

# Machine Learning for Investor Relations

How Machine Learning can Unlock Shareholder Value

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This report aims to demystify and illustrate the practical applications of machine learning techniques to deconstruct valuation drivers and use these insights to unlock shareholder value. Specifically, we focus on the topics below:

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Exhibit 1: Comparing your valuation to local and international peers

### **ML for Investor Relations**

How Machine Learning Can Unlock Shareholder Value

While many organizations and leaders have a general understanding of how the capital markets value their securities, the majority of boards, management, and investor relations teams find it hard to quantify exactly how the business value their companies generate translates into shareholder value. In a volatile and competitive capital markets landscape, they wrestle with providing concrete answers to questions such as:

- Why are industry competitors trading at a valuation premium?
- How well do our corporate, business, and financial decisions translate into a compelling, differentiated investment thesis?
- Does our strategic messaging strike a chord with analysts and investors?
- Which metrics matter most to analysts and investors?
- What is the value of our ESG and IR efforts and our Credit Rating?



#### Valuation Multiple (Price / Book Value)

With most of these questions unanswered, the common refrain from organizations and leaders is that there are too many variables involved to understand what drives valuation or that markets are too short-term and fail to understand the potential upside of their companies. The result is that they acknowledge the gaps between their intrinsic and their market value and often make "gut" decisions about their interactions with capital markets participants. In doing so, they will either be lucky or wrong.

This report aims to demystify and illustrate the practical applications of machine learning techniques to deconstruct valuation drivers and then use these insights to unlock shareholder value in three steps:

- Use machine learning to quantify what drives your valuation.
- Translate these valuation insights into better management decision-making and a more powerful investment thesis.
- Reduce the gap between management's view of its business value and the price that investors are willing to pay for it.

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### **Decomposing Valuations**

Iridium Quant Lens Machine Learning algorithms explain what investors really pay for

In this note, we continue our efforts to apply Machine Learning in practice, building on our 2020 framework, which quantified the constituent drivers of company valuation. The first report on this subject, <u>Iridium Quant Lens: The Value of Investor Relations Quantified</u><sup>1</sup>, explained the detailed methodology underpinning Iridium's proprietary Quant Lens machine learning platform, which at its essence is derived from the classic finance theory that a company's valuation is a function of the reward it offers relative to its risk.

The Machine Learning algorithms, which in the current phase of the technology focus on banks, were built on this foundation by searching for significant explanatory risk and return factors impacting valuation multiples (defined as Price-to-Tangible-Book-Value), thereby seeking to identify the financial and non-financial drivers of valuations at a particular point in time.

To achieve this, over 10 million data points were ingested and analyzed by Iridium Quant Lens' four different Machine Learning models (LASSO Linear Regression, LASSO Logarithmic Regression, Random Forest and XGBoost), using S&P Capital IQ Pro data.

The models were deployed to explore 30+ risk and return factors summarized in Exhibit 2, covering over 750 banks from 96 countries, including 65 GCC-based banks, across different time horizons, ranging from 1 to 10 years.

Our algorithms are highly successful in decomposing valuation drivers and can explain more than 95% of valuations (see Model Performance page 17).

Exhibit 2: Risk & Return Factors Considered by Iridium Quant Lens

Company Factors	Geographic & Economic Factors
<ul> <li>Company-specific effects</li> </ul>	<ul> <li>Country effect</li> </ul>
<ul> <li>Islamic vs. conventional</li> </ul>	
<ul> <li>Company size</li> </ul>	<ul> <li>Region effect</li> </ul>
<ul> <li>ESG Score</li> </ul>	<ul> <li>Exchange effect</li> </ul>
Credit Ratings	Time effect
<ul> <li>IR Quality</li> </ul>	
Financial Factors	
<ul> <li>Net interest margin</li> </ul>	<ul> <li>Loan to deposit ratio</li> </ul>
<ul> <li>Non-financial income margin</li> </ul>	<ul> <li>NPL and coverage ratios</li> </ul>
<ul> <li>Cost of risk</li> </ul>	<ul> <li>ROE volatility</li> </ul>
<ul> <li>Cost to income ratio</li> </ul>	• 1y and 3y EPS Consensus
<ul> <li>Tier 1 capital ratio</li> </ul>	<ul> <li>Dividend payout ratio</li> </ul>
Market Factors	
<ul> <li>Share price volatility (90d, 180d, 360d)</li> </ul>	<ul> <li>Foreign ownership and limits</li> </ul>
<ul> <li>Share price momentum (RSI)</li> </ul>	<ul> <li>Free float</li> </ul>
<ul> <li>Volume traded as percentage of total</li> </ul>	<ul> <li>MSCI market classification</li> </ul>

ML Algorithms build on classic finance theory of risk-and-return, and can quantify valuation drivers

>10 million data points and 30+ explanatory variables considered for 750 banks from 96 countries

### **Predicting Valuations**

Iridium Quant Lens predicts valuations and deconstructs them into constituent drivers

One of the practical applications of machine learning is that it enables company management and Investor Relations Officers to predict their company's valuation and deconstruct this prediction into its constituent valuation drivers. This, in turn, can identify specific valuation risks or opportunities.

