

Fair-Value Controversy Top-Down Versus Bottom-Up

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When calculating the Net Asset Value (“NAV”) for a mutual fund portfolio containing foreign equity securities for which market quotations are not “readily available”, fund management must choose whether to make fair value price adjustments for individual securities or for groups of securities (such as countries, sectors, or entire portfolios). This is a crucial decision. The issues inherent in this choice have been discussed in at least three forums: a series of Director Roundtables sponsored by several law firms and Deloitte & Touche, an interview with Paul Roye, the Director of the Division of Investment Management at the Securities and Exchange Commission (“SEC”), published in “The Investment Lawyer,” and a webcast sponsored by NICSA and PricewaterhouseCoopers. These discussions appear to support varying interpretations.

Interactive Data Pricing and Reference Data believes that a fair value pricing methodology that operates at the individual security level produces more accurate results for several reasons. First, as a matter of law, a significant event rendering market quotations not “readily available” may not affect all of the securities in a portfolio. As the SEC staff’s April 30, 2001 letter to Craig S. Tyle, General Counsel of the Investment Company Institute (the “2001 letter”), notes, when market quotations are readily available, “funds are not permitted to ignore these quotations and fair value price the securities.” The 2001 letter highlights this point by its repeated use of singular articles (‘a’) and qualifiers (‘that’): e.g., “When market quotations for a portfolio security are not readily available, a fund must calculate its NAV by using the fair value of that security, as determined in good faith by the fund’s board.” (Emphasis added.) This language suggests a security by security analysis.

Second, the securities comprising certain market sectors, such as pharmaceutical and technology, can be inversely correlated. For example, Astra Zenca and Vodafone, two large capitalization UK companies, have been inversely correlated on numerous occasions. If all UK securities were adjusted by the same amount, one of the two companies will often be adjusted in the wrong direction.

Thirdly, portfolio composition is constantly, and sometimes dramatically, changing. Historical correlations between a portfolio and an index or a country, the foundation of many fair value pricing methodologies, lose accuracy with each and every portfolio change.

Interactive Data Pricing and Reference Data, with consulting design from Professor Eric Zitzewitz of Stanford University, has constructed a service that produces fair value information for individual securities. To test the Fair Value Information Service, we created two hypothetical portfolios (one equal weighted and one value weighted) of randomly selected European and Asia Pacific equity securities. The attached report compares the NAVs of these hypothetical portfolios calculated using stale local closing prices with the NAVs calculated using fair value evaluated prices for the period from September 30, 2000 through October 1, 2001.¹

¹ In the report that follows, please note that we could not calculate fair value evaluated prices for 36% of the securities. (These were mostly lower capitalization issues. The 64% for which we did calculate fair-value evaluated prices represent 86% of the capitalization.)

In summary, the results from applying Interactive Data Pricing and Reference Data's Fair Value Information Service were impressive. A market timer switching between cash and the value weighted hypothetical portfolio based on a 75 basis point move in the S&P 500 Index could have generated excess returns of approximately 53% based on a NAV calculated with local closing prices. If the NAV was calculated with fair value evaluated prices, excess returns were approximately minus 2%. With respect to the equal-weighted portfolio the market timer could have generated excess returns of approximately 42% based on a NAV calculated with stale prices, versus approximately minus 3% based on a NAV calculated with fair value evaluated prices.

Fair Value Pricing Analysis for 50 Randomly Selected Securities

The following results were produced using Interactive Data Pricing and Reference Data's Fair Value Information Service and demonstrate that our fair value evaluated prices can be used by a mutual fund essentially to eliminate arbitrage opportunities and can also aid a mutual fund in meeting the legal requirement that NAVs be constructed using fair value prices when a significant event has occurred such that the closing price would not be considered a readily available market quotation.

Methodology

To discuss the results, it might be helpful first to explain our Fair Value Information Service methodology. The methodology uses information available in the U.S. markets to create an evaluated prediction for each foreign equity security of what price might prevail in a liquid market given all of the information available at 4:00 p.m. Eastern Time ("ET"), when most funds calculate their NAV. Market efficiency theory states that arbitrageurs should not be able to earn risk adjusted abnormal returns by trading at liquid market prices using currently available information. So an appropriate test of whether our fair value evaluated prices are useful in approximating liquid market prices is whether they can be used by a mutual fund to eliminate arbitrage opportunities.

The main categories of factors used in our Fair Value Information Service may include:

1. ADRs
2. Relevant industry sector indices – Telecom, Finance, Pharmaceuticals, etc.
3. General indices – S&P 500, Nasdaq
4. Foreign country information – ADR baskets, iShares, Index futures

For each security we measure how its daily log change historically correlates with various factors. These historical correlations, which change on a daily basis, determine each factor's contribution to the fair value evaluation.

