Peru was based on operational issues associated with the Santa Ana project directly, so it is unclear that schedule delays, if any, would reach the length of Brattle's suggested delay."[286] To our knowledge, the protests were targeted at the Santa Ana Project specifically.[287] FTI

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[282] First Brattle Report, fn. 83. To calculate a delay, we needed information about the estimated start of production or construction given in the feasibility study and either the actual or the revised projected start of construction production. The analysis therefore could not include projects that faced social opposition but for which the resulting delay or expected delay was not yet known.

[283] First Brattle Report, ¶ 104, Table 5. Four of the six projects we identified were delayed by between four and five years.

[284] FTI Reply Report, ¶ 7.42.

[285] First Brattle Report, Table 1.

[286] FTI Reply Report, ¶ 7.44.

[287] Luis Fernando Gala Soldevilla, the President of the Peruvian Mining Council under the Peruvian Ministry of Energy and Mines, states that "the Puno protests, specifically those in the south, were directly related to the Santa Ana project from the start." He describes that the "Puno Department crisis had three different fronts…In the south, in the Chucuito and Puno Provinces, Aymara communities started protesting on April 22, 2011, demanding that actions be taken against mining the area, including Bear Creek's Santa Ana Project." Witness Statement of Luis Fernando Gala Soldevilla, Bear Creek Mining Corporation, Claimant, v. The Republic of Peru, Respondent, October 6, 2015, ¶¶ 5, 7.

draws an undefined distinction between "operational issues" and other aspects of the Project, but this is not a relevant distinction. The existence of community opposition indicates that Bear Creek was facing difficulties obtaining its social license to operate. As we discussed in Section II.A.1.c, the social license is of critical importance to developing a mining project successfully, and obtaining it is viewed in the industry as the responsibility of the company.

229. FTI does not address the issue of social license directly, but states elsewhere in its reply report that its analysis assumes, following Claimant's counsels' instruction, that social opposition could only affect the Project's cash flows by causing Peru to act in breach of the FTA.[288] This is a legal position that we understand Respondent is disputing and as to which we have no opinion. As we noted also in Section II.A.1.c, it is inconsistent with the industry's accepted view that a mining company has the responsibility to obtain the acceptance of the communities impacted by its operations, *i.e.*, to secure a project's social license to operate.

230. With respect to our estimate of delay due to community opposition, FTI appears to criticize our approach for using a sample with only companies that experienced community opposition rather than all projects for which we found data.[289] Such a criticism is unfounded – Santa Ana was experiencing community opposition, so it is appropriate to look at the experience of other projects that faced community opposition when estimating the impact of such opposition on the Project's schedule. The average delay (or lack thereof) at projects that did not face opposition is not the relevant benchmark.

231. RPA addresses our analysis of potential delay as well, but it either misunderstands it or misses its point. First, RPA makes the incorrect statement that "Brattle fails to mention that there were various projects at the time that were not delayed."[290] We provided the full list of projects that our selection process revealed, including those that did not face social opposition, and many had not experienced delays or were completed ahead of schedule.[291]

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288 FTI states that "[they] understand that the protests were not directly related to the Santa Ana project and could only impact its cash flows by influencing the Respondent to take actions to breach the Treaty." FTI Reply Report, ¶ 6.51.

289 FTI Reply Report, ¶ 7.40, 7.43.

290 RPA Reply Report, ¶ 210.

291 See Workpaper 4 in the First Brattle Report.

Our estimate is based on those that experienced social opposition because, as explained above, those are the relevant benchmarks for Santa Ana, which was facing social opposition.

232. RPA discusses two specific projects that did not experience delays, Constancia and La Arena.[292] Since those projects also had not faced community opposition as of the Valuation Date,[293] as Santa Ana had, their experience is not informative about the likelihood of delays at Santa Ana.[294]

4. Fiscal Regime

233. FTI assumed no change in the tax and royalty regime applicable to the Project despite the market expectation at the valuation date that the election of President Humala would result in increased fiscal burden for mining projects.[295] Once again, a valuation must take into account expectations. We pointed out that FTI's failure to reflect expectations about the tax and royalty regime as of its valuation date overstates the Project's FMV. We provided evidence based on stock price reaction to President Humala's election among mining companies with exposure to Peru, as well as analyst commentary, that the market did expect the tax and royalty regime to change.[296]

234. FTI does not dispute the evidence we provided but states that an adjustment would have been speculative because "there was no specific proposal or indication of what the changes to the tax and royalty regime would be and how they might impact the Santa Ana project."[297]

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[292] RPA Reply Report, ¶¶ 210-211.

[293] See, for example, "Update 2 – Bear Creek, Rio Alto shares drop on Peru protests," Reuters, May 30, 2011 (BR-198), where the CEO of Rio Alto states that La Arena "has strong support from local communities and it was not a target of protests." While Constancia has been the target of community opposition, the opposition did not begin until 2014, well after the Valuation Date. "Peruvian Community Denounces HudBay Minerals for Human Rights Violations over Constancia Project," MiningWatch Canada, November 11, 2014 (BR-210).

[294] FTI notes our analysis did not include these two projects. Constancia was not included because it completed its feasibility study in 2012, after the valuation date. For La Arena, we could not locate a feasibility study.

[295] First Brattle Report, ¶ 106.

[296] First Brattle Report, ¶¶ 106-109.

[297] FTI Reply Report, ¶ 7.46.

235. First, regardless of the precision with which the impact of increased taxation could be estimated, FTI does not deny that, as of the valuation date, the impact was in fact expected and was reflected in the market prices of mining company stocks.[298] FTI's inability to measure it does not render this factor irrelevant, and FTI's decision to ignore it results in a biased tax forecast that inflates FTI's estimated value of Santa Ana as of late June 2011, which we called erroneous. It is not a difference of opinion as to whether DCF cash flows should reflect expected outcomes, in this case expected taxes and royalties. To assume that there is no expected change when the contemporaneous data shows that a change was expected is faulty practice that biases the analysis.

236. Second, there is no reason to imagine that a change in fiscal regime that would affect the entire Peruvian mining sector would somehow impact Santa Ana differently or less than other mining projects in Peru. It would not be speculative to assume Santa Ana would experience the same fiscal regime applicable to the rest of the Peruvian mining industry.

237. Finally, FTI is incorrect that there were no indications of what the proposed changes might be. Mining fiscal reform had been part of President's Humala electoral platform and had been widely reported in the Peruvian press. The specific reforms that were advocated during the electoral by President Humala, who won the elections on June 5, 2011, included increasing the income tax rate from 30% to 40%, introducing a 40-45% tax on windfall mining profits, and doubling royalty rates from 1-3% to 2-6%. We include in Appendix C a selection of excerpts from contemporaneous news articles that discuss specific fiscal regime reform proposals. We note also that among the analysts cited by FTI in its first report, the three that issued reports after the election all made adjustments in their DCF models to reflect the expectation of higher taxes and royalties.[299]

5. Project Discount Rate

238. We noted that FTI's estimate of the discount rate used (i) a blunt country risk premium that is conceptually flawed and (ii) a beta estimated from a broad sample of mining companies whose projects were not necessarily similar to Santa Ana.[300]

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298 First Brattle Report, ¶ 108.

299 See details in Appendix C.

300 First Brattle Report, ¶¶ 111-114. Beta is a measure of systematic risk, which reflects the correlation between Santa Ana's cash flows and the overall market.

239. The beta is one of two adjustments that FTI made to reflect the risk of Santa Ana's cash flows (the other being the country risk premium). We believe it is a blunt adjustment for the same reasons we view the modern DCF approach as better suited to a mining project such as Santa Ana: it is not tailored to the Project's specific exposures to systematic risk. We did not present an alternative estimate for beta because, in our view, the modern DCF method, which applies risk adjustments to specific cash flow components based on futures prices and does not rely on beta to account for systematic risk, is more appropriate in this context. Because it is possible to obtain risk adjustments specific to revenues and costs separately, we do not need to calculate what the implied beta might be. Our approach to quantifying systematic risk in a modern DCF framework is described above in Section II.D.

240. Concerning the country risk premium included by FTI in its discount rate, we explained that it is an *ad hoc* adjustment without basis in finance theory or empirical evidence.[301] FTI does not dispute this assessment nor the rigorous evidence supporting it that is presented in the article we cited.[302] However, FTI draws the wrong conclusion from our criticism. We did not say that FTI should not have reflected country risk in its valuation; we said that the *method* FTI used to try to reflect country risk was flawed as a matter of theory and lacked empirical support.[303]

241. FTI's country risk adjustment, even accepting for the sake of argument that it could have reflected appropriately the additional risk to which an average investment in Peru was exposed, did not reflect the risk specific to Santa Ana that arose from the social opposition it faced. It is therefore incorrect for FTI to suggest that our critique implies FTI overstated the impact of country risk. The risk arising from community opposition is a kind of risk specific to Peru – it arises from the Project's location in a specific area of Peru, with an indigenous population that opposed the Project's development. Quantifying that risk

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301 First Brattle Report, ¶ 112.

302 First Brattle Report, fn. 92.

303 FTI Reply Report, ¶ 7.55. FTI states that "adopting Brattle's interpretation regarding country risk premiums, all other inputs being equal, the discount rate should decrease as the country risk would be set to 0.0%, implying that the Santa Ana project was undervalued in the FTI Report." This is technically correct because FTI is careful to say "all other inputs being equal," however it is meaningless. We did not state, nor can it be reasonably inferred from what we stated, that the valuation should be performed ignoring country risk. Other inputs should change to appropriately reflect that risk.

cannot be done without reference to a market benchmark, because it is specific to Santa Ana, but qualitatively the adjustment would reduce FTI's FMV estimate because FTI did not account for it at all. That is why we emphasized that benchmarking FTI's FMV estimate against Bear Creek's share price is critical to obtaining a reliable estimate of the Project's FMV.

6. Silver Price Projections

242. FTI's DCF model was implemented in "real" dollars, meaning all future revenues and costs were expressed in 2011 dollars without regard to future inflation. Based on a mix of historical spot prices, analyst forecasts, and futures prices, FTI developed a silver price forecast in 2011 dollars that declined slightly initially, followed by a sharp drop after about five years, and remained flat for the remainder of the mine life.[304] FTI's mix of spot and futures prices is inconsistent with finance principles, and the resulting price forecast was inconsistent with commodity pricing theory and economic evidence, which indicates a constant nominal price and declining real price for silver over time.[305]

243. FTI objects to any metal price forecast that has price being constant in nominal terms because it argues that prices have been inflating in nominal terms and is not fundamentally logical.[306] Let us address these points in order.

244. There is a long history of analysis on the long-term trend in metals prices. Most of this analysis is very technical. One of the main points of this literature is that for random processes like metal prices one cannot and should not infer from looking at a chart of prices over time that there is a systemic trend in price, especially one that is only 20 years in length as in the FTI Reply.[307] One needs to perform statistical analyses on the series. When such tests have been undertaken on metal price series the result is that the real price trend is downwards over the long term. Such a decline has been found for silver.[308] A declining real price is consistent with a flat nominal price in the long run, which is what we assume.

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304 See Figure 4 in the First Brattle Report.

305 First Brattle Report, ¶ 117.

306 FTI Reply Report, ¶¶ 7.67-7.68.

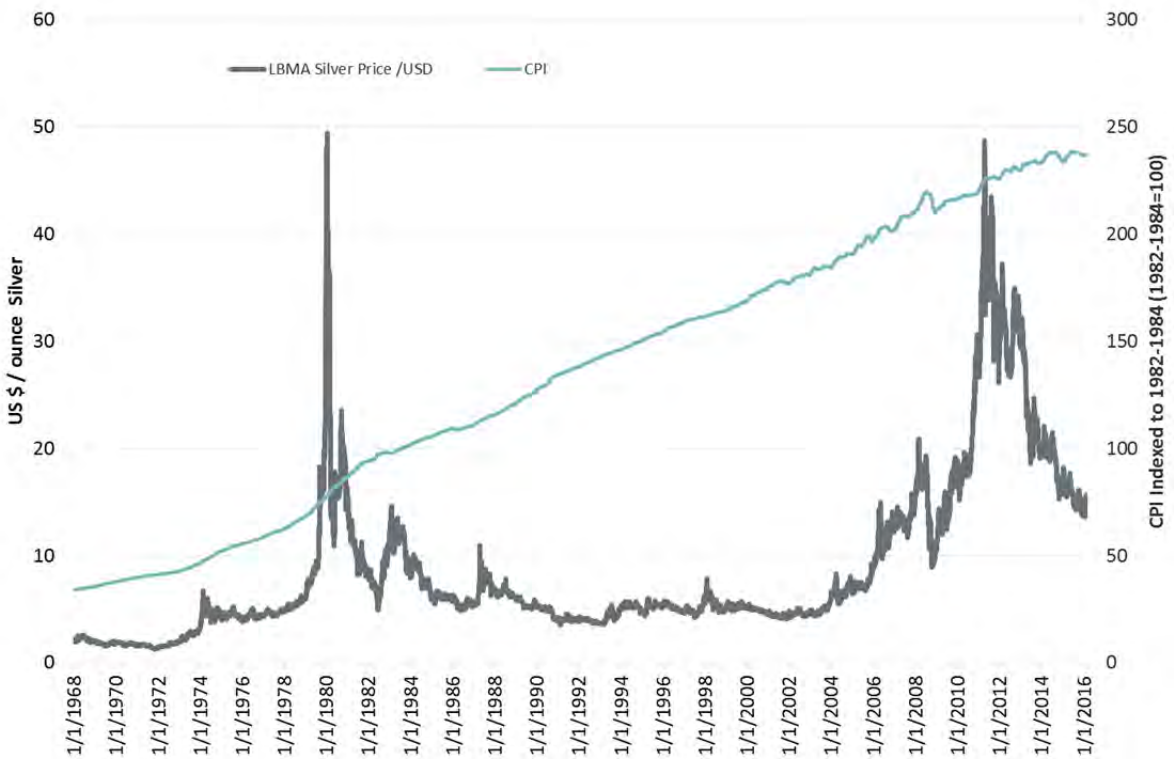
307 FTI Reply Report, Figure 7.

308 Viviana Fernandez, "Trends in real commodity prices: How real is real?" *Resources Policy*, Volume 37(1), 2012, 30-47 (BR-147). We discussed other evidence in our first report (First Brattle Report, ¶ 117).

The forward market data that we use is also consistent with a flat long-run nominal silver price.[309]

245. More superficially, if one plots a longer-term series of metal prices, one can see that the metal price remains flat for extended period of time. This reflects a constant nominal price. For example, the silver spot price around 2005 was equal to the spot price at the end of the 1970s (see Figure 4), a period during which the CPI (a measure of inflation) increased from about 80 to about 200, a 150% increase.[310]

Figure 4. Nominal Silver Spot Prices, 1968 - 2016



Sources: Bloomberg, L.P.; Federal Reserve Economic Data.

246. FTI also suggests that a real price trending towards zero is fundamentally illogical.[311] Not at all. As Svedberg and Tilton point out, a declining real price for a metal reflects its declining

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309 See Appendix B.

310 Consumer Price Index for All Urban Consumers, <https://research.stlouisfed.org/fred2/series/CPIAUCNS>, accessed 04/08/2016 (BR-204).

311 FTI Reply Report, ¶ 7.75.

scarcity: "[t]he standard explanation is that new technologies, the discovery of new deposits, recycling, and other forces have more than offset the cost-increasing effects of depletion over time."[312] A declining price also does not portend an eventual price of zero, as FTI suggests.[313] If the price of silver gets cheap enough there can be structural adjustments on the demand side that cause silver use to increase, supporting its price. In any event, our analysis only presumes that the price will decline over the life of the Santa Ana mine, and not that it will decline forever to a price of zero. Using the mean-reverting model we estimated as described in Appendix B, our projected risk-adjusted price for silver after 25 years is $32/oz.[314] In 2011 dollars, that is the equivalent of $16/oz,[315] which is well above the historical silver prices in Figure 4 and not out of line with FTI's own long-term price forecast of $22/oz.[316]

247. FTI notes also that price volatility has increased beginning in the mid-2000 and that our assumption of mean reversion may not reflect this recent shift in commodity markets.[317] An increase in volatility is not equivalent to a change in the underlying nature of the price process. A price process can revert to a long-run mean regardless of whether volatility is high or low. For our valuation analysis, we relied on volatility estimates based on recent spot price data and calibrated our forward curve estimate to market futures prices on the Valuation Date, which reflect market conditions at the time.[318]

F. CLAIMANT'S AMOUNT INVESTED IN THE SANTA ANA PROJECT

248. As an alternative measure of damages, we were asked to calculate the amount invested by Claimant in the Santa Ana project. We calculated Claimant's amount invested in Santa Ana

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312 Peter Svedberg and John E. Tilton, "The *Real,* Real Price of Nonrenewable Resources: Copper 1870-2000," *World Development*, Volume 34(3), 2006, 501-519 (BR-143), p. 501.

313 FTI Reply Report, ¶ 7.75.

314 See Workpaper R-18.

315 See Table 10 in the Santa Ana DCF Model (BR-229).

316 First FTI Report, ¶ 7.47.

317 FTI Reply Report, ¶ 7.74.

318 See Appendix B. To identify rigorously the shift in commodity markets that FTI mention, we performed a statistical test of structural break in the price process and used market price data subsequent to the estimated break point to develop our projections.

by adding cumulative capitalized costs and operating costs that Bear Creek allocated to the Project, which as of June 30, 2011 was $21,827,687.[319]

249. FTI did not dispute that the costs we included were part of the amount invested but stated that we should have included also a portion of the Company's overhead costs, which include management's compensation and general and administrative expenses.[320] We note that among the exploration costs allocated to Santa Ana, Bear Creek included salaries as well as general expenses,[321] which indicates that the Company made its own assessment of what portions of these expenses were sufficiently related to the Project to warrant an allocation.

250. The largest expense item that Bear Creek did not allocate to its projects is "share-based compensation,"[322] which reflects stock options granted to Company employees.[323] Other smaller categories include "professional fees" and "shareholder information and filing fees." Ultimately, whether such indirect costs, which the Company itself did not treat as related specifically to any of its projects, are part of the appropriate compensation for the cost of Claimant's investment in Santa Ana is a legal question.

III. Corani Damages

251. In addition to the FMV of Santa Ana, Claimant asserts that the cancellation of Santa Ana's public necessity declaration has caused an ongoing loss to the value of Corani. Claimant

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319 First Brattle Report, Table 7 and ¶¶ 181-184.

320 FTI Reply Report, ¶ 5.22.

321 See lines "Salaries and consulting" and "Supplies and general" in First Brattle Report, Table 7.

322 Bear Creek Mining Corporation Consolidated Financial Statements, Year Ended December 31, 2011 and 2010 (BR-13), p. 4. Bear Creek Mining Corp., 2010 Annual Report (BR-10), p. 4. Bear Creek Mining Corp., 2009 Annual Report (BR-9), p. 4. Bear Creek Mining Corp., 2008 Annual Report (BR-8), p. 4. Bear Creek Mining Corp., 2007 Annual Report (BR-7), p. 4. Bear Creek Mining Corp., 2006 Annual Report (BR-6), p. 4. Bear Creek Mining Corp., 2005 Annual Report (BR-5), p. 21. Bear Creek Mining Corp., 2004 Annual Report (BR-4), p. 17. Sometimes referred to as "stock-based compensation."

323 Bear Creek Mining Corporation Consolidated Financial Statements, Year Ended December 31, 2011 and 2010 (BR-13), Note 3.b.i.

identified three causes of the loss: an increase in the cost and difficulty of financing Corani, delay, and an increase in the project's risk.[324]

252. FTI quantified this claimed loss based on the movement on Bear Creek's share price on the day immediately following the issuance of the Santa Ana Supreme Decree 032. By focusing on the *immediate* market reaction, FTI's approach fails to capture damages *to date*, which was admittedly its task.[325] FTI's reply does not address this inconsistency.

253. We showed in our first report that, had FTI analyzed Claimant's assertion that Corani was harmed and considered the facts during the subsequent four-year period, it would not have found evidence that the Corani project was harmed.[326] As we discuss in this section, FTI has not addressed our critique substantively. FTI's reply is in large part limited to extensive quotes from Mr. Swarthout's witness statement without any economic analysis on FTI's part. Where FTI adds its own analysis, it is flawed and lacks economic foundation.

A. FTI DOES NOT ADDRESS THE MAIN INCONSISTENCY IN ITS APPROACH

254. We explained in our first report that FTI's method of measuring damages to Corani does not answer the question FTI was asked to answer: what are the damages to Corani *to date* (*i.e.*, more than *four years later*).[327] FTI's method instead reflects the *one-day change* in the market value of Bear Creek following the loss of Santa Ana. It remains unanswered why that change, which of course has not remained static, is relevant to answering the question that was posed.

255. FTI ignores all information that has since emerged. Bear Creek's market value on June 27, 2011 (the first trading date following the issuance of Supreme Decree 032) reflected market expectations held at that time about the value of Bear Creek's projects, and specifically the likely advancement or delays in advancement for Corani. Now, more than four years later, more is known about how those expectations evolved. For example, we showed that the political views of the incoming President, Mr. Humala, were revealed shortly thereafter to be more moderate than feared and that the Government has been supportive of Bear

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[324] First FTI Report, ¶ 2.4; FTI Reply Report, ¶ 8.1.

[325] First Brattle Report, ¶ 31.

[326] First Brattle Report, Sections III.A and III.B.

[327] First Brattle Report, ¶¶ 31, 132, 133.

Creek's efforts to advance Corani.[328] FTI does not explain why these developments, which would reduce any loss FTI claims to measure immediately after Supreme Decree 032 was issued, should be ignored in determining the damages to Corani to date.

B. FTI'S CONCLUSION THAT THE LOSS OF SANTA ANA INCREASED CORANI'S COST OF CAPITAL REMAINS UNFOUNDED IN ECONOMIC THEORY

256. FTI repeats Claimant's assertion that the loss of Santa Ana increased Corani's cost of capital and thereby permanently lowered Corani's value.[329] As in its first report, FTI brings no analysis or evidence of its own to support these statements, although cost of capital analysis is within the expertise of valuation experts. FTI's *only* response to our arguments is to quote Mr. Swarthout and then to state that our conclusions are wrong.[330]

257. We explained above[331] that the cost of capital, *i.e.*, the cost of financing a project, depends on that particular project's risk. This is a fundamental principle of finance and it is not controversial: "*[t]he opportunity cost of capital depends on the use to which that capital is put.*"[332]

258. This principle implies that it is not more costly to finance a project with outside funds than it is to do so with internal funds, which in turn implies that Bear Creek was not harmed by not being able to finance Corani with its own funds (from Santa Ana) rather than outside funds. FTI does not state an open disagreement with this basic principle of finance. FTI instead argues that we "fail[ed] to provide evidence that Bear Creek's opportunity cost of internally generated capital would be greater than the cost of external financing."[333] We base our conclusion on fundamental finance principles. If FTI argues Corani is an exceptional case to which these finance principles do not apply, FTI should provide economic evidence and explain why.

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328 First Brattle Report, ¶¶ 35, 164.

329 FTI Reply Report, ¶ 8.2.

330 FTI Reply Report, ¶¶ 8.15-8.21.

331 See Section II.A.1 above.

332 Brealey, Richard, Stewart Myers and Franklin Allen, Principles of Corporate Finance, 10th ed. (BR-151), p. 214. Emphasis in original. FTI repeats Mr. Swarthout's statement that "[t]o decouple Corani from Santa Ana when discussing cost of capital is naïve and unrealistic." FTI Reply Report, ¶ 8.17. We do not agree that applying well established principles of finance to our work is naïve and unrealistic.

333 FTI Reply Report, ¶ 8.21.

259. FTI states also that the increase in "the gross amount of funds that needed to be raised by Bear Creek … would have the effect of making the terms of potential financing less favourable and overall more expensive for Bear Creek."[334] This statement is in contradiction with the same fundamental finance principle. The risk of a project does not depend on its owner.[335] If due to Santa Ana's cash flows, Bear Creek would have needed to borrow less or issue less equity, then Bear Creek would have borne more of the risk itself. But that would not change the overall risk of the Corani project and therefore would not affect the total cost of financing (whether internal or external). The change of financing source does not create a loss to Bear Creek.[336]

260. Moreover, the net increase in external financing associated with the Santa Ana license cancellation was small, only about 11% of Corani's construction costs.[337] FTI did not address this point directly, but it performed its own calculation concluding that Santa Ana's cash flows would have paid for approximately 24% of Corani's initial capital costs.[338] But FTI's calculation ignores the fact that, by not building Santa Ana, Bear Creek had available the $71 million it had planned to spend on the estimated Sana Ana construction costs.[339]

261. Mr. Swarthout states that he "do[es] not view the unexpected availability of this US$ 71 million as a windfall for Corani" because those funds were intended for use at Santa Ana under the "Use of Proceeds" provision of the equity offering under which the funds were raised.[340] We do not express a legal opinion as to whether Bear Creek could use the $71 million intended for Santa Ana's construction to build Corani. Neither does Mr. Swarthout state unequivocally that it would have been illegal to do so.

262. As a factual matter, since 2011, Bear Creek has used the majority of that cash for purposes other than the construction of Santa Ana. As of December 31, 2015, Bear Creek has cash

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334 FTI Reply Report, ¶ 8.21.

335 Poor *management* of a project could introduce project execution risk and reduce project value. As discussed in Section II.A.1.a, Claimant's view is that Bear Creek's management was experienced and capable of executing the Corani project successfully.

336 We explained this point in more detail in our first report (First Brattle Report, ¶ 156).

337 First Brattle Report, ¶ 159.

338 FTI Reply Report, ¶ 8.20.

339 First Brattle Report, ¶ 159.

340 Swarthout Second WS, ¶ 54.

reserves of $22.7 million, less than a third of the $71 million intended for Santa Ana's construction. As Bear Creek has not returned these funds to investors,[341] and Santa Ana has not been constructed,[342] it is clear that the terms of the equity offering did not prevent Bear Creek from using the proceeds for other purposes, including to advance Corani.[343]

C. FTI'S CONCLUSION THAT THE DELAY TO CORANI WAS RELATED TO SANTA ANA REMAINS UNPROVEN

263. There is no dispute that the Corani project has been delayed relative to the timeline projected in the 2011 Feasibility Study.[344] As of 2016, the Corani mine has not been built, even though projections in the Corani 2011 FS were that production would start at the end of 2014.[345] Bear Creek attributes the delay to being unable to obtain financing as a result of the loss of cash flows from operating Santa Ana and increased risk related to Corani, which FTI assumes was anticipated by the market immediately after Santa Ana's public necessity declaration resulted in the revocation of the Santa Ana license.[346] We discussed two reasons why it is unlikely that the loss of Santa Ana was related to delay, and thus to claimed damages, for Corani.

264. First, we pointed out that both immediately after the revocation of Santa Ana's license and up to two years later, Bear Creek made repeated public statements that Corani was unaffected by the inability to pursue the Santa Ana Project. On June 27, 2011 Mr. Swarthout stated that "we don't see the timeline as affected … So I would say our 2014 goal

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341 Bear Creek has not repurchased shares since 2011 (As of November 19, 2015, Bear Creek Mining had 93.1 million outstanding common shares. Bear Creek Mining Corp. Management Discussion and Analysis, 9 months ended September 30, 2015 (BR-170), p. 24. The 2011 Annual Report states that as of December 31, 2011, there were 92.1 million outstanding shares. Bear Creek Mining Corporation Consolidated Financial Statements, Year Ended December 31, 2011 and 2010 (BR-13), p. 6.) and has not paid dividends. See Bloomberg Screenshot of Bear Creek Mining dividends (BR-217).

342 Bear Creek's financial statements show that after the license cancellation, Bear Creek has spent $3.1 million in exploration costs related to Santa Ana, primarily reflecting legal expenses. See Workpaper R-13.

343 Between June 30, 2011 and December 31, 2015, Bear Creek incurred $47.6 million in Corani exploration costs. See Workpaper R-13.

344 First Brattle Report, ¶ 137.

345 Corani 2011 FS (C-66), Figure 24-1.

346 FTI's measure of damages is based on the change in Bear Creek's stock price between May 27 and June 27, 2011. It is not influenced by any subsequent developments. First FTI Report, ¶ 6.5.

is still valid."[347] In April 2013, Bear Creek stated that "Corani remains on schedule for production in 2015,"[348] and as late as May 2014, Bear Creek declared that "[w]e have Corani moving forward totally uninterfered by this Santa Ana process."[349]

265. These statements indicate that Bear Creek did not anticipate delays to Corani's schedule as a result of the Santa Ana developments in June 2011.[350] Yet Mr. Swarthout asserts that unlike Bear Creek, the market anticipated the delay.[351] FTI's reply provides no comment on this contradiction.

266. Second, we noted that the Company's decision to pursue an updated feasibility study (released in June 2015) has resulted in delays which cannot be attributed to the loss of Santa Ana.[352] This decision occurred after commodity markets, including silver, had worsened substantially, and we explained that undertaking optimization strategies is common for mining companies when markets become unfavorable.[353] The updated feasibility study work in turn required modifications to the Environmental Impact Assessment (EIA) study, which had been approved by Peru in September 2013.[354] Bear Creek only submitted the modifications for approval in December 2015 and received approval in January 2016.[355]

267. Bear Creek states that the work documented in the 2015 updated feasibility study was part of recommended optimization strategies identified by the Corani 2011 feasibility study and

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347 Transcript of Bear Creek Mining Corp. Special Call, Monday, June 27, 2011 (BR-133), p. 7.

348 "Bear Creek announces positive Corani public hearing and life of mine community investment agreements; Large scale silver project on track for approval," SEDAR, April 15, 2013 (BR-80), p. 1.

349 First Brattle Report, ¶¶ 140-143, quoting Bear Creek Mining Corp, "Special Call," May 14, 2014 (BR-134), p. 7.

350 Mr. Swarthout interpreted our reference to his statements as a suggestion that these statements could be in violation of Canadian securities laws (Swarthout Second WS, ¶ 48). It was not. We referred to the Company's disclosure obligations to show that there is no reason to believe those statements were inaccurate, which means Bear Creek did not anticipate a delay to Corani after Santa Ana was cancelled.

351 Swarthout Second WS, ¶ 48.

352 First Brattle Report, ¶ 138.

353 First Brattle Report, ¶ 139.

354 First Brattle Report, ¶¶ 138, 142.

355 "Bear Creek Mining Provides an Update on Corporate Activities," SEDAR, January 27, 2016 (BR-171).

it was undertaken independent of market conditions.[356] However, additional technical studies like the 2015 feasibility study were *not* contemplated in the 2011 feasibility study or in the accompanying press release.[357] Mr. Swarthout stated at that time that "[t]he ESIA is the final piece in taking the project to a bankable feasibility study level."[358] Mr. Swarthout's witness statement states similarly that "[i]n my experience working on mining projects in Peru and in other countries, *once a company has completed the Feasibility Study and obtained the ESIA*, it has a bankable mining project."[359] By September 2013, when Corani's EIA was approved, both elements were in place. Conducting an updated feasibility study, as Bear Creek chose to do in 2014, was not part of the development plan in place in 2011.

D. SELLING CORANI TO MITIGATE CLAIMED LOSSES WOULD NOT HAVE BEEN A FORCED SALE

268. Claimant's main explanation for the damages to Corani calculated by FTI is that not being able to develop Santa Ana affected Bear Creek's ability to raise capital and increased the cost of financing. This effect does not apply to other potential owners of Corani. Had Bear Creek sold Corani, it would not have had to bear this claimed loss of value.[360]

269. FTI states that "if Corani was sold by Bear Creek … the realized price would be depressed; there is no motivation for a buyer to pay forced sellers full price in forced sale scenarios."[361] FTI misunderstands what a forced sale is. What defines a forced sale is the short amount of time in which the seller must liquidate the asset. Consider the following textbook explanation of the requirement that FMV must reflect a transaction in which neither party is compelled to trade:

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356 Swarthout Second WS, ¶ 46.

357 Corani FS 2011 (C-66). "Bear Creek Announces Corani Feasibility Study: Positive economics including low cash costs," SEDAR, November 9, 2011 (BR-173).

358 "Bear Creek submits Corani ESIA; silver project on track for approval," SEDAR, December 11, 2012 (BR-172).

359 Swarthout Second WS, ¶ 40.

360 First Brattle Report, ¶ 153 and fn. 148. This was the point of our tomato farm example (First Brattle Report, ¶ 154), which Mr. Swarthout found offensive (Swarthout Second WS, ¶ 51). We did not intend to suggest that Santa Ana was comparable to a tomato farm. Our example was meant to illustrate that an asset's market value reflects its optimal use and not necessarily its current use. For Santa Ana, that means it reflects its value to an owner who does have adequate access to finance.

361 FTI Reply Report, ¶ 8.31.

> Neither party being compelled to act suggests a time-frame context – that is, the time frame for the parties to identify and negotiate with each other is such that, whatever it happens to be, it does not affect the price at which a transaction would take place. In addition, this suggests this is not a forced transa9 ction such as might be compelled by a court or government agency.[362]

270. Bear Creek's sale of Corani would not have been a forced sale. As is clear, Bear Creek has had the liquidity necessary to continue developing Corani, having spent $47.6 million in development costs since 2011.[363] Had it decided to sell Corani, it would have had ample time to market the project appropriately, allow potential buyers to conduct due diligence, and conduct an orderly sale. There is no basis for FTI's conclusion that an arm's length sale of Corani would have resulted in a price below its FMV.

E. FTI'S ARGUMENT THAT THE MARKET'S PERCEPTION OF CORANI RISK WAS SUBSTANTIALLY AFFECTED BEYOND THE IMMEDIATE AFTERMATH OF THE LOSS OF SANTA ANA IS INCORRECT AND MISLEADING

271. Bear Creek asserts that the revocation of Bear Creek's right to develop Santa Ana increased the market's perception of the risk of the Corani project and thereby lowered the latter's value permanently.[364] FTI claims that we did not address its concern that an increase in market's perception of the risk of similar government action against Corani reduced Corani's value.[365] This is incorrect. We acknowledged that such an effect was possible and if it occurred it would have resulted in a loss to Bear Creek.[366] The question is whether any such effect has been shown to have occurred (which we are advised Bear Creek has the burden of proving). FTI relied exclusively on the testimony of Mr. Swarthout to assert this effect resulted in a loss to Corani's value.

272. To evaluate whether this claimed increase in market risk perception occurred and persisted, we analyzed two pieces of evidence:

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362 Holthausen, Robert W. and Mark E. Zmijewski, *Corporate Valuation: Theory, Evidence & Practice* (Cambridge Business Publishers, 2014) (BR-150), p. 5 (emphasis added).

363 As of September 30, 2015. See Workpaper R-13. As of September 30, 2015, Bear Creek Mining had additional liquidity of $22.7 million in cash and marketable securities. Bear Creek Mining Corp. Management Discussion and Analysis, 9 months ended September 30, 2015 (BR-170), p. 23.

364 Swarthout WS, ¶ 46.

365 FTI Reply Report, ¶ 8.36.

366 First Brattle Report, ¶ 160.

a. Whether or not there are similarities between Corani and Santa Ana that could have resulted in Peru taking similar steps with respect to Corani, and

b. The stock market reaction to the issuance of the Santa Ana decree.

273. With respect to the former, we noted that social opposition, which led to the Government's action regarding Santa Ana, apparently did not exist at Corani, making a link between the two projects tenuous.[367] Neither was Corani within the 50-km border zone that subjected it to the need for a special declaration of public necessity to operate.[368] Bear Creek's own management repeatedly emphasized the lack of a connection between Corani and Santa Ana.[369]

274. In their replies, neither FTI nor Mr. Swarthout reconciles Claimant's position that Corani's risk increased with the Company's previous public statements that Corani was unaffected by the events at Santa Ana. Indeed, Mr. Swarthout confirms that in one of those statements he was specifically referring to the lack of social opposition at Corani.[370] Mr. Swarthout's reply testimony states however that "it is irrelevant that social opposition has not existed with respect to Corani."[371] That cannot be correct: if social opposition did not exist at Corani, then there would be little reason for the market to expect a higher chance of adverse government action in response to social opposition at that project.

