HEC MONTRÉAL

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The Determinant of Selective Hedging

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1. Introduction and Motivation

"Selective hedging" involves actively adjusting the size and timing of derivative transactions based on a firm's market views. (Stulz 1996) suggests that for firms to create value for shareholders through selective hedging, they must have an information advantage over the market and sufficient financial strength to take on additional speculative risks. However, there needs to be more research on whether these criteria are necessary for value enhancement through selective hedging or on the possibility that financially distressed firms may engage in selective hedging for asset substitution. Selective hedging is characterized as profit-driven and forecast-based hedging behavior (Stulz 1996). Nevertheless, it is still unclear why managers frequently engage in selective hedging and to what extent firms engage in this approach in a way that is consistent with the firm's value maximization.

Non-financial firms indicate in their annual reports that they have exclusively used derivatives to hedge their exposure. Also, prior studies focus on why firms use derivatives but largely ignore the existence of selective hedging. However, using derivatives to time the market based on an active manager's view for additional returns by considering industry-level factors have not been addressed.

The gold mining industry is an excellent area to examine selective hedging since, firstly, this industry has served as a testing ground for numerous studies of corporate hedging techniques due to the availability of high-quality data on derivatives; Secondly, gold prices are determined mainly by supply and demand in a worldwide market that is financially integrated. Based on the studies, gold prices were generally stable during the study period (1989–1999), while hedging ratio changes were frequently active. This means fluctuations in gold prices do not create any abnormal changes in edge ratios that we interpret as selective hedging. Alternately, low gold prices suggest that firms are under more pressure to profit by using derivatives selectively since the profits of gold mining businesses are primarily based on spot pricing.

In (Adam, Fernando et al. 2017), we observe that selective hedging positively correlates with a firm's future stock return volatility. Additionally, we discover a negative relationship between the firm's size and selective hedging, suggesting that smaller firms speculate more than bigger ones. In robustness checks, we find comparable negative correlations between selective hedging and two other indicators of a firm's presence in the gold market: yearly gold production and total gold reserves. In the gold mining sector, firm size, gold production, and gold reserves are all likely to be directly connected with an information advantage regarding the total gold production and, consequently, the future gold price. Additionally, we discover that selective hedging is adversely correlated with the firm's age and the CEO's tenure, two potential substitute indicators of information advantage. Additionally, we discover a negative correlation between selective hedging and the likelihood of financial distress. In line with (Stulz 1996)'s prediction for uninformed firms,
companies with the highest chances of bankruptcy are likely to speculate the most.

In (Brown, Crabb et al. 2006), we analyze the risk management practices of 44 gold mining firms between 1993 and 1998. We find there is substantial variability in the fraction of an exposure hedged by a typical corporation. We also find that changes in the hedge ratio are positively associated with contemporaneous and lagged changes in gold prices but not with firm-specific characteristics such as the probability of financial distress. Managerial efforts to adjust derivative positions based on market views are common and can generate statistically significant gross profits. However, the economic magnitude of these gains is small and not linked to better performance on operating or financial dimensions. The findings suggest that many managers believe they have informational advantages in the markets where they hedge, but these beliefs do not translate into substantial increases in shareholder value. The results are consistent with the asset substitution problem and the idea that selective hedging may increase risk.

Selective hedging only sometimes reduces exposure to market risk. In fact, it could amplify financial losses when managers misestimate market movements. Unhedged cash flow volatility would also result in underinvestment (Froot, Scharfstein et al. 1993), expensive financial distress, and a higher tax burden (Mayers and Smith 1982) (Smith, Stulz et al. 1985). Investors find it challenging to determine the timing and extent of selective hedging behaviour since annual reports lack precise disclosure (Géczy, Minton et al. 2007). Investigating the factors that influence a firm's selective hedging behaviour is important to help investors understand the possible risks associated with corporate derivative use. It is advantageous to discuss how the context in which a firm operates impacts corporate hedging behavior, given the requirement for increased transparency in the disclosure of financial derivative use.

2. Literature review

In (Adam, Fernando et al. 2017), We investigate the relationships between selective hedging and firm size, the likelihood of bankruptcy, and several aspects of corporate governance. Then we perform robustness checks. We also consider the idea that managerial compensation and selective hedging may be related. Additionally, our findings in (Brown, Crabb et al. 2006) suggest that many managers hold the opinion that they have an informational advantage in the markets where they hedge, and that these beliefs have an impact on corporate risk management actions. Despite this, managers rarely possess advantages that result in appreciable gains in shareholder value. We review the main aspects of these two studies in the following sections.

2.1 Speculation, firm size, and the probability of bankruptcy

The findings of (Adam, Fernando et al. 2017) on how speculative activity relates to firm characteristics, particularly corporate governance characteristics, are shown in Table 1. In this part, we pay close attention to the relationship between firm size, a proxy for insider information about the gold market, and Altman's Z-score and Ohlson's O-score (Adam, Fernando et al. 2017), measures of the probability of bankruptcy. Smaller firms speculate more than larger ones, according to the results in Table 1, where the relationship between selective hedging and firm size is statistically significant across all eight parameters.

