

# Fixed Income Falling Knives Phase Two:

## Examining the Relationship Between Issuer-Specific Bond and Equity Returns

### October 2007

## Executive Summary

Previous research by the Brandes Institute, a division of Brandes Investment Partners, L.P., documented the opportunities available by investing in falling knives, securities whose prices have fallen sharply.

Often, in these situations, many would-be investors see only the risk of further price erosion. Hence, they tend to avoid such securities. Given the results of our earlier research on fixed income *and* equity falling knives, such investors may be foregoing significant opportunities.

Now, in new research on this topic, we investigate whether *stock* prices provided any indication of subsequent falling knife *bond* returns.

This research builds on work done by Lehman Brothers, who developed an approach designed to point toward future bond prices using option-adjusted spreads<sup>1</sup> (OAS) and prior equity returns for the issuing companies (“related-equity performance”).

In their report published in 2002, Lehman Brothers analyzed data for securities in its U.S. Corporate Index and equity data from its global equity databases and concluded that bonds with high OAS *combined* with high prior equity returns provided attractive outperformance over 3- and 12-month holding periods. Here, outperformance was measured relative to duration-matched Treasuries. This pattern was evident for both investment- and non-investment grade U.S. bonds. Note that this work does not relate specifically to the falling knife concept. However, it did demonstrate a link between prior equity performance and subsequent short-term bond performance.

While this Lehman Brothers study may be useful for short-term bondholders, our experience in our other research suggests that looking at results over a longer period than 3-12 months may be more useful for long-term investors.

Our research goal was to apply this concept to our falling knives universe over longer holding periods, looking for evidence that prior period equity and/or bond characteristics have been good indicators of which falling knives subsequently provided above-average performance.

To test this, we took three steps:

1. We adapted the Lehman Brothers methodology and applied it to our fixed income falling knife (“FIFK”) universe. Defining a FIFK as a U.S. investment grade bond whose OAS widened 100 basis points or more within a 3-month period, there were 1,497 such issues between 1990 and 2005.
2. We extended our observation period of subsequent returns to three years (through December 31, 2006).
3. We measured characteristics of the equity and debt securities of an individual issuer *before* and *after* a falling knife event.

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<sup>1</sup> OAS reflects the application of option pricing techniques that adjust for a fixed income security’s optionality. The OAS helps investors compare bonds with options to those without options.

We started by confirming that our results over 3- and 12-month periods were consistent with the Lehman Brothers' findings. In the falling knife universe, just as in Lehman's broader study, high OAS bonds with high related-equity returns generally outperformed comparable duration Treasuries in subsequent periods.

Extending the study period to three years provided some interesting findings:

- Adding one more year past Lehman Brothers' horizon (Year 2 in our study) reversed some of their findings: outperformance shifted from bonds that had shown *high* related equity performance to bonds with *low* related equity performance.
- Looking at the full 3-year subsequent period, based on average, annualized returns, prior related-equity performance turned out to have been a poor indicator of future falling knife bond performance.
- However, for falling knife bonds of any given rating, a higher spread (OAS) generally was a consistent indicator of FIFK outperformance.

We concluded that in the FIFK universe, prior related-equity performance was not a useful indicator of subsequent bond performance beyond 12 months. However, analysis of which bonds have had high option-adjusted spreads relative to others with the same rating seemed to be valuable.

This work suggested that there were still two other potentially productive relationships within the FIFK universe. First, if related-equity returns were poor indicators of bond returns beyond 12 months, could bond returns help forecast related-equity returns? Secondly, within that FIFK universe, were prior related-equity returns an indicator of subsequent equity returns?

We therefore investigated these two additional relationships:

1. FIFK prior *bond* spreads and FIFK issuers' subsequent *equity* returns.
2. *Prior* equity returns for FIFK issuers and *subsequent* equity returns (post the falling knife event).