275. FTI seems to downplay the risk of social opposition at Corani and complains that we "focus[ed] entirely on the expropriation element, ignoring the other knock-on effects that the loss of Santa Ana would have on Bear Creek's plans for Corani's development."[372] The knock-on effects FTI refers to are the claimed impact on obtaining financing for Corani.[373] We did not ignore those effects – they are addressed in our first report,[374] and Sections III.B and III.C in this report discuss FTI's reply concerning these effects.

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367 First Brattle Report, ¶ 161.

368 First Brattle Report, ¶ 161.

369 First Brattle Report, ¶ 162.

370 Swarthout Second WS, ¶ 48.

371 FTI Reply Report, ¶ 8.32.

372 FTI Reply Report, ¶ 8.36.

373 FTI Reply Report, ¶¶ 8.37-8.38.

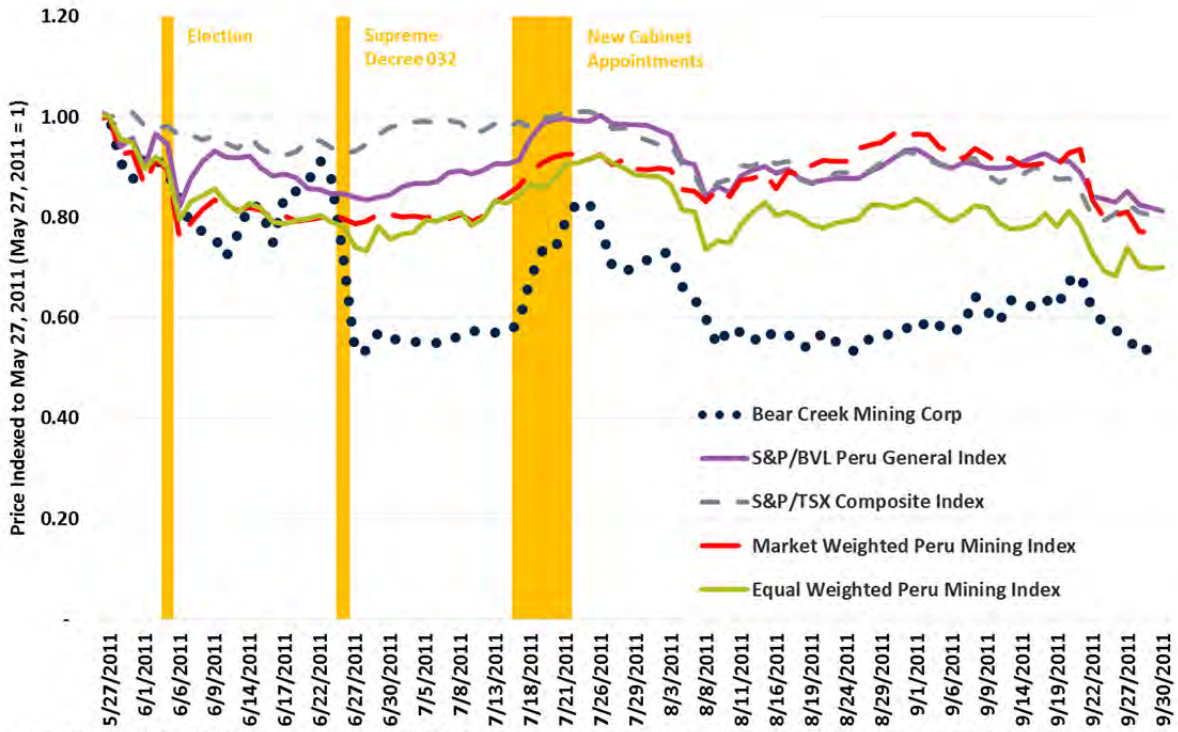
374 First Brattle Report, ¶¶ 136, 152-159.

276. The second piece of evidence we analyzed was the market reaction to the Santa Ana decree. We showed that although the market's reaction was negative, both as reflected in Bear Creek's share price and in the share price of other foreign mining companies with projects in Peru, that reaction was short-lived. FTI looked only at the share price impact on the single day immediately following the issuance of the decree. But within a month, during which the uncertain political situation that followed the election of President Humala was clarified by his choice of a moderate cabinet, the reaction was reversed.[375] FTI's calculation of damages ignores this reversal.

277. Figure 5 below reproduces Figure 6 in our first report, which shows the short-term negative reaction after the second vertical yellow bar, and the subsequent reversal, ending once the new cabinet was announced during the period indicated by the third vertical yellow portion. Bear Creeks' share price is indicated by the dotted blue line. The dashed red and continuous green lines show the evolution of an index of mining companies with projects in Peru. They all show the same pattern: an immediate negative reaction (larger for Bear Creek, of course, because it could no longer pursue Santa Ana), followed by an increase that accelerated during the week when the new cabinet was formed.

[375] First Brattle Report, ¶ 35.

Figure 5. Bear Creek's Share Price vs. Market Indicators (Indexed to May 27, 2011)



Source: Bloomberg. The Peru Mining Index/Market Weighted Peru Mining Index are calculated based on the equal-weighted average return/ market capitalization-weighted average return of 16 publicly traded companies that own assets exclusively in Peru (excluding Bear Creek). For index calculation and selection of constituents, see Workpapers 5 and 10.

278. FTI states that our conclusion that the reversal was temporary is unsupported because, after the recovery, Bear Creek's share price dropped again.[376] FTI overlooks however that the decrease it points to, starting shortly after the new cabinet was appointed, reflected an overall market decline. As Figure 5 shows, all indices we considered, including the S&P/TSX Composite (dashed blue line) and the S&P/BVL Peru General Index (continuous purple line) experienced a decline at that time.

279. To see this more clearly, Figure 6 plots Bear Creek's price and several market indicators (those in Figure 5 plus others FTI suggested as more relevant) starting from July 21, 2011, the end of the period highlighted yellow in Figure 5.[377] By then, the new cabinet was formed and Bear Creek's share price had experienced a reversal of the initial drop,

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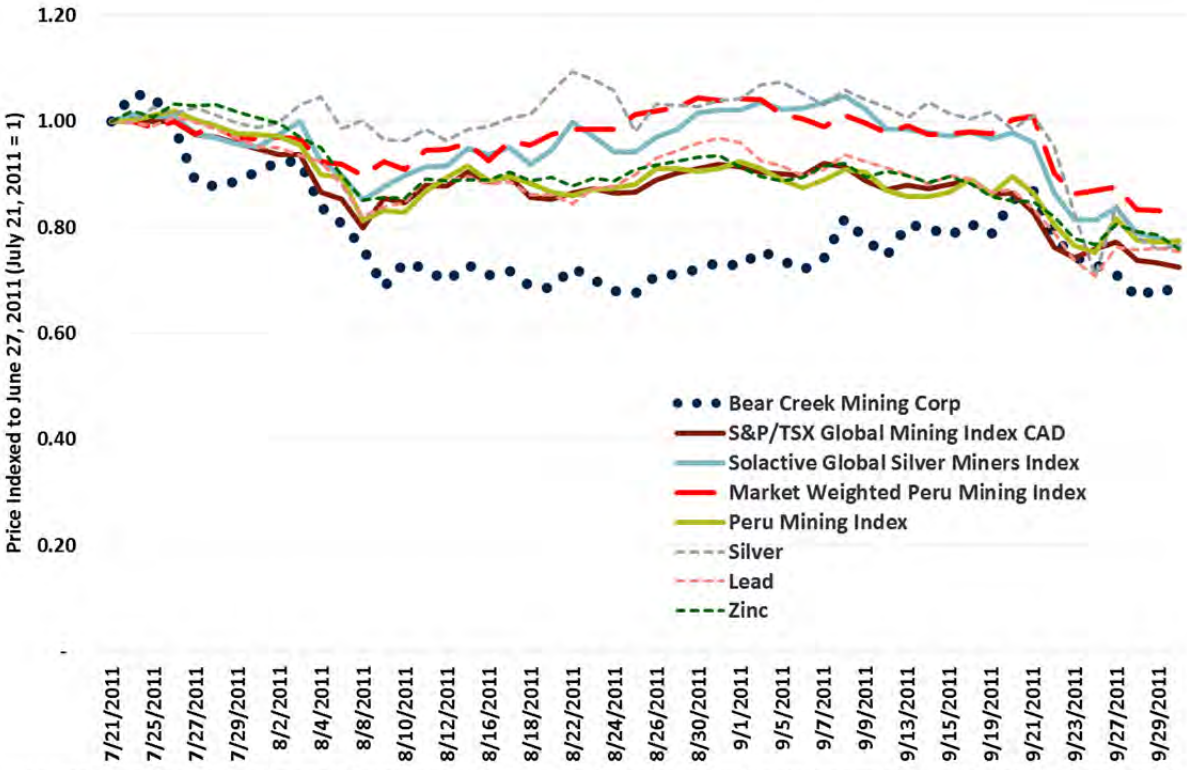
[376] FTI Reply Report, ¶ 8.41.

[377] FTI prefers the TSX Global Mining Index to benchmark its calculations (FTI Reply Report, ¶ 8.42). We added also an industry index specific to silver, the Solactive Global Silver Miners Index, as well as the spot price of zinc and lead, the two primary metals at Corani in addition to silver.

consistent with a reduction in the uncertainty about the political regime and the impact broader impact of the Santa Ana events. FTI says the reversal was short-lived, because, from this point onward, Bear Creek's share price fell. It did, but as Figure 6 shows, so did all the other market indices. The slightly larger drop in Bear Creek's share price over the period is consistent with its share price being more volatile than an index, as would be expected since the index reflects the average of multiple stocks with partially offsetting variations in price. Similarly, because of operational leverage (a 1% drop in revenues results in more than 1% drop in profits), it is not surprising that the market value of Corani fell by more than the price of silver, zinc, or lead.

Figure 6. Bear Creek's Share Price vs. Market Indicators (Indexed to July 21, 2011)



Source: Bloomberg. The Peru Mining Index is the calculated based on the equal-weighted average return of 16 publicly traded companies that own assets exclusively in Peru. For index calculation, see Workpaper 2 in the First Brattle Report.

280. In any event, simply looking at the change share price between June 27, 2011, the date on which FTI's calculation stopped, and September 30, 2011, the end of this series, also confirms that Bear Creek's share price outperformed market indices (*i.e.*, it regained the initial loss experienced on June 27, 2011). Table 5 shows the change in several market indicators related to Bear Creek's value: FTI's preferred index, the TSX Global Mining, fell by 21%; zinc and lead prices fell by 18% and 21% respectively; silver price fell by 10%; an

index of global silver mining firms fell by 8%. In contrast, Bear Creek's share price remained unchanged. The reversal of the initial drop is clear – had there been no reversal, Bear Creek's share price would have been much lower.

Table 5. Change in Price between June 27, 2011 and September 30, 2011

Market Indicator	Unit	6/27/2011	9/30/2011	Percent Change
Bear Creek Mining Corp	$	3.8	3.8	0%
S&P/TSX Global Mining Index		114.1	90.5	-21%
Solactive Global Silver Miners Index		175.4	162.2	-8%
Lead	$/MT	2,555	2,019	-21%
Zinc	$/MT	2,229	1,838	-18%
Silver	$/oz	34.0	30.5	-10%

Source: Bloomberg, L.P.
Represents change in price between 6/27/2011 and 9/30/2011.

281. FTI uses the same market change data and attempts to prove the contrary (*i.e.*, that the loss of value reflected in Bear Creek's share price exceeded that associated with market changes) by focusing on the change between May 27 and September 30, 2011.[378] In a section titled "[t]he reduction in value to Corani was more pronounced than any of the market indicators," FTI highlights that Bear Creek's share price fell by more than these market benchmarks during that period.[379] But comparing Bear Creek's share price on May 27, when it still owned Santa Ana, with Bear Creek's share price on September 30, when it did not, and claiming that the decline reflects the "reduction in value to Corani" is incorrect and misleading. Of course the share price fell once Bear Creek lost the opportunity to pursue one of its two principal assets. But FTI is quantifying that loss *separately* at $224 million. It defies reason that FTI suggests the decline in Bear Creek's value since May 27, 2011 reflects *only* the loss of value to Corani.

282. FTI suggests also that Bear Creek's current low share price, which implies an enterprise value $18.1 million, is itself evidence that the Corani project was harmed by the Santa Ana

[378] FTI Reply Report, ¶¶ 8.43-8.45, Figures 10 and 11.

[379] FTI Reply Report, pp. 94-95. Mr. Swarthout makes reference to a similar calculation (Swarthout Second WS, ¶ 57).

events.[380] Bear Creek's main asset at the moment is the Corani project, so its market value is indeed low. Not only has the project lost value due to declining silver, zinc, and lead prices since 2011 (which is not related to the Santa Ana events), but the additional work reflected in the updated Corani 2015 Feasibility Study did not resolve the main project risk identified by prior work: because zinc and lead head grades at Corani are very low, obtaining saleable concentrates is uncertain.[381] There is no substantive reason related to the Santa Ana events why Bear Creek could not have sought to resolve the issues in its updated Feasibility Study. It is our opinion that the drop in Bear Creak's share price has occurred because markets are growing increasingly concerned about Bear Creek's reluctance to resolve these technical issues at Corani and discount Corani substantially on this account.

F. FTI's Calculations of Damages for Corani and Santa Ana Remain Inconsistent

283. Unlike its valuation of Santa Ana, FTI's calculation of damages to Corani relies on Bear Creek's share price. Specifically, FTI starts with Bear Creek's EV on May 27, 2011, apportions it to the two projects, and then measures the change in the market value of Corani until June 27, 2011 after excluding the effect of overall market changes between those dates.[382] This estimated change in market value of Corani is FTI's measure of damages to Corani as a result of the events that transpired between May 28, 2011 and June 27, 2011.[383] As we noted, by ignoring developments subsequent to June 27, 2011, this measure is not relevant to the question of the claimed ongoing harm to Corani.

284. We noted in our first report that FTI's reliance on Bear Creek's share price to measure the change in Corani's market value was inconsistent with its view that the same share price had no relevance to the market value of Santa Ana.[384] A consistent view would have resulted in a substantially lower total damages claim, even assuming, incorrectly, that

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380 FTI Reply Report, ¶ 8.9.

381 First SRK Report, ¶ 108; SRK Reply Report, Section 3.4.2.

382 First FTI Report, ¶¶ 8.4-8.12; First Brattle Report, ¶ 175.

383 Supreme Decree 032 was issued on Friday, June 24, 2011. June 27, 2011 is the following trading date.

384 First Brattle Report, ¶ 178.

damages to Corani should be measured based on the one-day market reaction to the Santa Ana events.[385]

285. FTI's reply does not resolve this inconsistency. FTI again states that Bear Creek's share price did not reflect either Santa Ana or Corani's FMV on any of those dates. Therefore, it stands by its DCF estimate for Santa Ana. For Corani FTI states it had no better measure so it had to rely on the change in share price as the only "objective" measure of the drop in Corani's value and "the best estimate with the information available at the time of writing."[386] Having devoted considerable effort to discredit the relevance of share prices, including because they are determined by trading among uninformed and irrational investors who trade on sentiment rather than information,[387] FTI still attempts to rely on the actions of those same traders to support a $170 million claim of damages for Corani. FTI's position remains internally inconsistent.

286. Of course, the premise of FTI's approach is incorrect because Bear Creek's share price did reflect the FMV of both Santa Ana and Corani. We explained in Section II.A why FTI's arguments to the contrary are flawed. Under this view, there is no inconsistency. The substantial fall in Bear Creek's share price on June 27, 2011 reflects Santa Ana's market value and a reduction in Corani's market value due to the immediate concern about possible broader implications of the Santa Ana events in the context of an uncertain political environment. As Figure 5 shows,[388] the drop in Corani's market value was temporary and disappeared once that uncertainty was resolved and additional information became available.

IV. Pre-Award Interest

287. FTI calculated pre-award interest at a 5% annual rate on a compound basis based on a stated instruction from Claimant's counsel that "the applicable legal interest rate for

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385 First Brattle Report, ¶ 177.

386 FTI Reply Report, ¶¶ 8.10, 8.55-8.56.

387 FTI Reply Report, ¶¶ 6.41-6.48.

388 See also First Brattle Report, ¶¶ 167-170 and Section III.E in this report.

judgments in Peru is determined based on a reference rate published by the Central Reserve Bank of Peru."[389]

288. We showed in our first report that FTI selected the 5% rate based on the Central Bank reference rate *in Peruvian currency* and applied it to an award *in U.S. dollars*.[390] Correcting this elementary mistake by using the U.S. dollar reference rate from the same source would have lowered FTI's pre-award interest rate from 5% to 1.2% (LIBOR + 1%).[391] FTI does not dispute that its selected reference interest rate was erroneous,[392] yet it fails to correct its calculations. FTI now claims that the 5% rate is consistent with Respondent's and Claimant's cost of borrowing.[393]

289. We showed also in our first report that FTI's 5% rate was inconsistent with Claimant's "forced loan" theory of pre-award interest, under which the appropriate rate reflects Respondent's credit risk.[394] We explained that an appropriate application of the forced loan theory relies on short-term rates. Credit risk is measured from the market prices of credit default swaps (CDS) on Peruvian sovereign bonds. Using these inputs, we calculated the average annual pre-award interest through the date of our first report at 0.65%, which corresponds to a cumulative interest factor of 2.79% of the award amount.[395] As of March 31, 2016, the updated average annual pre-award interest rate is 0.72%, and the cumulative interest amount is 3.48% of the award amount.[396]

290. FTI states that the rate we calculated is "not consistent with Peru's actual borrowing costs in USD."[397] To support this statement, FTI provides three arguments. None of them proves that the rate we calculated is inappropriate.

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389 First FTI Report, ¶ 9.3.

390 First Brattle Report, ¶ 197.

391 First Brattle Report, ¶ 197.

392 The FTI Reply Report does not address our critique at all.

393 FTI Reply Report, ¶ 9.14.

394 First Brattle Report, ¶ 196.

395 First Brattle Report, fn. 190, ¶ 189.

396 See Workpaper R-14, column H, interest factor of 1.0348 as of March 23, 2016.

397 FTI Reply Report, ¶ 9.5.

291. First, FTI uses our correction to FTI's reference rate calculation, which yields a rate of approximately 1.2% based on a 1% spread above one-month LIBOR, to suggest that Respondent's borrowing cost should be higher than the rate we calculated.[398] FTI's inference is flawed. The Peruvian Central Bank describes the reference rate used by FTI as a rate for "monetary regulation credit."[399] It is not clear, and FTI does not explain, why it would provide a benchmark for Peru's cost of borrowing.

292. Second, FTI references the "Respondent's EMBI spread," which was 2% in June 2011, as a benchmark for Peru's credit risk spread. FTI suggests that Peru's cost of borrowing would be at least 2% higher than the equivalent risk-free borrowing rate.[400] The JP Morgan EMBI+ index reflects the average yield on sovereign bonds of various maturities, according to a proprietary formula. As we explained in our first report, and FTI has not disputed, the relevant rates for calculating pre-award interest are short-term rates because they reflect credit risk without including also interest rate or inflation risk, which are not related to Respondent's credit.[401] Using short-term rates, updated monthly, as we did, tracks how interest rates and credit risk evolves over time between the expropriation date and the award date. The EMBI+ index at the date of expropriation is not the relevant measure of credit risk for pre-award interest because it does not reflect short-term credit instruments.

293. Third, FTI points to the coupon rates and yields on long-term bonds issued by Peru, which were higher than the rate we calculated, and suggests that the relevant measure of Peru's cost of borrowing is the average yield on its outstanding bonds or the coupon rate on Peru's most recently issued bond.[402] Again FTI is incorrect and misleading.

294. The sovereign bonds referenced by FTI are primarily long-term bonds, maturing as far out as 2050. As discussed above, FTI does not dispute that the appropriate rates used for pre-award interest are short-term rates. FTI's inclusion in its average yield of bonds with maturities of 39 years, or 26 years, for example, such as the Peru Global 50 and Peru Global 37, is without basis. To justify its 5% assumed pre-award interest rate, FTI calculates the

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398 FTI Reply Report, ¶ 9.6.

399 First Brattle Report, ¶ 197 and fn. 196.

400 FTI Reply Report, ¶ 9.7.

401 First Brattle Report, ¶ 186.

402 FTI Reply Report, ¶¶ 9.8-9.9.

average yield on eight Peru bonds, seven of which have maturities in excess of one year, and four of which have maturities in excess of ten years.[403] The average maturity of those bonds, calculated using the same weights FTI used to calculate the average yield, is 18.5 years.[404] There is no justification for calculating pre-award interest at these long-term rates.

295. Finally, FTI suggests that the 5% rate it used can be justified because it is close to Claimant's cost of borrowing as estimated by FTI.[405] Claimant's borrowing cost is inconsistent both with Claimant's theory of interest, which is based on *Respondent's* cost of borrowing, and with Claimant's counsel's instruction to FTI to use a Peruvian Central Bank reference rate.

296. Claimant's cost of borrowing reflects the risk of Claimant's investments,[406] which as FTI acknowledges, do not include commercial loans.[407] FTI's inference that if Bear Creek did extend loans, it would do so at a rate exceeding its cost of borrowing as a mining company[408] is flawed. If Bear Creek was in the business of extending commercial loans, its borrowing cost would reflect the risk of commercial lending, which is different from that of mining. And if it extended loans to Respondent, then that cost would be Respondent's cost of borrowing. The average cost of borrowing across a group of mining companies, which is how FTI estimated Bear Creek's cost of borrowing, has nothing to do with Respondent's cost of borrowing.

297. We presented also a calculation of pre-award interest based on the risk-free rate, which is consistent with a legal view that compensation for risk is not appropriate.[409] That

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403 FTI Reply Report, Figure 12.

404 See Workpaper R-15.

405 FTI Reply Report, ¶¶ 9.14, 9.15.

406 In fact, Bear Creek had no debt outstanding and FTI estimated its borrowing cost based on the borrowing cost of other mining companies. To be precise, the cost of borrowing depends on the risk of a company's investment and on the company's capital structure, which dictates how that risk is shared between equity and debt holders.

407 FTI Reply Report, ¶ 9.14.

408 FTI Reply Report, ¶ 9.14.

409 First Brattle Report, Section V.B.

calculation, updated to March 23, 2016, yields a total interest amount equal to 0.92% of the award amount.[410]

298. FTI objects that the risk-free rate is not a commercial rate of interest because it is not the rate at which "either the Claimant or Respondent could issue debt to arm's length parties."[411] The rate is commercial because it is determined in the market by buyers and sellers of U.S. Treasury instruments. These buyers and sellers include commercial entities and the price reflects the demand and supply of riskless assets in financial markets.

299. We agree that neither Claimant nor Respondent could borrow at the risk-free rate. We did not present the risk-free rate as such. As we explained, whether compensation for risk should be awarded rests on one's view as to whether compensation for bearing litigation risk is consistent with the legal premise of a defendant's presumption of innocence.[412] The article by Franklin Fisher and Craig Romaine that we quoted[413] argues that if liability is thought to arise only at the time a decision is rendered (not before), then the only compensation that should be reflected in pre-award interest is for the time value of money. In contrast, if the liability is thought to arise at the time of the harm, then compensation for risk between the harm and the award is appropriate.[414] The appropriate legal view in this case is a matter for the Tribunal.

Date: 13 April 2016

Graham A. Davis

Florin A. Dorobantu

410 See Workpaper R-14, column G, interest factor 1.0092 as of March 23, 2016.

411 FTI Reply Report, ¶¶ 9.12-9.13.

412 First Brattle Report, ¶ 192.

413 First Brattle Report, ¶ 192.

414 However, once the award is rendered, liability has been established under either theory and post-award interest should reflect compensation for risk.

Appendix A. Materials Relied On

A-1. Exhibits to the First Brattle Report

BR-2 Bear Creek Mining Corp., 2013 Management's Discussion and Analysis

BR-4 Bear Creek Mining Corp., 2004 Annual Report

BR-5 Bear Creek Mining Corp., 2005 Annual Report

BR-6 Bear Creek Mining Corp., 2006 Annual Report

BR-7 Bear Creek Mining Corp., 2007 Annual Report

BR-8 Bear Creek Mining Corp., 2008 Annual Report

BR-9 Bear Creek Mining Corp., 2009 Annual Report

BR-10 Bear Creek Mining Corp., 2010 Annual Report

BR-12 Bear Creek Mining Corp., Interim Consolidated Financial Statements, Six Months Ended June 30, 2011

BR-13 Bear Creek Mining Corporation Consolidated Financial Statements, Year Ended December 31, 2011 and 2010

BR-80 "Bear Creek announces positive Corani public hearing and life of mine community investment agreements; Large scale silver project on track for approval," SEDAR, April 15, 2013

BR-81 CIM Definition Standards for Mineral Resources and Mineral Reserves, Prepared by the CIM Standing Committee on Reserve Definitions, Adopted by CIM Council on November 27, 2010.

BR-112 S&P Capital IQ, Bear Creek Mining Corp. Public Ownership History, June 30, 2011

BR-123 Samis, Michael, Graham A. Davis, David Laughton, and Richard Poulin, "Valuing uncertain asset cash flows when there are no options: A real options approach," *Resources Policy* 30 (2006)

BR-126 Robicheck, Alexander A., and Stewart C. Myers, "Conceptual Problems in the Use of Risk-Adjusted Discount Rates," The Journal of Finance, Vol. 21, No. 4 (1966), pp. 727-730

BR-133 Transcript of Bear Creek Mining Corp. Special Call, Monday, June 27, 2011

BR-134 Bear Creek Mining Corp, "Special Call," May 14, 2014

A-2. ADDITIONAL BRATTLE EXHIBITS

BR-143 Peter Svedberg and John E. Tilton, "The *Real,* Real Price of Nonrenewable Resources: Copper 1870-2000," *World Development*, Volume 34(3), 2006, 501-519

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BR-151 Brealey, Richard, Stewart Myers and Franklin Allen, Principles of Corporate Finance, 10th ed.

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BR-155 CIMVal, Answers Submitted October 22, 2012 in Response to Questions in the IVSC Discussion Paper – Valuation in Extractive Industries

BR-156 Rachel Davis and Daniel Franks, "Costs of Company-Community Conflict in the Extractive Sector" Corporate Social Responsibility Initiative Report No. 66, 2014.

BR-157 Spence, K. "Canadian Standards and Guidelines for Valuation of Mineral Properties – An Update"

BR-158 Adam Graf, CFA, "Valuation Methodology – An Overview," Cowen Equity Research, May 2014

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BR-161 "RPA's Graham Clow: Red flags investors should heed," The Northern Miner, November 2014

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BR-164 Monkhouse, Peter H.L., "The Costs and Benefits of Part IIIA," Presented at the Australian Competition and Consumer Commission, July 26, 2007

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BR-167 Graeme, Guthrie. *Real Options in Theory and Practice* (Oxford University Press, 2009)

BR-168 Bear Creek Mining Corp. Consolidated Financial Statements, December 31, 2012 and 2011

BR-169 Bear Creek Mining Corp. Management Discussion and Analysis, year ended December 31, 2014

BR-170 Bear Creek Mining Corp. Management Discussion and Analysis, 9 months ended September 30, 2015

BR-171 "Bear Creek Mining Provides an Update on Corporate Activities," SEDAR, January 27, 2016

BR-172 "Bear Creek submits Corani ESIA; silver project on track for approval," SEDAR, December 11, 2012

BR-173 "Bear Creek Announces Corani Feasibility Study: Positive economics including low cash costs," SEDAR, November 9, 2011

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BR-178 "Humala Plantea Siete Nuevos Impuestos," Peru 21, May 2, 2011

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BR-183 "The Distillery: Mining qualms," Business Spectator, June 7, 2011

BR-184 "A Quick Explanation for why the Peruvian Election has Investors Freaking Out," Business Insider, June 7, 2011

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BR-188 "Peruvian mining stocks plunge after leftist Humala wins presidency," Northern Miner, June 13, 2011

BR-189 "Party of Former Peruvian Leader Will Support President-Elect's Windfall Tax Proposal in Congress," IHS Global Insight, June 14, 2011

BR-190 "New Peru tax should only apply to profits – miners," Reuters News, June 15, 2011

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BR-203 "No Lesser Evil," The Economist, June 2, 2011

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BR-206 "Controversial Spanish mine to reopen," The Guardian, February 25, 2011

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BR-213 Banco Central de Reserva del Peru, Weekly Economic Report, May 27, 2011

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BR-216 SUNAT, compendio_tasas_impositivas.xls, Annex 01, retrieved from <http://www.sunat.gob.pe/estadisticasestudios/principales_tasas/compendio_tasas_impositivas.xls >, accessed 4/13/2016

BR-217 Bloomberg Screenshot of Bear Creek Mining dividends

BR-218 Native Excel file underlying Appendix B of the First RPA Report

BR-219 SRK Extended Life Projections

BR-220 Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2014 and 2013

BR-221 Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2013 and 2012

BR-222 Bear Creek Mining Corporation Interim Condensed Consolidated Financial Statements, Nine Months Ended September 30, 2015 and 2014

BR-223 Real Options Articles based on JStor Search

BR-224 Zivot, Eric, and Donald W.K. Andrews (1992), "Further Evidence on the Great Crash, the Oil Price Shock, and the Unit Root Hypothesis," *Journal of Business & Economic Statistics* 10(3): 251-270

BR-225 Tang, Cheng Yang, and Song Xi Chen (2009), "Parameter Estimation and Bias Correction for Diffusion Processes," *Journal of Econometrics* 149(1): 65-81

BR-226 Ball, Clifford A., and Walter N. Torous (1996), "Unit Roots and the Estimation of Interest Rate Dynamics," *Journal of Empirical Finance* 3(2): 215-238

BR-227 Yu, Jun, and Peter C. B. Phillips (2001), "A Gaussian Approach for Continuous Time Models of the Short-term Interest Rate," *The Econometrics Journal* 4(2): 210-224

BR-228 Phillips, Peter C. B. (1972), "The Structural Estimation of a Stochastic Differential Equation System," *Econometrica*, 40(6): 1021-1041

BR-229 Santa Ana Modern DCF Model

BR-230 Corani Modern DCF Model

A-3. FTI EXHIBITS

FTI-4 *CIMVal Standards and Guidelines for Valuation of Mineral Properties*, Prepared by the CIM Special Committee of the Canadian Institute of Mining, Metallurgy, and Petroleum on Valuation of Mineral Properties, February 2003

FTI-47 Republic of Peru, Ministry of Economy and Finance, General Bureau of Public Debt and Treasury, Bureau of Analysis and Strategy, Daily Report, June 23, 2011

FTI-55 Paradigm, "June 8, 2011 Report"

FTI-56 Canaccord, "June 7, 2011 Report"

FTI-65 Mergerstat, "Control Premium Study 1st Quarter 2011"

A-4. RPA EXHIBITS

RPA-Santa Ana-18 Santa Ana Financial Model

RPA-Santa Ana-19 InfoMine, 2011, Mine Cost Services, Cost Models Section

RPA-Corani-7 Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx

RPA-Reply-21 SNL Mining News – La Arena Work History

A-5. CLAIMANT'S EXHIBITS

C-61 Bear Creek Mining Corporation Revised Feasibility Study Santa Ana Project – Puno, Peru NI 43-101 Technical Report Update to the 21-Oct-2010 Report, April 1, 2011

C-66 Corani Project Form 43-101F1 Technical Report Feasibility Study, Puno Peru, M3 Engineering and Technology Corporation, December 2011

A-6. EXPERT REPORTS

Expert Report of Graham A. Davis and Florin A. Dorobantu, The Brattle Group, October 6, 2015 ("First Brattle Report")

Expert Report of Neal Rigby, SRK Consulting, October 6, 2015 ("First SRK Report")

Reply Expert Report of Neal Rigby, SRK Consulting, April 13, 2016, ("SRK Reply Report")

Expert Report of Howard N. Rosen and Chris Milburn, FTI Consulting, May 29, 2015 ("First FTI Report")

Reply Expert Report of Howard N. Rosen and Chris Milburn, FTI Consulting, January 8, 2016 ("FTI Reply Report")

RPA Technical Review of the Santa Ana Project and Corani Project, Puno, Peru, May 29, 2015 ("First RPA Report")

RPA Response Report on the Santa Ana Project and Corani Project, Puno, Peru, January 6, 2016 ("RPA Reply Report")

A-7. WITNESS STATEMENTS

Witness Statement of Andrew T. Swarthout, Bear Creek Mining Corporation Claimant, v. The Republic of Peru, Respondent ("Swarthout WS")

Reply Witness Statement of Andrew T. Swarthout, Bear Creek Mining Corporation Claimant, v. The Republic of Peru, Respondent ("Swarthout Second WS")

Witness Statement of Catherine McLeod Seltzer, Bear Creek Mining Corporation, Claimant, v. The Republic of Peru, Respondent ("McLeod Seltzer WS")

Witness Statement of Peter M. Brown, Bear Creek Mining Corporation, Claimnt, v. The Republic of Peru, Respondent ("Brown WS")

Witness Statement of Luis Fernando Gala Soldevilla, Bear Creek Mining Corporation, Claimant, v. The Republic of Peru, Respondent, October 6, 2015

Appendix B. Commodity Prices Estimation and Simulation

A. ESTIMATION

1. Silver

1. We use the model proposed by Laughton and Jacoby (1993) to estimate the price process of silver.[415] In the Laughton & Jacoby model, prices S under the risk-neutral measure follow a lognormal single-factor stochastic process defined by

$$dS = [\alpha^* e^{-2\kappa t} + \frac{1}{2}\sigma^2 - \kappa \ln(\frac{S}{S^*})]Sdt + \sigma S dW \quad (1)$$

where W is a Wiener process, α^* is the short-term growth rate of the price median, σ is the short-term price volatility, κ is the mean-reversion factor, and S^* is the long-term price median. If we let $X = \ln S$ and $\mu = \ln S^*$, the above price process can be rewritten as

$$dX = [\alpha^* e^{-2\kappa t} + \kappa(\mu - X)]dt + \sigma dW \quad (2)$$

Note that if one sets $\alpha^* = 0$, one obtains the standard Ornstein-Uhlenbeck mean reverting process:

$$dX = \kappa(\mu - X)dt + \sigma dW \quad (3)$$

Therefore, the model is a generalized version of the standard mean reverting process.

2. In order to estimate the price process specified in (2), four underlying parameters need to be estimated: μ, κ, σ, and α^*.

3. Empirical studies have shown that the estimation of the parameters μ and κ via maximum likelihood can incur large bias and/or variation,[416] while the estimation of σ generates

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[415] Laughton, David G., and Henry D. Jacoby (1993), "Reversion, Timing Options, and Long-Term Decision-Making," *Financial Management* 22(3): 225-240 (BR-148).