There is some uncertainty regarding the theoretical relation between selective hedging and the possibility of financial distress. According to (Stulz 1996), firms that engage in selective hedging

must have the financial capacity to take on the added risk of acting on their market views. Our research supports the claim that financial distress positively correlated with speculating. In all our criteria, there is a negative and statistically significant link between speculation and Z-score at the 5% level or higher. This finding demonstrates that firms with a larger likelihood of bankruptcy speculate more.

We observe a convex relationship between bankruptcy risk (as measured by Z-scores) and speculation (as measured by either production or reserves). The coefficient of $\mathrm{z\,score}^2$, which indicates the curvature of the relationship, is positive and statistically significant. This suggests that as bankruptcy risk increases, the relationship between bankruptcy risk and speculation becomes more exaggerated (i.e., the slope becomes steeper). However, the economic magnitude of this coefficient is small, which means that the overall effect of bankruptcy risk on speculation is not very large. We also find that the relationship between bankruptcy risk and speculation is asymmetrical, with larger increases in speculation for firms with lower bankruptcy risk (i.e., the left side of the curve is steeper than the right side). This supports the argument that financially distressed firms will speculate more than financially secure firms.

We find that there is a positive relationship between changes in speculation and changes in stock return volatility. This suggests that when speculation increases, stock return volatility also increases. The results support the idea that speculation may be motivated by a desire to transfer wealth or overcome financial constraints, particularly for financially distressed firms.

In conclusion, we discuss that larger firms hedge more of their production than smaller firms do. These results align with earlier research, which may mean that larger firms are more sophisticated and can devote more resources, including money and human resources, to risk management practices than smaller firms. Moreover, we expect a higher propensity for selective hedging among larger firms since they should be more likely to have or believe they have an information advantage about the gold market than smaller firms. Surprisingly, we discover that smaller firms speculate more than larger firms. (Graham and Harvey 2001) discuss the idea that smaller firms' managers are less financially sophisticated than the ones in the larger firms. Therefore, managers at smaller firms are more likely to mistakenly believe they have information about the market when they do not have. (Malmendier and Tate 2005) have shown that overconfident managers tend to overinvest and perform poorly. These managers may mistakenly believe they can predict gold prices. Our findings support the claim made by (Campbell, Kracaw et al. 1999). Due to the difficulty in obtaining external financing due to asymmetric knowledge, smaller firms may resort to selective hedging to supplement their limited internal resources. Additionally, our discovery that among financially weaker firms, those with a higher probability of bankruptcy speculate more supports the agency-theoretic hypothesis put forth by (Stulz 1996) that shareholders of firms on the verge of bankruptcy may have incentives to speculate at the expense of bondholders.

Table 1
Selective hedging as a function of firm characteristics, board characteristics, CEO tenure and institutional ownership.

Variable	I	II	III	IV
	Total speculation (production)		Total speculation (reserves)	
Panel A: Without firm fixed effects in second stage of Heckman regression				
Firm size	−0.0232**	−0.0290*	−0.0110***	−0.0159***
	(−2.062)	(−1.792)	(−4.090)	(−4.075)
Z score	−0.0681***		−0.0294**	
	(−3.121)		(−2.572)	
Z score^2	0.00969***		0.00413**	
	−2.875		−2.236	
O score		0.0211**		7.55e−05
		(2.112)		(0.0394)
O score^2		0.00355*		−0.000897*
		(1.970)		(−1.721)
Board size	0.0153**	0.0120*	0.00627***	0.00571***
	−2.659	(1.965)	−3.907	(3.188)
Outside director ratio	−0.0283	0.0404	−0.0413	−0.0341
	(−0.415)	(0.600)	(−1.315)	(−0.826)
Staggered dummy	−0.0523**	−0.0458*	0.00148	−0.00391
	(−2.137)	(−1.751)	−0.153	(−0.453)
CEO – Chair duality	−0.0239	0.00421	−0.00594	0.000343
	(−1.148)	(0.173)	(−0.990)	(0.0480)
CEO tenure	0.000577	−0.000433	−0.000519	−0.000847
	−0.33	(−0.336)	(−0.965)	(−1.539)
Institutional ownership	−0.0168	0.0133	−0.00237	−0.000810
	(−0.371)	(0.289)	(−0.206)	(−0.0737)
Intercept	0.251***	0.185**	0.114***	0.116***
	−3.433	(2.432)	−3.824	(2.995)
Observations	117	119	206	202
R-squared	0.285	0.189	0.200	0.157
Variable	V	VI	VII	VIII
	Total Speculation (production)		Total Speculation (reserves)	
Panel B: With firm fixed effects in second stage of Heckman regression				
Firm size	−0.0224*	−0.0293*	−0.0109***	−0.0159***
	(−1.976)	(−1.776)	(−3.994)	(−4.025)
Z score	−0.0708***		−0.0296**	
	(−3.148)		(−2.595)	
Z score^2	0.00988***		0.00418**	
	(2.834)		(2.259)	
O score		0.0217**		5.70e−05
		(2.094)		(0.0298)
O score^2		0.00352*		−0.000900*
		(1.872)		(−1.726)
Board size	0.0156**	0.0122*	0.00628***	0.00571***
	(2.680)	(1.959)	(3.850)	(3.146)
Outside director ratio	−0.0358	0.0380	−0.0411	−0.0341
	(−0.516)	(0.550)	(−1.296)	(−0.822)
Staggered dummy	−0.0526**	−0.0460*	0.000962	−0.00427
	(−2.070)	(−1.700)	(0.0990)	(−0.492)
CEO – Chair duality	−0.0246	0.00484	−0.00592	0.000444
	(−1.152)	(0.192)	(−0.982)	(0.0622)
CEO tenure	0.000391	−0.000531	−0.000520	−0.000853
	(0.222)	(−0.399)	(−0.955)	(−1.544)
Institutional ownership	−0.0188	0.0113	−0.00279	−0.00108
	(−0.400)	(0.238)	(−0.241)	(−0.0977)
Intercept	0.254***	0.187**	0.113***	0.115***
	(3.414)	(2.390)	(3.755)	(2.964)
Observations	117	119	206	202
R-squared	0.287	0.187	0.199	0.156