By way of a real-world example, Exhibit 3 below shows a valuation waterfall, based on the results of the aggregate GCC bank sample models, for National Bank of Kuwait<sup>2</sup> (NBK) for 2Q 2021.

For this bank and period, Quant Lens predicted a P/TBV of 1.86x, which is only marginally different from its actual valuation of 1.84x. In other words, the models accurately predict valuation or interpreted alternatively, the bank is fairly valued.

Additionally, the algorithms decompose this valuation into its constituent financial and non-financial drivers relative to the average bank's baseline "fair value" of 0.98x. For NBK, most of the valuation drivers are positive this is clearly not always the case as can be seen in a similar decomposition for Bank Dhofar<sup>2</sup>, a bank based in Oman, for the same period in Exhibit 4 on the following page.



<sup>2</sup>Neither National Bank of Kuwait or Bank Dhofar are clients of Iridium Advisors.



For Bank Dhofar, the predicted valuation is 0.54x, much lower than the baseline valuation due to a number of factors impacting the valuation negatively, such as relatively high capitalization, a country discount and a persistent company-specific discount relating to perceptions of limited visibility of its management track record and franchise.

#### Exhibit 4: Bank Dhofar Valuation Waterfall 2Q 2021



#### Use machine learning to quantify what drives your valuation

As can be seen from these examples, this decomposition of P/TBV into constituent drivers helps to identify valuation risks and opportunities.

For NBK, the focus should be on defending its premium valuation and continuing its efforts to maintain its strong credit rating and improve its IR quality in an ever-changing capital market landscape.

For Bank Dhofar, several opportunities exist to improve the valuation, including upgrading their IR capability, improving its communication efforts to build credibility in its track record, and optimizing its financial strategy.

### **Comparing Valuations**

Assessing individual or multiple industry peers can reveal meaningful competitive intelligence

As a practical extension of the valuation decomposition shown previously, the algorithms allow for comparing the valuation of two banks and the underlying drivers that result in a value differential. Using the previous real-world example, Exhibit 5 below shows a valuation waterfall that compares the actual P/TBV valuations of NBK and Bank Dhofar for 2Q 2021.

If, for example, Bank Dhofar is trying to understand why their valuation of 0.47x P/TBV is so much lower than NBK's at 1.84x, this analysis provides actionable insights. Firstly, if Bank Dhofar were to upgrade the quality of its investor relations to the same level as NBK, this could – all things being equal - add 0.10x or 21% to its valuation.

Secondly, the National Bank of Kuwait enjoys "National Champion" status in the country in which it operates. It is widely recognized for its strong management team, consistent track record of delivery, and credible communications, while Bank Dhofar has historically been perceived otherwise. The market is rewarding this through a substantial companyspecific premium for NBK relative to Bank Dhofar of 0.19x. For Bank Dhofar, this perception gap is an area that could potentially be improved over time with effective communication and financial strategies.

Lastly, Bank Dhofar operates with lower financial leverage or higher capitalization than NBK, which accounts for 0.16x of the P/TBV differential, thereby offering Bank Dhofar opportunities for capital optimization initiatives. Similarly, Bank Dhofar carries a higher relative non-performing loans ratio which impacts its valuation by 0.15x – this could be alleviated with risk appetite refinement or risk management initiatives.

As a final word on these valuation comparatives, this is not limited to two individual banks, but can be extended to groups of banks or individual countries or geographic regions.

Exhibit 5: NBK vs. Bank Dhofar Valuation Comparison Waterfall 2Q 2021





## **Mispricing Signals**

# Machine Learning models can identify temporary undervaluation and overvaluation of stocks

As was seen in the previous practical examples, the predictions of P/TBV are subject to "mispricing" in that the predicted values typically do not exactly equal the actual values. This is normal for predictive models. The predictive power of such statistical models is usually expressed using R-Squared (R<sup>2</sup>), which represents the proportion of the variance for the dependent variable (i.e. P/TBV) that is explained by the independent variables (i.e. the predictive risk and return factors included in the model).