[416] See, for example, Ball, Clifford A., and Walter N. Torous (1996), "Unit Roots and the Estimation of Interest Rate Dynamics," *Journal of Empirical Finance* 3(2): 215-238 (BR-226); and Yu, Jun, and Peter C. B. Phillips (2001), "A Gaussian Approach for Continuous Time Models of the Short-term Interest Rate," *The Econometrics Journal* 4(2): 210-224 (BR-227).

results of much higher quality.[417] Consequently, we estimate σ via maximum likelihood based on historical silver spot prices and calibrate the remaining parameters to match the forward curve on the estimation date.[418]

4. The maximum likelihood estimation is based on the construction of a likelihood function derived from the transition probability density of a discretely sampled data. Phillips (1972) shows that the transition density for equation (3) is given by

$$X_{ih}|X_{(i-1)h} \sim N(e^{-\kappa h}X_{(i-1)h} + \mu(1 - e^{-\kappa h}), \frac{\sigma^2(1 - e^{-2\kappa h})}{2\kappa}) \quad (4)$$

where $\{X_h, X_{2h}, \dots, X_{Nh}\}$ is the sequence of N observations, recorded discretely at points $(h, 2h, \dots, Nh(\equiv T))$ in the time interval $[0, T]$.[419] h is taken to be $\frac{1}{52}$ since a weekly silver spot price series is used (as will be described). The transition density (4) is then used to construct the likelihood function for the maximum likelihood estimation.

5. Daily futures contract prices of silver traded in COMEX were obtained from Bloomberg. Because there is no spot contract of silver traded in COMEX, the price of the nearest futures contract were used to approximate the spot prices of silver. The sample starts from December 29, 2005 and ends at June 24, 2011, which is the Valuation Date. December 29, 2005 was chosen as the start date because there is a structural break in the level of the long-term average price occurring on December 28, 2005, based on the results of a structural break test (described below). Therefore, spot price data from December 29, 2005 onward are used to reflect more recent and most relevant information about σ. From the daily price series of the nearest futures contract obtained from Bloomberg, a weekly spot price series is

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[417] See, for example, Tang, Cheng Yang, and Song Xi Chen (2009), "Parameter Estimation and Bias Correction for Diffusion Processes," *Journal of Econometrics* 149(1): 65-81 (BR-225). In particular, Tang and Chen (2009) show that the bias of the κ estimators and the variances of the μ and κ estimators are effectively at the order of $(Nh)^{-1}$, whereas the bias and the variance of the estimators for the diffusion parameters σ^2 basically enjoy much smaller orders at N^{-1}, where N is the sample size and h is the sampling interval.

[418] Maximum likelihood is a statistical estimation technique in which the σ parameter is estimated so that it maximizes the probability of observing the historical silver prices given the underlying price process.

[419] Phillips, Peter C. B. (1972), "The Structural Estimation of a Stochastic Differential Equation System," *Econometrica*, 40(6): 1021-1041 (BR-228).

constructed from the spot prices on every Wednesday. This weekly spot price series becomes the input data for the maximum likelihood estimation for σ.

6. A potential concern with using a long time series for estimating these parameters is the possibility of structural breaks in the data. Several statistical tests for the presence of structural breaks in time series data have been proposed. We apply the method of Zivot and Andrews (1992)[420] to COMEX spot prices from January 2, 1975 (the earliest date for which this data is available in Bloomberg) to June 24, 2011, with the hypothesis that there is a structural break in the intercept of the spot price series. The Zivot-Andrews test estimates rather than assumes a break point. The results indicate that December 28, 2005 was a break point in the LME spot price series. Therefore, December 29, 2005 was chosen as the start date of the time series used to estimate the model parameters.

7. The other three parameters were calibrated so that the implied risk-adjusted prices match the observed forward curve on the valuation date as closely as possible. Given the price process specified in equation (1), the forward price $F_{t+\Delta t}$ at time t is

$$F_{t+\Delta t} = S_t^{e^{-\kappa\Delta t}} e^{\left(\mu+\frac{\alpha^*}{\kappa}e^{-\kappa\Delta t}\right)\left(1-e^{-\kappa\Delta t}\right)+\frac{\sigma^2\left(1-e^{-2\kappa\Delta t}\right)}{4\kappa}} \quad (5)$$

where S_t is the risk-adjusted price at time t.[421]

8. This mean reverting property is visible in the silver forward curve. Figure 7 shows the silver spot prices along with the forward curves constructed from the prices of cooper futures contracts traded on COMEX. The blue curve is the silver spot price on COMEX from October 1, 2008 to June 22, 2011. Selected forward curves are shown between October 1, 2008 and June 22, 2011.

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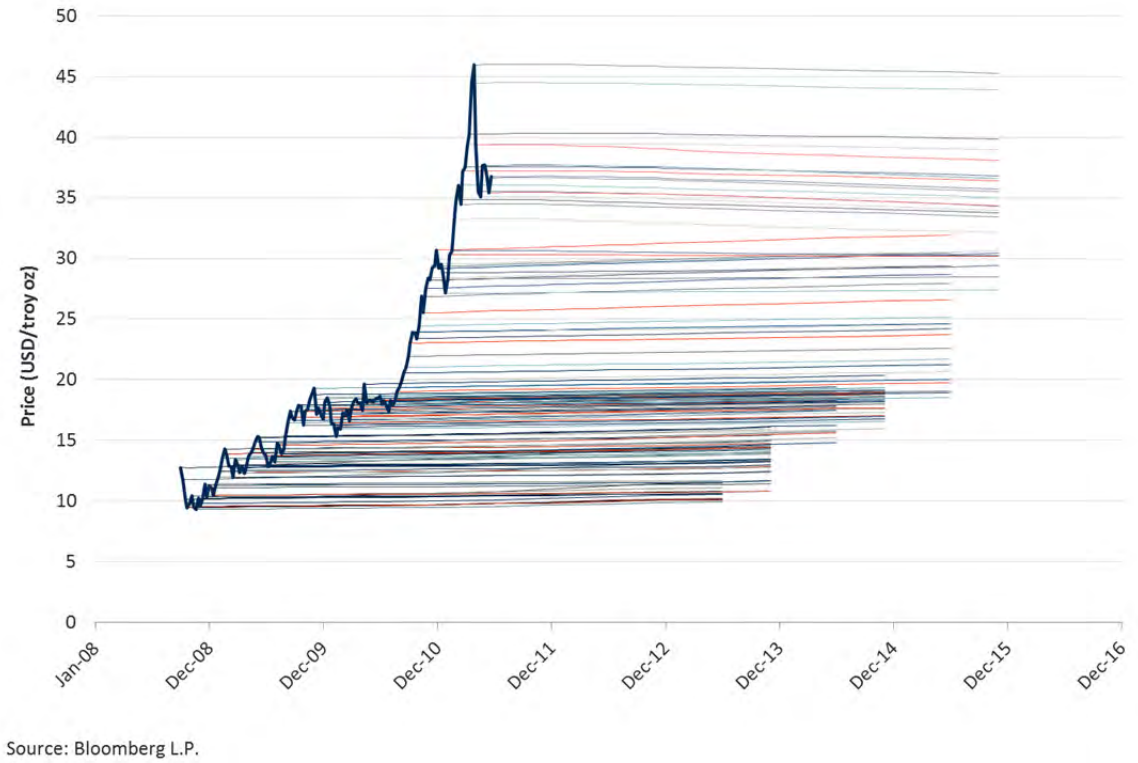
420 Zivot, Eric, and Donald W.K. Andrews (1992), "Further Evidence on the Great Crash, the Oil Price Shock, and the Unit Root Hypothesis," *Journal of Business & Economic Statistics* 10(3): 251-270 (BR-224).

421 If one is instead interested in modeling spot prices, but not risk-adjusted prices, one can back out the μ term (call it μ^*) of the log-spot price process by adding back a constant λ to μ. For example, under the CAPM model, $\lambda = \frac{PR\rho\sigma}{\kappa}$, where PR is the market risk premium and ρ is the correlation of log-returns between the state variable and the market.

Figure 7. Silver: COMEX Forward Curves, 10/1/2008 – 6/22/2011



Source: Bloomberg L.P.

9. Silver futures prices on the COMEX as of June 24, 2011, the valuation date, are obtained from Bloomberg to construct the silver forward curve. For each maturity with available futures prices, the forward price is calculated using equation (5). The estimates for μ, κ, and α^* were obtained by minimizing the sum of squared differences between the observed futures prices and those calculated from equation (5). Note that in this step, the point estimate of σ obtained from the maximum likelihood estimation using equation (3) above is used as an input for the estimation of the parameters μ, κ, and α^*.

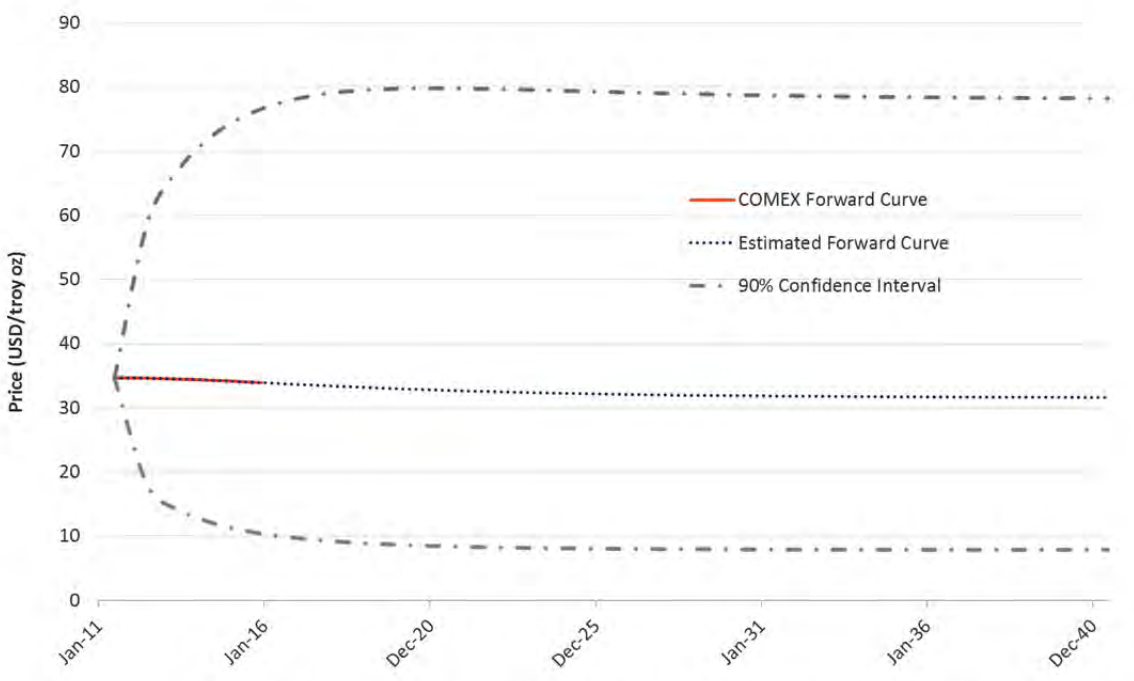
10. Table 6 shows the point estimates of α^*, μ, κ, and σ based on the approach discussed above for different valuation dates.

Table 6. Silver Price Process Estimated Parameters

Valuation Date [A]	α* [B]	μ [C]	κ [D]	σ [E]
3/7/2008	-0.028	2.743	0.052	0.359
10/14/2009	-0.063	2.778	0.158	0.409
5/27/2011	-0.017	3.355	0.206	0.395
6/23/2011	-0.017	3.267	0.200	0.393
6/24/2011	-0.022	3.208	0.158	0.393
9/30/2011	-0.007	2.985	0.167	0.408

11. Figure 8 shows the forward curve for silver observed on June 24, 2011 and the estimated forward curve over a 30-year time horizon, as well as the 90% confidence interval of the estimated forward prices as modeled in equation (5).

Figure 8. Silver Risk-Adjusted Price: Estimated Forward Curve and Confidence Interval - 30 Years

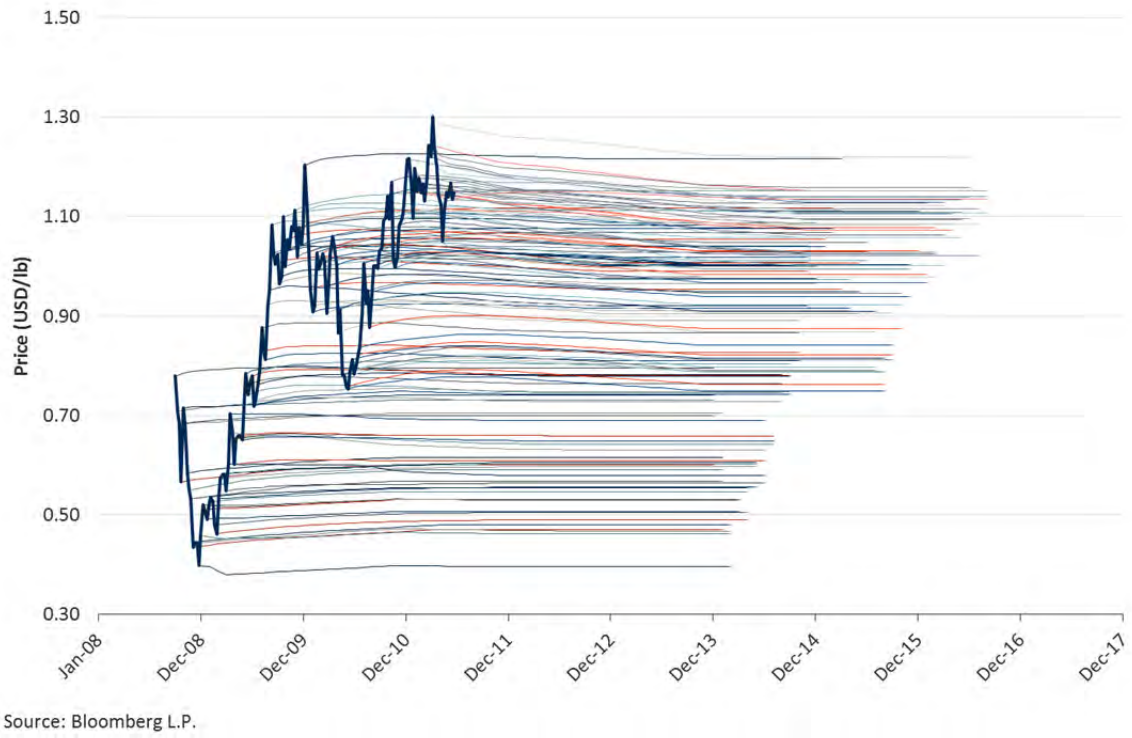


Note: COMEX Forward Curve is based on data obtained from Bloomberg L.P.; Estimated Forward Curve is calculated based on Equation (5); and 90% Confidence Interval is calcuated based on the distribution of forward prices derived from Equation (4).

2. Lead

12. We use the same Laughton-Jacoby mean reverting price process for lead. Figure 9 shows the lead spot prices along with the forward curves from October 1, 2008 to June 22, 2011, which are also consistent with mean reversion.

Figure 9. Lead: LME Forward Curves, 10/01/2008 – 6/22/2011



Source: Bloomberg L.P.

13. The method employed to estimate the price process for silver was also applied to estimate the parameters for lead prices: α^*, μ, κ, and σ. Spot and futures prices of lead traded on the LME were obtained from Bloomberg. The sample starts from June 29, 2006 and ends at the valuation date.[422] June 29, 2006 was chosen as the start date of the sample period based on the results of a Zivot-Andrews test to the spot price data.[423]

14. Table 7 shows the point estimates of α^*, μ, κ, and σ based on the approach discussed above for different valuation dates.

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[422] As we evaluate the DCF model at different dates, as explained in the report, the end of the sample varies accordingly.

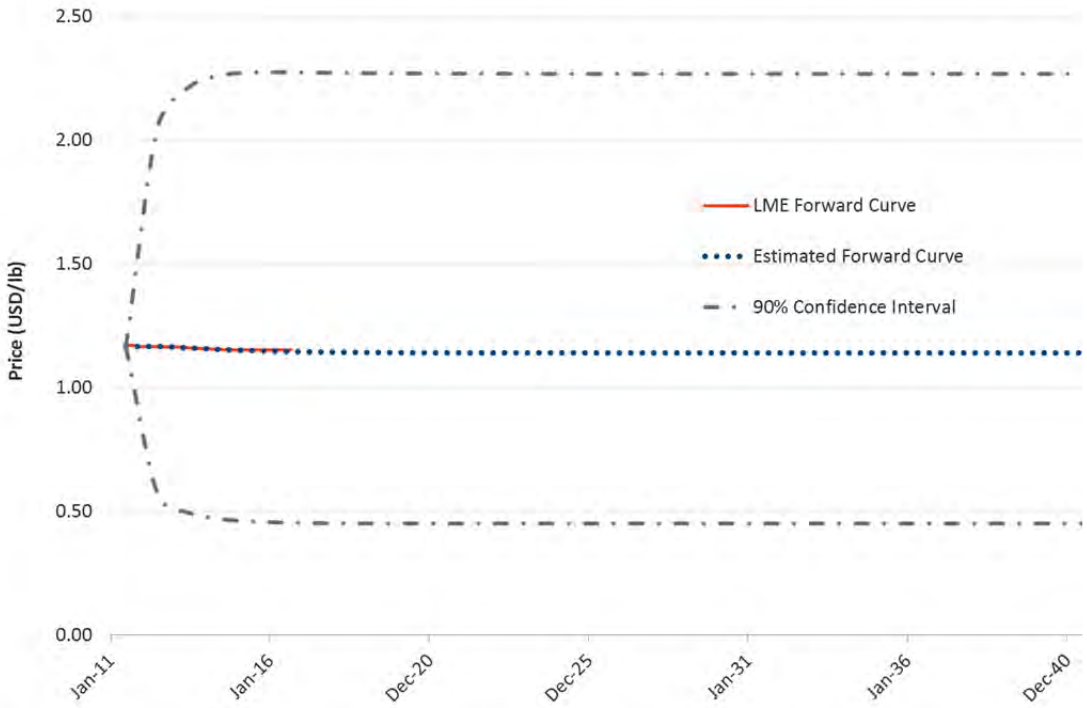
[423] In the structural break test for lead spot prices, the data from January 3, 1989 to June 24, 2011 are used. January 3, 1989 is the earliest date when the lead spot prices are available in Bloomberg.

Table 7. Lead Price Process Estimated Parameters

Valuation Date [A]	α* [B]	μ [C]	κ [D]	σ [E]
3/7/2008	0.030	0.116	0.514	0.410
10/14/2009	0.003	-0.125	0.757	0.525
5/27/2011	-0.067	-0.018	0.524	0.495
6/23/2011	-0.036	0.015	0.561	0.491
6/24/2011	-0.040	0.010	0.499	0.491
9/30/2011	-0.199	-0.099	1.264	0.488

15. Figure 10 shows the forward curve observed on June 24, 2011 and the estimated forward curve over a 30-year horizon, along with the 90% confidence interval for the estimated forward prices.

Figure 10. Lead: Predicted Forward Curve and Confidence Interval - 30 Years

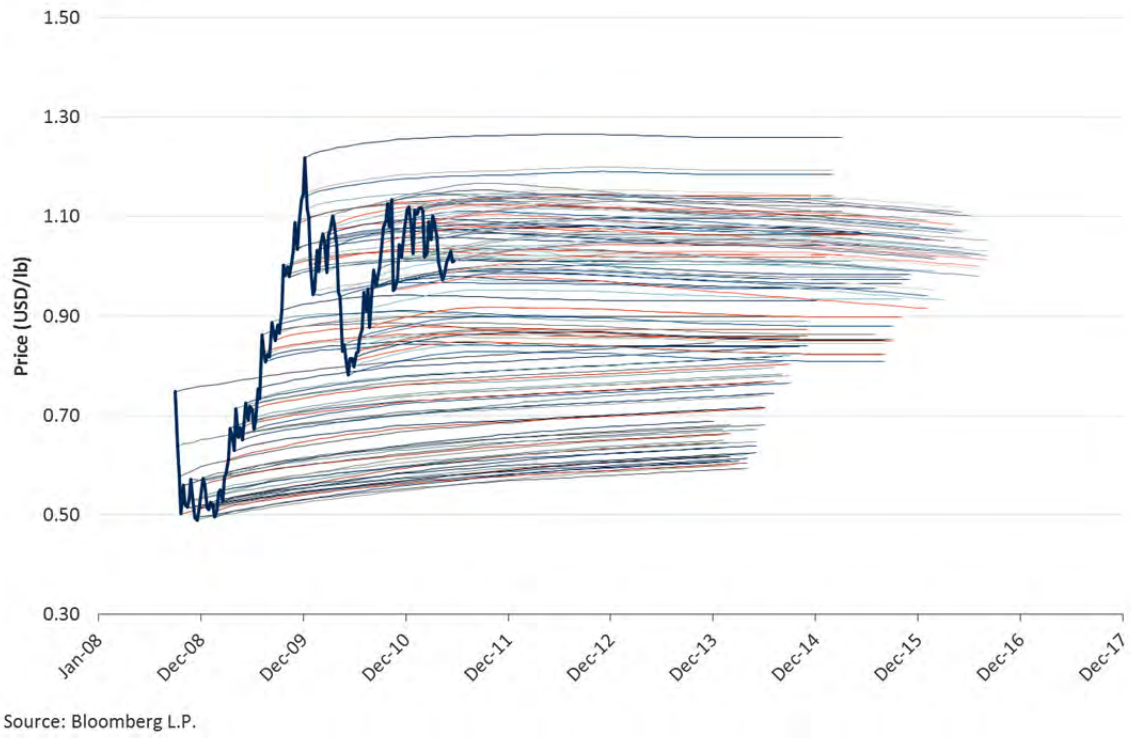


Note: LME Forward Curve is based on data obtained from Bloomberg L.P.; Estimated Forward Curve is calculated based on Equation (5); and 90% Confidence Interval is calcuated based on the distribution of forward prices derived from Equation (4).

3. Zinc

16. We use the same Laughton-Jacoby mean reverting price process for zinc. Figure 11 shows the zinc spot prices along with the forward curves from October 1, 2008 to June 22, 2011, which are consistent with mean reversion in nominal prices.

Figure 11. Zinc: LME Forward Curves, 10/01/2008 – 6/22/2011



Source: Bloomberg L.P.

17. The methodology employed to estimate the price process for silver was also applied to estimate the parameters for zinc prices: α^*, μ, κ, and σ. Spot and futures prices of zinc traded on the LME were obtained from Bloomberg. The sample starts from July 21, 2005 and ends at the valuation date. July 21, 2005 was chosen as the start date of the sample period based on the results of a Zivot-Andrews test to the spot price data.[424]

18. Table 8 shows the point estimates of α^*, μ, κ, and σ based on the approach discussed above for different valuation dates.

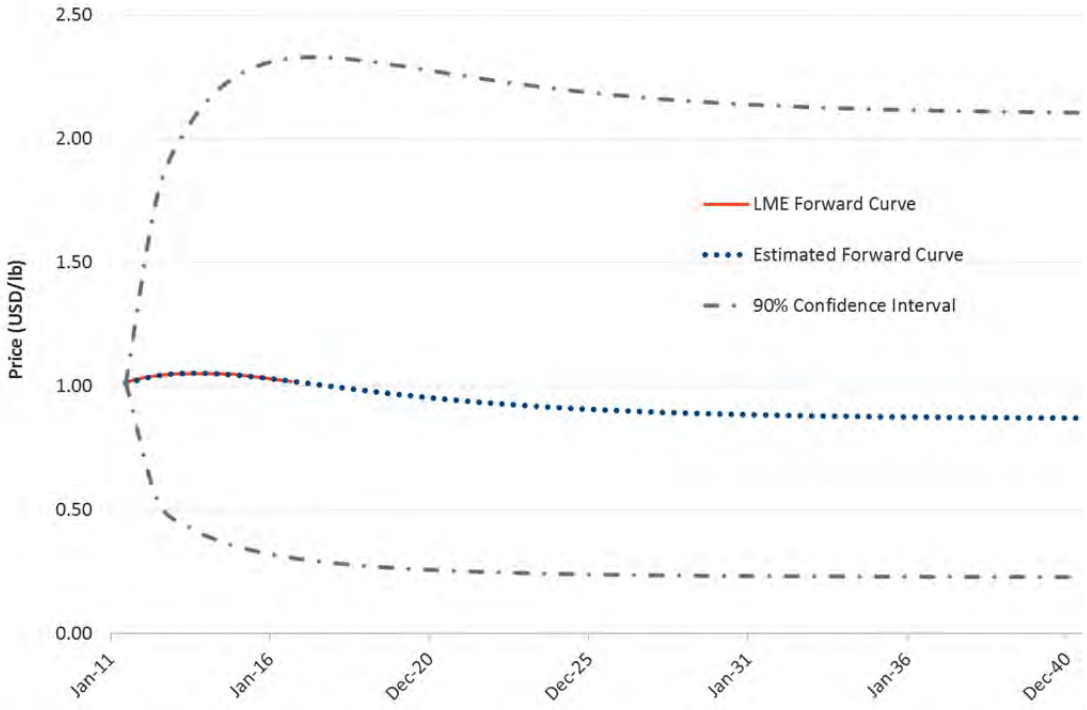
[424] In the structural break test for zinc spot prices, the data from January 4, 1989 to June 24, 2011 are used. January 4, 1989 is the earliest date when the lead spot prices are available in Bloomberg.

Table 8. Zinc Price Process Estimated Parameters

Valuation Date [A]	α* [B]	μ [C]	κ [D]	σ [E]
3/7/2008	0.046	-0.015	0.468	0.400
10/14/2009	0.026	-0.125	0.822	0.412
5/27/2011	0.060	-1.228	0.081	0.399
6/23/2011	0.035	-0.444	0.153	0.396
6/24/2011	0.031	-0.370	0.172	0.396
9/30/2011	0.013	-0.261	0.312	0.396

19. Figure 12 shows the forward curve observed on June 24, 2011 and the estimated forward curve over a 30-year horizon, along with the 90% confidence interval for the estimated forward prices.

Figure 12. Zinc Risk-Adjusted Prices: Predicted Forward Curve and Confidence Interval - 30 Years



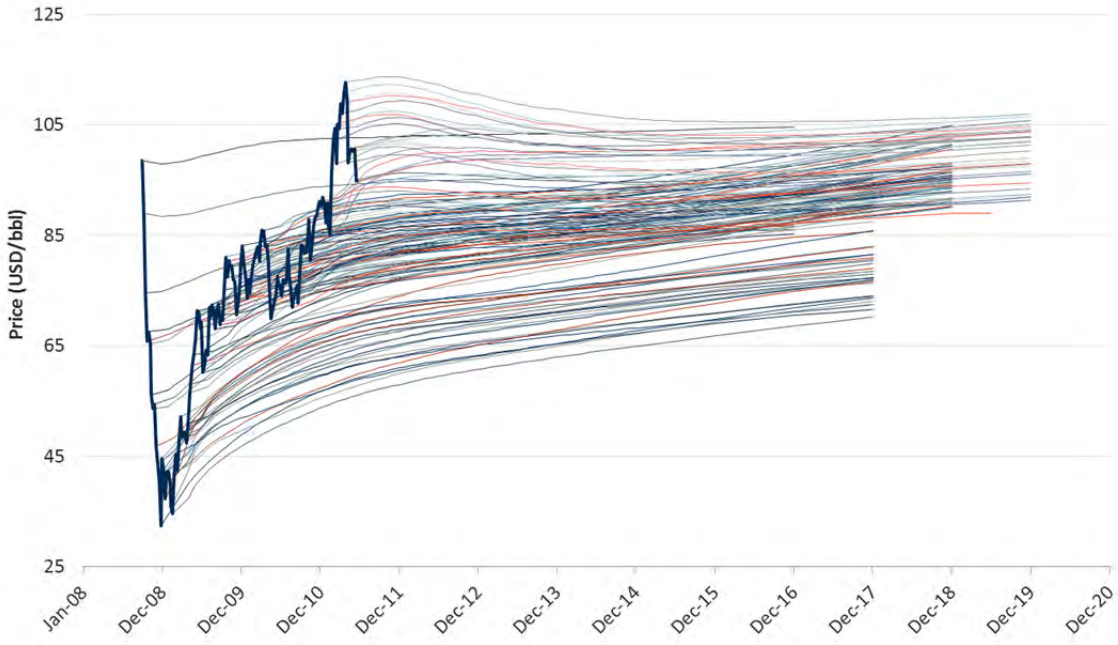
Note: LME Forward Curve is based on data obtained from Bloomberg L.P.; Estimated Forward Curve is calculated based on Equation (5); and 90% Confidence Interval is calcuated based on the distribution of forward prices derived from Equation (4).

4. WTI Crude Oil

20. We use the same Laughton-Jacoby mean reverting price process for WTI crude oil. Figure 13 shows the WTI Cushing Crude Oil Spot Prices along with the forward curves from

October 1, 2008 to June 22, 2011. Forward curves are consistent with mean reversion in nominal prices.

Figure 13. Crude Oil: WTI Forward Curves, 10/01/2008 – 6/22/2011



Source: Bloomberg L.P.

21. The methodology employed to estimate the price process for silver was also applied to estimate the parameters for oil prices: α^*, μ, κ, and σ.

22. Spot and futures prices of WTI Crude were obtained from Bloomberg. The sample starts from December 16, 2004 and ends on the valuation date. December 16, 2004 was chosen as the start date of the sample period based on the results of a Zivot-Andrews test to the spot price data.[425]

23. Table 9 shows the point estimates of α^*, μ, κ, and σ based on the approach discussed above for different valuation dates.

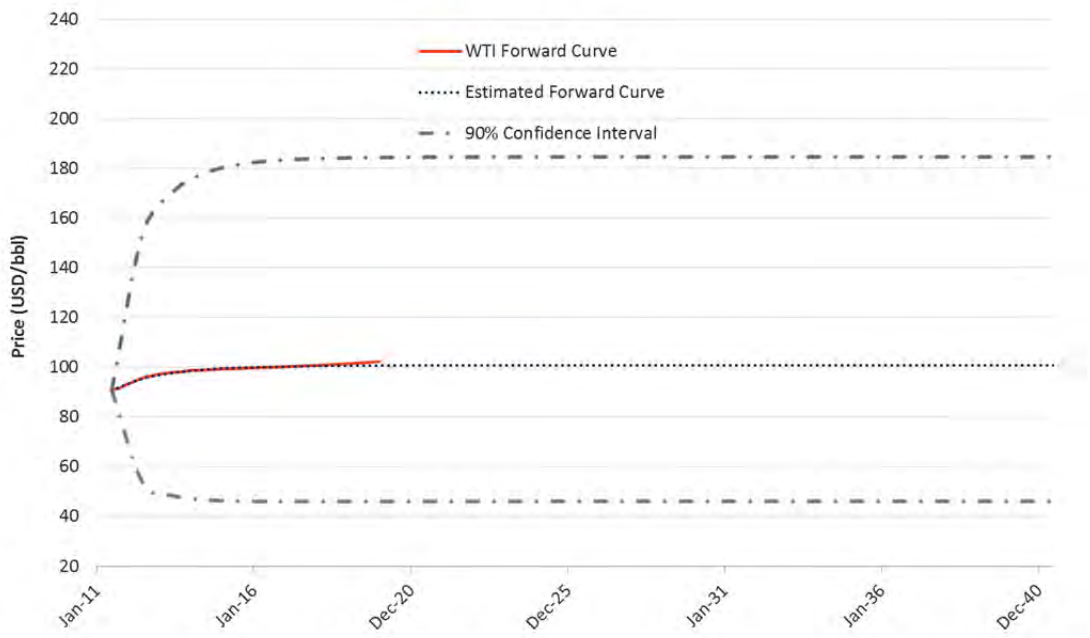
[425] In the structural break test for WTI spot prices, the data from May 16, 1983 to June 24, 2011 are used. May 16, 1983 is the earliest date when the WTI spot prices are available in Bloomberg.

Table 9. WTI Crude Oil Price Process Estimated Parameters

Valuation Date [A]	α* [B]	μ [C]	κ [D]	σ [E]
3/7/2008	-0.099	4.539	0.270	0.306
10/14/2009	-0.035	4.266	0.131	0.429
5/27/2011	0.038	4.565	0.860	0.400
6/23/2011	-0.014	4.516	0.495	0.399
6/24/2011	-0.016	4.524	0.446	0.399
9/30/2011	-0.032	4.263	0.145	0.395

24. Figure 14 shows the forward curve observed on June 24, 2011 and the estimated forward curve over a 30-year horizon, along with the 90% confidence interval for the estimated forward prices.

Figure 14. Crude Oil: Predicted Forward Curve and Confidence Interval - 30 Years



Note: WTI Forward Curve is based on data obtained from Bloomberg L.P.; Estimated Forward Curve is calculated based on Equation (5); and 90% Confidence Interval is calcuated based on the distribution of forward prices derived from Equation (4).

5. Gold

25. Academic studies generally find that gold prices show much less, if any, mean reversion than do prices of other storable commodities. Given the lack of empirical evidence of mean reversion in gold prices, it was assumed that gold prices follow a geometric Brownian motion under the risk-neutral measure:

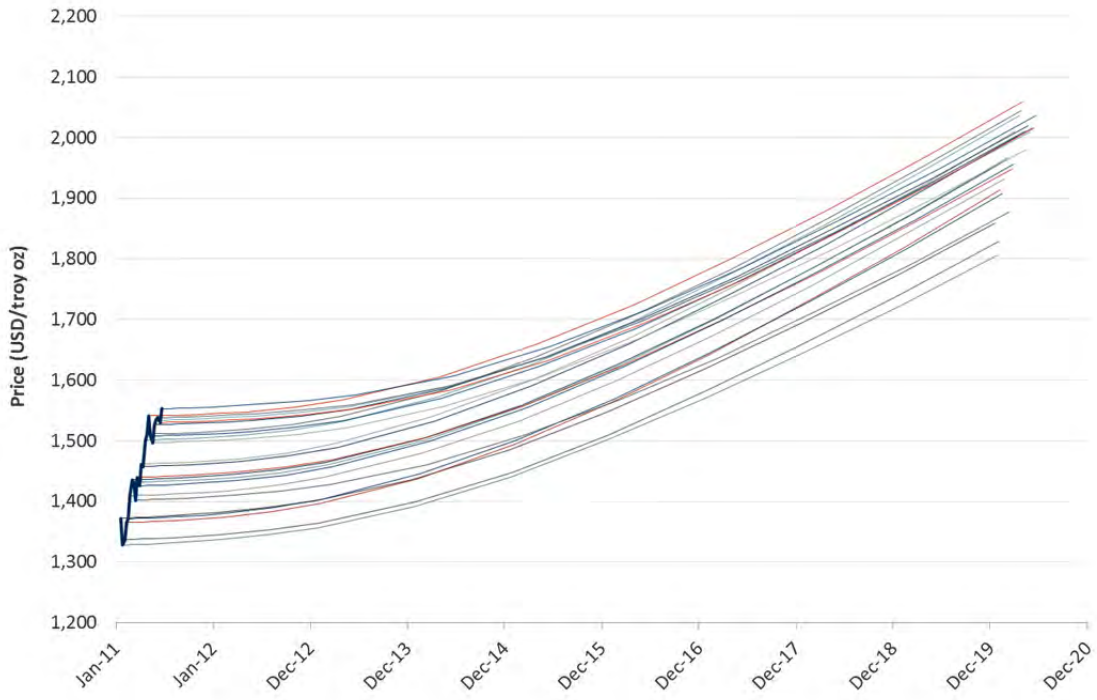
$$dX = \left(\mu - \frac{1}{2}\sigma^2\right)dt + \sigma dW \quad (6)$$

where X is the natural logarithm of the risk-adjusted price S, μ is the drift, σ is the volatility, and W is a Wiener process. It can be shown that the corresponding forward price is:

$$\ln F_{t+\Delta t} = \ln S_t + \mu \Delta t \quad (7)$$

26. That gold is not mean-reverting is visible from the gold forward curve. Figure 15 shows the gold spot prices along with the forward curves constructed from the forward rates distributed by the London Bullion Market Association (LBMA). The blue curve represents the spot prices from January 19, 2011 to June 22, 2011. Selected forward curves are also shown. As can be seen from the figure, the forward curves are upward sloping, unlike for the other metals discussed above. This indicates that investors do not anticipate mean reversion in gold spot or forward prices.