We found:

- Bond spreads had been an indicator of subsequent equity returns. Specifically, the *equities* of issuers with higher OAS bonds tended to outperform the Russell 3000 Index over the 3-year period after the *bond's* initial fall.
- However, in general, the *related-equity* returns of FIFK issuers prior to the falling knife event were not good indicators of equity returns *after* that event.

These findings strengthen our conclusion regarding the importance of analyzing the option-adjusted spread of falling knife bonds. Those with a high OAS were associated not only with better subsequent bond returns, but also better subsequent equity returns (relative to the Russell 3000 Index).

We also found a stronger price relationship between the equity and debt securities of an individual issuer *after* a falling knife event vs. prior to a falling knife event.

How might an investor apply these results?

We believe the greatest benefits of buying FIFK bonds accrue to those investors who have the best issue-selection skills, and we believe these investors can now add “high OAS” as an additional tool to their work. In addition, based on our conclusions in this research, we considered three different approaches for investing in the bonds and equities of FIFK issuers and concluded that a “long debt” strategy offered a more compelling risk-reward trade-off than a “long equity” or “long debt/short equity” approach.

As noted in our previous research, a significant number of falling knife securities tend to be created during event-driven market downturns (1998 and 2002 for bonds, for example). Such downturns do not happen frequently. As such, these events and the corresponding large number of falling knives they may generate can heavily influence overall results. In addition, the availability of historical, issuer-specific debt information is relatively short (15 years).

Given the limitations of the data and the typically episodic creation of falling knives, we plan to re-visit the relationship between falling knife stock and bond prices after the next event-specific market decline with the goal of better assessing any indicative relationship between these two securities.

## I. Introduction

In *Fixed Income Falling Knives*, the predecessor to this paper, we noted the substantial returns generated by corporate bonds whose spreads had widened suddenly. Our investigation of returns included investment grade U.S. corporate bonds whose option-adjusted spreads (OAS) widened more than 100 basis points, relative to the spread of the market, within a 3-month period, at any time between December 31, 1989 and December 31, 2005.<sup>2</sup> In general, these FIFK had default rates higher than the overall average among investment grade corporate bonds, but, similar to falling knife equities, delivered notable outperformance. Fixed income falling knives outpaced the Citigroup U.S. Broad Investment Grade Corporate Bond Index (“BIG Index”) by more than 3.5% on a 3-year annualized basis, post fall.

Given these findings, we sought to combine elements of our falling knife studies of equity (see *Falling Knives Around the World*) and fixed income securities to test whether equity prices provided any indicative power for subsequent bond returns at the issuer-specific level. A survey of existing literature on this topic produced a number of studies that addressed the relationship between equity and bond prices at the *aggregate* level, focusing on price movements between various stock and bond indices. One study examined stock and bond returns at the individual issuer level; it was published by Lehman Brothers in January 2002 in its *Quantitative Credit Research Quarterly*.<sup>3</sup>

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<sup>2</sup> Our entire fixed income falling knife universe was captured prior to Dec. 31, 2005. As applicable, we measured performance through Dec. 31, 2006. For example, for bonds entering the universe in 2005, we measured their performance through 2006. Bonds with two and three years of performance data entered the universe in 2004 and 2003, respectively. No performance for any bond was calculated beyond Dec. 31, 2006.

<sup>3</sup> Naik, Vasant, Marco Naldi, Dominic O’Kane, Graham Robinson, Lutz Schloegl, Minh Trinh. *Quantitative Credit Research Quarterly*. Volume 2002-Q1. Lehman Brothers. January 31, 2002.

In the first section of this paper, the Lehman Brothers research and its findings are summarized. In subsequent sections of this report, details regarding how we adapted the Lehman Brothers methodology for our study of FIFK are revealed. Next, results of our study are shared as they relate to two avenues of research: equity performance as a potential indicator of FIFK returns and the interrelationship of issuer-specific bond and equity returns, particularly *after* a falling-knife event. We begin with an explanation of Lehman Brothers' work.