To illustrate this, Exhibit 6 below plots the predicted versus the actual P/TBV of Gulf banks in 2Q 2021 using the average of the four different machine learning models where  $R^2 = 95\%$ .

#### Gulf Banks 2Q 2021



These differences between actual and predicted values can arise from the fact that there may be other factors that were not considered in our machine learning models, such as market sentiment towards an individual bank, that could explain the remaining portion of valuation.

Alternatively, these differences can be viewed as a temporary "mispricing" signal of the stock, i.e. an undervaluation or overvaluation, which investors could potentially turn into an investment strategy by buying undervalued stocks and shorting overvalued stocks.

For example, as noted earlier, NBK's predicted P/TBV of 1.86x exceeded its actual valuation of 1.84x by 0.02x, which is a minor 1% delta indicating a fair valuation of the stock.

For Bank Dhofar, the actual P/TBV of 0.47x is 15% below the predicted value of 0.54x, indicating a potential undervaluation of the stock at that point in time.

To further explore this point, the "mispricing" signals are plotted over time for these two banks in Exhibit 7 on the following page.

#### Exhibit 6: Actual vs. Predicted P/TBV





#### Bank Dhofar



Finally, it is notable from the timeseries above that the deviation between actual and predicted valuation tends to be mean-reverting or cyclical, albeit in a random fashion.

This supports our view that they could represent temporary mispricing rather than fundamental risk or return factors that would tend to have a more consistent impact on valuation.



### **Feature Importance**

#### Identifying important features underpinning valuations

Another practical application of Iridium's Quant Lens Machine Learning algorithms quantifies the most important factors impacting valuations. This is done by calculating a measure called "feature importance" which assigns a percentage to explanatory variables based on how useful they are in predicting the target variable, with all explanatory variables for a given model summing to 100%.

In Exhibit 8 below, the top three financial and non-financial features and their respective ranks are shown for all models in aggregate.







We found that the most important individual factor in the prediction of the Price-to-Tangible-Book-Value was the non-performing loans ratio which explains 7.2% of valuations in aggregate. This may not be surprising because non-performing loans are a key risk metric for banks that investors typically scrutinize in depth, especially in the current market environment.

The second most important financial factor is the Tier 1 capital ratio, as a proxy for leverage, which explains 6.2% of bank valuations, while the net interest margin provides 4.5% explanatory power.

In relation to non-financial factors, investor relations quality is most important, explaining 5% of P/TBV variability. Interestingly, strong credit ratings, which are typically viewed more as drivers of debt pricing, are also important determinants of equity valuations. Finally, and not unsurprisingly, the MSCI classification of a country as either Standalone, Frontier, Emerging or Developed is the third most important non-financial factor.

#### Alignment of communication efforts to enable a fair valuation of the company

This kind of insight can be utilized by company management and investor relations team to focus their investor communications on the most important performance indicators to ensure that the market fully understands them, thereby promoting fair valuation of their stock.

#### IFRS and regulatory disclosure requirements in themselves are not sufficient

One may question at this point why this would be necessary given comprehensive reporting requirements under International Financial Reporting Standards (IFRS) and, in the case of banks, stringent regulatory disclosure obligations.

While these do indeed provide a comprehensive framework to ensure that investors can understand the financial performance of a company, we would argue that these are not sufficient in isolation. For instance, while IFRS prescribes specific disclosable metrics, they do not require explanations for underlying drivers or movements.

In other words, they do not answer questions such as "why has income increased?" or "what is the outlook for revenue growth". Additionally, IFRS does not always require the disclosure of important information. For example, accounting standards require disclosure of dividends paid but not of a company's dividend policy.

information gapFor these reasons, Investor Relations exists - to bridge this gap between<br/>regulatory disclosure requirements and investor information needs, and the<br/>Iridium Quant Lens ML models can aid organizations and leaders in identifying<br/>the most important gaps to focus on.

#### IFRS does not require disclosure of net interest margin

A classic example of one of these information gaps for the banking industry is the disclosure of net interest margins. As shown earlier in Exhibit 8, this factor is the third most important financial driver of bank valuations on average.

Despite its importance, disclosure of a bank's net interest margin is not required under IFRS. In fact, one would probably not find a single mention of this term in any set of bank financial statements in the GCC region. This is compounded by the fact that of the 65 Gulf-based listed banks in our sample, 41% are classified as IR-Agnostic, where disclosures are limited to statutory minima. In contrast, 42% are classified as IR-Basic where net interest margin disclosures are typically lacking granularity. Only 17% of the GCC banks in our sample are classified on par with Emerging market IR.