Figure 15. Gold: LBMA Forward Curves, 1/19/2011 - 6/22/2011



Source: Bloomberg L.P.

27. Eq. (6) involves two parameters: μ and σ. The method of maximum likelihood estimation (MLE) was applied to a time series of gold spot prices to estimate σ. The MLE estimate of σ is the one that maximizes the probability of observing the historical spot prices.[426]

28. The maximum likelihood estimation is based on the construction of a likelihood function derived from the transition probability density of a discretely sampled data. According to Phillips and Yu (2009), the transition density for equation (6) is given by

$$X_{ih}|X_{(i-1)h} \sim N(X_{(i-1)h} + \left(\mu - \frac{\sigma^2}{2}\right)h, \sigma^2 h) \quad (8)$$

where $\{X_h, X_{2h}, \dots, X_{Nh}\}$ is the sequence of N observations, recorded discretely at points $(h, 2h, \dots, Nh(\equiv T))$ in the time interval $[0, T]$. h is taken to be $\frac{1}{52}$ since a weekly gold spot price series is used (as will be described). The transition density (8) is then used to construct the likelihood function for the maximum likelihood estimation.

29. The London Gold Market Fixing Prices, determined by the London Bullion Market Association (LBMA), were used as historical gold spot prices. The LBMA is a trade association that focuses on the over-the-counter market for gold and silver. Selected LBMA members meet twice a day (in the morning and in the afternoon) to determine a gold price, such that it clears the market based on bids and offers submitted. These prices are known as the London Gold Market Fixing Prices. The London Gold Market Fixing Prices determined in the afternoon are obtained from Bloomberg. The sample starts from November 1, 1976 (the end of the Gold Standard in the United States)[427] and on the valuation date.[428] From the daily spot price series obtained from Bloomberg, a weekly spot price series is constructed from the spot prices on every Wednesday. This weekly spot price series was used for the maximum likelihood estimation of σ.

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[426] This process also estimates the drift parameter, but instead we use a drift calibrated to the forward curve, as discussed below.

[427] The Gold Standard in the United States (a monetary system where the USD and gold have a fixed exchange rate) officially ended in October 1976.

[428] The sample starting from January 1, 2000 and ending at June 24, 2011 is also used. The resulting estimate of σ is very close to the estimate of σ from the sample starting from November 1, 1976.

30. The parameter of μ is calibrated so that the implied risk-adjusted prices, based on Equation (7), match the observed forward curve on the valuation date as closely as possible.

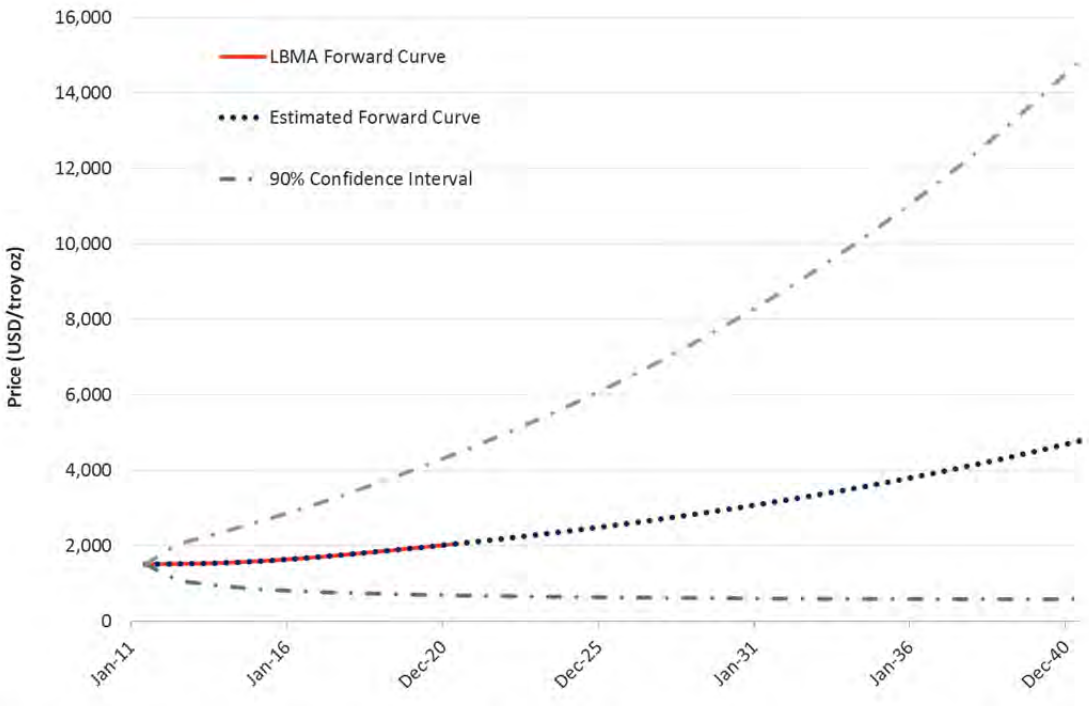
31. Table 10 shows the point estimates of μ and σ based on the approach discussed above for different valuation dates.

Table 10. Estimation by Fitting the Forward Curve for Gold

Valuation Date [A]	μ [B]	σ [C]
5/27/2011	0.027	0.180
6/23/2011	0.027	0.180
6/24/2011	0.026	0.180

32. Figure 16 below shows the actual forward curve observed on June 24, 2011 and the estimated forward curve over a 30-year horizon, as well as the 90% confidence interval of the estimated forward prices.

Figure 16. Gold Risk-Adjusted Price: Estimated Forward Curve and Confidence Interval - 30 Years



Note: LBMA Forward Curve is based on data obtained from Bloomberg L.P.; Estimated Forward Curve is calculated based on Equation (7); and 90% Confidence Interval is calcuated based on the distribution of forward prices derived from Equation (8).

B. COMMODITY PRICE SIMULATION

33. Based on the estimates of the underlying parameters of the price processes described above, risk-adjusted prices of silver, lead, zinc, gold, and oil are simulated as necessary to implement the modern DCF model. For silver, lead, zinc, and oil, the price is assumed to follow a mean reverting process, and for gold, a geometric Brownian motion.

1. Mean Reverting Process

34. The mean reverting process discussed above depends on four commodity-specific parameters: α^*, μ, κ, and σ. The simulation of the risk-adjusted price process involves iterative steps, repeated at each time t starting with $t = 1$.[429] The time at the valuation date is $t = 0$, and the spot price at that time is denoted by S_0.

35. The procedure within each iterative step goes as follows:

- Step 1: Draw a standard normal random number $\epsilon_t \in N(0,1)$.
- Step 2: Calculate the mean log-risk-adjusted price at time t:

$$M_t \equiv \text{Mean}(\ln S_t) = \left(\mu + \frac{\alpha^*}{\kappa} e^{-\kappa t}\right)(1 - e^{-\kappa t}) - e^{-\kappa}\left(\mu + \frac{\alpha^*}{\kappa} e^{-\kappa(t-1)}\right)\left(1 - e^{-\kappa(t-1)}\right) + e^{-\kappa} \ln S_{t-1}$$

- Step 3: Calculate the standard deviation of the log-risk-adjusted price at time t:

$$SD_t \equiv \text{Standard Deviation}(\ln S_t) = \sqrt{\sigma^2 \frac{1 - e^{-2\kappa}}{2\kappa}}$$

- Step 4: Calculate the simulated log-risk-adjusted price at time t:

$$\ln S_t = M_t + SD_t \epsilon_t$$

- Step 5: Calculate the risk-adjusted price by exponentiating the above:

$$S_t = e^{\ln S_t}$$

[429] An annual frequency is assumed.

Now that the risk-adjusted price at time t has been simulated, Steps 1-5 can be repeated at time $t + 1$.

2. Geometric Brownian Motion Process

36. The geometric Brownian motion process discussed above depends on two commodity-specific parameters: μ and σ. The simulation of the risk-adjusted price process involves iterative steps, repeated at each time t starting with $t = 1$.[430] The time at the valuation date is $t = 0$, and the spot price at that time is denoted by S_0.

37. The procedure within each iterative step goes as follows:

- Step 1: Draw a standard normal random number $\epsilon_t \in N(0,1)$.
- Step 2: Calculate the mean of the log-risk-adjusted price at time t:

$$M_t \equiv \text{Mean}(\ln S_t) = \ln S_{t-1} + \mu_t - \frac{1}{2}\sigma^2$$

- Step 3: Calculate the standard deviation of the log-risk-adjusted price at time t:

$$SD_t \equiv \text{Standard Deviation}(\ln S_t) = \sigma$$

- Step 4: Calculate the simulated log-risk-adjusted price at time t:

$$\ln S_t = M_t + SD_t \epsilon_t$$

- Step 5: Calculate the risk-adjusted price by exponentiating the above:

$$S_t = e^{\ln S_t}$$

Now that the risk-adjusted spot price at time t has been simulated, Steps 1-5 can be repeated at time $t + 1$.

38. The simulation described above is implemented in @RISK, which allows the three standard normal random numbers underlying the three commodities to be correlated according to the correlations shown in Workpapers R-6.1 through R-6.5 for each valuation date.

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[430] An annual frequency is assumed.

Appendix C. Fiscal Regime Changes

	Date	Source	Quote
	Analyst Reports		
FTI-56	7 Jun 2011	Canaccord	*Given the strong likelihood for increased taxes and royalties in Peru and the overall uncertainty associated with the Humala victory, we have pushed back our start of production for Santa Ana to 2015 and increased our discount rate to 15% (from 10%).* In consideration for the increased uncertainty and volatility associated with the Presidential election in Peru, in our discounted cash flow valuations for Bear Creek, *we have applied a 15% discount rate to future free cash flows from the Santa Ana and Corani projects.*
FTI-55	8 Jun 2011	Paradigm	… we had expected that taxes and royalty rates would likely be increased no matter who won the election. Given that the left-leaning candidate was victorious, we expect the rise will be more than it would have been under Keiko Fujimori. We have made estimates of what we believe "reasonable" changes to the royalty and tax rates might be in our Valuation section. Scenario 2 is our "most likely" case following Humala's election — *it assumes some additional time delay for both of Bear Creek's projects, increases the corporate tax rate to 40% (from the current 30%) and the mining royalty to 6% NSR (from 3% NSR).* These are substantial increases, but *we still consider them reasonable as they are within the global average ranges* (albeit toward the higher end).
BR-176	9 Jun 2011	Raymond James	Humala's victory has evoked *widespread concerns that his government will impose higher taxes and/or royalties on foreign companies* and could potentially lead to a wave of nationalism. Resulting in more than a 12% drop on the Lima stock exchange before trading was suspended on Monday morning (now down roughly 3% since Monday). *We continue to expect that changes in taxes and/or royalties are ultimately in the cards*,

			however we do not anticipate anything overly dramatic (ie expropriation) given Humala's party, Gana Peru, controls only about a third of the seats in congress, making it difficult for him to push through radical reforms. For reference, we set out roughly what the impact would be on our NAVPS estimate assuming a variety of royalty and tax rates. [3.0-6.0% royalty rates; 30% to 50% income tax rates] As set out above, even if we assume what we would consider to be an extreme case, 6% royalty and a 50% tax rate, Bear Creek is trading below what our NAVPS estimate would be.
	News Articles		
BR-177	31 March 2011	Perú 21	El programa confirma que se aplicará un impuesto a las sobreganancias mineras de entre 40% y 45% de las utilidades, y se "revisarán y eliminarán", mediante negociaciones, los contratos de estabilidad tributaria. La tasa impositiva para las empresas que tienen estos acuerdos pasaría de 5% a 7%.
BR-178	2 May 2011	Perú 21	La página 71 del documento de propuestas de Gana Perú indica que se establecerá un impuesto a las ganancias extraordinarias en las actividades mineras para financiar las políticas sociales. "Sobre este último impuesto se puede establecer una tasa de 40% a 45% a las utilidades extraordinarias, como ocurre en otros países (entre ellos, Australia)", apunta. Según Humala se puede recaudar US$1,500 millones al año.
BR-179	9 May 2011	El Comercio	Luis Carranza (Minister of Economy and Finance) said this: Acá, el 50% del Impuesto a la Renta de la minería va para el Gobierno Central y el otro 50% se reparte con el canon en regiones y en distritos con minería. Humala afirma que las empresas mineras deberían pagar el 30% de Impuesto a la Renta y adicionalmente 15% por concepto de canon. Es decir, pagarían 45% de Impuesto a la Renta. Además de ello, se plantea el impuesto a las sobreganancias.

			Con los precios actuales se podría incrementar el margen de la tributación minera En el margen puedes incrementar la carga, pero habría que ver la carga tributaria total para no desincentivar la inversión. Es un tema técnico y no hay un estudio. Sería temporal. Si cae, no se cobra. La base gravable no debería ser las ventas, sino la utilidad. Yo no eliminaría el aporte voluntario. Ya hay un proceso de aprendizaje en la asignación de los recursos que no se debe perder. Un nuevo esquema de tributación no debe desecharlo, quizá pueda tener carácter obligatorio. No olvidar que se compite con otros países y la inversión va donde tiene mayor rentabilidad.
BR-180	13 May 2011	Reuters	Humala, a former army officer who has tempered his radical image since narrowly losing the 2006 election, also dropped plans to raise the corporate income tax rate on firms in the country's vast mining sector to 45 percent from 30 percent. But he still plans to slap a windfall profits tax on mining companies that he said would raise $1-$2.5 billion a year in revenue to help fight poverty that afflicts a third of the population. The revision of his controversial plan – it is the second time he has changed it in the campaign – seeks to calm Peruvian voters and investors worried that he will intervene in the fast-growing economy.
BR-181	18 May 2011	Business News Americas	Presidential candidates Ollanta Humala and Keiko Fujimori have both proposed increasing royalties on miners as the sector enjoys strong profits thanks largely to higher metal prices. 'Both [candidates] are saying that they will sit down and discuss their initiatives with the private sector and try to reach a consensus regarding how to structure the windfall tax'
BR-183	7 Jun 2011	Business Spectator	Despite their varying political hues, both candidates had a mining unfriendly platform. Ollanta "Kevin" Humala proposes doubling royalties (currently 1-3 percent) and introducing a 40 per cent "windfall tax ".

BR-182	7 Jun 2011	The Times	Ollanta Humala claimed victory at the weekend, raising the prospect of a huge tax rise for the mining industry. Analysts said that a final result may not be known for some time, so the details of any tax rise remain unclear. However, the expectation in Peru is for a 40 per cent windfall tax on profits, in addition to a corporation tax rate of 30 per cent. Royalty charges of 3 per cent are expected to double.
BR-184	7 Jun 2011	Business Insider	Humala had promised – during the election – to increase taxes and royalties. He also wanted to increase the corporate tax rate to 45% from 30%, and he's called for a windfall tax on mining companies.
BR-185	8 June 2011	Commodity Online	Pre election rhetoric from apparent winner Ollanta Humala called for a doubling of mining royalties Deutsche Bank notes. There have also been talks of increasing corporate tax rate to 45% from 30% and introducing a windfall tax on mining profits the bank says.
BR-186	8 June 2011	Wall Street Journal Online	Mr. Humala's plans for increasing revenues won't start to become clearer until his economic team takes shape in the weeks leading up to his July 28th inauguration, but the threat of higher royalties or a new windfall profits tax have captured the attention of mining executives.
BR-187	9 June 2011	Steel Business Briefing	Peru's newly elected president, Ollanta Humala, intends to negotiate the introduction of a windfall tax on the country's mining sector… Peruvian miners' stocks plunged following Humala's election on June 5, given investors' limited confidence in the new government, which is expected to create economic instability as a consequence of increasing government involvement in domestic industries, sources say. Humala first announced plans for the mining windfall tax in March.
BR-188	13 June 2011	Northern Miner	Investors worry the election of Humala might lead to the nationalization of certain industries, higher corporate income taxes and royalty rates for mining companies… 'Humala will seek to increase revenues substantially by

			increasing royalties and instituting a high windfall tax that will affect new and existing projects. Humala will probably try to negotiate changes with companies who have contracts guaranteed by Peru's constitution.' According to Reuters, the proposals include upping the tax rate on foreign mining profits from the current 30% to 40% or even 45%; raising tariffs on utilities and royalties on oil and gas production
BR-189	14 June 2011	IHS Global Insight Daily Analysis	Daniel Mora, an elected deputy and spokesman from Peru Possible (PP), former president Alejandro Toledo's (2001-06) platform, said on Sunday (12 June) that his party will back President-Elect Ollanta Humala's proposal to introduce a windfall tax on mining activities…The windfall tax proposal is expected to be proposed by Humala's GP and backed up by PP, and to be one of the first pieces of legislation to be approved in Congress, though the rate to be introduced or when negotiations with the mining sector remain unclear.
BR-190	15 June 2011	Reuters News	Top miners in Peru expect to have to pay a new tax on windfall profits proposed by President-elect Ollanta Humala, but on Wednesday urged the incoming government to refrain from raising royalties based on sales. Humala has clearly backed introducing a tax on windfall profits, but has yet to stake out a clear position on royalties. Peru currently charges a royalty of 1 to 3 percent based on gross sales by miners. Humala, a former radical, adopted an increasingly conciliatory tone during his campaign, and told Reuters in an interview after declaring victory that he planned to talk with mining companies about the windfall tax rate. Humala's revised government plan suggests a new tax would apply to profits.
BR-191	16 June 2011	IHS Global Insight Daily Analysis	Humala's electoral pledge to impose a windfall profit tax on mining companies to fund social programmes, as well as an increase on royalties, is likely to go ahead. However, royalties in Peru are low relative to its regional peers (1% to 3% of gross sales) and therefore, there is ample scope for negotiations with mining multinationals. Taxation of mining, which stand at 30%,

			is not expected to be affected.
BR-192	20 June 2011	Business News Americas	During his campaign, president-elect Ollanta Humala said he would evaluate increasing royalties and implementing a windfall tax on miners to help pay for social programs.

Appendix D. Supporting Workpapers

Workpaper R-1: Davis and Franks - Mines with Opposition

				Manifestation of Conflict										
				Procedure-based				Physical Protest		Violence to property		Violence to person(s)		
Country	Primary Commodity	Company Type	Stage	Submissions	Administrative proceedings	Litigation	Publicity	Demonstrations	Blockade	Damage to private property	Damage to public property	Injuries to people	Deaths	**Any Opposition**
Chile	Copper	Operating Junior	5o	•	•	•	•	•						•
Chile	Copper	Major	5o	•	•	•	•	•	•		•			•
Chile	Gold	Major	3o	•	•		•	•						•
Peru	Gold	Major	5o	•	•	•	•	•				•	•	•
Peru	Copper	Major	3s	•	•		•	•	•	•	•	•	•	•
Colombia	Coal	Major	5o				•	•	•	•		•	•	•
Bolivia	Silver	Exploration Junior	3a	•			•	•				•	•	•
Peru	Gold	Major	5o	•	•		•	•	•			•	•	•
Chile	Copper	State Owned	5o	•		•	•							•
Argentina	Gold	Mid-Tier	3a	•	•	•	•	•						•
Peru	Gold	Operating Junior	4a	•	•		•	•	•	•			•	•
Peru	Copper	Major	6o	•	•	•	•	•				•	•	•
Peru	Copper	Mid-Tier	6o		•			•	•			•		•
Count				11	10	6	12	12	6	3	2	7	7	**13**
Count of mines abandoned or suspended with given manifestation of conflicted				4	3	1	4	4	2	2	1	2	3	**4**
Percentage abandoned or suspended given specific manifestation of conflict				36%	30%	17%	33%	33%	33%	67%	50%	29%	43%	**31%**

Sources and Notes:
Rachel Davis and Daniel Franks, "Costs of Company-Community Conflict in the Extractive Sector", Corporate Social Responsibility Initiative Report No. 66, 2014 (BR-156), pp. 50-51.

Workpaper R-2: Beta of U.S. Mining and Processing Capital and Operating Costs

		Surface CapEx	Mill CapEx	Mining OpEx	Processing OpEx
Market Index:	S&P 500	0.018	0.034	0.062	0.132
	World MSCI	0.020	0.035	0.083	0.115

Sources and Notes:
Capital and operating costs indices for the U.S. are from Infomine USA, Inc., "Mining Cost Service U.S. Cost Indexes", 2016.
S&P 500 and World MSCI indices are from Bloomberg, LP.
Beta is estimated as the slope of a linear regression of monthly returns calculated for each index. S&P 500 and MSCI mmonthly returns calculated based on the average of daily index values within the month. Infomine cost indices are provided on a monthly basis.
Data from January 2005 through June 2011.

Workpaper R-3: Proportion of Energy-Related Operating Costs

Corani Mining Costs [1]

	Drilling	Blasting	Loading	Hauling	Auxiliary	General Mine	General Maintenance	G&A	Total
Corani Mine Operating Costs per Total Tonne ($/tonne)	0.121	0.126	0.207	0.467	0.279	0.04	0.043	0.087	1.369
Percentage of Operating Costs	8.8%	9.2%	15.1%	34.1%	20.3%	2.9%	3.2%	6.3%	
Percentage of Fuel-Driven Operating Costs (drilling, loading, and hauling)	**58.00%**								

Corani Processing Costs [2]

	Primary Crushing	Grinding	Flotation	Concentrate Thickening, Filtration, and Tailings	Ancillary	Total
Power Cost ($/tonne)	0.028	1.066	0.462	0.208	0.019	1.783
Total Cost ($/tonne)	0.182	2.811	3.813	0.471	0.266	7.543
Percentage of Fuel Driven Processing Costs	15.38%	37.92%	12.12%	44.16%	7.14%	**23.64%**

Santa Ana Mining Costs [3]

	Supplies and Materials	Labor	Equipment Operation	Administration	Sundry Items	Total
Gold Heap Leach Mine Operating Costs ($/tonne)	1.38	2.55	2.91	0.9	0.77	8.51
Percentage of Operating Costs	16.22%	29.96%	34.20%	10.58%	9.05%	100.00%
Percentage of Fuel-Driven Operating Costs that (equipment operation)	**34.20%**					

Santa Ana Processing Costs [4]

	Operating Labor	Reagents	Repair and Maintenance Supplies	Wear Items	Electric Power	Heavy Mobile Equipment Operation	Staff / Supervision	Total
Gold Heap Leach Mine Processing Costs ($/tonne leached) at 10,000 tpd	0.59	1.03	0.2	0.02	0.16	0.05	0.18	2.23
Percentage of Processing Costs	26.46%	46.19%	8.97%	0.90%	7.17%	2.24%	8.07%	100.00%
Percentage of Energy Related Processing Costs (electric power, heavy mobile equipment operation)	**9.42%**							

Sources and Notes:
[1]: Corani 2011 FS (C-66), Table 21-2.
[2]: Corani 2011 FS (C-66), Table 21-4.
[3]: InfoMine, 2011, Mine Cost Services, Cost Models Section (RPA-Santa Ana-19), p. 15, 2:1 strip ratio.
[4]: InfoMine, 2011, Mine Cost Services, Cost Models Section (RPA-Santa Ana-19), p. 147, 10,000 tpd.

Workpaper R-4: Annual Probability of Mine Closure Due to Geological or Environmental Issues Moel and Tufano (2002)

		Total number of mines (excluding mines closed due to reserve depletion) [A]	Closings due to non-economic factors [B]	Permanent closings for unknown reasons [C]
Number of Mines in Each Category as Reported	[1]	206	14	31
Adjusted Number of Mines Reflecting Allocation of Closings for Unknown Reasons	[2]	206	16	
Fraction of Mines Closed Permanently for Non-Economic Reasons	[3]		7.63%	
Implied Annual Probability of Closing for Non-Economic Reasons	[4]		0.79%	

Sources and Notes:
Moel, Alberto and Peter Tufano (2002), "When Are Real Options Exercised? An Empirical Study of Mine Closings," The Review of Financial Studies, 15(1) (BR-152), Table 2.
[1][A]: Mines with available information (285) less mines closed for reserve depletion (79)
[1][B]: Mines closed for geological reasons (11) plus mines closed for environmental concerns (3).
[1][C]: Mines closed for 'Reason not Given' (44), less mines re-opened for reason 'None given (16),' excluding the 3 mines closed for strikes, which were assumed to have re-opened.
[2][A]: [1][A].
[2][B]: [1][B] + [1][C] x [1][B] / (285 - [1][C]).
[3][B]: [2][B] / [2][A].
[4]: 1 - ((1 - [3]) ^ (1 /10)).

Workpaper R-5: Annual Probability of Closure due to Political Risk

Date		3/7/2008	10/14/2009	5/27/2011	6/23/2011
Estimated Ratio (% of Spread Due to Political Risk)	[1]	0.42	0.42	0.72	0.72
EMBI+ Spread (bps)	[2]	199	174	176	193
Average Yield on Long-Term Sovereign Bonds	[3]	5.12%	4.32%	4.15%	4.23%
Absolute Political Risk Spread (bps)	[4]	84	73	126	138
Implied Annual Probability of Loss	[5]	0.80%	0.70%	1.21%	1.33%

Sources and Notes:
[1]: For 2008 and 2009, see Bekaert, Geert, et. al., ''Political risk spreads,'' Journal of International Business Studies (45), 2014 (BR-145), p. 485; For 2011, see Bekaert, et. al., ''Political risk and international valuation,'' Journal of Corporate Finance, 2015 (BR-146), Appendix C.
[2]: Banco Central Reserva del Peru, Weekly Economic Report June 24, 2011 (BR-212); Banco Central Reserva del Peru, Weekly Economic Report June May 27, 2011 (BR-213);
Banco Central Reserva del Peru, Weekly Economic Report October 16, 2009 (BR-214); Banco Central Reserva del Peru, Weekly Economic Report March 7, 2008 (BR-215).
[3]: Average bid yield on all Peru sovereign outstanding bonds. Bloomberg, L.P., data pulled March 30, 2016.
[4]: [1] x [2].
[5]: ([4] / (1 + [3])) / 10,000.

Workpaper R-6.1: Correlations of Weekly Commodity Returns (March 7, 2008)

	Silver [A]	Gold [B]	Zinc [C]	Lead [D]	Crude [E]
Silver	1.00	0.87	0.39	0.19	0.25
Gold	0.87	1.00	0.39	0.11	0.33
Zinc	0.39	0.39	1.00	0.50	0.02
Lead	0.19	0.11	0.50	1.00	0.01
Crude	0.25	0.33	0.02	0.01	1.00

Sources and Notes:

Correlations are calculated from weekly commodity returns measured from 03/07/2007 to 03/05/2008.

[A]: Correlations with returns on LBMA Silver Spot Price in Workpaper R-7, column [B].

[B]: Correlations with returns on LBMA Gold Spot Price in Workpaper R-7, column [C].

[C]: Correlations with returns on LME Zinc Spot Price in Workpaper R-7, column [D].

[D]: Correlations with returns on LME Lead Spot Price in Workpaper R-7, column [A].

[E]: Correlations with returns on WTI Cushing Crude Spot Price in Workpaper R-7, column [E].

Workpaper R-6.2: Correlations of Weekly Commodity Returns (October 14, 2009)

	Silver [A]	Gold [B]	Zinc [C]	Lead [D]	Crude [E]
Silver	1.00	0.75	0.28	0.35	0.34
Gold	0.75	1.00	0.34	0.27	0.35
Zinc	0.28	0.34	1.00	0.69	0.40
Lead	0.35	0.27	0.69	1.00	0.49
Crude	0.34	0.35	0.40	0.49	1.00

Sources and Notes:

Correlations are calculated from weekly commodity returns measured from 10/08/2008 to 10/07/2009.

[A]: Correlations with returns on LBMA Silver Spot Price in Workpaper R-7, column [B].

[B]: Correlations with returns on LBMA Gold Spot Price in Workpaper R-7, column [C].

[C]: Correlations with returns on LME Zinc Spot Price in Workpaper R-7, column [D].

[D]: Correlations with returns on LME Lead Spot Price in Workpaper R-7, column [A].

[E]: Correlations with returns on WTI Cushing Crude Spot Price in Workpaper R-7, column [E].

Workpaper R-6.3: Correlations of Weekly Commodity Returns (May 27, 2011)

	Silver [A]	Gold [B]	Zinc [C]	Lead [D]	Crude [E]
Silver	1.00	0.69	0.31	0.21	0.56
Gold	0.69	1.00	0.27	0.17	0.56
Zinc	0.31	0.27	1.00	0.87	0.42
Lead	0.21	0.17	0.87	1.00	0.47
Crude	0.56	0.56	0.42	0.47	1.00

Sources and Notes:

Correlations are calculated from weekly commodity returns measured from 05/26/2010 to 05/25/2011.

[A]: Correlations with returns on LBMA Silver Spot Price in Workpaper R-7, column [B].

[B]: Correlations with returns on LBMA Gold Spot Price in Workpaper R-7, column [C].

[C]: Correlations with returns on LME Zinc Spot Price in Workpaper R-7, column [D].

[D]: Correlations with returns on LME Lead Spot Price in Workpaper R-7, column [A].

[E]: Correlations with returns on WTI Cushing Crude Spot Price in Workpaper R-7, column [E].

Workpaper R-6.4: Correlations of Weekly Commodity Returns (June 23, 2011)

	Silver [A]	Gold [B]	Zinc [C]	Lead [D]	Crude [E]
Silver	1.00	0.70	0.31	0.21	0.57
Gold	0.70	1.00	0.29	0.19	0.56
Zinc	0.31	0.29	1.00	0.87	0.44
Lead	0.21	0.19	0.87	1.00	0.50
Crude	0.57	0.56	0.44	0.50	1.00

Sources and Notes:

Correlations are calculated from weekly commodity returns measured from 06/23/2010 to 06/22/2011.

[A]: Correlations with returns on LBMA Silver Spot Price in Workpaper R-7, column [B].

[B]: Correlations with returns on LBMA Gold Spot Price in Workpaper R-7, column [C].

[C]: Correlations with returns on LME Zinc Spot Price in Workpaper R-7, column [D].

[D]: Correlations with returns on LME Lead Spot Price in Workpaper R-7, column [A].

[E]: Correlations with returns on WTI Cushing Crude Spot Price in Workpaper R-7, column [E].

Workpaper R-6.5: Correlations of Weekly Commodity Returns (June 24, 2011)

	Silver [A]	Gold [B]	Zinc [C]	Lead [D]	Crude [E]
Silver	1.00	0.70	0.31	0.21	0.57
Gold	0.70	1.00	0.29	0.19	0.56
Zinc	0.31	0.29	1.00	0.87	0.44
Lead	0.21	0.19	0.87	1.00	0.50
Crude	0.57	0.56	0.44	0.50	1.00

Sources and Notes:

Correlations are calculated from weekly commodity returns measured from 06/23/2010 to 06/22/2011.

[A]: Correlations with returns on LBMA Silver Spot Price in Workpaper R-7, column [B].

[B]: Correlations with returns on LBMA Gold Spot Price in Workpaper R-7, column [C].

[C]: Correlations with returns on LME Zinc Spot Price in Workpaper R-7, column [D].

[D]: Correlations with returns on LME Lead Spot Price in Workpaper R-7, column [A].

[E]: Correlations with returns on WTI Cushing Crude Spot Price in Workpaper R-7, column [E].