### **Lehman Brothers' Methodology**

Lehman Brothers conducted its study using U.S. corporate bonds between May 1994 and December 2001. Lehman Brothers' U.S. Corporate Index constituted the universe of corporate bonds on which they tested this theory, while corresponding equity data was extracted from Lehman Brothers' global equity database.<sup>4</sup>

After adjusting for ratings and duration, Lehman Brothers concluded, ". . . a portfolio of bonds with past high equity returns tends to outperform a portfolio of bonds with past low equity returns." Outperformance was measured as excess returns over comparable-duration Treasury bonds. Lehman Brothers researchers added, ". . . this effect is especially strong for bonds that are trading at above-average spread levels compared with their peer groups."<sup>5</sup> This dynamic was found to exist among investment- and non-investment-grade bonds.

To assess the relationship between OAS and returns, Lehman divided its bond universe into three, equally sized *duration* segments denoted as "long," "medium," and "short." Each of these segments was further divided based upon OAS spreads, denoted as "high," "medium," and "low." These segments were created each month and outperformance was measured over subsequent 3-month periods.

After Lehman Brothers found minimal outperformance attributable to OAS, its researchers sought more robust results by studying the corresponding stock returns. They segmented the bond universe according to duration (but not OAS levels). Bonds within each duration segment (long, medium, and short) were further divided each month into three groups according to returns for the corresponding equity security during the prior three months: the top 20%, the middle 60%, and the bottom 20%. Outperformance for the bonds was measured over subsequent 3-month periods. Lehman Brothers found evidence of a "significant equity-momentum effect for both A-rated and BBB-rated bonds."<sup>6</sup>

Given these *separate* findings on OAS levels and prior equity returns, Lehman researchers combined these two traits to gauge their potential indicative powers, dubbing this approach the "ESPRI" model (Equity returns as SPRead Indicators).

The Lehman Brothers authors concluded that high OAS alone was not a robust indicator of future corporate bond performance. However, high OAS *combined* with high prior equity returns (as measured using the ESPRI model) provided attractive outperformance vs. comparable duration Treasuries for bond investors among investment- and non-investment-grade issues. The Lehman research did not relate specifically to the falling knife concept, but it did

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<sup>4</sup> Among the criteria Lehman Brothers used for including bonds in its universe for study were: maturities between three and 30 years, and bonds for which a matching publicly traded equity stock could be identified. Lehman Brothers also analyzed securities in Japanese, U.K., and European bond markets as described in a PowerPoint presentation titled "Introducing ESPRI: A Credit Selection Model with Equity Returns as Spread Indicators" by Vasant Naik, Minh Trinh, Graham Rennison, and Srivaths Balakrishnan, published in June 2003. Lehman Brothers noted that results for non-U.S. securities were similar to results for U.S. securities.

<sup>5</sup> Naik, Vasant, Marco Naldi, Dominic O'Kane, Graham Robinson, Lutz Schloegl, Minh Trinh. *Quantitative Credit Research Quarterly*. Volume 2002-Q1. Lehman Brothers. January 31, 2002, page 27.

<sup>6</sup> Naik, Vasant, Marco Naldi, Dominic O'Kane, Graham Robinson, Lutz Schloegl, Minh Trinh. *Quantitative Credit Research Quarterly*. Volume 2002-Q1. Lehman Brothers. January 31, 2002, page 32. Lehman Brothers also investigated results based upon prior 1-, 6-, 9-, and 12-month equity returns. As the holding period increased, the excess returns tended to decrease, but the evidence was still present at these horizons. Transaction costs were not considered in outperformance calculations.

demonstrate a link between prior equity performance and subsequent short-term bond performance. Among bonds of any given rating, those with higher spreads (OAS) and better related-equity performance were found to have above-average subsequent short-term bond results vs. those with lower spreads and weaker related-equity returns.

In the next section of this paper, we apply the essence of the ESPRI model to the Brandes Institute’s FIFK universe to test for evidence that prior period equity and/or bond characteristics have been good indicators of which falling knives subsequently provided above-average performance. The interrelation of falling knives’ bond and equity returns also is investigated.