#### IR Quality 2Q 2021

Proportion of Gulf Banks in IR Quality Archtypes (%)



IR exists to bridge the information gap between regularity disclosure requirements and investor needs

Exhibit 9: IR Quality for GCC Banks

#### The absence of disclosure adds a risk premium leading to a valuation discount

Hence, in the absence of additional IR disclosures, investors and analysts are left with calculating their own margin measures, often based on incomplete data, and drawing their own – often more conservative – conclusions on margin drivers and their future expected trajectory. This, in turn, introduces a risk premium to analyst and investor financial forecast and valuation models, typically resulting in a valuation discount.

#### Create alignment of investor communication efforts to enable fair valuation

The converse is also true. Knowing the importance of the net interest margin, banks can improve their disclosures around this metric to enhance market understanding, reduce estimation and modeling risk which can lead to improved valuations.

## **Impact and Sensitivity**

Machine Learning can quantify the impact of factors on valuation and its sensitivity

In addition to the importance of a feature, the machine learning algorithms also quantify the marginal impact on bank valuation for a given change in that factor. For illustrative purposes, Exhibit 10 below shows the top three positive and negative factors that impact valuation for a 10% increase in that metric for a financial factor or a one-notch shift in a non-financial factor.



For example, an increase in the Tier 1 Capital Ratio by 10%, as a proxy for leverage, (e.g. from 15% to 16.5%) on aggregate reduces the P/TBV of a bank by 3.3%. Similarly, a one-notch upgrade in IR quality (e.g. from an Agnostic to Basic level of IR), improves the valuation by 11.0% on average.

#### ML models can also quantify sensitivity of a valuation to specific factors

While the aforementioned marginal impacts measure the aggregate sensitivity of the valuation to a specific factor, these impacts are not always linear and may differ depending on the starting point for a particular bank.

The beauty and benefit of machine learnings algorithms are that they can capture these non-linear patterns. This allows management to take this analysis one step further and successfully quantify the sensitivity of P/TBV to specific factors.

As an example, Exhibits 11-13 on the following page could enable management to plot these non-linear sensitivities for three of the most sensitive valuation drivers.

Exhibit 10: Marginal impact of 10% increase in financial factor or onenotch increase in non-financial factor

In the example below on net interest margins, it is clear that the valuation sensitivity to this factor differs along different points on the curve, with a move from 2.12% to 3.12% increasing P/TBV by 13.3%, while a shift from 5.13% to 6.13% improves the valuation by 22.8%.







For bank capitalization levels, the impact on valuation is more linear and, perhaps surprising to some, is a negative relationship with higher Tier 1 Capital Ratios reducing equity valuations.



# Finally, an upgrade in IR quality from Agnostic to Basic impacts valuation positively by 10.4% and a further upgrade to Emerging adds another 14.6%. In total, a full upgrade from Agnostic to Emerging unlocks 25% valuation.

#### Exhibit 13: IR Quality Sensitivity

Exhibit 12: Tier 1 Capital Ratio

Sensitivity

#### **IR Quality Archetypes**

Impact on Valuation (%)



#### Machine Learning models can be used to augment strategic decision-making

In so understanding the most impactful valuation drivers as well as specific factor sensitivities, management could further utilize these techniques to supplement strategic decision-making.

For instance, quantifying the market value impact of a particular strategic decision could add meaningful insight to supplement traditional evaluation metrics such as profitability, internal rates of return, net present value, and risk-adjusted return on capital.

An example of this would be to utilize the machine learning models to optimize capitalization for maximum market value:

- The capital adequacy of a bank measures the amount of capital it retains compared to its risky assets. It is an essential measure for shareholders, bondholders, customers, and regulators alike. It reflects the institution's financial soundness and ability to absorb losses from untoward events and risks that banks are exposed to in the ordinary course of business.
- Additionally, capital strength also provides greater scope for future growth and the ability to underwrite larger transactions. However, while higher capitalization levels are positive for bank regulators, bondholders, and credit rating agencies, they also reduce returns on capital, which are negative from a shareholders' point of view, as already illustrated in Exhibit 9.
- These competing demands from stakeholders and inter-relationships between capitalization, returns, and credit ratings make capital optimization a complex and difficult task. Nevertheless, the ability to quantify the valuation impact of different capitalization scenarios within levels comfortable to regulators, customers, and rating agencies, could add value to the decision-making process.

ML insights can help optimize capital for maximum market value

### **A Final Word**

### The case for augmenting Investor Relations with Artificial Intelligence tools

Organization leaders and investor relations officers are in the business of creating shareholder value. While this commonly starts with creating value for customers, employees, and other stakeholders, the path to translating that business value into value for shareholders is challenging to comprehend.