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
2/21/2007	1,858.00	13.74	661.25	3,344.00	59.47	1,534.37	1,457.63							
2/28/2007	1,857.00	14.31	664.20	3,486.00	61.79	1,490.44	1,406.82	-0.1%	4.1%	0.4%	4.2%	3.8%	-2 9%	-3.5%
3/7/2007	1,879.00	12.89	646.40	3,352.00	61.82	1,470.37	1,391.97	1 2%	-10.5%	-2.7%	-3.9%	0.0%	-1.4%	-1.1%
3/14/2007	1,906.00	12.65	643.25	3,226.00	58.16	1,456.19	1,387.17	1.4%	-1.9%	-0.5%	-3.8%	-6.1%	-1.0%	-0.3%
3/21/2007	1,933.00	13.33	658.75	3,114.00	58.31	1,512.18	1,435.04	1.4%	5.2%	2.4%	-3.5%	0.3%	3.8%	3.4%
3/28/2007	1,910.00	13.36	666.75	3,196.50	64.08	1,510.35	1,417.23	-1.2%	0.2%	1.2%	2.6%	9.4%	-0.1%	-1.2%
4/4/2007	2,026.50	13.45	672.25	3,501.50	64.38	1,538.17	1,439.37	5.9%	0.7%	0.8%	9.1%	0.5%	1 8%	1.6%
4/11/2007	1,977.50	13.92	678.20	3,509.00	62.01	1,544.24	1,438.87	-2.4%	3.4%	0.9%	0.2%	-3.8%	0.4%	0.0%
4/18/2007	1,976.00	13.96	688.75	3,667.50	63.13	1,576.04	1,472.50	-0.1%	0.3%	1.5%	4.4%	1.8%	2.0%	2.3%
4/25/2007	1,969.00	13.79	684.00	3,740.00	64.88	1,587.76	1,495.42	-0.4%	-1.2%	-0.7%	2.0%	2.7%	0.7%	1.5%
5/2/2007	2,047.00	13.18	669.50	3,870.00	63.68	1,585.85	1,495.92	3.9%	-4.5%	-2.1%	3.4%	-1.9%	-0.1%	0.0%
5/9/2007	2,057.50	13.45	683.00	4,110.00	61.55	1,602.48	1,512.58	0.5%	2.0%	2.0%	6.0%	-3.4%	1.0%	1.1%
5/16/2007	2,077.50	13.16	667.75	3,855.00	62.55	1,598.20	1,514.14	1.0%	-2.2%	-2.3%	-6.4%	1.6%	-0.3%	0.1%
5/23/2007	2,114.00	12.96	662.05	3,659.00	65.06	1,612.60	1,522.28	1.7%	-1.5%	-0.9%	-5.2%	3.9%	0.9%	0.5%
5/30/2007	2,288.50	13.11	652.65	3,597.00	63.49	1,608.61	1,530.23	7.9%	1.2%	-1.4%	-1.7%	-2.4%	-0.2%	0.5%
6/6/2007	2,301.00	13 69	669.70	3,695.00	65.96	1,607.75	1,517.38	0.5%	4.3%	2.6%	2.7%	3.8%	-0.1%	-0.8%
6/13/2007	2,297.50	12.86	647.65	3,697.00	66.26	1,589.47	1,515.67	-0.2%	-6.3%	-3.3%	0.1%	0.5%	-1.1%	-0.1%
6/20/2007	2,523.00	13.34	657.70	3,612.00	68.19	1,611.23	1,512.84	9.4%	3.7%	1.5%	-2.3%	2.9%	1.4%	-0.2%
6/27/2007	2,602.50	12.26	642.10	3,346.50	68.97	1,588.19	1,506.34	3.1%	-8.4%	-2.4%	-7.6%	1.1%	-1.4%	-0.4%
7/4/2007	2,889.50	12.61	654.15	3,479.00	71.41	1,627.41	1,524.87	10.5%	2.8%	1.9%	3.9%	3.5%	2.4%	1.2%
7/11/2007	2,995.00	12.95	663.00	3,510.00	72.56	1,625.10	1,518.76	3.6%	2.7%	1.3%	0.9%	1.6%	-0.1%	-0.4%
7/18/2007	3,262.00	12.94	666.75	3,526.00	75.05	1,643.92	1,546.17	8.5%	-0.1%	0.6%	0.5%	3.4%	1.2%	1.8%
7/25/2007	3,179.00	13.18	674.75	3,673.50	75.98	1,614.79	1,518.09	-2.6%	1.8%	1.2%	4.1%	1.2%	-1 8%	-1.8%
8/1/2007	3,151.00	12.77	665.75	3,558.50	76.53	1,556.33	1,465.81	-0.9%	-3.1%	-1.3%	-3.2%	0.7%	-3.7%	-3.5%
8/8/2007	3,121.50	13.03	675.50	3,500.00	72.15	1,589.53	1,497.49	-0.9%	2.0%	1.5%	-1.7%	-5.9%	2.1%	2.1%
8/15/2007	3,013.00	12.51	667.25	3,232.00	73.33	1,494.53	1,406.70	-3.5%	-4.1%	-1.2%	-8.0%	1.6%	-6 2%	-6.3%
8/22/2007	3,043.00	11.68	659.50	3,099.00	69.31	1,531.75	1,464.07	1.0%	-6.9%	-1.2%	-4.2%	-5.6%	2.5%	4.0%
8/29/2007	3,183.00	11.80	664.25	3,075.00	73.51	1,536.98	1,463.76	4.5%	1.0%	0.7%	-0.8%	5.9%	0.3%	0.0%
9/5/2007	2,970.00	12.22	680.25	2,812.50	75.73	1,555.99	1,472.29	-6.9%	3.5%	2.4%	-8.9%	3.0%	1.2%	0.6%
9/12/2007	3,149.00	12.66	706.00	2,763.50	79.91	1,559.47	1,471.56	5.9%	3.6%	3.7%	-1.8%	5.4%	0.2%	0.0%
9/19/2007	3,292.00	13.00	725.15	2,986.00	81.93	1,609.85	1,529.03	4.4%	2.6%	2.7%	7.7%	2.5%	3 2%	3.8%
9/26/2007	3,527.00	13.44	734.75	3,006.00	80.30	1,616.57	1,525.42	6.9%	3.4%	1.3%	0.7%	-2.0%	0.4%	-0.2%
10/3/2007	3,739.00	13.35	730.25	3,117.00	79.94	1,647.82	1,539.59	5 8%	-0.7%	-0.6%	3.6%	-0.4%	1.9%	0 9%
10/10/2007	3,989.00	13.62	741.25	3,070.00	81.30	1,670.27	1,562.47	6.5%	2.0%	1.5%	-1.5%	1.7%	1.4%	1.5%
10/17/2007	3,575.00	13.60	762.50	2,966.50	87.40	1,653.10	1,541.24	-11.0%	-0.1%	2.8%	-3.4%	7.2%	-1.0%	-1.4%
10/24/2007	3,518.00	13.44	757.50	2,820.00	89.10	1,627.85	1,515.88	-1.6%	-1.2%	-0.7%	-5.1%	1.9%	-1.5%	-1.7%
10/31/2007	3,683.00	14.32	789.50	2,806.50	94.53	1,682.35	1,549.38	4.6%	6.3%	4.1%	-0.5%	5.9%	3.3%	2.2%
11/7/2007	3,631.00	15.82	834.50	2,765.50	96.37	1,630.32	1,475.62	-1.4%	10.0%	5.5%	-1.5%	1.9%	-3.1%	-4.9%
11/14/2007	3,575.00	14.97	813.50	2,678.00	94.09	1,607.88	1,470.58	-1.6%	-5.5%	-2.5%	-3.2%	-2.4%	-1.4%	-0.3%
11/21/2007	2,910.00	14.55	798.00	2,220.50	98.04	1,542.57	1,416.77	-20.6%	-2.8%	-1.9%	-18.7%	4.1%	-4.1%	-3.7%
11/28/2007	3,022.50	14.28	801.75	2,479.00	90.62	1,592.20	1,469.02	3.8%	-1.9%	0.5%	11.0%	-7.9%	3.2%	3.6%
12/5/2007	2,834.00	14.34	793.00	2,392.00	87.49	1,609.85	1,485.01	-6.4%	0.5%	-1.1%	-3.6%	-3.5%	1.1%	1.1%
12/12/2007	2,581.00	14.64	814.00	2,456.50	94.39	1,622.88	1,486.59	-9.4%	2.0%	2.6%	2.7%	7.6%	0.8%	0.1%
12/19/2007	2,518.00	13.98	799.75	2,291.00	91.07	1,552.42	1,453.00	-2.5%	-4.6%	-1.8%	-7.0%	-3.6%	-4.4%	-2.3%

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
12/26/2007	2,664.00	14.35	810.50	2,399.50	95.97	1,598.19	1,497.66	5 6%	2.6%	1.3%	4.6%	5.2%	2.9%	3.0%
1/2/2008	2,606.50	14.93	846.75	2,436.00	99.62	1,578.13	1,447.16	-2.2%	4.0%	4.4%	1.5%	3.7%	-1 3%	-3.4%
1/9/2008	2,592.00	16.00	877.00	2,488.50	95.67	1,529.69	1,409.13	-0.6%	6.9%	3.5%	2.1%	-4.0%	-3.1%	-2.7%
1/16/2008	2,599.00	15.85	889.75	2,260.75	90.84	1,469.56	1,373.20	0 3%	-0.9%	1.4%	-9.6%	-5.2%	-4.0%	-2.6%
1/23/2008	2,495.50	15.95	888.25	2,187.50	87.64	1,397.17	1,338.60	-4.1%	0.6%	-0.2%	-3.3%	-3.6%	-5.1%	-2.6%
1/30/2008	2,725.00	16.76	919.00	2,326.00	92.33	1,449.37	1,355.81	8.8%	5.0%	3.4%	6.1%	5.2%	3.7%	1.3%
2/6/2008	2,820.00	16.48	903.00	2,373.50	87.14	1,425.07	1,326.45	3.4%	-1.7%	-1.8%	2.0%	-5.8%	-1.7%	-2.2%
2/13/2008	3,039.00	16.98	899.00	2,396.50	93.27	1,445.47	1,367.21	7.5%	3.0%	-0.4%	1.0%	6.8%	1.4%	3.0%
2/20/2008	3,290.00	17.42	920.00	2,392.00	100.74	1,443.24	1,360.03	7.9%	2.6%	2.3%	-0.2%	7.7%	-0 2%	-0.5%
2/27/2008	3,360.50	19.33	959.50	2,661.50	99.64	1,498.20	1,380.02	2.1%	10.4%	4.2%	10.7%	-1.1%	3.7%	1.5%
3/5/2008	3,348.00	19.48	974.50	2,799.00	104.52	1,444.99	1,333.70	-0.4%	0.8%	1.6%	5.0%	4.8%	-3 6%	-3.4%
3/12/2008	3,126.00	19.70	975.50	2,612.50	109.92	1,430.93	1,308.77	-6.9%	1.1%	0.1%	-6.9%	5.0%	-1.0%	-1.9%
3/19/2008	2,824 25	19.88	958.50	2,379.50	104.48	1,400.35	1,298.42	-10.2%	0.9%	-1.8%	-9.3%	-5.1%	-2.2%	-0.8%
3/26/2008	2,783.00	18.07	946.75	2,298.50	105.90	1,446.74	1,341.13	-1.5%	-9.5%	-1.2%	-3.5%	1.3%	3.3%	3 2%
4/2/2008	2,857.00	16.89	890.00	2,338.00	104.83	1,481.23	1,367.53	2 6%	-6.8%	-6.2%	1.7%	-1.0%	2.4%	1 9%
4/9/2008	2,947 25	17.49	917.00	2,343.25	110.87	1,476.89	1,354.49	3.1%	3.5%	3.0%	0.2%	5.6%	-0 3%	-1.0%
4/16/2008	2,855.00	18.07	945.00	2,313.75	114.93	1,491.39	1,364.71	-3.2%	3.3%	3.0%	-1.3%	3.6%	1.0%	0 8%
4/23/2008	2,790.00	17.55	898.50	2,207.50	119.40	1,504.51	1,379.93	-2.3%	-2.9%	-5.0%	-4.7%	3.8%	0.9%	1.1%
4/30/2008	2,694.50	16.47	871.00	2,205.50	113.46	1,508.99	1,385.59	-3.5%	-6.4%	-3.1%	-0.1%	-5.1%	0.3%	0.4%
5/7/2008	2,402.50	16.69	868.25	2,225.50	123.53	1,523.27	1,392.57	-11.5%	1.3%	-0.3%	0.9%	8.5%	0.9%	0.5%
5/14/2008	2,243.00	16.69	866.50	2,259.00	124.22	1,530.81	1,408.66	-6.9%	0.0%	-0.2%	1.5%	0.6%	0.5%	1.1%
5/21/2008	2,129.00	17.77	923.00	2,180.50	132.57	1,532.58	1,390.71	-5.2%	6.3%	6.3%	-3.5%	6.5%	0.1%	-1.3%
5/28/2008	2,009 25	17.26	902.50	2,096.00	131.03	1,515.15	1,390.84	-5.8%	-2.9%	-2.2%	-4.0%	-1.2%	-1.1%	0.0%
6/4/2008	1,984.50	16.67	883.50	1,959.50	122.30	1,504.56	1,377.20	-1.2%	-3.5%	-2.1%	-6.7%	-6.9%	-0.7%	-1.0%
6/11/2008	1,866.75	16.58	876.25	1,892.75	136.38	1,453.19	1,335.49	-6.1%	-0.5%	-0.8%	-3.5%	10.9%	-3.5%	-3.1%
6/18/2008	1,841.00	17.00	887.50	1,963.50	136.68	1,456.85	1,337.81	-1.4%	2.5%	1.3%	3.7%	0.2%	0 3%	0.2%
6/25/2008	1,759.75	16.70	882.75	1,842.50	134.03	1,428.38	1,321.97	-4.5%	-1.8%	-0.5%	-6.4%	-2.0%	-2.0%	-1.2%
7/2/2008	1,680.50	17.92	935.25	1,838.50	143.57	1,375.41	1,261.52	-4.6%	7.1%	5.8%	-0.2%	6.9%	-3 8%	-4.7%
7/9/2008	1,787.00	17.82	927.25	1,856.50	136.05	1,361.74	1,244.69	6.1%	-0.6%	-0.9%	1.0%	-5.4%	-1.0%	-1.3%
7/16/2008	1,962.50	18.83	977.50	1,775.75	134.60	1,337.53	1,245.36	9.4%	5.5%	5.3%	-4.4%	-1.1%	-1 8%	0.1%
7/23/2008	2,229.00	17.59	926.50	1,914.75	123.64	1,385.42	1,282.19	12.7%	-6.8%	-5.4%	7.5%	-8.5%	3.5%	2.9%
7/30/2008	2,198.50	17.12	897.50	1,863 25	126.77	1,374.93	1,284.26	-1.4%	-2.7%	-3.2%	-2.7%	2.5%	-0 8%	0.2%
8/6/2008	2,069.50	16.74	879.50	1,752.00	118.58	1,369.23	1,289.19	-6.0%	-2.2%	-2.0%	-6.2%	-6.7%	-0.4%	0.4%
8/13/2008	1,693.00	14.68	818.50	1,649.50	116.00	1,341.67	1,285.83	-20.1%	-13.1%	-7.2%	-6.0%	-2.2%	-2.0%	-0.3%
8/20/2008	1,771.00	13 27	815.75	1,732.00	114.98	1,322.53	1,274.54	4.5%	-10.1%	-0.3%	4.9%	-0.9%	-1.4%	-0.9%
8/27/2008	2,053.00	13.76	827.00	1,827.50	118.15	1,330.45	1,281.66	14 8%	3.6%	1.4%	5.4%	2.7%	0 6%	0.6%
9/3/2008	1,931.75	12.79	803.50	1,767.00	109.35	1,318.19	1,274.98	-6.1%	-7.3%	-2.9%	-3.4%	-7.7%	-0.9%	-0.5%
9/10/2008	1,786.75	11.27	775.75	1,729.75	102.58	1,264.27	1,232.04	-7.8%	-12.7%	-3.5%	-2.1%	-6.4%	-4 2%	-3.4%
9/17/2008	1,770.50	10.77	813.00	1,696.00	97.16	1,191.37	1,156.39	-0.9%	-4.5%	4.7%	-2.0%	-5.4%	-5 9%	-6.3%
9/24/2008	1,981.00	13.29	896.00	1,761.75	106.88	1,244.03	1,185.87	11 2%	21.0%	9.7%	3.8%	9.5%	4 3%	2.5%
10/1/2008	1,718.00	12.28	880.00	1,648.00	98.53	1,184.29	1,161.06	-14.2%	-7.9%	-1.8%	-6.7%	-8.1%	-4 9%	-2.1%
10/8/2008	1,559.50	11.65	903.50	1,404.00	88.95	1,003.69	984.94	-9.7%	-5.3%	2.6%	-16.0%	-10.2%	-16.5%	-16.5%
10/15/2008	1,507.00	10 92	847.00	1,273 25	74.54	950.36	907.84	-3.4%	-6.5%	-6.5%	-9.8%	-17.7%	-5.5%	-8.2%
10/22/2008	1,249.00	9.84	744.00	1,106.00	65.85	909.84	896.78	-18.8%	-10.4%	-13.0%	-14.1%	-12.4%	-4.4%	-1.2%

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
10/29/2008	1,575.50	9 38	764.00	1,233.25	67.50	924.29	930.09	23.2%	-4.8%	2.7%	10.9%	2.5%	1.6%	3 6%
11/5/2008	1,506.00	10.28	753.75	1,148.00	65.30	982.98	952.77	-4.5%	9.2%	-1.4%	-7.2%	-3.3%	6.2%	2.4%
11/12/2008	1,287 25	9 65	724.75	1,136.50	56.16	869.98	852 30	-15.7%	-6.3%	-3.9%	-1.0%	-15.1%	-12.2%	-11.1%
11/19/2008	1,212.00	9.40	762.00	1,172.50	53.62	821.63	806.58	-6.0%	-2.6%	5.0%	3.1%	-4.6%	-5.7%	-5.5%
11/26/2008	1,173.00	10.30	812.50	1,262.00	54.44	876.87	887 68	-3.3%	9.1%	6.4%	7.4%	1.5%	6.5%	9.6%
12/3/2008	957.00	9.43	766.25	1,150.50	46.79	860.19	870.74	-20.4%	-8.8%	-5.9%	-9.3%	-15.1%	-1 9%	-1.9%
12/10/2008	981.75	9 96	802.25	1,087.75	43.52	899.09	899.24	2.6%	5.5%	4.6%	-5.6%	-7.2%	4.4%	3.2%
12/17/2008	976.75	10.98	870.00	1,080.00	40.06	928.12	904.42	-0.5%	9.7%	8.1%	-0.7%	-8.3%	3.2%	0.6%
12/24/2008	877.00	10.29	843.50	1,126.50	32.35	887.96	868.15	-10.8%	-6.5%	-3.1%	4.2%	-21.4%	-4.4%	-4.1%
12/31/2008	1,012.00	10.79	869.75	1,180 25	44.60	920.23	903.25	14 3%	4.7%	3.1%	4.7%	32.1%	3 6%	4.0%
1/7/2009	1,147.50	11.41	848.50	1,265.00	42.63	939.60	906.65	12 6%	5.6%	-2.5%	6.9%	-4.5%	2.1%	0.4%
1/14/2009	1,123.00	10.77	821.50	1,237.00	37.28	862.25	842.62	-2.2%	-5.8%	-3.2%	-2.2%	-13.4%	-8.6%	-7.3%
1/21/2009	1,082.50	11.34	849.25	1,131.50	42.25	838.43	840 24	-3.7%	5.2%	3.3%	-8.9%	12.5%	-2 8%	-0.3%
1/28/2009	1,141.50	11.98	895.25	1,125.75	42.16	878.83	874.09	5 3%	5.5%	5.3%	-0.5%	-0.2%	4.7%	3.9%
2/4/2009	1,181.00	12.40	905.00	1,158.00	40.32	847.95	832 23	3.4%	3.4%	1.1%	2.8%	-4.5%	-3 6%	-4.9%
2/11/2009	1,161 25	13.39	938.00	1,146.75	35.94	845.04	833.74	-1.7%	7.7%	3.6%	-1.0%	-11.5%	-0 3%	0.2%
2/18/2009	1,056.50	14.05	964.00	1,092.00	34.62	791.38	788.42	-9.5%	4.8%	2.7%	-4.9%	-3.7%	-6 6%	-5.6%
2/25/2009	1,017.75	13.81	978.50	1,121.50	41.70	763.81	764.90	-3.7%	-1.7%	1.5%	2.7%	18.6%	-3.5%	-3.0%
3/4/2009	1,173.75	12.87	908.50	1,201.00	45.38	722.38	712.87	14 3%	-7.0%	-7.4%	6.8%	8.5%	-5 6%	-7.0%
3/11/2009	1,263 25	12.62	899.50	1,213 25	42.33	730.95	721.36	7.3%	-2.0%	-1.0%	1.0%	-7.0%	1.2%	1.2%
3/18/2009	1,282 25	12.61	893.25	1,161.75	48.14	788.83	794.35	1.5%	-0.1%	-0.7%	-4.3%	12.9%	7.6%	9.6%
3/25/2009	1,280.50	13.16	929.00	1,268.50	52.17	829.44	813.88	-0.1%	4.3%	3.9%	8.8%	8.0%	5.0%	2.4%
4/1/2009	1,208.25	12.98	924.50	1,284 25	48.39	817.56	811.08	-5.8%	-1.4%	-0.5%	1.2%	-7.5%	-1.4%	-0.3%
4/8/2009	1,328.25	12.28	880.00	1,346.75	49.38	835.52	825.16	9.5%	-5.5%	-4.9%	4.8%	2.0%	2.2%	1.7%
4/15/2009	1,551.25	12.94	891.00	1,487.00	49.25	863.48	852.06	15.5%	5.2%	1.2%	9.9%	-0.3%	3.3%	3.2%
4/22/2009	1,467.00	12.12	886.00	1,443 25	47.45	857.49	843.55	-5.6%	-6.5%	-0.6%	-3.0%	-3.7%	-0.7%	-1.0%
4/29/2009	1,326.50	12.50	898.25	1,386.50	50.97	886.03	873 64	-10.1%	3.1%	1.4%	-4.0%	7.2%	3.3%	3.5%
5/6/2009	1,440 25	13.44	910.00	1,573.50	56.34	934.77	919.53	8 2%	7.3%	1.3%	12.7%	10.0%	5.4%	5.1%
5/13/2009	1,452.00	14.14	924.00	1,447.25	58.02	919.73	883 92	0 8%	5.1%	1.5%	-8.4%	2.9%	-1 6%	-3.9%
5/20/2009	1,454.75	14.29	939.50	1,489.50	61.44	953.47	903.47	0 2%	1.1%	1.7%	2.9%	5.7%	3.6%	2.2%
5/27/2009	1,434.00	14.50	951.00	1,433.75	63.45	952.14	893.06	-1.4%	1.5%	1.2%	-3.8%	3.2%	-0.1%	-1.2%
6/3/2009	1,589.50	15.97	976.75	1,510.50	66.12	982.99	931.76	10 3%	9.7%	2.7%	5.2%	4.1%	3.2%	4.2%
6/10/2009	1,729.75	15.39	953.75	1,597.25	71.33	987.53	939.15	8.5%	-3.7%	-2.4%	5.6%	7.6%	0.5%	0.8%
6/17/2009	1,634.75	14.02	930.50	1,522.50	71.03	952.44	910.71	-5.6%	-9.3%	-2.5%	-4.8%	-0.4%	-3 6%	-3.1%
6/24/2009	1,684.75	13.88	933.50	1,582.50	68.14	951.09	900.94	3.0%	-1.0%	0.3%	3.9%	-4.2%	-0.1%	-1.1%
7/1/2009	1,718 25	13.65	938.25	1,568.00	69.31	972.85	923.33	2.0%	-1.7%	0.5%	-0.9%	1.7%	2.3%	2.5%
7/8/2009	1,584.75	13.05	918.00	1,482.00	60.14	921.14	879.56	-8.1%	-4.5%	-2.2%	-5.6%	-14.2%	-5.5%	-4.9%
7/15/2009	1,612.00	13.27	938.00	1,517.50	61.54	972.24	932.68	1.7%	1.7%	2.2%	2.4%	2.3%	5.4%	5.9%
7/22/2009	1,682.00	13.40	948.25	1,662 25	64.25	1,005.29	954.07	4.3%	1.0%	1.1%	9.1%	4.3%	3 3%	2.3%
7/29/2009	1,739.00	13.60	931.00	1,617.75	63.35	1,023.42	975.15	3.3%	1.5%	-1.8%	-2.7%	-1.4%	1.8%	2.2%
8/5/2009	1,933.50	14.67	960.50	1,899.50	71.97	1,061.64	1,002.72	10 6%	7.6%	3.1%	16.1%	12.8%	3.7%	2.8%
8/12/2009	1,827.00	14.28	947.25	1,823.00	70.16	1,058.58	1,005.81	-5.7%	-2.7%	-1.4%	-4.1%	-2.5%	-0 3%	0 3%
8/19/2009	1,790.00	13.59	943.00	1,781.50	72.42	1,050.65	996.46	-2.0%	-5.0%	-0.4%	-2.3%	3.2%	-0 8%	-0.9%
8/26/2009	2,033.00	14.32	940.50	1,817.00	71.43	1,086.60	1,028.12	12.7%	5.3%	-0.3%	2.0%	-1.4%	3.4%	3.1%

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
9/2/2009	2,099.50	14.91	964.75	1,802.75	68.05	1,058.95	994.75	3 2%	4.0%	2.5%	-0.8%	-4.8%	-2 6%	-3.3%
9/9/2009	2,387.75	16.24	999.50	1,956.50	71.31	1,106.31	1,033.37	12 9%	8.5%	3.5%	8.2%	4.7%	4.4%	3.8%
9/16/2009	2,264.50	17.29	1,015.75	1,912.25	72.51	1,138.33	1,068.76	-5.3%	6.3%	1.6%	-2.3%	1.7%	2.9%	3.4%
9/23/2009	2,212.50	17.10	1,010.25	1,876.50	68.77	1,137.89	1,060.87	-2.3%	-1.1%	-0.5%	-1.9%	-5.3%	0.0%	-0.7%
9/30/2009	2,258 25	16.45	995.75	1,943.25	70.61	1,126.98	1,057.08	2.0%	-3.9%	-1.4%	3.5%	2.6%	-1.0%	-0.4%
10/7/2009	2,127.00	17.40	1,040.25	1,909.75	69.57	1,122.97	1,057.58	-6.0%	5.6%	4.4%	-1.7%	-1.5%	-0.4%	0.0%
10/14/2009	2,159 25	17.93	1,059.50	2,007.00	75.18	1,162.57	1,092.02	1.5%	3.0%	1.8%	5.0%	7.8%	3.5%	3.2%
10/21/2009	2,423.50	17.39	1,053.75	2,209.50	81.04	1,163.52	1,081.40	11.5%	-3.1%	-0.5%	9.6%	7.5%	0.1%	-1.0%
10/28/2009	2,204.75	16.33	1,031.75	2,164 25	77.46	1,108.97	1,042.63	-9.5%	-6.3%	-2.1%	-2.1%	-4.5%	-4 8%	-3.7%
11/4/2009	2,323.75	17.48	1,090.00	2,203.00	80.40	1,115.33	1,046.50	5.3%	6.8%	5.5%	1.8%	3.7%	0 6%	0.4%
11/11/2009	2,278 25	17.63	1,115.25	2,157.75	79.28	1,162.16	1,098.51	-2.0%	0.9%	2.3%	-2.1%	-1.4%	4.1%	4.9%
11/18/2009	2,381.50	18.74	1,149.00	2,220.50	79.58	1,171.54	1,109.80	4.4%	6.1%	3.0%	2.9%	0.4%	0 8%	1.0%
11/25/2009	2,363 25	18.63	1,179.75	2,276.50	77.06	1,170.71	1,110.63	-0.8%	-0.6%	2.6%	2.5%	-3.2%	-0.1%	0.1%
12/2/2009	2,452.75	19.18	1,212.50	2,398.50	76.60	1,173.86	1,109.24	3.7%	2.9%	2.7%	5.2%	-0.6%	0.3%	-0.1%
12/9/2009	2,246.50	17.77	1,141.00	2,278 25	70.67	1,148.94	1,095.95	-8.8%	-7.6%	-6.1%	-5.1%	-8.1%	-2.1%	-1.2%
12/16/2009	2,377.50	17.60	1,137.50	2,397.40	72.66	1,165.71	1,109.18	5.7%	-1.0%	-0.3%	5.1%	2.8%	1.4%	1.2%
12/23/2009	2,300 25	16.92	1,085.25	2,502.50	75.67	1,166.32	1,120.59	-3.3%	-3.9%	-4.7%	4.3%	4.1%	0.1%	1.0%
12/30/2009	2,381.50	16.92	1,087.50	2,524.25	79.28	1,171.29	1,126.42	3.5%	0.0%	0.2%	0.9%	4.7%	0.4%	0.5%
1/6/2010	2,652.75	17.89	1,130.00	2,686.25	83.18	1,193.52	1,137.14	10 8%	5.6%	3.8%	6.2%	4.8%	1.9%	0.9%
1/13/2010	2,453.75	18.35	1,127.25	2,458.25	79.65	1,201.61	1,145.68	-7.8%	2.5%	-0.2%	-8.9%	-4.3%	0.7%	0.7%
1/20/2010	2,271.50	18.48	1,120.25	2,421.50	77.62	1,184.49	1,138.04	-7.7%	0.7%	-0.6%	-1.5%	-2.6%	-1.4%	-0.7%
1/27/2010	2,099 25	16.74	1,094.75	2,211.50	73.67	1,140.28	1,097.50	-7.9%	-9.9%	-2.3%	-9.1%	-5.2%	-3 8%	-3.6%
2/3/2010	2,002.00	16.79	1,115.25	2,081.00	76.98	1,138.90	1,097.28	-4.7%	0.3%	1.9%	-6.1%	4.4%	-0.1%	0.0%
2/10/2010	2,027.50	15.60	1,069.50	2,101.75	74.52	1,101.44	1,068.13	1.3%	-7.4%	-4.2%	1.0%	-3.2%	-3 3%	-2.7%
2/17/2010	2,266.25	16.21	1,119.00	2,276.75	77.33	1,133.79	1,099.51	11.1%	3.8%	4.5%	8.0%	3.7%	2 9%	2.9%
2/24/2010	2,191.00	15.76	1,103.00	2,179.50	79.75	1,133.20	1,105.24	-3.4%	-2.8%	-1.4%	-4.4%	3.1%	-0.1%	0.5%
3/3/2010	2,214.00	17.17	1,136.50	2,294.75	80.87	1,157.37	1,118.79	1.0%	8.6%	3.0%	5.2%	1.4%	2.1%	1.2%
3/10/2010	2,262.75	17.47	1,120.50	2,347.75	82.09	1,180.31	1,145.61	2.2%	1.7%	-1.4%	2.3%	1.5%	2.0%	2.4%
3/17/2010	2,226.75	17.54	1,121.75	2,317.50	82.93	1,202.51	1,166.21	-1.6%	0.4%	0.1%	-1.3%	1.0%	1.9%	1.8%
3/24/2010	1,996.75	16 68	1,090.75	2,178 25	80.31	1,190.33	1,167.72	-10.9%	-5.0%	-2.8%	-6.2%	-3.2%	-1.0%	0.1%
3/31/2010	2,119 25	17.50	1,115.50	2,344.75	83.76	1,200.53	1,169.43	6.0%	4.8%	2.2%	7.4%	4.2%	0.9%	0.1%
4/7/2010	2,262 25	17.97	1,142.00	2,366.50	85.88	1,213.33	1,182.45	6.5%	2.7%	2.3%	0.9%	2.5%	1.1%	1.1%
4/14/2010	2,336 25	18.39	1,153.75	2,427.25	85.84	1,239.31	1,210.65	3.2%	2.3%	1.0%	2.5%	0.0%	2.1%	2.4%
4/21/2010	2,292.00	17.82	1,143.00	2,389.25	82.93	1,225.37	1,205.94	-1.9%	-3.1%	-0.9%	-1.6%	-3.4%	-1.1%	-0.4%
4/28/2010	2,209.50	17.96	1,161.00	2,296.00	83.22	1,194.23	1,191.36	-3.7%	0.8%	1.6%	-4.0%	0.3%	-2 6%	-1.2%
5/5/2010	1,908.00	17.63	1,165.00	2,091.75	79.97	1,157.86	1,165.90	-14.7%	-1.9%	0.3%	-9.3%	-4.0%	-3.1%	-2.2%
5/12/2010	2,013.75	19.59	1,237.50	2,068.75	75.65	1,158.71	1,171.67	5.4%	10.5%	6.0%	-1.1%	-5.6%	0.1%	0.5%
5/19/2010	1,724 25	18.53	1,195.00	1,826.50	69.87	1,095.69	1,115.05	-15.5%	-5.6%	-3.5%	-12.5%	-7.9%	-5.6%	-5.0%
5/26/2010	1,723.50	18.27	1,212.00	1,858.50	71.51	1,053.25	1,067.95	0.0%	-1.4%	1.4%	1.7%	2.3%	-4.0%	-4.3%
6/2/2010	1,667.25	18.43	1,215.00	1,769.75	72.86	1,079.22	1,098.38	-3.3%	0.9%	0.2%	-4.9%	1.9%	2.4%	2.8%
6/9/2010	1,661.75	18.27	1,233.50	1,722 25	74.36	1,050.35	1,055.69	-0.3%	-0.9%	1.5%	-2.7%	2.0%	-2.7%	-4.0%
6/16/2010	1,737.75	18.51	1,234.50	1,795.00	77.67	1,111.11	1,114.61	4.5%	1.3%	0.1%	4.1%	4.4%	5 6%	5.4%
6/23/2010	1,790.75	18.91	1,226.50	1,795.00	75.85	1,095.86	1,092.04	3.0%	2.1%	-0.7%	0.0%	-2.4%	-1.4%	-2.0%
6/30/2010	1,725.75	18.74	1,244.00	1,759.50	75.63	1,041.32	1,030.71	-3.7%	-0.9%	1.4%	-2.0%	-0.3%	-5.1%	-5.8%

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
7/7/2010	1,771.50	17.65	1,193.25	1,822.00	74.07	1,071.75	1,060.27	2.6%	-6.0%	-4.2%	3.5%	-2.1%	2.9%	2 8%
7/14/2010	1,808.75	18.29	1,207.00	1,824.50	77.04	1,113.08	1,095.17	2.1%	3.6%	1.1%	0.1%	3.9%	3.8%	3.2%
7/21/2010	1,845 25	17.88	1,191.50	1,890.25	76.26	1,088.38	1,069.59	2.0%	-2.3%	-1.3%	3.5%	-1.0%	-2 2%	-2.4%
7/28/2010	1,994.50	17.63	1,157.00	1,926.50	76.99	1,129.30	1,106.13	7.8%	-1.4%	-2.9%	1.9%	1.0%	3.7%	3.4%
8/4/2010	2,219 25	18.50	1,199.50	2,091.75	82.47	1,152.50	1,127.24	10.7%	4.8%	3.6%	8.2%	6.9%	2.0%	1.9%
8/11/2010	2,038.00	18.12	1,205.50	2,006.00	78.02	1,112.83	1,089.47	-8.5%	-2.1%	0.5%	-4.2%	-5.5%	-3.5%	-3.4%
8/18/2010	2,095.75	18.36	1,218.00	2,105.75	75.42	1,119.66	1,094.16	2.8%	1.3%	1.0%	4.9%	-3.4%	0.6%	0.4%
8/25/2010	1,934.00	18.63	1,237.50	1,932.00	71.92	1,073.83	1,055.33	-8.0%	1.5%	1.6%	-8.6%	-4.8%	-4 2%	-3.6%
9/1/2010	2,088 25	19.47	1,246.50	2,103 25	73.91	1,111.52	1,080.29	7.7%	4.4%	0.7%	8.5%	2.7%	3.4%	2.3%
9/8/2010	2,205.50	20.02	1,255.00	2,189.75	74.67	1,128.58	1,098.87	5.5%	2.8%	0.7%	4.0%	1.0%	1.5%	1.7%
9/15/2010	2,207.50	20.44	1,267.00	2,118 25	76.02	1,159.21	1,125.07	0.1%	2.1%	1.0%	-3.3%	1.8%	2.7%	2.4%
9/22/2010	2,194.50	21.08	1,293.50	2,161.00	72.66	1,170.55	1,134.28	-0.6%	3.1%	2.1%	2.0%	-4.5%	1.0%	0.8%
9/29/2010	2,273.00	21.87	1,307.50	2,195 25	77.86	1,183.96	1,144.73	3.5%	3.7%	1.1%	1.6%	6.9%	1.1%	0.9%
10/6/2010	2,288.00	22.92	1,346.50	2,303.50	83.23	1,205.33	1,159.97	0.7%	4.7%	2.9%	4.8%	6.7%	1 8%	1.3%
10/13/2010	2,408.00	23.53	1,365.50	2,381 25	83.01	1,222.06	1,178.10	5.1%	2.6%	1.4%	3.3%	-0.3%	1.4%	1.6%
10/20/2010	2,422.00	23.71	1,339.00	2,407.50	81.77	1,221.86	1,178.17	0.6%	0.8%	-2.0%	1.1%	-1.5%	0.0%	0.0%
10/27/2010	2,517.75	23.77	1,324.50	2,483.00	81.94	1,213.89	1,182.45	3.9%	0.3%	-1.1%	3.1%	0.2%	-0.7%	0.4%
11/3/2010	2,415.00	25.00	1,345.50	2,380.00	84.69	1,233.94	1,197.96	-4.2%	5.0%	1.6%	-4.2%	3.3%	1.6%	1.3%
11/10/2010	2,579.75	27.53	1,390.50	2,500.00	87.81	1,250.41	1,218.71	6.6%	9.6%	3.3%	4.9%	3.6%	1 3%	1.7%
11/17/2010	2,240.50	25.20	1,337.50	2,097.75	80.44	1,214.57	1,178.59	-14.1%	-8.8%	-3.9%	-17.5%	-8.8%	-2 9%	-3.3%
11/24/2010	2,198.50	27.41	1,372.50	2,107 25	83.26	1,221.91	1,198.35	-1.9%	8.4%	2.6%	0.5%	3.4%	0.6%	1.7%
12/1/2010	2,250 25	28.74	1,385.50	2,147.50	86.75	1,216.68	1,206.07	2.3%	4.7%	0.9%	1.9%	4.1%	-0.4%	0.6%
12/8/2010	2,386.00	29.02	1,385.50	2,301.00	88.28	1,246.56	1,228.28	5.9%	1.0%	0.0%	6.9%	1.7%	2.4%	1.8%
12/15/2010	2,411.00	29.06	1,388.75	2,247.00	88.62	1,259.68	1,235.23	1.0%	0.1%	0.2%	-2.4%	0.4%	1.0%	0 6%
12/22/2010	2,443.50	29.35	1,387.00	2,319.00	89.83	1,273.73	1,258.84	1.3%	1.0%	-0.1%	3.2%	1.4%	1.1%	1 9%
12/29/2010	2,536.00	30.44	1,412.50	2,385.75	91.12	1,279.09	1,259.78	3.7%	3.6%	1.8%	2.8%	1.4%	0.4%	0.1%
1/5/2011	2,681.00	29.21	1,368.00	2,457.00	90.30	1,285.14	1,276.56	5.6%	-4.1%	-3.2%	2.9%	-0.9%	0.5%	1 3%
1/12/2011	2,682.00	29.60	1,378.75	2,467.50	91.86	1,298.46	1,285.96	0.0%	1.3%	0.8%	0.4%	1.7%	1.0%	0.7%
1/19/2011	2,562.00	29.32	1,372.00	2,374.00	90.86	1,308.81	1,281.92	-4.6%	-1.0%	-0.5%	-3.9%	-1.1%	0.8%	-0.3%
1/26/2011	2,419.00	27.10	1,328.00	2,262 25	87.33	1,318.32	1,296.63	-5.7%	-7.9%	-3.3%	-4.8%	-4.0%	0.7%	1.1%
2/2/2011	2,638.00	28.27	1,337.00	2,454.00	90.86	1,332.77	1,304.03	8.7%	4.2%	0.7%	8.1%	4.0%	1.1%	0.6%
2/9/2011	2,538.00	30.22	1,365.00	2,437 25	86.71	1,342.34	1,320.88	-3.9%	6.7%	2.1%	-0.7%	-4.7%	0.7%	1.3%
2/16/2011	2,595.75	30.77	1,371.25	2,459.75	84.99	1,352.03	1,336.32	2.2%	1.8%	0.5%	0.9%	-2.0%	0.7%	1.2%
2/23/2011	2,529 25	33.29	1,409.25	2,465.75	96.50	1,329.90	1,307.40	-2.6%	7.9%	2.7%	0.2%	12.7%	-1.7%	-2.2%
3/2/2011	2,572 25	34.75	1,435.50	2,452 25	102.23	1,337.94	1,308.44	1.7%	4.3%	1.8%	-0.5%	5.8%	0.6%	0.1%
3/9/2011	2,493.00	36.17	1,431.00	2,245 25	104.38	1,339.58	1,320.02	-3.1%	4.0%	-0.3%	-8.8%	2.1%	0.1%	0.9%
3/16/2011	2,597.00	34.73	1,402.00	2,263.00	97.98	1,260.15	1,256.88	4.1%	-4.1%	-2.0%	0.8%	-6.3%	-6.1%	-4.9%
3/23/2011	2,742.50	36.58	1,439.50	2,404.50	105.20	1,311.62	1,297.54	5.5%	5.2%	2.6%	6.1%	7.1%	4.0%	3.2%
3/30/2011	2,689.50	37.53	1,425.50	2,321.50	104.27	1,335.98	1,328.26	-2.0%	2.6%	-1.0%	-3.5%	-0.9%	1.8%	2.3%
4/6/2011	2,868.50	39.63	1,461.50	2,428.00	108.83	1,348.86	1,335.54	6.4%	5.4%	2.5%	4.5%	4.3%	1.0%	0.5%
4/13/2011	2,732.00	40.22	1,457.50	2,400.00	107.11	1,338.75	1,314.41	-4.9%	1.5%	-0.3%	-1.2%	-1.6%	-0.8%	-1.6%
4/20/2011	2,646.00	44.79	1,501.00	2,337.10	110.85	1,350.22	1,330.36	-3.2%	10.8%	2.9%	-2.7%	3.4%	0.9%	1.2%
4/27/2011	2,519.50	45.30	1,511.00	2,224.00	112.76	1,371.38	1,355.66	-4.9%	1.1%	0.7%	-5.0%	1.7%	1.6%	1.9%
5/4/2011	2,478.50	40.29	1,541.00	2,172.25	109.24	1,371.36	1,347.32	-1.6%	-11.7%	2.0%	-2.4%	-3.2%	0.0%	-0.6%