This table presents the regression results of speculation as a function of firm characteristics, board characteristics, CEO tenure and institutional ownership. Total speculation is the yearly standard deviation of the quarterly residuals from a two-step Heckman regression of hedging on firm characteristics. Firm size is the log of the market value of assets in millions of US$. *Z*-scores and *O*-scores are calculated following Altman (1968) and Ohlson (1980), respectively. Institutional ownership is the percentage of the firm owned by institutions as reported in proxy statements. Staggered dummy is equal to one if the board of directors is staggered and zero otherwise. CEO-Chair duality is equal to one if the CEO is also the chairman of the board and zero otherwise. CEO tenure is the tenure of chief executive officers at their firms. Outside director ratio is the fraction of outsiders on the board of directors and board size is the number of directors on the board of directors. Figures in parentheses denote *t*-statistics estimated with standard errors adjusted for firm clustering following Petersen (2009) and *,**,***denote significance at the 10, 5, and 1% levels respectively. The second stage in the Heckman two-step regression includes firm fixed effects for models V–VIII but not for models I–IV.

Based on (Brown, Crabb et al. 2006), we calculate regressions using the quarterly hedge ratios of gold producers' standard deviation as the dependent variable. We use the firm's size (log of total assets), the proportion of projected gold production in our sample as a proxy for market share, Altman's Z-score to measure financial flexibility, operating margin as another potential financial flexibility indicator, and the market-to-book ratio as a proxy for growth or investment opportunities as independent variables. Few significant relationships between these variables and the variability of hedge ratios are revealed by the estimation findings. Our result supports the idea that firms with better growth opportunities engage in less selective hedging.

2.2 Selective hedging, corporate governance characteristics, and managerial compensation

Our findings in (Adam, Fernando et al. 2017) show selective hedging increases stock return volatility, raising the questions of how selective hedging is related to corporate governance, and if there is a causal link between specific governance characteristics and a practice that seems to have no value for shareholders. Unfortunately, there needs to be more corporate governance data available for our sample of firms, which limits the depth of analysis we can conduct to address this issue.

Table 1 also shows the findings of our investigation into the associations between selective hedging and various board features, CEO tenure, and institutional ownership. We highlight a few notable correlations between selective hedging and corporate governance indicators, even though some of our results are weak. For both measures of total speculation, the coefficient for board size is positive and statistically significant. These findings imply that companies with larger boards speculate more frequently than companies with smaller boards. According to this result, companies with staggered boards speculate less. In our analysis, board independence and CEO duality did not appear to impact speculation. We repeat our analysis with firm-level fixed effects included and found that the results remained the same.

So far, our findings indicate that the relationship between speculation and several aspects of corporate governance is weak. The discovery that companies with larger boards speculate more than companies with smaller boards is one of the strongest of these correlations.

In (Adam, Fernando et al. 2017), we investigate whether selective hedging could be a sensible managerial reaction to incentive compensation. As mentioned before, if selective hedging makes a firm's stock more volatile, managers with a large number of stock options may be more likely to engage in speculation than managers with few or no stock options because the value of options rises as volatility does. If this were the case, we would anticipate discovering a positive correlation between speculating and the executive compensation sensitivity to stock price volatility. However, (Adam and Fernando 2006) as well as (Brown, Crabb et al. 2006) demonstrate that corporations do not generate economically significant cash flows on average from selective hedging, which suggests that corporate speculation does not increase shareholder value. The sensitivity of management stock and option holdings to the firm's stock price should limit corporate speculation if this is common knowledge among the firm’s managers.