## II. The ESPRI Model and FIFK

Applying the ESPRI criteria to the Brandes Institute’s falling knife universe (1,497 issues from 397 issuers between 1990 and 2005) affirmed the Lehman Brothers study’s finding of an equity-momentum effect. This effect was measured and validated over 3-month and 12-month periods. As shown in Exhibit 1, at all three levels of OAS spreads – high, mid, and low – falling knife bonds linked to high-performing equities prior to their fall notably outperformed bonds whose issuing companies generated less compelling equity returns.

This result was especially robust for the high- and mid-level OAS bonds. Consistent with Lehman’s approach, bond performance is measured relative to duration-matched Treasuries.

For convenience, going forward we adopt Lehman Brothers naming convention and generally refer to falling knife bonds by their spread segment first, then by their equity return in the prior period. For example, high-OAS bonds with high prior equity returns are denoted as “HH.” High-OAS bonds with low prior equity returns are denoted as “HL.”

As shown in Exhibit 1, HH bonds outperformed HL bonds by more than 5% during the 3-month period post fall. In fact, regardless of OAS segment, bonds with high prior equity returns all provided robust, positive relative performance (vs. comparable duration Treasuries), while bonds linked with low prior equity performance for all three OAS groups recorded negative relative performance. Bonds with high prior equity returns over the prior 12-month period also delivered robust outperformance.<sup>7</sup>

**Exhibit 1: Average Relative Performance for FIFK in the 3-Month and Year 1 Periods, Post Fall, 1990 - 2006**

3-Month	Prior 3-Month Equity Performance				Year 1	Prior 12-Month Equity Performance				
	OAS Group	High	Mid	Low		Total	OAS Group	High	Mid	Low
<b>High</b>		5.33	1.40	(0.18)	1.89	<b>High</b>	12.26	13.49	8.22	12.47
<b>Mid</b>		2.82	(0.35)	(3.53)	(0.16)	<b>Mid</b>	8.09	7.39	2.85	6.62
<b>Low</b>		1.72	0.41	(2.33)	0.08	<b>Low</b>	3.62	2.64	(1.55)	1.91
<b>Total</b>		3.25	0.45	(1.91)	0.58	<b>Total</b>	8.05	7.77	2.75	6.88

Source: FactSet; The Brandes Institute, as of 12/31/06

<sup>7</sup>To be clear, Exhibit 1 illustrates returns for fixed income falling knife bonds relative to comparable duration Treasuries. The falling knife universe has been segmented into groups based on OAS level (high, mid, and low) and related equity returns during the 3- or 12-month periods prior to each bond’s fall. Returns are measured over the 3- or 12-month period post fall. For example, bonds with low OAS spreads and mid-level equity returns (during the 12 months prior to their fall) outperformed comparable duration Treasuries by 2.64%, on average, during the 12 months *after* their fall.

While the Lehman Brothers study did not track performance past 12 months, we extended the time frame for measuring future bond performance to include the two, subsequent 12-month periods (denoted “Year 2” and “Year 3”).<sup>8</sup> In doing so, we found the extended results reflected a considerable mean reversion, as outperformance shifted from bonds with *high* prior 12-month equity performance to bonds with *low* prior 12-month equity performance.

Tracking returns in Year 2, Exhibit 2 illustrates the extent of this reversal, which was pronounced for HL bonds where average relative performance jumped to 28.29%, compared to 3.67% for the HH bonds. Median relative returns, when substituted for each segment’s average, produced comparable findings. We also found a consistent pattern across all three OAS groups of FIFK bonds with low-prior equity performance outperforming high-prior equity performance bonds. Note that aggregate outperformance of high OAS bonds remains intact, as shown in the “Total” columns of Exhibit 2.<sup>9</sup>

By Year 3, we observed a reversion to the mean, as the dispersion of returns across all segments was tighter than during preceding periods. Within our fixed income falling knife universe, HL bonds delivered the best relative returns, 8.61%, in the Year 3 period.