Workpaper R-7: Weekly (Wednesday) Prices and Returns

Date	Prices							Returns						
	Lead ($/MT) [A]	Silver ($/OZ) [B]	Gold ($/OZ) [C]	Zinc ($/MT) [D]	Crude ($/Barrel) [E]	MSCI [F]	S&P 500 [G]	Lead [H]	Silver [I]	Gold [J]	Zinc [K]	Crude [L]	MSCI [M]	S&P 500 [N]
5/11/2011	2,315.00	39.18	1,508.00	2,143.25	98.21	1,357.35	1,342.08	-6.8%	-2.8%	-2.2%	-1.3%	-10.6%	-1.0%	-0.4%
5/18/2011	2,450.75	34.59	1,496.50	2,167 25	100.10	1,341.98	1,340.68	5.7%	-12.5%	-0.8%	1.1%	1.9%	-1.1%	-0.1%
5/25/2011	2,535.50	37.17	1,526.25	2,226.50	100.72	1,320.26	1,320.47	3.4%	7.2%	2.0%	2.7%	0.6%	-1 6%	-1.5%
6/1/2011	2,511.50	37.95	1,533.75	2,238.50	100.29	1,335.59	1,314.55	-1.0%	2.1%	0.5%	0.5%	-0.4%	1.2%	-0.4%
6/8/2011	2,574.50	36.22	1,537.75	2,271 25	100.74	1,301.84	1,279.56	2.5%	-4.7%	0.3%	1.5%	0.4%	-2 6%	-2.7%
6/15/2011	2,502.50	35.26	1,529.75	2,225.00	94.81	1,283.97	1,265.42	-2.8%	-2.7%	-0.5%	-2.1%	-6.1%	-1.4%	-1.1%
6/22/2011	2,532.00	35.91	1,552.50	2,226.75	95.01	1,299.53	1,287.14	1.2%	1.8%	1.5%	0.1%	0.2%	1 2%	1.7%
6/29/2011	2,618.75	34.39	1,504.25	2,293.75	94.77	1,314.00	1,307.41	3.4%	-4.3%	-3.2%	3.0%	-0.3%	1.1%	1.6%
7/6/2011	2,689.50	35.38	1,527.25	2,354.00	96.65	1,341.98	1,339.22	2.7%	2.8%	1.5%	2.6%	2.0%	2.1%	2.4%
7/13/2011	2,689.00	36.75	1,579.00	2,332 25	98.05	1,320.34	1,317.72	0.0%	3.8%	3.3%	-0.9%	1.4%	-1 6%	-1.6%
7/20/2011	2,672.50	38.59	1,586.00	2,424 25	98.14	1,324.12	1,325.84	-0.6%	4.9%	0.4%	3.9%	0.1%	0.3%	0.6%
7/27/2011	2,671.00	40.81	1,625.00	2,494.75	97.40	1,318.96	1,304.89	-0.1%	5.6%	2.4%	2.9%	-0.8%	-0.4%	-1.6%
8/3/2011	2,505.50	41.04	1,669.25	2,350.50	91.93	1,262.71	1,260.34	-6.4%	0.6%	2.7%	-6.0%	-5.8%	-4.4%	-3.5%
8/10/2011	2,266.00	38.31	1,772.00	2,071.75	82.89	1,130.33	1,120.76	-10.0%	-6.9%	6.0%	-12.6%	-10.4%	-11.1%	-11.7%
8/17/2011	2,370.75	40.02	1,790.00	2,187.75	87.58	1,200.34	1,193.89	4.5%	4.4%	1.0%	5.4%	5.5%	6.0%	6.3%
8/24/2011	2,351.75	42.08	1,770.00	2,149.75	84.98	1,168.58	1,177.60	-0.8%	5.0%	-1.1%	-1.8%	-3.0%	-2.7%	-1.4%
8/31/2011	2,594.00	41.35	1,813.50	2,264.25	88.81	1,211.22	1,218.89	9.8%	-1.8%	2.4%	5.2%	4.4%	3.6%	3.4%
9/7/2011	2,434.00	40.98	1,810.00	2,218.25	89.34	1,173.44	1,198.62	-6.4%	-0.9%	-0.2%	-2.1%	0.6%	-3 2%	-1.7%
9/14/2011	2,360.75	41.23	1,818.50	2,140.00	88.91	1,145.07	1,188.68	-3.1%	0.6%	0.5%	-3.6%	-0.5%	-2.4%	-0.8%
9/21/2011	2,234.00	40.25	1,793.00	2,052 25	85.75	1,137.18	1,166.76	-5.5%	-2.4%	-1.4%	-4.2%	-3.6%	-0.7%	-1.9%
9/28/2011	2,029.00	31.04	1,643.00	1,918.50	81.21	1,122.45	1,151.06	-9.6%	-26.0%	-8.7%	-6.7%	-5.4%	-1.3%	-1.4%
10/5/2011	1,919.25	28.69	1,617.00	1,822.75	79.68	1,096.16	1,144.03	-5.6%	-7.9%	-1.6%	-5.1%	-1.9%	-2.4%	-0.6%

Annualized Standard Deviation of Returns	Weeks	Period Start	Period End	Valuation Date						
	52	3/7/2007	3/5/2008	3/7/2008	40.5%	27.9%	15.0%	39.3%	30.2%	17.6%	16 3%
	52	10/8/2008	10/7/2009	10/14/2009	63.6%	40.7%	27.0%	45.0%	68.8%	30.4%	30 2%
	52	5/26/2010	5/25/2011	5/27/2011	35.9%	34.7%	13.6%	34.2%	30.7%	16.4%	16.1%
	52	6/23/2010	6/22/2011	6/23/2011	35.7%	35.4%	13.6%	33.5%	31.0%	15.4%	14.7%
	52	6/23/2010	6/22/2011	6/24/2011	35.7%	35.4%	13.6%	33.5%	31.0%	15.4%	14.7%

Sources and Notes:
[A] - [G]: Bloomberg, L.P.
[H] - [N]: Natural logarithm of the ratio of current week's return and past week's return in [A] - [G], respectively

Workpaper R-8: Santa Ana DCF Assumptions/Inputs

		Units	5/27/2011	6/23/2011	6/24/2011	Sources/Notes
Production						
Pre-Development Period						
Year of Preparation before Mine Development	[1]	*Year*	1	1	1	Assumption that there will be 1 year of preparation before development begins. See Brattle Reply Report, Section II.D.1.c.iii.
Average Delay	[2]	*Year*	3	3	3	Assumption that, on average across simulations, the mine will be delayed by 3 years. See Brattle Reply Report, Section II.D.1.c.iii.
Life of the Mine						
Final Production Year (Expansion Case)	[3]	*Year*	25	25	25	SRK Extended Life Projections (BR-219).
Presence of Metals						
Gold Grade	[4]	*grams/tonne*	0.006	0.006	0.006	Santa Ana 2011 FSU (C-61), Section 16.2.
Metallurgical recovery	[5]	*%*	70%	70%	70%	Santa Ana 2011 FSU (C-61), Section 16.1.
Inferred Resources Probability of Realization	[6]	*%*	50%	50%	50%	First Brattle Report, ¶ 127.
Prices						
Silver						
Silver alpha*	[7]		-0.02	-0.02	-0.02	Brattle Reply Report, Appendix B.
Silver mu	[8]		3.35	3.27	3.21	Brattle Reply Report, Appendix B.
Silver k	[9]		0.21	0.20	0.16	Brattle Reply Report, Appendix B.
Silver sigma	[10]		0.40	0.39	0.39	Brattle Reply Report, Appendix B.
Silver Spot Price at Valuation Date	[11]	*$/ounce*	37.86	35.00	34.64	Brattle Reply Report, Appendix B.
Gold						
Gold mu	[12]		0.03	0.03	0.03	Brattle Reply Report, Appendix B.
Gold sigma	[13]		0.18	0.18	0.18	Brattle Reply Report, Appendix B.
Gold Spot Price at Valuation Date	[14]	*$/ounce*	1,533.00	1,523.00	1,514.75	Brattle Reply Report, Appendix B.
Crude Oil						
Crude Oil alpha*	[15]		0.04	-0.01	-0.02	Brattle Reply Report, Appendix B.
Crude Oil mu	[16]		4.57	4.52	4.52	Brattle Reply Report, Appendix B.
Crude Oil k	[17]		0.86	0.49	0.45	Brattle Reply Report, Appendix B.
Crude Oil sigma	[18]		0.40	0.40	0.40	Brattle Reply Report, Appendix B.
Crude Oil Spot Price at Valuation Date	[19]	*$/barrel*	100.59	90.65	90.83	Brattle Reply Report, Appendix B.
Price Correlation Coefficients						
Silver - Gold	[20]		0.69	0.70	0.70	See Workpapers R-6.3, R-6.4, and R-6.5.
Silver - Crude Oil	[21]		0.56	0.57	0.57	See Workpapers R-6.3, R-6.4, and R-6.5.
Gold - Grude Oil	[22]		0.56	0.56	0.56	See Workpapers R-6.3, R-6.4, and R-6.5.
Charges						
Transport Charge	[23]	*$/ounce*	0.34	0.34	0.34	Santa Ana 2011 FSU (C-61), Table 23.8.
Treatment and Refining Charge	[24]	*$/ounce*	0.29	0.29	0.29	Santa Ana 2011 FSU (C-61), Table 23.8.
Weight Deduction	[25]	*%*	0.005%	0.005%	0.005%	Santa Ana Financial Model, tab 'Production Schedule' (RPA-Santa Ana-01).
Capital Costs						
Capital Costs Increased by x%	[26]	*%*	14%	14%	14%	First Brattle Report, ¶ 101.
Mine, Process, Infrastructure, and Owner's Costs Production Yr -1	[27]	*%*	20%	20%	20%	First RPA Report, Appendix B and underlying native file (BR-218), tab 'CF Summary'.
Mine, Process, Infrastructure, and Owner's Costs Production Yr -2	[28]	*%*	80%	80%	80%	First RPA Report, Appendix B and underlying native file (BR-218), tab 'CF Summary'.
Sustaining Capital Costs beyond RPA Base Case Term	[29]	*$/tonne*	0.42	0.42	0.42	First RPA Report, Appendix B and underlying native file (BR-218), tab 'CF Summary'.
Working Capital (days of revenue)	[30]	*Days*	25	25	25	Assumption that 25 days of revenue are held in accounts receivable.
Salvage Value	[31]	*$, Thousands*	2,500	2,500	2,500	First RPA Report, Appendix B and underlying native file (BR-218), tab 'Capex'.
Closure Costs Adjustment (used when ore processed is more or less than the RPA base case)	[32]	*$/tonne*	0.23	0.23	0.23	First RPA Report, Appendix B and underlying native file (BR-218), tab 'CF Summary'.
Operating Costs						
Percentage of Costs Driven by Fuel						
Mining	[33]	*%*	34.2%	34.2%	34.2%	See Workpaper R-3.
Processing	[34]	*%*	9.4%	9.4%	9.4%	See Workpaper R-3.
G&A	[35]	*%*	0.0%	0.0%	0.0%	See Workpaper R-3.
Unit Costs						
Mining Costs	[36]	*$/tonne*	2.50	2.50	2.50	First SRK Report, Section 6.5.
Processing	[37]	*$/tonne*	5.36	5.36	5.36	RPA Reply Report, Table 6-1. SRK Reply Report, ¶ 22.
G&A Costs	[38]	*$/tonne*	1.45	1.45	1.45	RPA Reply Report, Table 6-1.

Adjustments for Residual Risks						
Early Termination						
Political Risk	[39]	%	1.21%	1.33%	1.33%	See Workpaper R-5.
Early Termination Probability (p)	[40]	%	0.79%	0.79%	0.79%	See Workpaper R-4.
Political Risk + Early Termination Probability (p)	[41]	%	2.12%	2.12%	2.12%	[39] + [40].
Year When Early Termination becomes Possible	[42]	*Year*	3	3	3	
Social License Failure						
PV of Santa Ana Implied by the Corani DCF (Low End)	[43]		54,458	31,900		See Brattle Reply Report, Tables 2 and 3, [4].
Probability of Social License Failure (Low End)	[44]		75.10%	80.37%		Probability of social license failure that causes the Santa Ana PV to equal the PV implied by the Start Range of the Corani PV.
PV of Santa Ana Implied by the Corani DCF (High End)	[45]		152,407	117,826		See Brattle Reply Report, Tables 2 and 3, [4].
Probability of Social License Failure (High End)	[46]		30.20%	26.76%		Probability of social license failure that causes the Santa Ana PV to equal the PV implied by the End Range of the Corani PV.
Abandonment due to Negative Cash Flows						
Consecutive Years Negative Cash Flow Before Abandon	[47]	*Year*	4	4	4	Optimized year to abandon the mine after consecutive negative cash flows.
Fiscal Regime						
NSR Royalty Bracket 1 (Upper Bound)	[48]	*$, Thousands*	60,000	60,000	60,000	Santa Ana 2011 FSU (C-61), Section 22.8.2.
NSR Royalty Bracket 2 (Upper Bound)	[49]	*$, Thousands*	120,000	120,000	120,000	Santa Ana 2011 FSU (C-61), Section 22.8.2.
NSR Royalty Bracket 1 Rate	[50]	%	2%	2%	2%	Santa Ana 2011 FSU (C-61), Section 22.8.2. We assume a doubling of the royalty rate. See Brattle Reply Report, Section II.D.1.d.
NSR Royalty Bracket 2 Rate	[51]	%	4%	4%	4%	Santa Ana 2011 FSU (C-61), Section 22.8.2. We assume a doubling of the royalty rate. See Brattle Reply Report, Section II.D.1.d.
NSR Royalty Bracket 3 Rate	[52]	%	6%	6%	6%	Santa Ana 2011 FSU (C-61), Section 22.8.2. We assume a doubling of the royalty rate. See Brattle Reply Report, Section II.D.1.d.
Total Tax Loss Carryforward (available in the first year of production)	[53]	*$, Thousands*	14,414	14,414	14,414	Santa Ana 2011 FSU (C-61), Section 22.8.2. The feasibility study notes that the tax loss carryforward will be available in 2013 (its assumed first year of production). We assume that the carryforward will be applied in the first year of production, regardless of the date.
Pre-Production Expenses for Amortization	[54]	*$, Thousands*	23,960	23,960	23,960	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Depreciation Production Yr 1-6	[55]	%	15%	15%	15%	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Depreciation Production Yr 7	[56]	%	10%	10%	10%	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Workers Profit Sharing	[57]	%	8%	8%	8%	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Corporate Income Tax	[58]	%	40%	40%	40%	Assumption that the corporate tax rate will increase to 40%. See Brattle Reply Report, Section II.D.1.d.
IGV (VAT) Rate	[59]	%	18%	18%	18%	SUNAT, compendio_tasas_impositivas.xls, Annex 01, retrieved from <http://www.sunat.gob.pe/estadisticasestudios/principales_tasas/compendio_tasas_impositivas.xls > (accessed April 11, 2016) (BR-216).
IGV (VAT) Recuperation Amount (available as of Valuation Date)	[60]	*$, Thousands*	8,442	8,442	8,442	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Other Inputs						
Conversions						
Gram to Troy Ounce	[61]	*ounces/gram*	0.03215	0.03215	0.03215	
Thousand	[62]	*unit*	1,000	1,000	1,000	
Hundred	[63]	*unit*	100	100	100	

Workpaper R-9: Inputs to Corani DCF Model

		Units	3/7/2008	10/14/2009	5/27/2011	6/23/2011	6/24/2011	Sources/Notes
Production								
Delay								
Year of Preparation before Mine Development	[1]	*Year*	3	2	1	1	1	2008 and 2009 Schedule from Corani 2009 PFS (BR-199), p. 221; 2011 Schedule from Corani 2011 FS (C-66), p. 243.
Average Delay	[2]	*Year*	1	1	1	1	1	First Brattle Report, Section II.d.2.b; Brattle Reply Report, Section 2.D.1.c.iii.
Final Production Year	[3]	*year*	27	27	27	27	27	Corani 2009 PFS (BR-199), p. 19.
First Post-Production Year	[4]	*year*	28	28	28	28	28	[3] + 1.
Zinc Concentrate								
Ag Recovery	[5]	*%*	13.7%	13.7%	13.7%	13.7%	13.7%	Corani 2009 PFS (BR-199), p. 11.
Zinc Recovery	[6]	*%*	71.3%	71.3%	71.3%	71.3%	71.3%	Corani 2009 PFS (BR-199), p. 11.
Zinc Concentrate Grade	[7]	*%*	52.3%	52.3%	52.3%	52.3%	52.3%	Corani 2009 PFS (BR-199), p. 11.
Payable Metal - Zinc	[8]	*%*	85.0%	85.0%	85.0%	85.0%	85.0%	Corani 2009 PFS (BR-199), p. 257.
Zinc Minimum Deduction	[9]	*% of conc grade*	8.0%	8.0%	8.0%	8.0%	8.0%	Corani 2009 PFS (BR-199), p. 257.
Payable Metal - Silver	[10]	*% of balance*	70.0%	70.0%	70.0%	70.0%	70.0%	Corani 2009 PFS (BR-199), p. 257.
Silver Deduction	[11]	*ounces /dmt conc*	3.5	3.5	3.5	3.5	3.5	Corani 2009 PFS (BR-199), p. 257.
Lead Concentrate	[12]							
Ag Recovery	[13]	*%*	60.8%	60.8%	60.8%	60.8%	60.8%	Corani 2009 PFS (BR-199), p. 11.
Lead Recovery	[14]	*%*	71.7%	71.7%	71.7%	71.7%	71.7%	Corani 2009 PFS (BR-199), p. 11.
Lead Concentrate Grade	[15]	*%*	56.8%	56.8%	56.8%	56.8%	56.8%	Corani 2009 PFS (BR-199), p. 11.
Payable Metal - Lead	[16]	*%*	95.0%	95.0%	95.0%	95.0%	95.0%	Corani 2009 PFS (BR-199), p. 257.
Lead Minimum Deduction	[17]	*% of conc grade*	3.0%	3.0%	3.0%	3.0%	3.0%	Corani 2009 PFS (BR-199), p. 257.
Payable Metal - Silver	[18]	*% of balance*	95.0%	95.0%	95.0%	95.0%	95.0%	Corani 2009 PFS (BR-199), p. 257.
Silver Minimum Deduction	[19]	*ounces /dmt conc*	2.6	2.6	2.6	2.6	2.6	Corani 2009 PFS (BR-199), p. 257.
Prices								
Silver								
Silver alpha*	[20]		-0.03	-0.06	-0.02	-0.02	-0.02	Brattle Reply Report, Appendix B.
Silver mu	[21]		2.74	2.78	3.35	3.27	3.21	Brattle Reply Report, Appendix B.
Silver k	[22]		0.05	0.16	0.21	0.20	0.16	Brattle Reply Report, Appendix B.
Silver sigma	[23]		0.36	0.41	0.40	0.39	0.39	Brattle Reply Report, Appendix B.
Silver Spot Price at Valuation Date	[24]	*$ /ounce*	20.16	17.91	37.86	35.00	34.64	Brattle Reply Report, Appendix B.
Zinc								
Zinc alpha*	[25]		0.05	0.03	0.06	0.04	0.03	Brattle Reply Report, Appendix B.
Zinc mu	[26]		-0.02	-0.13	-1.23	-0.44	-0.37	Brattle Reply Report, Appendix B.
Zinc k	[27]		0.47	0.82	0.08	0.15	0.17	Brattle Reply Report, Appendix B.
Zinc sigma	[28]		0.40	0.41	0.40	0.40	0.40	Brattle Reply Report, Appendix B.
Zinc Spot price at Valuation Date	[29]	*$ / lbs*	1.19	0.91	1.02	1.01	1.01	Brattle Reply Report, Appendix B.
Lead								
Lead alpha*	[30]		0.03	0.00	-0.07	-0.04	-0.04	Brattle Reply Report, Appendix B.
Lead mu	[31]		0.12	-0.12	-0.02	0.01	0.01	Brattle Reply Report, Appendix B.
Lead k	[32]		0.51	0.76	0.52	0.56	0.50	Brattle Reply Report, Appendix B.
Lead sigma	[33]		0.41	0.53	0.49	0.49	0.49	Brattle Reply Report, Appendix B.
Lead Spot price	[34]	*$ / lbs*	1.40	0.98	1.14	1.15	1.16	Brattle Reply Report, Appendix B.
Crude Oil								
Crude Oil alpha*	[35]		-0.10	-0.04	0.04	-0.01	-0.02	Brattle Reply Report, Appendix B.
Crude Oil mu	[36]		4.54	4.27	4.57	4.52	4.52	Brattle Reply Report, Appendix B.
Crude Oil k	[37]		0.27	0.13	0.86	0.49	0.45	Brattle Reply Report, Appendix B.
Crude Oil sigma	[38]		0.31	0.43	0.40	0.40	0.40	Brattle Reply Report, Appendix B.
Crude Oil Spot price	[39]	*$ /barrel*	105.15	75.18	100.59	90.65	90.83	Brattle Reply Report, Appendix B.
Price Correlation Coefficients								
Silver - Zinc	[40]		0.39	0.28	0.31	0.31	0.31	Workpapers R-6.1 - R-6.5.
Silver - Lead	[41]		0.19	0.35	0.21	0.21	0.21	Workpapers R-6.1 - R-6.5.
Silver - Crude Oil	[42]		0.25	0.34	0.56	0.57	0.57	Workpapers R-6.1 - R-6.5.
Zinc - Lead	[43]		0.50	0.69	0.87	0.87	0.87	Workpapers R-6.1 - R-6.5.
Zinc - Crude Oil	[44]		0.02	0.40	0.42	0.44	0.44	Workpapers R-6.1 - R-6.5.
Lead - Crude Oil	[45]		0.01	0.49	0.47	0.50	0.50	Workpapers R-6.1 - R-6.5.
Charges								
Zinc Treatment Charges								

Workpaper R-9: Inputs to Corani DCF Model

		Units	3/7/2008	10/14/2009	5/27/2011	6/23/2011	6/24/2011	Sources/Notes
Treatment for Prices at $1,600 / tonne	[46]	*US $ / dmt*	113.6	115.0	120.2	120.1	120.1	115 in 2009 US $ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Per dollar escalator for prices between $1,600 - $2,000 / tonne	[47]	*US $ / dmt*	0.119	0.120	0.125	0.125	0.125	0.12 in 2009 US $ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Per dollar escalator for price greater than $2,000 / tonne	[48]	*US $ / dmt*	0.148	0.150	0.157	0.157	0.157	0.15 in 2009 US $ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Per dollar escalator for prices less than $1,600 / tonne	[49]	*US $ / dmt*	-0.059	-0.060	-0.063	-0.063	-0.063	-.06 in 2009 US $ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Lead Treatment Charges								
Treatment for Prices at $1,600 / tonne	[50]	*US $ / dmt*	79.0	80.0	83.6	83.5	83.5	80 in 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Per dollar escalator for prices between $1,600 - $2,000 / tonne	[51]	*US $ / dmt / US $ Lead Price*	0.099	0.100	0.105	0.104	0.104	0.10 in 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Per dollar escalator for price greater than $2,000 / tonne	[52]	*US $ / dmt / US $ Lead Price*	0.148	0.150	0.157	0.157	0.157	0.15 in 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Penalties								
Zinc	[53]	*US $ / dmt*	22.14	22.41	23.42	23.40	23.40	10 ppm free, excess at $3 per 10 ppm applied to 84.7 ppm = 22.41 is 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Lead - Sb	[54]	*US $ / dmt*	8.00	8.10	8.47	8.46	8.46	0.30% free, excess at $3 per 0.10% applied to 0.57% = 8.1 in 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Lead - Hg	[55]	*US $ / dmt*	2.87	2.91	3.04	3.04	3.04	10 ppm free, excess at $3 per 10 ppm applied to 19.7 ppm = 2.91 in 2009 US$ / dmt adjusted by CPI; Corani 2009 PFS (BR-199), p. 257.
Transportation/Rep/Ins/Loss Charges								
Concentrate Trucking	[56]	*US $ / wmt*	76.10	54.41	72.80	65.61	65.74	72 in 2011 US $ / wmt adjusted using WTI Crude Oil Spot Price; Corani 2011 FS (C-66), p. 231.
Concentrate Shipping	[57]	*US $ / wmt*	58.13	41.57	55.61	50.12	50.22	55 in 2011 US $ / wmt adjusted using WTI Crude Oil Spot Price; Corani 2011 FS (C-66), p. 231.
Transportation/Rep/Ins/Loss Charges	[58]	*US $ / wmt*	134.24	95.98	128.42	115.73	115.96	[56] + [57].
Moisture	[59]	*%*	8%	8%	8%	8%	8%	Corani 2011 FS (C-66), p. 231.
Capital Costs								
Capital Costs Increased by x%	[60]	*%*	14%	14%	14%	14%	14%	FIrst Brattle Report, ¶101.
Initial Capital	[61]	*US $ thousands*	325,053	339,000	357,984	358,371	358,371	2009 US $333.9 million adjusted using InfoMine USA, Inc. Mining Cost Service U.S. Cost Index: Surface Capital Cost; Corani 2009 PFS (BR-199), p. 120.
Sustaining Capital	[62]	*US $ thousands*	12,561	13,100	13,834	13,849	13,849	2009 US $13.1 million adjusted using InfoMine USA, Inc. Mining Cost Service U.S. Cost Index: Surface Capital Cost; Corani 2009 PFS (BR-199), p. 120.
Salvage Value	[63]	*US $ thousands*	-6,532	-6,613	-6,912	-6,905	-6,905	2011 US -$6.903 million adjusted using CPI; Corani 2011 FS (C-66) Model, p. 240.
Reclamation & Closure	[64]	*US $ thousands*	38,990	39,474	41,261	41,217	41,217	2011 US $41.208 million adjusted using CPI; Corani 2011 FS (C-66) Model, p. 240.
Operating Costs								
Percentage of Costs Driven By Fuel	[65]							
Mining	[66]	*%*	58%	58%	58%	58%	58%	Fuel-driven costs estimated to be Drilling, Loading, and Hauling; Corani 2011 FS (C-66), p. 213.
Processing	[67]	*%*	24%	24%	24%	24%	24%	Fuel-driven costs estimated to all Power costs; Corani 2011 FS (C-66), p. 215.
General and Administrative	[68]	*%*	6%	6%	6%	6%	6%	Fuel-driven costs estimated to be Power and Vehicle Operating & Maintenance; Corani 2011 FS (C-66), p. 210.
Unit Costs								
Mining (Includes ore, waste and rehandle costs)	[69]	*$ / t proc ore*	$ 4.03	$ 3.75	$ 4.39	$ 4.41	$ 4.41	3.75 adjusted using InfoMine USA, Inc. Mining Cost Service U.S. Cost Index: Surface Operating Cost; Corani 2009 PFS (BR-199), p. 17.
Processing	[70]	*$ / t proc ore*	$ 7.53	$ 7.30	$ 8.78	$ 8.82	$ 8.82	7.3 adjusted using InfoMine USA, Inc. Mining Cost Service U.S. Cost Index: Mill Operating Cost; Corani 2009 PFS (BR-199), p. 17.
General and Administrative	[71]	*$ / t proc ore*	$ 1.19	$ 1.20	$ 1.25	$ 1.25	$ 1.25	1.2 adjusted to 2011 dollars using CPI; Corani 2009 PFS (BR-199), p. 17.
Adjustment of Costs From Feasibility Studies to Valuation Dates								
Corani 2009 PFS (BR-199) (10/14/2009)								
CPI	[72]		0.988	1.000	1.045	1.044	1.044	Actual Inflation from the Corani 2009 PFS (BR-199) to Valuation date based on CPI.
Surface Capital Cost	[73]		0.959	1.000	1.056	1.057	1.057	Actual Inflation from the Corani 2009 PFS (BR-199) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
Surface Operating Cost	[74]		1.075	1.000	1.170	1.176	1.176	Actual Inflation from the Corani 2009 PFS (BR-199) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
Mill Operating Cost	[75]		1.031	1.000	1.203	1.209	1.209	Actual Inflation from the Corani 2009 PFS (BR-199) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
WTI Crude Oil Spot Price	[76]		1.399	1.000	1.338	1.206	1.208	Actual change in price from the Corani 2009 PFS (BR-199) to Valuation date based on WTI Crude Oil Spot Price.
2011 Corani PFS (12/22/2011)								
CPI	[77]		0.946	0.958	1.001	1.000	1.000	Actual Inflation from the Corani 2011 FS (C-66) to Valuation date based on CPI.

Workpaper R-9: Inputs to Corani DCF Model

		Units	3/7/2008	10/14/2009	5/27/2011	6/23/2011	6/24/2011	Sources/Notes
Surface Capital Cost	[78]		0.889	0.927	0.979	0.980	0.980	Actual Inflation from the Corani 2011 FS (C-66) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
Surface Operating Cost	[79]		0.915	0.851	0.995	1.001	1.001	Actual Inflation from the Corani 2011 FS (C-66) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
Mill Operating Cost	[80]		0.881	0.854	1.028	1.033	1.033	Actual Inflation from the Corani 2011 FS (C-66) to Valuation date based on InfoMine USA, Inc. Mining Cost Service U.S. Cost Indexes (BR-197).
WTI Crude Oil Spot Price	[81]		1.057	0.756	1.011	0.911	0.913	Actual change in price from the Corani 2011 FS (C-66) to Valuation date based on WTI Crude Oil Spot Price.
Adjustments for Residual Risks								
Early Termination Probability	[82]	*%*	0.79%	0.79%	0.79%	0.79%	0.79%	Brattle Reply Report, Workpaper R-4.
Political Risk	[83]	*%*	0.80%	0.70%	1.21%	1.33%	1.33%	Brattle Reply Report, Workpaper R-5.
Political Risk + Early Termination Probability	[84]	*%*	1.59%	1.49%	2.00%	2.12%	2.12%	[82] + [83].
Consecutive Years Negative Cash Flow Before Abandon	[85]	*years*	2	2	2	2	2	Optimized year to abandon the mine after consecutive negative cash flows. See Table 1.
# of Years Delayed before Abandoned	[86]	*years*	10	10	10	10	10	Assumption that after 10 years of delay PV would be minimal.
Last Project Year of Construction Start before Abandon Delay	[87]	*years*	12	12	11	11	11	If valuation date is in 2011, [86] + 1, otherwise, [86] + 2.
Probability of Tecnology Failure - Lower Bound	[88]	*%*	0%	0%	46%	46%	46%	Brattle Reply Report, Table 4.
Probability of Tecnology Failure - Upper Bound	[89]	*%*	0%	0%	57%	57%	57%	Brattle Reply Report, Table 4.
Selected Probability of Technology Failure	[90]	*%*	0%	0%	57%	57%	57%	[88] or [89] based on Switch in Exhibit BR-230, Table 1.
Fiscal Regime	[91]							
NSR Royalty Bracket 1 (Upper Bound)	[92]	*US $ thousands*	$ 60,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000	USD Thousand
NSR Royalty Bracket 2 (Upper Bound)	[93]	*US $ thousands*	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000	USD Thousand
NSR Royalty Bracket 2 Rate	[94]	*%*	1%	1%	2%	2%	2%	Corani 2009 PFS (BR-199), p. 249.
NSR Royalty Bracket 3 Rate	[95]	*%*	2%	2%	4%	4%	4%	Corani 2009 PFS (BR-199), p. 249.
NSR Royalty Bracket 1 Rate	[96]	*%*	3%	3%	6%	6%	6%	Corani 2009 PFS (BR-199), p. 249.
Depreciation years 1 - 6	[97]	*%*	15%	15%	15%	15%	15%	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Depreciation year 7	[98]	*%*	10%	10%	10%	10%	10%	Santa Ana 2011 FSU (C-61), Section 22.8.2.
Profit Sharing	[99]	*%*	8%	8%	8%	8%	8%	Corani 2009 PFS (BR-199), p. 249.
Peruvian Corporate Tax	[100]	*%*	30%	30%	40%	40%	40%	30% From Corani 2009 PFS (BR-199), p. 249. 40% is due to uncertainty regarding elections in 2011, see Brattle Reply Report, Section II.D.1.d..
IGV Tax Rate	[101]	*%*	19%	19%	18%	18%	18%	Corani 2009 PFS (BR-199), p. 249; SUNAT, compendio_tasas_impositivas.xls, Annex 01, retrieved from <http://www.sunat.gob.pe/estadisticasestudios/principales tasas/compendio tasas impositi
Percent of Initial Capital	[102]	*%*	98%	98%	98%	98%	98%	Based on RPA Exhibit: Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx (RPA-Corani-7).
Percent of Mining Operating Costs	[103]	*%*	90%	90%	90%	90%	90%	Based on RPA Exhibit: Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx (RPA-Corani-7).
Percent of Processing Operating Costs	[104]	*%*	95%	95%	95%	95%	95%	Based on RPA Exhibit: Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx (RPA-Corani-7).
Percent of General and Administrative Operating Costs	[105]	*%*	70%	70%	70%	70%	70%	Based on RPA Exhibit: Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx (RPA-Corani-7).
Number of Months of Unrefunded IGV	[106]	*months*	3	3	3	3	3	Based on RPA Exhibit: Global Resource Engineering, 2015g, Corani_Fin_Model_140135_R13_100%_Lease_Purchase.xlsx (RPA-Corani-7).
Other Inputs								
Gram to Troy Ounce	[107]	*ounces / gram*						
Tonnes to lbs	[108]	*lbs / tonne*						
Thousand	[109]	*unit*						
Hundred	[110]	*unit*						
Days in Year	[111]	*days*						
Account Recievable (Days)	[112]	*days*						
Accounts Payable (Days)	[113]	*days*						

Workpaper R-10: FMV of Corani on March 7, 2008

		Nominal Value *(US $, millions)* [A]	Present Value Factor [B]	Present Value as of March 7, 2008 *(US $, millions)* [C]
Bear Creek shares	[1]	30.0	1.00	30.0
Cash Payment at December 31, 2008	[2]	20.0	0.99	19.7
Cash Payment at December 31, 2009	[3]	25.0	0.97	24.3
Total Consideration Paid to Rio Tinto	[4]	75.0		74.1
Success fee if Feasibility Study Reserves exceed 100 million oz silver	[5]	5.0	0.97	4.9
Estimated success fee at $0.015 per oz of silver reserves	[6]	2.5	0.97	2.4
Total extinguished obligations	[7]	7.5		7.2
Consideration Paid for 30% Share of Corani	[8]	67.5		66.8
FMV of 100% of Corani	[9]	225.2		222.8

Sources and Notes:
[A][1]-[3]: ''Bear Creek Consolidates 100% of Corani Silver Deposit,'' SEDAR, March 7, 2008 (BR-174).
[A][4]: Sum of [A][1] through [A][3].
[A][5]: ''Bear Creek and Rio Tinto Formalized Option Agreement on Corani Silver Deposit, Peru,'' SEDAR, March 15, 2007 (BR-175).
[A][6]: Bear Creek will pay US$0.015 / oz. of silver reserves. See ''Bear Creek and Rio Tinto Formalized Option Agreement on Corani Silver Deposit, Peru,'' SEDAR, March 15, 2007 (BR-175).
See also, Corani Resource Estimate and PEA, March 3, 2008 (BR-195), Table 1-1, p. 2. Assumes a 50% conversion of Measured & Indicated Resources intoMineral Reserves.
[A][7]: [A][5] + [A][6].
[A][8]: [A][4] - [A][7].
[A][9]: [A][5] / 30%.
[B]: 1 / (1 + Treasury Yield) ^ Years since March 7, 2008. The 1-Year Treasury is used for [2]. The 2-Year Treasury is used for [3], [5], and [6]. Assumes that the Feasibility Study would be completed in approximately 2 years.
[C][1]-[3], [5]-[6]: [A] x [B].
[C][4]: Sum of [C][1] through [C][3].
[C][7]: [C][5] + [C][6].
[C][8]: [C][4] - [C][7].
[C][9]: [C][5] / 30%.