The above factors are listed in approximate order of importance. If a security has a liquid **ADR**, this factor is often the most important. However, the key word is "liquid." We've found that only 4% of existing ADRs are liquid enough to be sufficient predictors of fair value evaluated prices. In 96% of the cases the ADR must be supplemented by other factors. As ADR liquidity decreases, other factors increase in importance. For instance, one might think that a fair value evaluated price could always be calculated when an ADR exists. In our sample, however, fair value evaluated prices couldn't be calculated for 2 of the 11 securities with ADRs. One might also think that the fair value evaluated prices from those securities with ADRs had the most statistical power. In our sample, however, of the 10 securities with the most statistical power, only 3 had ADRs.

WHITE PAPER #2 (CONTINUED)

We find that returns are becoming increasingly correlated within **industry sectors** across countries. For example, a profit warning from Cisco may be relevant to the valuation of technology stocks around the world.² Our system automatically weights those sector indices that are the best predictive factors for the security in question.

Like the sector indices, **general indices**, such as the S&P 500, Russell 2000 and Nasdaq, have a major effect on foreign equity prices. The Fair Value Information Service selects the most correlated general indices for each security.

Since February 2001 we have been collecting intraday values for all factors. As time passes and we have more of this data, the statistical power of our model will increase.

Test of excess returns

To test the impact of fair value pricing, we created two hypothetical portfolios (one equal weighted and one value weighted) consisting of the same 50 randomly selected European and Asia Pacific equity securities and estimated the excess returns to a market timer using an arbitrage trading strategy for the period from September 30, 2000 until October 1, 2001, with and without the use of fair value evaluated pricing.

| | Closing Prices Excess Return | Fair Value Prices Excess Return |
|--------------------------|---------------------------------|------------------------------------|
| Equal Weighted Portfolio | 42% | -3% |
| Value Weighted Portfolio | 53% | -2% |

These results show that consideration of fair value evaluated prices can virtually eliminate the statistically certain excess returns caused by stale pricing.

For the purposes of this test, excess returns are defined as the difference between the returns to a strategy of holding the hypothetical portfolio on those days on which the U.S. market rises by 75 basis points and selling on days it falls by 75 basis points, versus the returns to buying and holding a 50-50 mixture of the hypothetical portfolio and cash. We used a 50-50 mixture as a benchmark since it represents the same average exposure to the market. That is, using this benchmark makes our excess return calculations independent of whether the time period we chose produced positive or negative absolute returns for the hypothetical portfolio. (All returns are in log percentage points, i.e., are not compounded, so an abnormal return of 70% implies a doubling, an abnormal return of 140% involves a quadrupling, etc.).

² See “The New Economy and Global Stock Returns” by Brooks and Cataeo, IMF Working Paper 216, for a discussion of the increasing importance of sectors and the decreasing importance of country effects.

WHITE PAPER #2 (CONTINUED)

Excess return of individual securities

We chose a Confidence Interval of 95% as our criteria for determining to engage in a fair value analysis (Clients could choose a lower or higher value.) With this criteria fair value evaluated prices could be calculated for 32 of the 50 securities. These securities are the larger capitalization issues. Although these represent 64% of the number of securities, they represent 86% of the capitalization.

Summary of excess returns from September 30, 2000 to October 1, 2001:

| Company Name | Country | Industry | Cap (\$mm) | Has an ADR? | F-Test | Stale Price Excess Return | Fair Value Excess Return |
|--------------------|----------------|-----------------------------------|------------|-------------|--------|---------------------------|--------------------------|
| HSBC HLDGS | Hong Kong | Finance | 97,939 | YES | 14.36 | 70.4% | 2.2% |
| CHINA MOBILE (HK) | Hong Kong | Consolidated enterprises | 59,167 | YES | 12.12 | 109.1% | -14.7% |
| SAMSUNG ELECTRONIC | South Korea | Electrical, Electronic Equipment | 16,171 | | 9.55 | 111.2% | -32.8% |
| FURUKAWA ELECTRIC | Japan | Non-ferrous metals | 3,493 | | 9.12 | 120.8% | -31.2% |
| HUTCHISON WHAMPOA | Hong Kong | Consolidated enterprises | 31,708 | | 7.60 | 73.3% | -19.7% |
| NTT DOCOMO | Japan | Communication | 143,722 | | 6.15 | 75.1% | -8.7% |
| ROHM CO | Japan | Electrical machinery | 11,166 | | 6.12 | 76.6% | -1.7% |
| SK TELECOM | South Korea | Communication | 14,161 | YES | 6.12 | 90.0% | -27.9% |
| CHEUNG KONG(HLDGS) | Hong Kong | Properties | 18,043 | | 6.05 | 58.0% | -13.8% |
| LI & FUNG | Hong Kong | Consolidated enterprises | 2,720 | | 5.80 | 106.0% | -9.7% |
| TELEVISION BROADCT | Hong Kong | Consolidated enterprises | 1,188 | | 5.28 | 65.3% | -13.0% |
| CANON INC | Japan | Electrical machinery | 25,534 | YES | 4.98 | 80.7% | 12.1% |
| VODAFONE GROUP | United Kingdom | Telecommunication services | 148,020 | YES | 4.97 | 55.2% | -0.2% |
| WPP GROUP | United Kingdom | Media and photography | 8,162 | YES | 4.45 | 59.6% | -9.3% |
| ASTRAZENECA | United Kingdom | Pharmaceuticals | 80,608 | YES | 4.44 | -5.8% | 7.6% |
| HENDERSON LAND DEV | Hong Kong | Properties | 5,642 | | 4.20 | 64.3% | -3.9% |
| ABN-AMRO HLDGS NV | Netherlands | Banks | 24,047 | YES | 4.10 | 47.4% | 14.4% |
| AMOY PROPERTIES | Hong Kong | Properties | 2,797 | | 4.02 | 44.1% | -6.2% |
| SUN HUNG KAI PROP | Hong Kong | Properties | 15,301 | | 4.01 | 71.8% | -16.5% |
| WHARF(HLDGS) | Hong Kong | Consolidated enterprises | 4,063 | | 4.00 | 75.3% | 13.9% |
| OVERSEA-CHINESE BK | Singapore | Finance | 6,948 | | 3.13 | 26.0% | -30.8% |
| NINTENDO CO | Japan | Other products | 20,264 | | 3.09 | 56.4% | 9.7% |
| SWIRE PACIFIC | Hong Kong | Consolidated enterprises | 3,538 | | 2.98 | 52.4% | -7.6% |
| FUJI ELECTRIC CO | Japan | Electrical machinery | 2,018 | | 2.81 | 77.3% | 22.7% |
| ADVANCED INFO SERV | Thailand | Communication | 3,098 | | 2.80 | 51.6% | -24.1% |
| HYUNDAI MOTOR CO | South Korea | Transport Equipment | 2,811 | | 2.62 | 55.6% | -30.4% |
| MATSUSHITA ELC IND | Japan | Electrical machinery | 24,379 | YES | 2.59 | 36.3% | 4.1% |
| CITY DEVELOPMENTS | Singapore | Properties | 1,885 | | 2.53 | 54.5% | -7.9% |
| AMP DIV PTY TRUST | Australia | | 584 | | 2.45 | 21.8% | -0.1% |
| SINGAPORE AIRLINES | Singapore | Transport/Storage/Communications | 5,788 | | 2.42 | 50.7% | 2.6% |
| SHIN-ETSU CHEMICAL | Japan | Chemicals | 12,384 | | 2.29 | 62.1% | 6.3% |
| HONGKONG&CHINA GAS | Hong Kong | Utilities | 6,600 | | 2.23 | 2.3% | -3.8% |
| CHUBU ELEC POWER | Japan | Electric power and gas | 16,043 | | 1.96 | -17.7% | -3.8% |
| SINGAPORE PRESS HD | Singapore | Manufacturing | 3,428 | | 1.95 | 28.9% | -18.6% |
| TELEKOM MALAYSIA | Malaysia | Trading/Services | 7,490 | | 1.94 | 2.5% | -9.1% |
| SUZUKI MOTOR CORP | Japan | Transport equipment | 5,430 | | 1.93 | 30.4% | 38.6% |
| SINGAPORE TECH ENG | Singapore | Multi-industry | 3,531 | | 1.89 | 22.5% | -2.4% |
| BRIT AMER TOBACCO | Malaysia | Consumer Products | 2,611 | | 1.85 | -12.9% | -4.8% |
| TOYOTA INDUSTRIES | Japan | Transport Equipment | 5,341 | | 1.75 | 29.0% | 6.3% |
| ITO-YOKADO CO | Japan | Retail | 19,284 | YES | 1.66 | 18.0% | -5.4% |
| H M SAMPOERNA | Indonesia | Consumer goods industry | 1,410 | | 1.66 | -2.8% | -31.9% |
| ITC | Australia | Miscellaneous | 2 | | 1.58 | -6.8% | -37.8% |
| KANSAI ELEC POWER | Japan | Electric power and gas | 16,663 | | 1.54 | -4.9% | 12.7% |
| EAST JAPAN RAILWAY | Japan | Land transport | 24,012 | | 1.53 | -14.6% | 0.0% |
| CLP HOLDINGS | Hong Kong | Utilities | 9,568 | | 1.51 | -6.2% | -1.7% |
| PUBLIC BK BHD | Malaysia | Finance | 2,450 | | 1.47 | -3.9% | -41.1% |
| TOKIO MARINE &FIRE | Japan | Insurance | 14,090 | YES | 1.44 | 8.9% | 30.9% |
| ASAHI ORGANIC CHEM | Japan | Chemicals | 258 | | 1.41 | 15.3% | -3.7% |
| RELIANCE INDS | India | Synthetic fibers, silk and woolen | 5,719 | | 0.99 | 19.9% | 1.1% |
| mitsui sumitomo in | Japan | Insurance | 4,218 | | 0.77 | -3.8% | 9.6% |

Limitations

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The fair value information used in these white papers was produced using Interactive Data Pricing and Reference Data's Fair Value Information Service. Please note that it is the obligation of a mutual fund's board of directors to determine in good faith the fair value of a portfolio security. Users of the Fair Value Information Service should be aware that it cannot take the place of a fund's internal fair valuation responsibilities. Rather, the Service is designed to provide subscribers with input to their independent fair value determinations.

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