**Exhibit 2: Average Relative Performance for FIFK in the Year 2 and Year 3 Periods, Post Fall, 1990 - 2006**

Year 2		Prior 12-Month Equity Performance			Year 3		Prior 12-Month Equity Performance		
OAS Group	High	Mid	Low	Total	OAS Group	High	Mid	Low	Total
<b>High</b>	3.67	8.27	28.29	11.19	<b>High</b>	2.50	1.89	8.61	3.29
<b>Mid</b>	2.26	4.61	15.32	6.48	<b>Mid</b>	3.02	(0.26)	3.38	1.29
<b>Low</b>	0.89	3.66	4.32	3.42	<b>Low</b>	0.73	1.99	2.31	1.80
<b>Total</b>	2.31	5.53	15.76	7.03	<b>Total</b>	2.11	1.23	4.63	2.11

Source: FactSet; The Brandes Institute, as of 12/31/06.

As shown in Exhibit 3, performance over the entire 3-year period affirmed that high-OAS remained a valid indicator of future falling knife bond outperformance. This result was robust regardless of prior equity performance.

Three-year annualized outperformance was highest for high OAS bonds at 8.09%, 4.92% for mid-OAS bonds, and 2.78% for low-OAS bonds. Also note the three highest-performing segments of bonds all resided in the high-OAS group. Finally, although prior equity performance was found to be indicative of future falling knife bond returns in the 3-month and Year 1 periods, it did not persist into Year 2. From Year 2 onward, equity performance was found to have been a valid contrarian indicator of subsequent falling knife bond performance. As a result, over the 3-year annualized period equity returns produced little differentiation among future bond performance. Note the disparity in total outperformance, segmented by OAS group, which ranges from 8.09% for the high OAS bonds to

<sup>8</sup> In future references, we refer to subsequent, consecutive 12-month periods after an issue joins the falling knife universe as “Year 1,” “Year 2,” and/or “Year 3.”

<sup>9</sup> To be clear, the *rows* labeled “Total” in each table refer to all bonds in the falling knife universe segmented by prior equity returns. The *columns* labeled “Total” refer to all bonds segmented by OAS group. For example, the average relative Year 2 return for all mid-level OAS bonds, regardless of prior 12-month related equity returns, was 6.48% vs. comparable Treasuries. The average relative Year 3 return for all bonds with low prior 12-month equity returns, regardless of OAS level, was 4.63% vs. comparable Treasuries. The average relative Year 2 return for *all* fixed income falling knife bonds in our universe was 7.03% vs. comparable Treasuries (the intersection of the “Total” column and row).

2.78% for low OAS bonds. Total outperformance, segmented by prior equity returns, was between zero and 0.44%. It was highest, at 5.55%, among falling knife bonds with low prior 12-month equity returns and lowest, at 5.11%, among bonds with mid-level prior 12-month equity returns.

**Exhibit 3: Average Relative Performance for FIFK, 3-Year Annualized, Post Fall, 1990 - 2006**

3-Year Annualized	Prior 12-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	8.17	7.48	10.11	8.09
Mid	5.25	4.76	4.77	4.92
Low	1.71	3.04	2.89	2.78
Total	5.19	5.11	5.55	5.23

Source: FactSet; The Brandes Institute, as of 12/31/06

We recognize these results were drawn from a universe of falling knife bonds generated largely in certain years following specific macroeconomic or credit-based events. In seeking to minimize influence of specific years and to develop a measurement basis more comparable to Lehman Brothers, we made a number of methodological adjustments. These adjustments focused on more appropriately measuring spread movement and equity and bond returns. The modifications and results are described in greater detail in the Appendix. Ultimately, these alterations produced findings similar to the results described above.