By adding the deltas of the CEO's and CFO's stock and option holdings, we can determine how sensitive a manager's wealth is to changes in the stock price, which can be caused by holding both stock and stock options. We may determine how sensitive stock option holdings are to changes in stock price volatility. CEO and CFO compensation results showed that none of the four compensation coefficients were statistically significant.

The deltas of stock and options holdings are given by:

$$\text{Delta (stock holdings)} = 0.01 * S * \text{number of shares owned}$$

$$\text{Delta (options holdings)} = 0.01 * e^{-dT}(NZ)S * \text{number of options owned}$$

where
$Z = (ln\ (S/X) + T\ (r - d + \sigma^2/2))/(\sigma T^{0.5})$.
S = underlying stock price.
X = option exercise price.
T = time to maturity of the option (number of years).
r = ln [1 + risk-free interest rate].
d = ln [1 + expected dividend rate on the stock].
σ = annualized stock return volatility.
N = cumulative density function for normal distribution.

The vega of options holdings is given by:

$$\text{Vega (options holdings)} = 0.01 * e^{-dT}N'(Z)ST^{0.5} * \text{number of options owned}$$

Table 2
Speculation and stock return volatility.

Variable	I	II	III	IV
	Changes in stock return volatility			
DTotal speculation (production)$_{t-1}$	0.203**	0.294***		
	(2.128)	(3.260)		
DTotal speculation (reserves)$_{t-1}$			0.638	0.802*
			(1.532)	(2.014)
Dfirm size$_t$		−0.134**		−0.0599*
		(−2.240)		(−1.787)
Dquick$_t$		−0.0105**		−0.00677***
		(−2.658)		(−2.934)
Dleverage$_t$		−0.0285		0.00825
		(−0.249)		(0.121)
Dmarket to book$_t$		0.0830**		0.0676***
		(2.267)		(3.535)
Constant	0.0459***	0.0429***	0.0582***	0.0539***
	(4.607)	(4.073)	(6.238)	(5.483)
Observations	91	86	188	178
R-squared	0.026	0.207	0.021	0.127

In another study done by (Adam, Fernando et al. 2017), we also observe the relationship between executive pay and selective hedging while only controlling for firm size. This suggests that executive stock and option compensation discourages executives from engaging in selective hedging. Some of the compensation coefficients in this scenario are negative and statistically significant.

The idea that stock option ownership could encourage managers to trade to raise stock return volatility and hence increase the value of their stock options is not supported by our discovery that speculating is unrelated to the Vega of option holdings by either CEOs or CFOs. Considering the finding in Table 2, we can conclude speculation increases stock price volatility. It also contradicts findings from recent studies by (Burns and Kedia 2006) and (Denis, Hanouna et al. 2006) that stock option compensation is positively correlated with managers' propensity to use strategies that could impact shareholders. While (Denis, Hanouna et al. 2006) discover that stock options increase the motivation for managers to engage in fraudulent activities, (Burns and Kedia 2006) find that the sensitivity of the CEO's option portfolio to the stock price is considerably positively related to

the tendency to misreport earnings. It is likely that executives who hold options and stock avoid engaging in speculating because they know that selective hedging does not add value and because they have invested in the firm.

In (Brown, Crabb et al. 2006), similar to the variables used by (Tufano 1996), we also gather information about companies' ownership structure and compensation policy. Only a fraction of our firms has access to this data; Therefore, we estimate a different model that takes these factors into account. Considering these outcomes—not presented in the article—we investigate whether variations in the ownership structure or compensation practices of the firms are related to cross-sectional changes in the variation in their hedging policies. We use the percentage ownership of officers and directors, the proportion of outsiders on the board, and option compensation as a percentage of overall compensation to regress the standard deviation in the fraction of production a firm hedge. These characteristics and the variation in hedging ratios for firms do not appear to be related in any consistent way. In conclusion, our analysis did not reveal any characteristics that, if any, could account for variations in hedging ratios among gold producers.

2.3 Robustness

To verify the robustness of our previous findings which are alternate measures of speculation and alternative measures of a firm's potential information advantage, we conduct additional empirical tests. Based on the results from our tests, speculation is still negatively connected to firm size. Results show a positive relationship between board size and speculation (statistically significant at the 1% level). The CEO-chair duality and board independence remain not significant. Our findings support the assumption that firms with larger boards speculate more frequently than those with smaller boards. The analysis showed that firms with a staggered board structure (a board structure where not all directors are up for election at the same time) had lower speculation levels compared to firms with a non-staggered board structure. Additionally, with the alternate measure of speculation, institutional ownership was negatively related to speculation at a low statistical significance level, which suggests that institutional ownership may help monitor executives and reduce speculation.