Workpaper R-11: Change in Corani Market Value between March 7, 2008 and October 14, 2009

Corani Preliminary Present Value as of March 7, 2008, Excluding Technology Failure Risk	[1]	615.2
Corani Preliminary Present Value as of October 14, 2009, Excluding Technology Failure Risk	[2]	393.8
Change Due to Market Variables	[3]	-36%

Sources and Notes:
[1]: Corani Modern DCF Model (Exhibit BR-230), Table 1 as of March 7, 2008, excluding proability of technology failure.
[2]: Corani Modern DCF Model (Exhibit BR-230), Table 1 as of October 14, 2009, excluding proability of technology failure.
[3]: [2] / [1] - 1.

Workpaper R-12: Effect of Lowering Project Discount Rate from 12% to 8%

			Constant Cash Flow Example				Corani 2011 FS			
Year	Discount Factor at 12% [A]	Discount Factor at 8% [B]	Nominal Cash Flow [C]	PV of Cash Flow at 12% [D]	PV of Cash Flow at 8% [E]	% Change [F]	Nominal Cash Flow [G]	PV of Cash Flow at 12% [H]	PV of Cash Flow at 8% [I]	% Change [J]
Total:			27,000	7,943	10,935	**38%**	966,865	119,950	270,303	**125%**
1	0 893	0.926	1,000	893	926	4%	-23,674	-21,138	-21,920	4%
2	0.797	0.857	1,000	797	857	8%	-228,965	-182,529	-196,301	8%
3	0.712	0.794	1,000	712	794	12%	-293,330	-208,787	-232,855	12%
4	0.636	0.735	1,000	636	735	16%	104,770	66,583	77,009	16%
5	0 567	0.681	1,000	567	681	20%	167,680	95,146	114,120	20%
6	0 507	0.630	1,000	507	630	24%	152,923	77,476	96,367	24%
7	0.452	0.583	1,000	452	583	29%	144,888	65,540	84,541	29%
8	0.404	0.540	1,000	404	540	34%	153,133	61,848	82,733	34%
9	0 361	0.500	1,000	361	500	39%	114,812	41,402	57,435	39%
10	0 322	0.463	1,000	322	463	44%	91,965	29,610	42,598	44%
11	0 287	0.429	1,000	287	429	49%	60,434	17,373	25,919	49%
12	0 257	0.397	1,000	257	397	55%	42,257	10,846	16,781	55%
13	0 229	0.368	1,000	229	368	60%	38,877	8,910	14,295	60%
14	0 205	0.340	1,000	205	340	66%	46,022	9,417	15,669	66%
15	0.183	0.315	1,000	183	315	73%	49,568	9,056	15,626	73%
16	0.163	0.292	1,000	163	292	79%	42,069	6,862	12,280	79%
17	0.146	0.270	1,000	146	270	86%	33,767	4,918	9,126	86%
18	0.130	0.250	1,000	130	250	92%	50,419	6,556	12,617	92%
19	0.116	0.232	1,000	116	232	100%	46,152	5,359	10,694	100%
20	0.104	0.215	1,000	104	215	107%	47,005	4,873	10,085	107%
21	0 093	0.199	1,000	93	199	115%	50,820	4,704	10,096	115%
22	0 083	0.184	1,000	83	184	123%	41,725	3,448	7,675	123%
23	0 074	0.170	1,000	74	170	131%	33,548	2,475	5,714	131%
24	0 066	0.158	1,000	66	158	139%				
25	0 059	0.146	1,000	59	146	148%				
26	0 053	0.135	1,000	53	135	157%				
27	0 047	0.125	1,000	47	125	167%				

Sources and Notes:
[A]: 1 / (1 + 12%) ^ Year.
[B]: 1 / (1 + 8%) ^ Year.
[C]: $1,000 nominal cash flow in each year.
[D]: [A] x [C].
[E]: [B] x [C].
[F]: ([E] - [D]) / [D].
[G]: Corani 2011 FS (C-66), Table 22-14.
[H]: [A] x [G].
[I]: [B] x [G].
[J]: ([I] - [H]) / [H].

Workpaper R-13: Exploration and Evaluation Costs at Santa Ana and Corani since Q3 2011 (US $ millions)

Time Period		Santa Ana	Corani
Q3-Q4 2011	[1]	0.59	9.85
2012	[2]	0.49	14.91
2013	[3]	0.51	9.23
2014	[4]	1.36	7.47
Q1-Q3 2015	[5]	0.20	6.15
Total Since Q3 2011	[6]	3.14	47.61

Sources and Notes:
[1]: Bear Creek Mining Corporation Interim Consolidated Financial Statements, Second Quarter ended June 30, 2011, August 15, 2011 (BR-12), p. 12, Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2011 and 2010, p.
[2]: Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2012 and 2011 (BR-167) pp. 19-20.
[3]: Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2013 and 2012 (BR-221), pp. 16, 19. Bear Creek Mining Corporation, Management Discussion and Analysis for the Year Ended December 31, 2013 (BR-02), p. 13. The $0.5 million in Santa Ana costs is "principally for ongoing legal related costs."
[4]: Bear Creek Mining Corporation Consolidated Financial Statements, December 31, 2014 and 2013 (BR-220), pp. 17, 21. Bear Creek Mining Corporation Management Discussion and Analysis, for year ended December 31, 2014 (BR-168), p. 18. The $1.4 million in Santa Ana costs is "principally for ongoing legal related costs."
[5]: Bear Creek Mining Corporation Interim Condensed Consolidated Financial Statements, Nine Months Ended September 30, 2015 and 2014 (BR-222), pp. 7, 10.
[6]: [1] + [5].

Workpaper R-14: Pre Award Interest as of March 23, 2016

Start of Period [A]	End of Period [B]	Days in Interest Period [C]	Risk Free Rate - Treasury [D]	Peru CDS Mid [E]	Peru Borrowing Cost [F]	Risk Free (Treasury) Based Interest Factor [G]	Peru Borrowing Cost Based Interest Factor [H]	LIBOR + 1% [I]	LIBOR Based Interest Factor [J]
6/24/2011	7/23/2011	30	0.16%	0.50%	0.66%	1 0001	1 0005	1.19%	1.0010
7/24/2011	8/23/2011	31	0 20%	0.46%	0.66%	1 0003	1 0011	1.19%	1.0020
8/24/2011	9/23/2011	31	0.11%	0.84%	0 95%	1 0004	1 0019	1.22%	1.0031
9/24/2011	10/23/2011	30	0.10%	0.84%	0 94%	1 0005	1 0027	1.24%	1.0041
10/24/2011	11/23/2011	31	0.11%	0.64%	0.75%	1 0006	1 0033	1.24%	1.0052
11/24/2011	12/23/2011	30	0.12%	0.75%	0 87%	1 0007	1 0040	1.26%	1.0062
12/24/2011	1/23/2012	31	0.12%	0.75%	0 87%	1 0008	1 0048	1.29%	1.0073
1/24/2012	2/23/2012	31	0.12%	0.74%	0 86%	1 0009	1 0055	1.28%	1.0085
2/24/2012	3/23/2012	29	0.18%	0.60%	0.78%	1 0010	1 0061	1.24%	1.0095
3/24/2012	4/23/2012	31	0.19%	0.49%	0.68%	1 0012	1 0067	1.24%	1.0105
4/24/2012	5/23/2012	30	0.18%	0.52%	0.70%	1 0013	1 0073	1.24%	1.0116
5/24/2012	6/23/2012	31	0 21%	0.65%	0 86%	1 0015	1 0080	1.24%	1.0127
6/24/2012	7/23/2012	30	0.19%	0.65%	0 84%	1 0017	1 0087	1.25%	1.0137
7/24/2012	8/23/2012	31	0.18%	0.59%	0.77%	1 0018	1 0094	1.24%	1.0148
8/24/2012	9/23/2012	31	0.19%	0.41%	0.60%	1 0020	1 0099	1.23%	1.0159
9/24/2012	10/23/2012	30	0.18%	0.18%	0 36%	1 0021	1 0102	1.22%	1.0169
10/24/2012	11/23/2012	31	0.18%	0.30%	0.48%	1 0023	1 0106	1.21%	1.0180
11/24/2012	12/23/2012	30	0.19%	0.29%	0.48%	1 0024	1 0110	1.21%	1.0190
12/24/2012	1/23/2013	31	0.16%	0.28%	0.44%	1 0026	1 0114	1.21%	1.0201
1/24/2013	2/23/2013	31	0.15%	0.27%	0.42%	1 0027	1 0117	1.20%	1.0211
2/24/2013	3/23/2013	28	0.16%	0.28%	0.44%	1 0028	1 0121	1.20%	1.0221
3/24/2013	4/23/2013	31	0.14%	0.28%	0.42%	1 0029	1 0124	1.20%	1.0231
4/24/2013	5/23/2013	30	0.13%	0.26%	0 39%	1 0030	1 0128	1.20%	1.0242
5/24/2013	6/23/2013	31	0.12%	0.39%	0 51%	1 0031	1 0132	1.19%	1.0252
6/24/2013	7/23/2013	30	0.16%	0.77%	0 93%	1 0033	1 0140	1.20%	1.0262
7/24/2013	8/23/2013	31	0.12%	0.67%	0.79%	1 0034	1 0147	1.19%	1.0273
8/24/2013	9/23/2013	31	0.14%	0.67%	0 81%	1 0035	1 0154	1.18%	1.0283
9/24/2013	10/23/2013	30	0.10%	0.68%	0.78%	1 0036	1 0160	1.18%	1.0293
10/24/2013	11/23/2013	31	0.12%	0.66%	0.78%	1 0037	1 0167	1.17%	1.0304
11/24/2013	12/23/2013	30	0.12%	0.61%	0.73%	1 0038	1 0173	1.17%	1.0314
12/24/2013	1/23/2014	31	0.14%	0.56%	0.70%	1 0039	1 0179	1.17%	1.0324
1/24/2014	2/23/2014	31	0.11%	0.59%	0.70%	1 0040	1 0185	1.16%	1.0334
2/24/2014	3/23/2014	28	0.11%	0.38%	0.49%	1 0041	1 0189	1.15%	1.0344
3/24/2014	4/23/2014	31	0.14%	0.38%	0 52%	1 0042	1 0193	1.15%	1.0354
4/24/2014	5/23/2014	30	0.10%	0.30%	0.40%	1 0043	1 0197	1.15%	1.0364
5/24/2014	6/23/2014	31	0.10%	0.25%	0 35%	1 0044	1 0200	1.15%	1.0374
6/24/2014	7/23/2014	30	0.12%	0.16%	0 28%	1 0045	1 0202	1.15%	1.0384
7/24/2014	8/23/2014	31	0.11%	0.18%	0 29%	1 0046	1 0205	1.15%	1.0394
8/24/2014	9/23/2014	31	0.10%	0.20%	0 30%	1 0046	1 0207	1.16%	1.0405
9/24/2014	10/23/2014	30	0.11%	0.23%	0 34%	1 0047	1 0210	1.15%	1.0415
10/24/2014	11/23/2014	31	0.11%	0.32%	0.43%	1 0048	1 0214	1.15%	1.0425
11/24/2014	12/23/2014	30	0.14%	0.33%	0.47%	1 0050	1 0218	1.15%	1.0435
12/24/2014	1/23/2015	31	0 26%	0.33%	0 59%	1 0052	1 0223	1.17%	1.0446
1/24/2015	2/23/2015	31	0.17%	0.49%	0.66%	1 0053	1 0229	1.17%	1.0456
2/24/2015	3/23/2015	28	0 22%	0.45%	0.67%	1 0055	1 0234	1.17%	1.0466
3/24/2015	4/23/2015	31	0 24%	0.55%	0.79%	1 0057	1 0241	1.17%	1.0476
4/24/2015	5/23/2015	30	0 24%	0.58%	0 82%	1 0059	1 0248	1.18%	1.0487
5/24/2015	6/23/2015	31	0 23%	0.55%	0.78%	1 0061	1 0254	1.18%	1.0497
6/24/2015	7/23/2015	30	0 30%	0.55%	0 85%	1 0063	1 0262	1.19%	1.0508
7/24/2015	8/23/2015	31	0 32%	0.60%	0 92%	1 0066	1 0270	1.19%	1.0518
8/24/2015	9/23/2015	31	0 33%	0.79%	1.12%	1 0069	1 0279	1.20%	1.0529
9/24/2015	10/23/2015	30	0 32%	0.89%	1 21%	1 0072	1 0290	1.19%	1.0540
10/24/2015	11/23/2015	31	0 24%	0.85%	1 09%	1 0074	1 0299	1.19%	1.0551
11/24/2015	12/23/2015	30	0 52%	0.83%	1 35%	1 0078	1 0311	1.23%	1.0561
12/24/2015	1/23/2016	31	0.64%	0.86%	1 50%	1 0083	1 0324	1.42%	1.0574
1/24/2016	2/23/2016	31	0.47%	0.98%	1.45%	1 0087	1 0336	1.43%	1.0587
2/24/2016	3/23/2016	29	0 55%	0.91%	1.46%	1 0092	1 0348	1.43%	1.0599
Average			0.19%	0.53%	0.72%			1.21%	

Notes and Sources:
[A]: Monthly as of 6/24/2011.
[B]: Monthly as of 7/23/2011.
[C]: Number of days between [A] and [B] in which interest will accrue at the specified rate.
[D]: Risk Free Base: DGS1 at the start of the period (06/24/2011). If data is not available on [A] the most recent date with reported data is used. Source: FRED Economic Data.
[E]: 1-Year Maturity Peru CDS Mid at the start of the period (06/24/2011). Source: S&P Capital IQ.
[F]: [D] + [E].
[G]: Factor = Factor_t-1 * (1 + [D] * [C] / 365). Prior period factor set at 1 for 06/24/2011.
[H]: Factor = Factor_t-1 * (1 + [F] * [C] / 365). Prior period factor set at 1 for 06/24/2011.
[I]: One Month US$ denominated LIBOR (USD1MTD156N). If data is not available on [A] the most recent date with reported data is used. Source: FRED Economic Data.
[J]: Factor = Factor_t-1 * (1 + [I] * [C] / 360). Prior period factor set at 1 for 06/24/2011.

Workpaper R-15: Average Maturity of FTI's Selected Peruvian Sovereign Bonds

[A]	Maturity [B]	Remaining Maturity (Years) [C]	Outstanding (US$MM) [D]	Coupon (%) [E]	Price [F]	Yield (%) [G]
Global 12	2/21/2012	0.66	312	9.13	104.70	1.78
Global 15	2/6/2015	3.62	278	9.88	124.43	2.72
Global 16	5/3/2016	4.86	581	8.38	122.63	3.29
Global 19	3/30/2019	7.77	1,000	7.13	119.92	4.10
Global 25	7/21/2025	14.08	2,250	7.35	121.52	5.18
Global 33	11/21/2033	22.43	2,245	8.75	136.31	5.83
Global 37	3/14/2037	25.74	1,202	6.55	110.90	5.73
Global 50	11/18/2050	39.43	1,000	5.63	94.19	6.01
Weighted Average:		18.52		7.58		5.07

Sources and Notes:
[A]: FTI Reply Report, Figure 12.
[B]: Bloomberg, LP.
[C]: ([B] - 6/24/2011) / 365.
[D]-[G]: Republic of Peru, Ministry of Economy and Finance, General Bureau of Public Debt and Treasury, Bureau of Analysis and Strategy, Daily Report, June 23, 2011 (FTI-47).
Weighted Average is weighted by [D].

Workpaper R-16: Bear Creek Share Price and Market Indices (Scaled to 7/21/2011)

	Market Indices					Spot Prices			Bear Creek	Peru Mining Indices			
Date	Solactive Global Silver Miners Index [A]	S&P/TSX Venture Composite Index [B]	S&P/TSX Composite Index [C]	S&P/BVL Peru General Index TR PEN [D]	S&P/TSX Global Mining Index CAD [E]	Silver [F]	Lead [G]	Zinc [H]	Bear Creek Mining Corp [I]	Market Weighted Index Return [J]	Market Weighted Peru Mining Index [K]	Equal Weighted Index Return [L]	Equal Weighted Peru Mining Index [M]
7/1/2011	0.86	#N/A	#N/A	0.86	#N/A	0.85	0.99	0.97	#N/A	-0.6%	0.87	1.5%	0.85
7/4/2011	0.86	0.93	0.98	0.87	0.97	0.86	1.00	0.98	0.70	0.2%	0.87	0.4%	0.85
7/5/2011	0.89	0.93	0.98	0.87	0.97	0.87	1.00	0.98	0.70	-0.4%	0.86	3.1%	0.88
7/6/2011	0.91	0.94	0.98	0.87	0.97	0.89	1.00	0.97	0.70	0.4%	0.87	-0.3%	0.87
7/7/2011	0.92	0.96	0.98	0.89	0.99	0.90	1.01	0.99	0.70	-0.7%	0.86	1.2%	0.88
7/8/2011	0.91	0.96	0.98	0.90	0.98	0.91	1.01	0.96	0.72	1.2%	0.87	0.9%	0.89
7/11/2011	0.89	0.93	0.96	0.89	0.95	0.91	1.00	0.94	0.73	-1.8%	0.86	-3.1%	0.86
7/12/2011	0.91	0.94	0.96	0.90	0.96	0.88	1.02	0.96	0.72	1.4%	0.87	2.1%	0.88
7/13/2011	0.96	0.96	0.98	0.91	0.98	0.92	1.00	0.96	0.72	3.4%	0.90	4.2%	0.92
7/14/2011	0.97	0.96	0.97	0.91	0.97	0.99	0.99	0.96	0.72	1.8%	0.91	-0.6%	0.91
7/15/2011	0.99	0.97	0.98	0.92	0.98	0.96	1.01	0.97	0.75	2.0%	0.93	1.9%	0.93
7/18/2011	1.01	0.97	0.97	0.96	0.98	1.01	1.01	0.99	0.86	3.3%	0.96	2.5%	0.96
7/19/2011	0.99	0.97	0.99	0.99	0.99	1.01	1.03	1.02	0.93	1.9%	0.98	-0.5%	0.95
7/20/2011	1.01	0.99	0.99	1.00	0.99	0.97	1.00	1.00	0.93	1.5%	0.99	1.5%	0.96
7/21/2011	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.6%	1.00	3.7%	1.00
7/22/2011	1.01	1.01	1.00	0.99	1.00	1.00	1.00	1.02	1.05	0.0%	1.00	0.2%	1.00
7/25/2011	1.01	1.00	1.00	0.99	1.00	1.03	0.99	1.01	1.05	-1.2%	0.99	1.0%	1.01
7/26/2011	1.01	0.99	0.99	1.01	1.00	1.01	1.01	1.03	0.99	1.1%	1.00	0.8%	1.02
7/27/2011	0.98	0.97	0.97	0.99	0.97	1.03	1.00	1.03	0.89	-2.3%	0.98	-1.6%	1.00
7/28/2011	0.97	0.97	0.97	#N/A	0.97	1.01	0.98	1.03	0.88	1.3%	0.99	-1.2%	0.99
7/29/2011	0.96	0.96	0.95	#N/A	0.96	1.00	0.97	1.02	0.89	-2.1%	0.97	-1.4%	0.98
8/1/2011	0.95	#N/A	#N/A	0.99	#N/A	0.99	0.95	1.01	#N/A	-0.2%	0.97	-0.2%	0.97
8/2/2011	0.98	0.95	0.93	0.98	0.94	1.00	0.95	1.00	0.92	0.4%	0.97	-0.3%	0.97
8/3/2011	1.00	0.94	0.94	0.97	0.94	1.03	0.94	0.97	0.92	-0.4%	0.97	-1.7%	0.96
8/4/2011	0.92	0.88	0.89	0.91	0.87	1.05	0.92	0.95	0.84	-4.5%	0.92	-5.9%	0.90
8/5/2011	0.90	0.86	0.87	0.91	0.85	0.99	0.88	0.90	0.81	-0.4%	0.92	-0.5%	0.89
8/8/2011	0.85	0.79	0.83	0.84	0.80	1.00	0.82	0.85	0.76	-2.4%	0.90	-9.2%	0.81
8/9/2011	0.88	0.80	0.86	0.87	0.86	0.96	0.84	0.86	0.69	3.0%	0.92	2.3%	0.83
8/10/2011	0.90	0.82	0.87	0.85	0.85	0.96	0.85	0.86	0.73	-1.7%	0.91	-0.4%	0.83
8/11/2011	0.91	0.84	0.89	0.88	0.88	0.98	0.89	0.89	0.72	3.9%	0.94	4.8%	0.87
8/12/2011	0.92	0.85	0.89	0.90	0.88	0.96	0.89	0.89	0.70	0.3%	0.95	3.1%	0.89
8/15/2011	0.95	0.86	0.91	0.90	0.90	0.98	0.90	0.89	0.73	1.3%	0.96	2.4%	0.92
8/16/2011	0.94	0.85	0.90	0.89	0.89	0.99	0.88	0.89	0.71	-3.5%	0.93	-3.1%	0.89
8/17/2011	0.95	0.86	0.90	0.90	0.90	1.01	0.89	0.90	0.72	4.0%	0.96	0.9%	0.89
8/18/2011	0.92	0.83	0.87	0.88	0.86	1.01	0.86	0.89	0.69	-0.8%	0.95	-1.3%	0.88
8/19/2011	0.94	0.83	0.86	0.87	0.85	1.06	0.86	0.89	0.68	2.2%	0.98	-1.9%	0.87
8/22/2011	1.00	0.83	0.86	0.88	0.86	1.09	0.85	0.88	0.72	1.0%	0.99	-0.8%	0.86
8/23/2011	0.97	0.82	0.88	0.88	0.87	1.08	0.87	0.89	0.70	0.0%	0.99	1.3%	0.87
8/24/2011	0.94	0.81	0.88	0.88	0.86	1.06	0.88	0.89	0.68	-0.1%	0.98	0.5%	0.87
8/25/2011	0.94	0.82	0.88	0.88	0.87	0.98	0.90	0.91	0.67	2.8%	1.01	0.6%	0.88
8/26/2011	0.97	0.83	0.88	0.89	0.89	1.03	0.93	0.92	0.71	0.8%	1.02	3.3%	0.91
8/29/2011	0.98	0.84	0.90	0.90	0.90	#N/A	#N/A	#N/A	0.71	0.5%	1.03	0.1%	0.91
8/30/2011	1.02	0.85	0.91	#N/A	0.91	1.03	0.96	0.93	0.72	1.8%	1.04	-0.7%	0.91
8/31/2011	1.02	0.86	0.92	0.94	0.92	1.04	0.97	0.93	0.74	-0.5%	1.04	0.6%	0.91
9/1/2011	1.02	0.86	0.92	0.94	0.91	1.04	0.96	0.91	0.73	0.4%	1.04	1.5%	0.92
9/2/2011	1.04	0.85	0.90	0.92	0.90	1.07	0.93	0.90	0.76	-0.1%	1.04	-1.5%	0.91
9/5/2011	1.02	#N/A	#N/A	0.91	#N/A	1.07	0.92	0.89	#N/A	-2.7%	1.01	-2.3%	0.89
9/6/2011	1.02	0.84	0.89	0.90	0.90	1.05	0.90	0.89	0.72	-0.8%	1.00	-1.7%	0.87
9/7/2011	1.04	0.84	0.91	0.91	0.92	1.03	0.91	0.92	0.74	-1.4%	0.99	1.8%	0.89
9/8/2011	1.05	0.85	0.91	0.91	0.91	1.06	0.94	0.92	0.82	2.1%	1.01	2.2%	0.91
9/9/2011	1.02	0.83	0.88	0.90	0.89	1.04	0.92	0.89	0.78	-1.5%	1.00	-0.5%	0.90
9/12/2011	0.98	0.81	0.86	0.90	0.87	1.03	0.91	0.91	0.75	-1.8%	0.98	-3.8%	0.87
9/13/2011	0.98	0.82	0.87	0.90	0.88	1.01	0.90	0.90	0.80	1.4%	0.99	-1.4%	0.86

Workpaper R-16: Bear Creek Share Price and Market Indices (Scaled to 7/21/2011)

	Market Indices					Spot Prices			Bear Creek	Peru Mining Indices			
Date	Solactive Global Silver Miners Index [A]	S&P/TSX Venture Composite Index [B]	S&P/TSX Composite Index [C]	S&P/BVL Peru General Index TR PEN [D]	S&P/TSX Global Mining Index CAD [E]	Silver [F]	Lead [G]	Zinc [H]	Bear Creek Mining Corp [I]	Market Weighted Index Return [J]	Market Weighted Peru Mining Index [K]	Equal Weighted Index Return [L]	Equal Weighted Peru Mining Index [M]
9/14/2011	0.98	0.82	0.88	0.91	0.87	1.04	0.88	0.88	0.80	-1.7%	0.97	0.1%	0.86
9/15/2011	0.97	0.83	0.89	0.92	0.88	1.01	0.90	0.90	0.78	0.2%	0.98	0.9%	0.87
9/16/2011	0.98	0.83	0.88	0.93	0.89	1.00	0.89	0.88	0.81	0.4%	0.98	2.8%	0.89
9/19/2011	0.97	0.81	0.87	0.92	0.86	1.02	0.87	0.86	0.79	-0.4%	0.98	-3.1%	0.86
9/20/2011	0.98	0.81	0.87	0.91	0.86	0.98	0.87	0.85	0.85	2.8%	1.00	3.8%	0.90
9/21/2011	0.96	0.79	0.84	0.89	0.83	1.01	0.83	0.85	0.87	0.7%	1.01	-3.5%	0.86
9/22/2011	0.86	0.72	0.79	0.84	0.76	0.95	0.79	0.82	0.78	-10.7%	0.90	-6.9%	0.80
9/23/2011	0.81	0.70	0.79	0.84	0.74	0.83	0.74	0.78	0.74	-4.4%	0.86	-4.9%	0.77
9/26/2011	0.81	0.68	0.80	0.83	0.76	0.71	0.71	0.77	0.73	0.8%	0.87	-1.6%	0.75
9/27/2011	0.84	0.71	0.82	0.85	0.77	0.84	0.76	0.80	0.71	0.8%	0.88	8.5%	0.82
9/28/2011	0.79	0.68	0.80	0.83	0.74	0.78	0.76	0.79	0.67	-5.0%	0.83	-5.1%	0.78
9/29/2011	0.78	0.66	0.80	0.82	0.73	0.76	0.76	0.79	0.69	-0.2%	0.83	-0.4%	0.77
9/30/2011	0.76	0.65	0.79	0.82	0.72	0.77	0.75	0.76	0.68	-1.0%	0.82	0.2%	0.77

Notes:
[A]: SOLGLOSI Index scaled to 1 on 07/21/2011.
[B]: SPTSXVEN Index scaled to 1 on 07/21/2011.
[C]: SPTSX Index scaled to 1 on 07/21/2011.
[D]: SPBLPGPT Index scaled to 1 on 07/21/2011.
[E]: TXGM Index scaled to 1 on 07/21/2011.
[F]: SLVRLND Index scaled to 1 on 07/21/2011.
[G]: LMPBDY Comdty scaled to 1 on 07/21/2011.
[H]: LMZSDY Comdty scaled to 1 on 07/21/2011.
[I]: BCM CN Equity scaled to 1 on 07/21/2011.
[J]: Market Capitalization Weighted Return = Sum of (Market Cap_company i_t-1 x Return_company i_t) / Sum of (Market Cap_company i_t-1). Returns from First Brattle Report, Workpaper 6, Market Cap from First Brattle Report, Workpaper 8.
[K]: Index of returns in [J] scaled to 1 on 07/21/2011.
[L]: Equal Weighted Return = Average Return for companies. If a company had no reported price for t or t-1, its return is not included in the average. Return from First Brattle Report, Workpaper 6.
[M]: Index of returns in [L] scaled to 1 on 07/21/2011.