In seeking to ensure that multiple debt securities from the same issuer didn't bias results, we created a universe of "proxy" bonds from the 1,497 original knives. For each issuer, for each date, a single debt security was selected to represent that specific issuer-event: one bond per falling knife event per issuer. This resulted in a universe of 769 proxy bond issuer events, representing the issuer-specific events from 1990-2005.<sup>10</sup>

Performance results shown in Exhibit 4 (and thereafter) incorporate methodological adjustments described in Exhibits A-1 and A-2 in the Appendix, including adjustments for the issuer's OAS net of the overall credit market spread, the issuer's equity return net of the comparable return for the Russell 3000 Index,<sup>11</sup> and the issuer's bond return net of a maturity-matched credit index.<sup>12</sup> See the [Appendix](#) (beginning on page 22) for details. Please note all subsequent research in this paper uses this proxy universe and results are measured against a maturity-matched credit index, unless otherwise noted.

Once again, the results remained consistent with earlier findings. Observe the reversal in Year 2 was not only present, but prominent in these results. We present the full results for the proxy falling knife bond data set in Exhibit 4.

<sup>10</sup> Proxy falling knife bonds were evaluated by examining the duration, OAS, credit rating agency coverage, and maturity date for all falling knife bonds from an issuer on a specific date, and selecting the bond believed to be most representative of the issuer's debt securities.

<sup>11</sup> We believe the Russell 3000 Index is fairly representative of the broad U.S. equity market and capitalization range represented by issuers in the falling knife universe.

<sup>12</sup> Performance of falling knife issues was compared to the appropriate maturity breakouts of Citigroup's BIG Index. The series separates issues in the BIG Index with maturities of 1-3, 3-7, 7-10, and over 10 years.

**Exhibit 4: Average Performance for Falling Knife Bonds Using “Proxy” Bonds,  
Relative to Maturity-Matched Credit Index, 1990 - 2006**

3-Month	Prior 3-Month Equity Performance				Year 1	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total	OAS Group	High	Mid	Low	Total
<b>High</b>	3.60	1.98	(3.02)	1.34	<b>High</b>	9.61	12.00	2.04	9.54
<b>Mid</b>	2.27	(0.43)	(2.33)	(0.25)	<b>Mid</b>	4.70	4.88	(2.63)	3.33
<b>Low</b>	0.01	(0.22)	(1.78)	(0.49)	<b>Low</b>	1.51	1.12	(2.43)	0.46
<b>Total</b>	1.95	0.42	(2.36)	0.18	<b>Total</b>	5.25	5.92	(1.06)	4.37

Year 2	Prior 12-Month Equity Performance				Year 3	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total	OAS Group	High	Mid	Low	Total
<b>High</b>	3.51	5.54	18.30	7.84	<b>High</b>	2.23	1.62	5.25	2.63
<b>Mid</b>	1.37	3.58	14.94	5.57	<b>Mid</b>	1.91	(0.72)	1.84	0.34
<b>Low</b>	0.57	0.84	2.09	1.05	<b>Low</b>	0.09	0.45	1.31	0.57
<b>Total</b>	1.83	3.34	11.91	4.85	<b>Total</b>	1.47	0.39	2.89	1.15

3-Year Annualized	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total
<b>High</b>	6.32	5.37	8.50	6.25
<b>Mid</b>	3.55	2.83	2.71	2.93
<b>Low</b>	1.28	1.06	1.13	1.11
<b>Total</b>	3.98	3.07	4.01	3.45

Source: FactSet; The Brandes Institute, as of 12/31/06

Note that the reversal of performance among falling knife bonds of poor-performing equity in Year 2 was not a recycling of the equity-momentum effect evident in Year 1. For example, the outperformance of HL bonds in Year 2 (18.30%) was not a subsequent result of strong performance delivered by those bonds’ respective equities in Year 1. In seeking to validate that this was not a recycling effect, we isolated the HL bonds from Year 2. The results of this breakout are provided in Exhibit 5. In Exhibit 5, the Year 1 Equity Return Group refers to equity returns of the 52 HL bonds in our study, segmented by related equity returns during the 12 months *after* the falling knife event.