We argue that firm size is an appropriate proxy for a firm's information advantage because larger firms often have better access to information due to their greater market presence, as well as more experience and other resources to acquire any information they may require. In unpublished research, we test the validity of our earlier conclusions using four other metrics of a firm's potential information advantage: annual gold production, gold reserves, firm age, and CEO tenure. Gold production and reserves have the potential to provide more accurate measures of a firm's footprint in the gold market, though at the expense of diluting other drivers of information advantage like management quality and other sources of in-house expertise, and access to external information sources. This is because the information advantage in our case relates to the future price of gold, and some of the firms in our sample are also involved in mining other metals and commodities. Similar to CEOs who have held their roles for an extended period, it is plausible that older firms have greater internal knowledge and expertise that can provide an information advantage. The findings, which are available upon request, are in line with those of our earlier research that substituted firm size for information advantage.

Finally, even though our dataset stops in 1999, we could access an alternative dataset for the years 2002–2011 from an internet source (from surveys collected by the VM Group for Fortis Bank Nederland). During this time, gold prices rose significantly, and firms significantly reduced their degree of hedging. In another study, we demonstrate that our main findings still hold for this time frame. Larger firms speculate less, and more constrained firms speculate more.

2.4. The Importance of Managerial Views

Various factors from financial theory can affect a firm's optimal hedge ratio. A firm is expected to modify its hedging policy when these conditions change. It can be challenging to measure changes (or perceived changes) in these characteristics, even while strategic concerns related to changes in expected long-term supply or industry consolidation may cause a significant change in a specific firm's preferred hedge ratio. The financial theory does not offer exact predictions on how changes in these elements are related to changes in hedge ratios, even though data on other factors that likely influence the hedge ratio is more easily available. For instance, a manager's decision might be impacted by changes in the possibility of financial trouble before such changes are reflected in the accounting metrics.

Given the challenges in accurately defining a regression that would disentangle these effects, we directly contact managers with a survey asking about risk management techniques to investigate the significance of managerial opinions. The survey is based on (Graham and Harvey 2001) and (Bodnar, Hayt et al. 1995). This survey was distributed to 30 gold producers listed as active at the time. According to the responses from the firms, managers' opinions about the market have a significant effect on hedge ratios for many firms.

A survey was conducted among 13 gold producers to better understand the role of managerial views in hedge ratio decisions. The results show that seven of these firms sometimes alter the timing or size of their hedges based on their outlook for future gold prices, and seven of these firms "actively take positions in gold derivatives" based on market views. The most important factors cited in determining hedge ratios were long-term and short-term market views on gold prices, followed by recent changes in gold prices and the pricing of derivative contracts. The least important factors were competitors' hedging strategies and the outcome of prior hedges. Two of the respondents did not believe that gold prices were predictable. Overall, the results suggest that market views have a significant effect on risk management policies. Still, it is unclear how much of the variability in hedge ratios is due to selective hedging.

2.5 Selective Hedging and Subsequent Market Returns

We discover that variations in hedge ratios are closely related to variations in gold prices based on (Brown, Crabb et al. 2006). In other words, firms hedge more during periods of rising gold prices and less during periods of falling gold prices. Gold prices must be mean reverting for such a strategy to generate excess returns.

For instance, the percentage changes in quarterly gold prices during the latter part of the period that corresponds with our sample (1992-98) are significantly negatively autocorrelated (correlation coefficient p-value 0.296), whereas quarterly price changes over the 15 years before our sample

(1978-92) are significantly positively autocorrelated (correlation coefficient p-value 0.294). According to studies by (Cheung and Lai 1993) and (Schwartz 1997), there is little evidence that gold prices mean-revert or that the gold market is not weak-form efficient. Recent research from a wide range of commodity futures markets generally supports efficient commodity markets, at least in their weak form. For instance, (Kellard, Newbold et al. 1999) prove that short-run inefficiencies are minimal and long-run efficiency is high in the commodities futures markets. (Irwin, Zulauf et al. 1996), we find no evidence to support the existence of mean-reversion in the prices of commodity futures. According to these studies, a firm can only anticipate making excess returns from trading over the long term if it has a competitive informational advantage.

Although the companies in our sample are chosen based on data availability, there is a case to be made that they may hold valuable private information. Many of the biggest gold producers in the world are represented in our sample of gold producers. They might therefore possess superior knowledge of both the supply of gold and the demand from significant customers.