Workpaper R-17: Bloomberg Data: Market Index Returns (US $)

TICKER:	S&P/TSX Composite Index SPTSX Index	S&P/TSX Venture Composite Index SPTSXVEN Index	S&P/BVL Peru General Index TR PEN SPBLPGPT Index	S&P/TSX Global Mining Index CAD TXGM Index	Solactive Global Silver Miners Index SOLGLOSI Index	Solactive Global Silver Miners Index SOLGLOSI Index	S&P/TSX Global Mining Index CAD TXGM Index
FIELD:	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	px_last	px_last
1/3/2011			8,442.97		208.55	208.55	
1/4/2011	15,367.76	2,272.72	8,383.33	133.16	202.18	202.18	126.33
1/5/2011	15,473.49	2,276.69	8,386.80	132.72	199.30	199.30	125.92
1/6/2011	15,356.04	2,228.19	8,315.21	130.10	190.42	190.42	123.44
1/7/2011	15,312.35	2,236.67	8,177.19	129.27	188.20	188.20	122.65
1/10/2011	15,300.98	2,247.65	8,029.45	130.15	187.79	187.79	123.48
1/11/2011	15,538.98	2,288.72	8,105.53	132.55	194.10	194.10	125.76
1/12/2011	15,655.97	2,333.89	8,113.23	133.78	193.22	193.22	126.89
1/13/2011	15,600.33	2,321.12	7,956.54	132.06	186.38	186.38	125.26
1/14/2011	15,633.58	2,297.09	7,816.56	130 62	181.93	181.93	123.89
1/17/2011	15,636.41	2,305.83	7,830.44	130 38	180.96	180.96	123.67
1/18/2011	15,683.65	2,309.55	7,943.65	131.81	184.93	184.93	125.03
1/19/2011	15,495.00	2,294.61	7,972.71	129.46	181.43	181.43	122.80
1/20/2011	15,341.79	2,252.81	7,826.02	127.07	173.26	173.26	120.53
1/21/2011	15,302.83	2,277.37	7,809.43	125.38	169.78	169.78	118.92
1/24/2011	15,426.72	2,262.35	7,885.51	127.06	167.03	167.03	120.52
1/25/2011	15,265.19	2,207.49	7,840.11	125.08	164.24	164.24	118.63
1/26/2011	15,528.94	2,259.26	7,939.23	129.36	172.59	172.59	122.70
1/27/2011	15,523.68	2,250.58	8,122.92	127.28	169.23	169.23	120.73
1/28/2011	15,471.57	2,272.14	8,123.57	125.89	172.15	172.15	119.41
1/31/2011	15,551.91	2,270.88	8,270.37	127.15	171.91	171.91	120.60
2/1/2011	15,920.56	2,325.19	8,391.23	131.66	179.74	179.74	124.88
2/2/2011	15,899.07	2,349.97	8,468.61	132.00	180.25	180.25	125.20
2/3/2011	16,076.75	2,388.71	8,572.39	134.21	185.12	185.12	127.28
2/4/2011	16,024.11	2,395.88	8,564.87	133.22	184.51	184.51	126.34
2/7/2011	16,053.93	2,401.64	8,597.74	133.57	185.21	185.21	126.68
2/8/2011	16,107.24	2,401.49	8,486.75	135.70	189.02	189.02	128.70
2/9/2011	15,950.70	2,369.37	8,303.98	132 64	185.19	185.19	125.79
2/10/2011	15,969.26	2,356.50	8,263.74	131 82	183.73	183.73	125.01
2/11/2011	16,006.94	2,384.22	8,236.44	131 94	183.59	183.59	125.11
2/14/2011	16,194.03	2,410.30	8,308.46	134.77	187.13	187.13	127.79
2/15/2011	16,207.69	2,423.37	8,215.51	133.96	189.54	189.54	127.02
2/16/2011	16,398.74	2,434.18	8,234.42	134.15	188.42	188.42	127.19
2/17/2011	16,515.89	2,460.72	8,239.03	134.34	192.49	192.49	127.37
2/18/2011	16,508.45	2,463.29	8,328.19	132.72	198.31	198.31	125.84
2/21/2011			8,304.69		199.80	199.80	
2/22/2011	16,275.91	2,395.36	8,168.05	129.90	199.17	199.17	123.16
2/23/2011	16,179.28	2,385.85	8,112.67	130.62	201.19	201.19	123.84
2/24/2011	16,217.32	2,366.98	8,143.89	129.20	195.16	195.16	122.48
2/25/2011	16,496.72	2,423.82	8,197.58	132.17	202.69	202.69	125.28
2/28/2011	16,722.58	2,458.37	8,233.18	133 96	207.85	207.85	126.98
3/1/2011	16,693.85	2,469.16	8,169.17	133.40	214.11	214.11	126.45
3/2/2011	16,737.87	2,469.65	8,190.90	134 23	215.63	215.63	127.11
3/3/2011	16,813.42	2,477.42	8,165.81	135.40	214.53	214.53	128.22
3/4/2011	16,882.71	2,510.85	8,183.48	135 33	220.42	220.42	128.16
3/7/2011	16,661.83	2,489.72	8,148.55	132.87	221.65	221.65	125.82
3/8/2011	16,609.62	2,456.47	8,103.64	132.50	219.56	219.56	125.47
3/9/2011	16,509.25	2,402.60	8,009.70	130.43	215.35	215.35	123.17
3/10/2011	16,113.46	2,298.21	7,814.02	125.32	202.87	202.87	118.34
3/11/2011	16,179.87	2,328.20	7,868.85	127.57	206.87	206.87	120.45
3/14/2011	16,090.27	2,249.06	7,751.84	126.52	203.75	203.75	119.46
3/15/2011	15,903.22	2,170.57	7,576.37	125.05	195.00	195.00	118.07
3/16/2011	15,693.29	2,146.19	7,574.13	121.91	191.43	191.43	115.10
3/17/2011	16,055.47	2,219.09	7,499.32	125.30	194.37	194.37	118.30
3/18/2011	16,133.01	2,278.04	7,407.51	126.66	199.21	199.21	119.59
3/21/2011	16,517.61	2,337.11	7,686.15	129.20	208.65	208.65	121.98
3/22/2011	16,496.38	2,348.31	7,895.62	128.63	208.35	208.35	121.44
3/23/2011	16,572.92	2,365.79	8,012.72	132.24	217.74	217.74	124.84
3/24/2011	16,570.94	2,360.99	8,109.95	132.33	217.43	217.43	124.93
3/25/2011	16,501.66	2,359.08	7,967.96	131.47	216.74	216.74	124.12

Workpaper R-17: Bloomberg Data: Market Index Returns (US $)

TICKER:	S&P/TSX Composite Index SPTSX Index	S&P/TSX Venture Composite Index SPTSXVEN Index	S&P/BVL Peru General Index TR PEN SPBLPGPT Index	S&P/TSX Global Mining Index CAD TXGM Index	Solactive Global Silver Miners Index SOLGLOSI Index	Solactive Global Silver Miners Index SOLGLOSI Index	S&P/TSX Global Mining Index CAD TXGM Index
FIELD:	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	px_last	px_last
3/28/2011	16,404.62	2,336.76	7,502.02	130.30	212.67	212.67	123.01
3/29/2011	16,475.97	2,335.22	7,636.36	131 96	213.92	213.92	124.57
3/30/2011	16,735.30	2,354.85	7,766.25	134.31	217.58	217.58	126.79
3/31/2011	16,801.70	2,368.59	7,837.76	135 35	218.90	218.90	127.77
4/1/2011	16,934.89	2,385.83	7,685.81	135.61	218.48	218.48	128.01
4/4/2011	16,968.41	2,401.90	7,534.37	137.01	223.91	223.91	129.33
4/5/2011	17,112.01	2,445.17	7,633.26	140.17	232.70	232.70	132.32
4/6/2011	17,102.25	2,464.85	7,666.42	140.17	233.59	233.59	132.32
4/7/2011	16,991.54	2,477.99	7,556.82	139.70	233.89	233.89	131.87
4/8/2011	17,150.33	2,497.28	7,585.27	141.80	240.65	240.65	133.86
4/11/2011	16,923.25	2,457.18	7,351.79	139.90	231.39	231.39	132.05
4/12/2011	16,591.12	2,398.38	7,061.01	136.80	222.05	222.05	129.12
4/13/2011	16,577.21	2,388.52	6,611.24	135.70	225.17	225.17	128.05
4/14/2011	16,633.78	2,398.14	6,622.18	137.00	225.01	225.01	129.25
4/15/2011	16,597.84	2,386.34	6,868.02	136.23	226.17	226.17	128.53
4/18/2011	16,358.92	2,314.50	6,679.51	133.82	220.01	220.01	126.25
4/19/2011	16,581.78	2,334.70	6,730.13	135.37	222.95	222.95	127.71
4/20/2011	16,823.96	2,372.22	6,669.74	138.06	226.83	226.83	130.25
4/21/2011	16,960.74	2,397.40		139 98	228.16	228.16	132.06
4/22/2011							
4/25/2011	16,834.46	2,368.00	6,441.47	138.28			130.45
4/26/2011	16,907.44	2,348.97	6,280.94	138.12	216.81	216.81	130.31
4/27/2011	16,819.96	2,358.63	6,340.45	138.83	225.64	225.64	130.97
4/28/2011	16,902.84	2,363.91	6,726.32	138.16	222.90	222.90	130.35
4/29/2011	17,007.07	2,376.14	6,952.10	139.44	221.08	221.08	131.55
5/2/2011	16,982.00	2,327.22	6,917.74	137 24	208.92	208.92	129.46
5/3/2011	16,672.85	2,274.17	6,888.86	134.07	203.13	203.13	126.47
5/4/2011	16,418.58	2,218.16	7,326.26	131 85	201.23	201.23	124.36
5/5/2011	16,099.50	2,119.65	7,330.31	127.65	189.89	189.89	120.40
5/6/2011	16,239.88	2,162.77	7,797.25	128.48	191.93	191.93	121.19
5/9/2011	16,380.66	2,196.17	7,738.75	131.53	198.56	198.56	124.07
5/10/2011	16,419.03	2,213.55	7,571.26	131 32	199.29	199.29	123.86
5/11/2011	16,161.61	2,156.29	7,417.44	126 83	187.97	187.97	119.62
5/12/2011	16,072.04	2,128.13	7,716.82	126.67	185.71	185.71	119.46
5/13/2011	15,973.54	2,104.56	7,992.26	124.53	184.15	184.15	117.44
5/16/2011	15,939.49	2,054.67	7,997.49	124.89	182.13	182.13	117.79
5/17/2011	15,932.95	2,017.91	7,958.36	125.54	182.07	182.07	118.40
5/18/2011	16,204.10	2,051.02	8,022.83	127.68	185.99	185.99	120.42
5/19/2011	16,266.00	2,066.54	8,002.33	127.14	186.23	186.23	119.91
5/20/2011	16,257.37	2,091.09	7,913.73	126.97	186.98	186.98	119.74
5/23/2011			7,786.91	126.97	184.29	184.29	
5/24/2011	16,085.06	2,072.94	7,914.57	126.33	189.90	189.90	119.14
5/25/2011	16,292.52	2,098.16	8,004.55	127.89	192.97	192.97	120.61
5/26/2011	16,279.81	2,116.33	8,238.61	129.00	193.02	193.02	121.66
5/27/2011	16,361.83	2,152.17	8,125.84	130 63	197.08	197.08	123.17
5/30/2011	16,402.84	2,149.61	7,651.28	130.73	197.05	197.05	123.27
5/31/2011	16,505.71	2,163.54	7,786.99	131.63	200.29	200.29	124.12
6/1/2011	16,087.02	2,123.34	7,300.32	128.34	195.87	195.87	121.01
6/2/2011	16,017.86	2,105.90	7,851.36	127 91	191.90	191.90	120.61
6/3/2011	16,050.45	2,107.97	7,689.80	127.13	190.92	190.92	119.87
6/6/2011	15,770.23	2,060.16	6,671.15	124.78	185.63	185.63	117.65
6/7/2011	15,796.80	2,058.01	7,129.68	125.50	186.19	186.19	118.33
6/8/2011	15,623.77	1,996.86	7,413.15	122.88	180.56	180.56	115.86
6/9/2011	15,762.23	2,010.72	7,580.23	124.94	185.25	185.25	117.80
6/10/2011	15,505.51	1,979.74	7,472.34	121.77	180.56	180.56	114.82
6/13/2011	15,334.69	1,959.07	7,468.30	120.53	177.63	177.63	113.63
6/14/2011	15,689.87	2,009.99	7,491.99	123.59	181.61	181.61	116.49
6/15/2011	15,333.10	1,961.77	7,294.05	119.73	178.45	178.45	112.86
6/16/2011	15,147.90	1,920.54	7,180.14	118.59	173.64	173.64	111.79
6/17/2011	15,118.10	1,934.97	7,208.19	118.73	175.03	175.03	111.91

Workpaper R-17: Bloomberg Data: Market Index Returns (US $)

TICKER:	S&P/TSX Composite Index SPTSX Index	S&P/TSX Venture Composite Index SPTSXVEN Index	S&P/BVL Peru General Index TR PEN SPBLPGPT Index	S&P/TSX Global Mining Index CAD TXGM Index	Solactive Global Silver Miners Index SOLGLOSI Index	Solactive Global Silver Miners Index SOLGLOSI Index	S&P/TSX Global Mining Index CAD TXGM Index
FIELD:	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	px_last	px_last
6/20/2011	15,223.55	1,922.13	7,150.01	119.31	175.87	175.87	112.46
6/21/2011	15,579.48	1,966.60	6,968.07	123.05	184.80	184.80	115.98
6/22/2011	15,588.17	1,992.53	6,951.21	123.01	184.90	184.90	115.94
6/23/2011	15,352.67	1,953.24	6,888.97	121.73	182.64	182.64	114.74
6/24/2011	15,184.30	1,932.27	6,881.68	120.52	178.12	178.12	113.60
6/27/2011	15,249.12	1,893.74	6,825.68	121.03	175.42	175.42	114.08
6/28/2011	15,470.37	1,897.39	6,792.26	123 61	179.30	179.30	116.51
6/29/2011	15,779.77	1,950.52		125.87	183.71	183.71	118.63
6/30/2011	16,028.76	1,976.11	6,866.76	127 92	184.09	184.09	120.56
7/1/2011			6,993.29		182.61	182.61	
7/4/2011	16,203.49	2,002.61	7,049.48	129.19	182.41	182.41	121.75
7/5/2011	16,240.51	2,011.80	7,044.18	129.56	188.56	188.56	122.10
7/6/2011	16,150.36	2,026.93	7,080.07	129.95	192.45	192.45	122.47
7/7/2011	16,250.09	2,072.10	7,235.20	131.51	194.55	194.55	123.94
7/8/2011	16,171.42	2,066.21	7,260.20	130 87	194.19	194.19	123.34
7/11/2011	15,822.40	2,010.16	7,202.55	127.33	189.27	189.27	120.00
7/12/2011	15,930.75	2,022.48	7,267.78	128.46	193.46	193.46	121.06
7/13/2011	16,157.51	2,076.04	7,374.52	131.33	204.23	204.23	123.74
7/14/2011	16,048.44	2,075.12	7,362.94	129.59	205.74	205.74	122.09
7/15/2011	16,202.78	2,105.05	7,421.39	130.81	209.48	209.48	123.24
7/18/2011	16,040.07	2,088.02	7,775.25	130.48	215.41	215.41	122.93
7/19/2011	16,305.21	2,098.38	8,026.15	131.65	211.51	211.51	124.03
7/20/2011	16,368.77	2,131.07	8,094.95	132.64	213.91	213.91	124.97
7/21/2011	16,537.88	2,160.51	8,105.47	133.33	212.60	212.60	125.62
7/22/2011	16,537.96	2,171.48	8,054.51	133.99	215.16	215.16	126.24
7/25/2011	16,533.98	2,156.12	8,064.67	133.23	214.59	214.59	125.53
7/26/2011	16,389.91	2,145.19	8,152.61	133.26	214.49	214.49	125.55
7/27/2011	15,989.16	2,095.29	8,025.98	129 93	207.50	207.50	122.41
7/28/2011	16,003.92	2,092.26		129 39	205.89	205.89	121.91
7/29/2011	15,757.41	2,071.21		127.68	203.54	203.54	120.30
8/1/2011			7,997.00		202.46	202.46	
8/2/2011	15,449.42	2,061.25	7,911.91	125.01	207.38	207.38	117.78
8/3/2011	15,476.67	2,040.94	7,844.42	125.02	212.42	212.42	117.77
8/4/2011	14,774.01	1,901.62	7,415.47	115.44	196.36	196.36	108.75
8/5/2011	14,469.40	1,852.98	7,358.78	113 68	190.84	190.84	107.08
8/8/2011	13,733.73	1,702.03	6,835.97	106.43	180.93	180.93	100.25
8/9/2011	14,223.91	1,728.19	7,011.90	114.00	186.18	186.18	107.39
8/10/2011	14,345.95	1,771.46	6,894.14	112.76	190.89	190.89	106.10
8/11/2011	14,780.79	1,817.46	7,172.85	117.24	194.13	194.13	110.32
8/12/2011	14,755.24	1,837.78	7,267.15	117.00	194.74	194.74	110.09
8/15/2011	15,024.97	1,862.24	7,319.86	120.55	201.58	201.58	113.42
8/16/2011	14,834.78	1,840.09	7,214.74	118.13	199.22	199.22	111.14
8/17/2011	14,927.71	1,856.21	7,286.66	119.46	202.17	202.17	112.39
8/18/2011	14,335.13	1,789.81	7,127.10	114 25	195.20	195.20	107.48
8/19/2011	14,179.64	1,790.64	7,065.86	113 65	200.88	200.88	106.91
8/22/2011	14,225.11	1,788.96	7,098.14	115 22	212.31	212.31	108.40
8/23/2011	14,536.26	1,781.92	7,133.40	116.43	206.48	206.48	109.53
8/24/2011	14,553.30	1,757.57	7,138.68	115 30	200.10	200.10	108.47
8/25/2011	14,518.84	1,765.81	7,128.64	115.40	200.11	200.11	108.56
8/26/2011	14,601.00	1,782.63	7,245.95	118.58	206.04	206.04	111.55
8/29/2011	14,889.48	1,809.40	7,331.95	120.23	209.22	209.22	113.08
8/30/2011	15,022.33	1,840.27		121.48	216.02	216.02	114.26
8/31/2011	15,237.11	1,855.17	7,593.88	122.51	217.00	217.00	115.20
9/1/2011	15,182.63	1,859.86	7,600.51	121.85	217.04	217.04	114.58
9/2/2011	14,954.70	1,844.09	7,491.23	120.63	220.26	220.26	113.43
9/5/2011			7,360.33		217.39	217.39	
9/6/2011	14,733.97	1,808.26	7,304.85	119.58	217.90	217.90	112.43
9/7/2011	15,023.94	1,813.42	7,388.90	122.76	220.13	220.13	115.02
9/8/2011	15,000.50	1,830.86	7,367.90	121 86	222.74	222.74	114.17
9/9/2011	14,499.99	1,793.00	7,301.14	118.43	217.45	217.45	110.96

Workpaper R-17: Bloomberg Data: Market Index Returns (US $)

TICKER:	S&P/TSX Composite Index SPTSX Index	S&P/TSX Venture Composite Index SPTSXVEN Index	S&P/BVL Peru General Index TR PEN SPBLPGPT Index	S&P/TSX Global Mining Index CAD TXGM Index	Solactive Global Silver Miners Index SOLGLOSI Index	Solactive Global Silver Miners Index SOLGLOSI Index	S&P/TSX Global Mining Index CAD TXGM Index
FIELD:	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	tot_return_index_gross_dvds	px_last	px_last
9/12/2011	14,230.77	1,754.48	7,305.28	116 24	209.20	209.20	108.91
9/13/2011	14,399.65	1,781.61	7,316.31	117.24	209.33	209.33	109.84
9/14/2011	14,477.28	1,770.67	7,389.12	116.44	207.85	207.85	109.09
9/15/2011	14,716.71	1,791.53	7,480.15	117.56	206.58	206.58	110.13
9/16/2011	14,612.31	1,800.66	7,533.16	118 26	208.30	208.30	110.79
9/19/2011	14,340.76	1,755.23	7,421.87	115.04	205.34	205.34	107.77
9/20/2011	14,362.26	1,742.17	7,416.27	115.25	207.92	207.92	107.97
9/21/2011	13,952.38	1,704.32	7,226.14	110.42	204.02	204.02	103.44
9/22/2011	13,144.95	1,557.34	6,847.43	101.75	183.87	183.87	95.32
9/23/2011	13,000.07	1,502.86	6,798.13	99.11	173.26	173.26	92.84
9/26/2011	13,215.13	1,477.14	6,745.18	101.11	172.83	172.83	94.71
9/27/2011	13,550.73	1,542.56	6,917.73	102.94	177.90	177.90	96.43
9/28/2011	13,244.83	1,470.76	6,698.19	98.25	167.56	167.56	92.02
9/29/2011	13,197.27	1,433.08	6,657.92	97.67	165.88	165.88	91.48
9/30/2011	13,075.25	1,412.39	6,610.32	96.59	162.20	162.20	90.47

Source: Bloomberg, date range: 1/1/2011 - 9/30/2011, Currency: USD.

Workpaper R-18: Silver Data for Out-of-Sample Forecast

Year [A]	Median Risk-adjusted Price [B]	Estimated Forward Price [C]	Confidence Interval (5%) [D]	Confidence Interval (95%) [E]
0	34.64	34.64	34.64	34.64
1	32.39	34.61	17.79	58.97
2	30.74	34.47	13.98	67.57
3	29.50	34.26	11.98	72.59
4	28.55	34.03	10.77	75.65
5	27.81	33.78	9.98	77.53
6	27.24	33.53	9.43	78.66
7	26.79	33.30	9.05	79.31
8	26.42	33.09	8.77	79.64
9	26.13	32.90	8.56	79.78
10	25.89	32.72	8.40	79.79
11	25.70	32.57	8.28	79.73
12	25.54	32.43	8.19	79.62
13	25.41	32.32	8.12	79.49
14	25.30	32.21	8.07	79.36
15	25.21	32.12	8.02	79.22
16	25.14	32.05	7.99	79.09
17	25.07	31.98	7.96	78.97
18	25.02	31.92	7.94	78.86
19	24.98	31.87	7.92	78.76
20	24.94	31.83	7.91	78.67
21	24.91	31.79	7.89	78.59
22	24.88	31.76	7.88	78.52
23	24.86	31.73	7.87	78.46
24	24.84	31.71	7.87	78.41
25	24.82	31.69	7.86	78.36
26	24.81	31.67	7.86	78.32
27	24.80	31.66	7.85	78.29
28	24.79	31.65	7.85	78.26
29	24.78	31.63	7.85	78.24
30	24.77	31.63	7.84	78.21

Sources and Notes:

[A]: 30-year forecast horizon, with annual frequency.

[B]: $S_t^{\,e^{-\kappa\Delta t}} e^{(\mu+\frac{\alpha^*}{\kappa}e^{-\kappa\Delta t})(1-e^{-\kappa\Delta t})}$, where S_t is the spot price on 6/24/2011, which is $34.64; Δt is in [A]; and α^*, μ, κ, and σ are from Table 6.

[C]: $[B] \times e^{\frac{\sigma^2(1-e^{-2\kappa\Delta t})}{4\kappa}}$, where Δt is in [A]; and κ and σ are from Table 6.

[D]: $[C] \times e^{z_\alpha \sigma \sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 6; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

[E]: $[C] \times e^{-z_\alpha \sigma \sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 6; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

Workpaper R-19: Simulated Silver Risk-adjusted Prices

	Path 1						Path 2						
Year	Random $\varepsilon_t \sim N(0,1)$	Mean($\ln S_t$)	SD_t	$\ln S_t$	S_t	$\ln S_{t-1}$	Year	Random $\varepsilon_t \sim N(0,1)$	Mean($\ln S_t$)	SD_t	$\ln S_t$	S_t	$\ln S_{t-1}$
[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]
0					34.64		0					34.64	
1	-0.2025	3.4779	0.3643	3.4041	30.09	3.5450	1	-1 6819	3.4779	0.3643	2.8653	17.55	3.5450
2	1.2815	3.3625	0.3643	3.8293	46.03	3.4041	2	0 9406	2.9026	0.3643	3.2452	25.67	2 8653
3	-0.3388	3.7289	0.3643	3.6055	36.80	3.8293	3	0 2812	3.2303	0.3643	3.3328	28.02	3 2452
4	-0.3547	3.5404	0.3643	3.4112	30.30	3.6055	4	0 6334	3.3077	0.3643	3.5384	34.41	3 3328
5	-0.4435	3.3765	0.3643	3.2149	24.90	3.4112	5	1.0971	3.4850	0.3643	3.8847	48.65	3.5384
6	0.4235	3.2103	0.3643	3.3645	28.92	3.2149	6	0 3717	3.7819	0.3643	3.9173	50.26	3 8847
7	-0.8778	3.3389	0.3643	3.0192	20.47	3.3645	7	-0.5732	3.8107	0.3643	3.6019	36.67	3 9173
8	0.7901	3.0449	0.3643	3.3327	28.01	3.0192	8	0.0433	3.5423	0.3643	3.5581	35.10	3 6019
9	0.4473	3.3131	0.3643	3.4760	32.33	3.3327	9	0 2090	3.5054	0.3643	3.5815	35.93	3.5581
10	1.3586	3.4357	0.3643	3.9306	50.94	3.4760	10	1.5589	3.5258	0.3643	4.0936	59.96	3.5815
11	-0.7691	3.8240	0.3643	3.5438	34.60	3.9306	11	-1.1081	3.9631	0.3643	3.5595	35.15	4.0936
12	0.0080	3.4941	0.3643	3.4970	33.02	3.5438	12	-0.0841	3.5075	0.3643	3.4768	32.36	3.5595
13	0.4106	3.4543	0.3643	3.6038	36.74	3.4970	13	-1 3229	3.4371	0.3643	2.9552	19.20	3.4768
14	0.8947	3.5456	0.3643	3.8715	48.01	3.6038	14	0 6829	2.9919	0.3643	3.2407	25.55	2 9552
15	-1.3974	3.7741	0.3643	3.2650	26.18	3.8715	15	-0.1981	3.2357	0.3643	3.1635	23.65	3 2407
16	0.7566	3.2565	0.3643	3.5321	34.20	3.2650	16	-0 9320	3.1699	0.3643	2.8304	16.95	3.1635
17	0.3527	3.4845	0.3643	3.6130	37.08	3.5321	17	-2.1129	2.8856	0.3643	2.1159	8.30	2 8304
18	-0.1671	3.5536	0.3643	3.4927	32.87	3.6130	18	0.0526	2.2758	0.3643	2.2949	9.92	2.1159
19	0.6489	3.4509	0.3643	3.6873	39.94	3.4927	19	-0 2529	2.4286	0.3643	2.3365	10.34	2 2949
20	0.5102	3.6170	0.3643	3.8028	44.83	3.6873	20	0.4232	2.4641	0.3643	2.6183	13.71	2 3365
21	0.8747	3.7157	0.3643	4.0343	56.50	3.8028	21	-0.1171	2.7046	0.3643	2.6620	14.32	2 6183
22	-0.7577	3.9132	0.3643	3.6372	37.99	4.0343	22	2 2877	2.7419	0.3643	3.5752	35.70	2 6620
23	-0.9592	3.5743	0.3643	3.2249	25.15	3.6372	23	-0.7297	3.5214	0.3643	3.2556	25.94	3.5752
24	1.1669	3.2224	0.3643	3.6475	38.38	3.2249	24	0.7181	3.2486	0.3643	3.5102	33.46	3 2556
25	-0.5758	3.5831	0.3643	3.3734	29.18	3.6475	25	-0.1470	3.4659	0.3643	3.4124	30.34	3.5102
26	-0.0334	3.3491	0.3643	3.3370	28.13	3.3734	26	1.4195	3.3824	0.3643	3.8995	49.38	3.4124
27	-1.4082	3.3181	0.3643	2.8051	16.53	3.3370	27	-0.0989	3.7982	0.3643	3.7622	43.04	3 8995
28	0.9151	2.8641	0.3643	3.1974	24.47	2.8051	28	0 9776	3.6810	0.3643	4.0371	56.66	3.7622
29	-1.1120	3.1990	0.3643	2.7939	16.34	3.1974	29	-0.1405	3.9156	0.3643	3.8644	47.68	4.0371
30	0.9037	2.8545	0.3643	3.1837	24.14	2.7939	30	0 8333	3.7683	0.3643	4.0718	58.66	3 8644

Sources and Notes:

[A]: 30-year simulation horizon, same as forecast horizon, with annual frequency.

[B]: Random number drawn from a standard normal distribution.

[C]: $(\mu + \frac{\alpha^*}{\kappa}e^{-\kappa t})(1 - e^{-\kappa t}) - e^{-\kappa}\left(\mu + \frac{\alpha^*}{\kappa}e^{-\kappa(t-1)}\right)\left(1 - e^{-\kappa(t-1)}\right) + e^{-\kappa}\ln S_{t-1}$, where t is in [A]; α^*, μ, κ, and σ are from Table 6; and $\ln S_{t-1}$ is in [G].

[D]: $\sqrt{\sigma^2\frac{1-e^{-2\kappa}}{\kappa}}$, where σ and κ are from Table 6.

[E]: [C] + [D] X [B].

[F]: Exponential of [E] if [A] is greater than 1; otherwise the spot price as of the valuation date, which is $34.64.

[G]: Logarithm of previous year's number in [F].

[H] - [N]: Same as [A] - [G], respectively.

Workpaper R-20: Lead Data for Out-of-Sample Forecast

Year [A]	Median Risk-adjusted Price [B]	Estimated Forward Price [C]	Confidence Interval (5%) [D]	Confidence Interval (95%) [E]
0	1.16	1.16	1.16	1.16
1	1.08	1.17	0.57	2.05
2	1.05	1.16	0.49	2.22
3	1.03	1.15	0.47	2.26
4	1.02	1.15	0.46	2.27
5	1.02	1.15	0.45	2.28
6	1.01	1.14	0.45	2.27
7	1.01	1.14	0.45	2.27
8	1.01	1.14	0.45	2.27
9	1.01	1.14	0.45	2.27
10	1.01	1.14	0.45	2.27
11	1.01	1.14	0.45	2.27
12	1.01	1.14	0.45	2.27
13	1.01	1.14	0.45	2.27
14	1.01	1.14	0.45	2.27
15	1.01	1.14	0.45	2.27
16	1.01	1.14	0.45	2.27
17	1.01	1.14	0.45	2.27
18	1.01	1.14	0.45	2.27
19	1.01	1.14	0.45	2.27
20	1.01	1.14	0.45	2.27
21	1.01	1.14	0.45	2.27
22	1.01	1.14	0.45	2.27
23	1.01	1.14	0.45	2.27
24	1.01	1.14	0.45	2.27
25	1.01	1.14	0.45	2.27
26	1.01	1.14	0.45	2.27
27	1.01	1.14	0.45	2.27
28	1.01	1.14	0.45	2.27
29	1.01	1.14	0.45	2.27
30	1.01	1.14	0.45	2.27

Sources and Notes:

[A]: 30-year forecast horizon, with annual frequency.

[B]: $S_t e^{-\kappa\Delta t} \mathrm{e}^{(\mu+\frac{\alpha^*}{\kappa}e^{-\kappa\Delta t})(1-e^{-\kappa\Delta t})}$, where S_t is the spot price on 6/24/2011, which is $1.16; Δt is in [A]; and α^*, μ, κ, and σ are from Table 7.

[C]: $[\mathrm{B}] \times e^{\frac{\sigma^2(1-e^{-2\kappa\Delta t})}{4\kappa}}$, where Δt is in [A]; and κ and σ are from Table 7.

[D]: $[\mathrm{C}] \times e^{z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 7; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

[E]: $[\mathrm{C}] \times e^{-z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 7; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

Workpaper R-21: Zinc Data for Out-of-Sample Forecast

Year [A]	Median Risk-adjusted Price [B]	Estimated Forward Price [C]	Confidence Interval (5%) [D]	Confidence Interval (95%) [E]
0	1.01	1.01	1.01	1.01
1	0.98	1.04	0.54	1.78
2	0.94	1.05	0.43	2.06
3	0.91	1.05	0.37	2.21
4	0.87	1.04	0.33	2.29
5	0.85	1.02	0.31	2.32
6	0.82	1.01	0.29	2.33
7	0.80	0.99	0.28	2.32
8	0.79	0.97	0.27	2.31
9	0.77	0.96	0.26	2.29
10	0.76	0.95	0.25	2.27
11	0.75	0.94	0.25	2.25
12	0.74	0.93	0.25	2.23
13	0.73	0.92	0.24	2.21
14	0.73	0.91	0.24	2.19
15	0.72	0.90	0.24	2.18
16	0.72	0.90	0.24	2.17
17	0.71	0.89	0.23	2.16
18	0.71	0.89	0.23	2.15
19	0.71	0.89	0.23	2.14
20	0.70	0.88	0.23	2.14
21	0.70	0.88	0.23	2.13
22	0.70	0.88	0.23	2.13
23	0.70	0.88	0.23	2.12
24	0.70	0.88	0.23	2.12
25	0.70	0.87	0.23	2.11
26	0.70	0.87	0.23	2.11
27	0.69	0.87	0.23	2.11
28	0.69	0.87	0.23	2.11
29	0.69	0.87	0.23	2.11
30	0.69	0.87	0.23	2.11

Sources and Notes:

[A]: 30-year forecast horizon, with annual frequency.

[B]: $S_t^{\,e^{-\kappa\Delta t}} \mathrm{e}^{(\mu+\frac{\alpha^*}{\kappa}e^{-\kappa\Delta t})(1-e^{-\kappa\Delta t})}$, where S_t is the spot price on 6/24/2011, which is \$1.01; Δt is in [A]; and α^*, μ, κ, and σ are from Table 8.

[C]: $[\mathrm{B}] \times e^{\frac{\sigma^2(1-e^{-2\kappa\Delta t})}{4\kappa}}$, where Δt is in [A]; and κ and σ are from Table 8.

[D]: $[\mathrm{C}] \times e^{z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 8; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

[E]: $[\mathrm{C}] \times e^{-z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 8; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

Workpaper R-22: WTI Data for Out-of-Sample Forecast

Year [A]	Median Risk-adjusted Price [B]	Estimated Forward Price [C]	Confidence Interval (5%) [D]	Confidence Interval (95%) [E]
0	90.83	90.83	90.83	90.83
1	90.56	95.45	53.12	154.39
2	90.84	97.83	48.22	171.15
3	91.21	99.10	46.67	178.26
4	91.52	99.79	46.15	181.47
5	91.75	100.19	46.00	182.99
6	91.91	100.43	45.97	183.75
7	92.01	100.57	45.98	184.14
8	92.08	100.66	46.00	184.36
9	92.13	100.72	46.01	184.48
10	92.16	100.75	46.02	184.56
11	92.18	100.77	46.03	184.60
12	92.19	100.79	46.04	184.63
13	92.20	100.80	46.04	184.65
14	92.21	100.80	46.04	184.66
15	92.21	100.81	46.04	184.66
16	92.21	100.81	46.05	184.67
17	92.21	100.81	46.05	184.67
18	92.21	100.81	46.05	184.67
19	92.22	100.81	46.05	184.67
20	92.22	100.81	46.05	184.67
21	92.22	100.81	46.05	184.67
22	92.22	100.81	46.05	184.67
23	92.22	100.81	46.05	184.67
24	92.22	100.81	46.05	184.67
25	92.22	100.81	46.05	184.67
26	92.22	100.81	46.05	184.67
27	92.22	100.81	46.05	184.67
28	92.22	100.81	46.05	184.67
29	92.22	100.81	46.05	184.67
30	92.22	100.81	46.05	184.67

Sources and Notes:

[A]: 30-year forecast horizon, with annual frequency.

[B]: $S_t e^{-\kappa\Delta t} \mathrm{e}^{(\mu+\frac{\alpha^*}{\kappa}e^{-\kappa\Delta t})(1-e^{-\kappa\Delta t})}$, where S_t is the spot price on 6/24/2011, which is $90.83; Δt is in [A]; and α^*, μ, κ, and σ are from Table 9.

[C]: $[\mathrm{B}] \times e^{\frac{\sigma^2(1-e^{-2\kappa\Delta t})}{4\kappa}}$, where Δt is in [A]; and κ and σ are from Table 9.

[D]: $[\mathrm{C}] \times e^{z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 9; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

[E]: $[\mathrm{C}] \times e^{-z_\alpha\sigma\sqrt{\frac{1-e^{-2\kappa\Delta t}}{2\kappa}}}$, where Δt is in [A]; κ and σ are from Table 9; and z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level.

Workpaper R-23: Gold Data for Out-of-Sample Forecast

Maturity (Years) [A]	Market Forward Curve [B]	Growth Rate in Log Forward Price [C]	Implied μ [D]	Estimated Forward Price [E]	Median Risk-adjusted Price [F]	Confidence Interval (5%) [G]	Confidence Interval (95%) [H]
0	1514.75			1514.75	1514.75	1514.75	1514.75
1	1522.37	0.50%	0.0050	1522.37	1498.01	1114.82	2012.90
2	1537.08	0.96%	0.0096	1537.08	1488.28	980.01	2260.17
3	1566.08	1.87%	0.0187	1566.08	1492.09	894.46	2489.05
4	1611.50	2.86%	0.0286	1611.50	1510.81	836.74	2727.89
5	1669.25	3.52%	0.0352	1669.25	1539.90	795.40	2981.26
6	1737.01	3.98%	0.0398	1737.01	1576.77	764.68	3251.32
7	1812.75	4.27%	0.0427	1812.75	1619.20	741.02	3538.12
8	1890.47	4.20%	0.0420	1890.47	1661.59	720.46	3832.09
9	1972.95	4.27%	0.0427	1972.95	1706.34	703.30	4139.92
10	2057.96	4.22%	0.0422	2057.96	1751.38	688.07	4457.88
11			0.0422	2146.63	1797.61	674.75	4789.02
12			0.0422	2239.12	1845.06	663.03	5134.33
13			0.0422	2335.59	1893.76	652.68	5494.74
14			0.0422	2436.22	1943.74	643.50	5871.18
15			0.0422	2541.19	1995.05	635.35	6264.55
16			0.0422	2650.67	2047.71	628.11	6675.78
17			0.0422	2764.88	2101.75	621.66	7105.78
18			0.0422	2884.01	2157.23	615.93	7555.50
19			0.0422	3008.27	2214.17	610.84	8025.92
20			0.0422	3137.88	2272.61	606.33	8518.02
21			0.0422	3273.08	2332.60	602.36	9032.82
22			0.0422	3414.10	2394.16	598.87	9571.38
23			0.0422	3561.20	2457.36	595.83	10134.79
24			0.0422	3714.63	2522.22	593.20	10724.17
25			0.0422	3874.68	2588.79	590.95	11340.70
26			0.0422	4041.62	2657.12	589.07	11985.59
27			0.0422	4215.76	2727.26	587.51	12660.09
28			0.0422	4397.40	2799.24	586.27	13365.51
29			0.0422	4586.86	2873.13	585.32	14103.19
30			0.0422	4784.49	2948.96	584.65	14874.56

Sources and Notes:

[A]: 30-year forecast horizon, with annual frequency.

[B]: Bloomberg L.P., with maturities up to 10 years.

[C]: Logarithm of current period's forward price in [B] minus logarithm of last period's forward price in [B] for maturities between 1 and 10 years, empty otherwise.

[D]: $\frac{[C]}{\Delta t}$, for maturities between 1 and 10, where Δt is the difference between current period's maturity in [A] and last period's maturity in [A]; for maturities greater than 10, equals the value in [D] corresponding to the 10-year maturity.

[E]: $S_{t-1}e^{\mu\Delta t}$, where S_{t-1} is last period's risk-adjusted price in [E]; μ is in [D]; and Δt is the difference between current period's maturity in [A] and last period's maturity in [A].

[F]: $\text{Med}_{t-1}e^{(\mu-0.5\sigma^2)\Delta t}$, where Med_{t-1} is last period's median risk-adjusted price in [F]; μ is in [D]; σ is from Table 10; and Δt is the difference between current period's maturity in [A] and last period's maturity in [A].

[G]: $[\text{F}] \times e^{z_\alpha\sigma\sqrt{\Delta t}}$, where z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level; σ is from Table 10; and Δt is the difference between current period's maturity in [A] and last period's maturity in [A].

[H]: $[\text{G}] \times e^{-z_\alpha\sigma\sqrt{\Delta t}}$, where z_α returns the inverse of the standard normal cumulative distribution with a probability of 5%, with 5% being chosen as the significance level; σ is from Table 10; and Δt is the difference between current period's maturity in [A] and last period's maturity in [A].

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