With the Iridium Quant Lens platform, we are now able to bridge that gap between business and shareholder value and provide insights to more meaningfully navigate the complex capital markets landscape.

In this context, it is clear that Investor Relations matters and can add value.

We would expect this logically - removing information asymmetries, improving the market's understanding of the business drivers and outlook reduces uncertainty and likely results in a fairer stock valuation. Based on our machine learning models, this impact can now be quantified, with a full upgrade path from Agnostic to Emerging adding 25% to bank valuations on average.

In addition, as noted earlier, the machine learning models can aid strategic decision-making and align management communication to the most important topics for investors and analysts. Over time, this can help shape a narrative to improve company-specific perceptions to generate a valuation premium.

In our view, this provides a compelling case for building an investor relations A compelling case for IR + AI capability and further improving it by embedding machine learning and wider artificial intelligence techniques into the function. At Iridium, we have already started doing so with several clients whereby the valuations of their stock and those of peers were analyzed to identify actionable valuation risk and opportunities to complement and inform their business, financial and investor relations strategies.

> Aside from the valuation engine, the Iridium Quant Lens platform also contains a natural language processing component that can quantify language sentiment, confidence, certainty, and complexity (See reports: Sentiment Quantified and Sentiment Quantified Part Deux). This has also been used in practice with clients to analyze their historic earnings call for sentiment, certainty, clarity, and confidence to aid preparation for conveying credible information in future calls.

> The use of artificial intelligence has already started to transform the investment industry. Concepts of machine learning, natural language processing, and robotics that were previously in the realm of science fiction, are now commonplace techniques at every step of the investment management value chain. The early adopters of these technologies have gained material competitive advantages.

There is an opportunity for listed companies to do the same.

### **Model Performance**

#### GCC models explain up to 97% of valuation

Iridium Quant Lens uses standard Machine Learning techniques, whereby a random sample of the data set is used to "train" the models and the performance is then tested against the "test" set, which is the most relevant measure for data scientists. The more detailed methodology is explained in our primer on machine learning (The Value of Investor Relations Quantified).

Our latest run of the ML algorithms covered over 750 banks globally, of which 65 are based in the gulf region. This analysis confirmed that the algorithms remained highly successful in decomposing valuation drivers across all models and, on average, explained 83% of valuation variability for the test data set and 89% of the full data set.

Additionally, as illustrated below, the average explanatory performance of the models was strong for each of the four different Machine Learning algorithms used for all time periods.

### Exhibit 14: Average global model fit; all time-horizons

Exhibit 15: Model fit for GCC banks; 3-

year time horizon



While the average performance of the global models was very good, some individual models were even more accurate in explaining valuation. In particular, the 3-year time horizon Lasso Logarithmic and XGBoost models for GCC banks were able to explain up to 92% of P/TBV for the test set and up to 97% of the full data set.

#### Model Fit - 3-Year GCC Banks

#### Lasso Linear Regression

Model Fit - All Models



#### Lasso Logarithmic Regression





### **About Iridium**

Iridium is a management consulting firm and the Middle East's leading advisor on investor relations.

Iridium unlocks potential of organizations and leaders by advancing the science and practice of investor relations.

The firm was founded in 2015 on the belief that first-hand capital markets and senior management experience are central to the process of converting business value into shareholder value.

Our results-oriented experts design, build and operate transformational investor relations programs that help organizations and leaders engage, transact and grow - whether they are healthy, challenged or distressed.

#### Iridium specializes in:

- Delivering a clear picture of what drives company valuations with quantitative and qualitative insights,
- Helping boards and management teams see their companies through the eyes of analysts and investors,
- Identifying and closing maturity and capability gaps
- Creating institutional-grade information content and presentation materials that enable meaningful financial analysis and attract investment.
- Protecting downside and unlocking potential.

#### Other reports in the Iridium Quant Lens series:

<u>The Value of Investor Relations Quantified:</u> Introducing the world's first Machine Learning algorithms that quantify the value of investor relations

Has Sentiment Returned to Normal? AI-powered Earnings Call Analysis

<u>Sentiment Quantified Part Deux:</u> AI-powered Analysis of Sentiment Trends and Management Credibility in Earnings Calls

<u>The Risky Business of Earnings Calls</u>: Earnings Call adoption is increasing in the GCC but remains extremely low, posing significant regulatory risks

<u>Sentiment Quantified:</u> AI-powered Earnings Call analysis detects early signs of recovery amidst Covid-19

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"Iridium unlocks potential of organizations and leaders by advancing the science and practice of investor relations."

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