According to anecdotal evidence, there may be an information asymmetry between producers and the market. Gold prices change in response to producer announcements of modifications to their hedging plans. For instance, on February 6, 2000, the day Placer Dome, a sizable gold producer, announced it was reducing the scope of its hedging, the price of gold surged by almost 8%. When Barrick Gold, another significant producer, announced that it would keep up its extensive hedging strategy the next day, prices fell by almost 3%. The 200 trading days before these events' standard deviation of daily returns was 1.2%. A different interpretation of these returns is that investors think hedging has an impact on prices, even though these returns are consistent with the idea that gold producers have superior knowledge of gold prices. For instance, if producers stop hedging, there will be less gold available for buyers to lock in future prices. This decrease in the anticipated future supply of gold may raise the possibility that gold prices will rise. We are unable to distinguish between these tales. We now turn to examine the statistical and economic significance of the gains from selective hedging to directly assess whether producers do have informational advantages or not.

2.5.1 Univariate Analysis

Gold producers may have an advantage in predicting short-term changes in gold prices. This is indicated by the fact that changes in the hedge ratio made by gold producers are in the correct direction relative to changes in gold prices 55.2% of the time for the overall sample, and 66.1% of the time for material changes in hedge ratio and price. However, this advantage is not more significant for active hedgers than inactive hedgers. The ability to predict changes in gold prices is slightly lower over a two-period horizon. These results suggest that gold producers may have an informational advantage in predicting short-term changes in gold prices. Nevertheless, this advantage may need to be more vital to earn excess returns through selective hedging consistently.

2.6 Benefit from Selective Hedging for shareholders

The study found that gold producers tend to increase their hedging when gold prices increase and decrease their hedging when gold prices decrease. We employ several methods to test whether this association between hedging and subsequent changes in gold prices was due to gold producers

having valuable private information about future prices or if it was self-fulfilling. We find that the association was statistically significant and concluded that gold producers might be able to predict short-term changes in gold prices, particularly for large changes in prices. We also estimated the potential gains from selective hedging for gold producers. We discover that they were positive and statistically significant for many cases, indicating that gold producers could earn excess returns through selective hedging. However, we note that the gains from selective hedging might be lower in practice due to transaction costs and other factors.

3. Personal Analysis

(Adam, Fernando et al. 2017), (Brown, Crabb et al. 2006), and other studies concentrate on the fundamental financial aspects of the firm and managerial compensation and even more examine managers' characteristics from the standpoint of behavioral corporate finance. Asymmetric derivative use is discovered by Adam et al. (2015) based on the prior effects of speculation, i.e., more speculation is done when gains are produced by prior speculation, but there is no decrease in speculation following prior speculation losses. They contend that these results can be attributed to the behavioral biases of a manager.

Our findings in (Adam, Fernando et al. 2017) indicate that firms that are (a) likely to be least informed (smaller) and (b) closest to financial distress speculate the most should disconcert shareholders and regulators. It should be the case since we show that selective hedging makes firms riskier. Moreover, other studies have shown that taking on this additional risk does not give shareholders any extra return.

Furthermore, findings prompt a discussion of the relationship between corporate governance and selective hedging. The best evidence we find is a correlation between the degree of selective hedging and board size, even if our total evidence on this subject is poor. This result supports the claim that smaller boards are more effective than larger ones. Another potential connection is that the board creates pay plans that may unintentionally encourage some managers to engage in speculation. For instance, (Géczy, Minton et al. 2007) discovered that the likelihood of actively taking positions is positively correlated with the sensitivity of CFO compensation to stock returns. In contrast, we find little proof that managerial compensation structures are the driving force behind selective hedging in our sample of firms. However, (Brown, Crabb et al. 2006), we find no evidence shows that changes in the hedge ratio are associated with these firm characteristics. Also, no compelling evidence was found that selective hedging leads to better performance based on a wide range of operating or financial dimensions.

In addition, by analyzing the time variation in the hedging ratios of gold producers, we analyze how managerial views affect business policies in this study. Our findings support the idea that gold producers use selective hedging (and can sometimes succeed), but we have not found any evidence that shareholders gain significantly from this strategy.

In contrast, despite considerable evidence that firms try to time the market when they use derivatives, we show that the expected benefits from selective hedging are small at best. Our analysis also provides new insights for future empirical studies aimed at measuring the benefits of derivatives use.

(Mello and Parsons 2000) examine derivative hedges with a focus on industry competition and make the case that rival firms hedge the least because of intensely strategic competition. The remaining unhedged exposure for a firm facing intense strategic competition may result in additional profits. Gaining additional profits gives the firm a competitive edge and is more advantageous than lowering earnings or reducing the volatility of cash flow (Mello and Ruckes 2006). Haushalter et al. (2007) claim that firms that are threatened by a rival strategic investing are more likely to use derivatives to hedge their positions by using a dummy variable that indicates the derivative hedge. Without derivative hedges, underinvestment could have more severe repercussions for a firm.

The reason why managers at smaller firms use selective hedging more frequently than managers at larger firms remains unclear. Nevertheless, according to (Graham and Harvey 1996), managers at smaller firms typically have less financial sophistication than managers at larger firms. As a result, managers at smaller companies can be more inclined to falsely feel that they have an informational advantage when they do not. These studies investigated corporate selective hedging behavior from isolated angles by focusing on the manager or the firm itself.

We choose to study firms in the gold mining industry since this industry is not vertically integrated; the price of gold on the world market is the primary factor influencing profitability. Also, their knowledge is the source of any information advantage on gold prices in the future. We analyze firms which are most likely to have a comparative advantage in their product market and, hence, most likely to be effective at selective hedging by concentrating on single-commodity (gold) producers. Selective hedging, however, appears to be frequent when firms manage FX and interest rate risk. It is even less likely that selective hedging would be effective enough to significantly raise firm value because nonfinancial firms are unable to have superior knowledge of these financial markets.

We can improve our results through a study on foreign exchange risk by focusing on how corporate selective hedging behavior is affected by the competitive environment in which a firm operates. Further research on the effects of competitive environments on corporate selective hedging behavior against interest rate risk or risk associated with changes in commodity prices would be interesting.

Literature in social ecology implies that human risk-taking behavior is affected by competitive environments. However, there is a lack of discussion on how corporate decision-making on selective hedging, as a risk-taking behavior, is affected by the competitive environments within which a firm (or the decision makers) is involved. Given that competitive environments have different dimensions, external and internal environments are examined in this study. The effects of product market competition at the industry level are investigated for the external competitive environment. For the internal environment, board structure, particularly board gender composition, is analyzed.

We can highlight how important contextual environments are in affecting corporate decision-making on derivative use. Taking a risk to time the derivative market is affected by other potential risks that decision makers, or the firms that they represent, could encounter. These risks come from not only aggressive external competition but also internal competitive conflicts in group decision-

making processes. In addition, decision-makers' individual risk preferences should not be ignored. A comprehensive understanding of corporate risk-taking behavior cannot be genuinely obtained without taking above those into account and balancing the risks (or risk preferences) that exist from an individual, group, and industry perspectives. This can provide insight into the decision-making process to explain how risks are dealt with in competitive environments.

In line with the previous issue raised, regarding board committees, how the composition of board committees affects corporate selective hedging behavior could be of interest to future research. In addition, board gender diversity can be a focus in this study investigating the effect of the internal competitive environment on corporate selective hedging behavior. Apart from board gender composition, other board directors' characteristics such as age, educational background, and ethnicity could also be factors affecting corporate risk management. If the critical mass theory is valid, it could possibly explain how these different board characteristics affect corporate selective hedging behavior non-linearly; further investigation is needed.

Numerous research has examined how gender differences in risk propensity. The majority of these studies show that women prefer more conservative levels of risk. For instance, (Shefrin 2001) indicates that women are more risk-averse in terms of physical health and safety after considering six safety product options (smoking, seat belt use, teeth flossing, regular teeth cleaning, exercise, and blood pressure checks). Except for social risk, women are more risk-averse when making financial, health and safety, recreational, and ethical decisions, according to (Weber, Blais et al. 2002). (Harris and Jenkins 2006) complement (Weber, Blais et al. 2002). by analyzing the gender gap in the likelihood of participating in risky behavior across four categories (gambling, health, recreation, and social). Additionally, previous research has shown that women are more risk averse when engaging in risky activities such as criminal activity (Dåderman and Differences 1999), athletic activity (Dervaux, Bayle et al. 2001), drug and alcohol use (Freixanet and differences 1991); (Hersch, 1996); (Pacula 1997), driving (Powell and Ansic 1997), sexual activity (Schroth and skills 1996); (Harrant & Vaillant, 2008).

4. Conclusion

There is a lot of evidence that firms use derivatives for speculating in addition to hedging. We investigate whether this selective hedging practice is in line with the two economic requirements outlined by (Stulz 1996) for this activity to create value: (a) possession of private information by firms; and (b) possession of sufficient financial strength to accept the additional risk that selective hedging imposes.

Our research reveals a negative relationship between firm size and selective hedging, suggesting that smaller firms speculate more than bigger firms. This result goes against what we would anticipate if firms engaged in selective hedging because they thought they could have an informational advantage.

The alternative explanation that selective hedging is primarily motivated by wealth transfer motives is supported by our finding that there is a positive correlation between the extent of selective hedging and the likelihood of experiencing financial distress, as well as between selective hedging and stock return volatility.

However, we find no evidence to support the idea that speculation is driven by managerial compensation, which is particularly important in light of our finding that stock return volatility is positively correlated with speculation. We also find weak relationships between speculation and some measures of corporate governance. Our research does not, however, rule out the last scenario for selective hedging suggested by Stulz (1996), which is that managers engage in selective hedging because they mistakenly think they can outperform the market.

Finally, we find no evidence for any selective hedging rationale that maximizes shareholder value, which is consistent with the findings presented in earlier studies.

5. References

Adam, T. R., C. S. Fernando and J. M. Salas (2017). "Why do firms engage in selective hedging? Evidence from the gold mining industry." Journal of Banking & Finance 77: 269-282.

Adam, T. R. and C. S. J. J. o. f. e. Fernando (2006). "Hedging, speculation, and shareholder value." 81(2): 283-309.

Bodnar, G. M., G. S. Hayt, R. C. Marston and C. W. J. F. m. Smithson (1995). "Wharton survey of derivatives usage by US non-financial firms." 24(2): 104-114.

Brown, G. W., P. R. Crabb and D. J. T. J. o. B. Haushalter (2006). "Are firms successful at selective hedging?" 79(6): 2925-2949.

Burns, N. and S. J. J. o. f. e. Kedia (2006). "The impact of performance-based compensation on misreporting." 79(1): 35-67.

Campbell, T., W. A. J. C. R. S. Kracaw, G. B. Management and e. D. Chew, Risk Publications, London (1999). "Optimal speculation in the presence of costly external financing."

Cheung, Y. W. and K. S. J. F. R. Lai (1993). "Do gold market returns have long memory?" 28(2): 181-202.

Dåderman, A. J. P. and I. Differences (1999). "Differences between severely conduct-disorderedjuvenile males and normal juvenile males: the study ofpersonality traits." 26(5): 827-845.

Denis, D. J., P. Hanouna and A. J. J. o. C. F. Sarin (2006). "Is there a dark side to incentive compensation?" 12(3): 467-488.

Dervaux, A., F. J. Bayle, X. Laqueille, M.-C. Bourdel, M.-H. Le Borgne, J.-P. Olie and M.-O. J. A. J. o. P. Krebs (2001). "Is substance abuse in schizophrenia related to impulsivity, sensation seeking, or anhedonia?" 158(3): 492-494.

Freixanet, M. G. J. P. and i. differences (1991). "Personality profile of subjects engaged in high physical risk sports." 12(10): 1087-1093.

Froot, K. A., D. S. Scharfstein and J. C. J. t. J. o. F. Stein (1993). "Risk management: Coordinating corporate investment and financing policies." 48(5): 1629-1658.

Géczy, C. C., B. A. Minton and C. M. J. T. J. o. F. Schrand (2007). "Taking a view: Corporate speculation, governance, and compensation." 62(5): 2405-2443.

Graham, J. R. and C. R. J. J. o. F. E. Harvey (1996). "Market timing ability and volatility implied in investment newsletters' asset allocation recommendations." 42(3): 397-421.

Graham, J. R. and C. R. J. J. o. f. e. Harvey (2001). "The theory and practice of corporate finance: Evidence from the field." 60(2-3): 187-243.

Harris, C. R. and M. Jenkins (2006). "Gender differences in risk assessment: why do women take fewer risks than men?".

Irwin, S. H., C. R. Zulauf and T. E. J. A. J. o. A. E. Jackson (1996). "Monte Carlo analysis of mean reversion in commodity futures prices." 78(2): 387-399.

Kellard, N., P. Newbold, T. Rayner, C. J. J. o. F. M. F. Ennew, Options, and O. D. Products (1999). "The relative efficiency of commodity futures markets." 19(4): 413-432.

Malmendier, U. and G. J. T. j. o. f. Tate (2005). "CEO overconfidence and corporate investment." 60(6): 2661-2700.

Mayers, D. and C. W. Smith (1982). On the corporate demand for insurance. Foundations of insurance economics, Springer: 190-205.

Mello, A. S. and J. E. J. T. R. o. F. S. Parsons (2000). "Hedging and liquidity." 13(1): 127-153.

Mello, A. S. and M. E. J. T. j. o. B. Ruckes (2006). "Team composition." 79(3): 1019-1039.

Pacula, R. L. J. T. A. E. R. (1997). "Women and substance use: are women less susceptible to addiction?" 87(2): 454-459.
Powell, M. and D. J. J. o. e. p. Ansic (1997). "Gender differences in risk behaviour in financial decision-making: An experimental analysis." 18(6): 605-628.
Schroth, M. L. J. P. and m. skills (1996). "Scores on sensation seeking as a predictor of sexual activities among homosexuals." 82(2): 657-658.
Schwartz, E. S. J. T. J. o. f. (1997). "The stochastic behavior of commodity prices: Implications for valuation and hedging." 52(3): 923-973.
Shefrin, H. J. J. o. a. c. f. (2001). "Behavioral corporate finance." 14(3): 113-126.
Smith, C. W., R. M. J. J. o. f. Stulz and q. analysis (1985). "The determinants of firms' hedging policies." 20(4): 391-405.
Stulz, R. M. J. E. F. M. (1996). "Does the cost of capital differ across countries? An agency perspective." 2(1): 11-22.
Tufano, P. J. t. J. o. F. (1996). "Who manages risk? An empirical examination of risk management practices in the gold mining industry." 51(4): 1097-1137.
Weber, E. U., A. R. Blais and N. E. J. J. o. b. d. m. Betz (2002). "A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors." 15(4): 263-290.