If average relative falling knife bond performance among HL bonds in Year 2 had been driven by “high” returning equities in Year 1, we could have concluded the falling knife bond outperformance was merely a subsequent cycle of the equity-momentum effect. However, Exhibit 5 shows bond outperformance of this HL group was driven by companies with *poor*-performing equities (41.01%), with contributions also from the “mid” equity return category (15.75%).

Thus, FIFK returns in Year 2 reflected a true reversal from earlier periods and the point at which strong preceding equity performance no longer translated into falling knife bond outperformance. In fact, from that point forward, we found that prior equity performance became a contrarian indicator of FIFK performance. Identical analysis we conducted of bond performance among ML and LL bonds in Year 2 further confirmed the strong returns exhibited by falling-knife bonds of poor-performing equities (at all OAS levels) was not a recycling effect, but a true performance reversal.

**Exhibit 5: Average Relative Performance for HL Bonds Using “Proxy” Bonds, Post-Fall, 1990 - 2006**

Year 1 Equity Return Group	# of Issues	Average Relative Bond Performance		Average Relative Equity Performance	
		Year 1	Year 2	Year 1	Year 2
High	22	14.44	6.86	84.72	20.53
Mid	12	2.63	15.75	(5.10)	42.63
Low	18	(18.60)	41.01	(72.57)	44.46
<b>Total</b>	52	2.04	18.30	15.92	33.74

Source: FactSet; The Brandes Institute, as of 12/31/06

We also wanted to determine if high OAS bonds that showed strong relative performance in the initial 3-month period sustained the rally over the subsequent 9-month period (or a total of one year from the initial falling knife event). In essence, was there a momentum effect for rallying falling knife bonds?

Exhibit 6 reveals that a majority of bonds with absolute and/or relative outperformance of 10% or greater in the initial 3-month period not only sustained this level of performance, but actually widened the margin of outperformance over the entire 12-month period. Among HH bonds, 14 of 18 issues with absolute performance of 10% or greater in the initial 3-months post-fall doubled this cumulative margin (i.e. performance of 20% or greater) over the entire 12-month period. In the HL segment, seven of the nine bonds with initial absolute performance of 10% or greater exceeded 20% by the end of the first year after the falling knife event. Momentum tended to dissipate by the end of the Year 2 period. While the sample set was small, these results suggest a strong momentum effect from falling knife bonds with high OAS levels.

Conversely, we noted that a majority of bonds with negative absolute returns during the first three months “recovered” during the subsequent nine months to generate positive returns for the full Year 1 period. Concurrently, a number of bonds that underperformed during the same initial period rallied in the subsequent nine months to outperform by the end of the Year 1 period.

These “recoveries,” noted in the right columns of Exhibit 6, were especially evident within the HH segment.

This suggests that investors who purchased or owned falling knife bonds, yet panicked and sold such bonds in the short term upon further declines may have missed potentially dramatic rebounds in performance.

**Exhibit 6: Incidence of Momentum and Recovery Among  
HH and HL Falling Knife Bonds, 1990 - 2006**

	Momentum			Recovery	
Subsequent Absolute Performance	3-Month >10%	Year 1 >20%	Year 2 >10%	3-Month <0%	Year 1 >0%
High OAS/ High Return (HH)	18	14	6	10	8
High OAS/ Low Return (HL)	9	7	4	25	16
Subsequent Relative Performance	3-Month >10%	Year 1 >20%	Year 2	3-Month	Year 1
High OAS/ High Return (HH)	12	6	9	14	11
High OAS/ Low Return (HL)	7	4	5	30	17

Source: FactSet; The Brandes Institute, as of 12/31/06

Thus far in this paper, we have summarized Lehman Brothers' approach for quantifying the relationship of issuer-specific equity performance and bond returns. We adjusted and applied the Lehman Brothers methodology to our universe of falling knives and found:

- Consistent with the Lehman Brothers results, FIFK with high prior equity returns delivered the greatest outperformance over 3- and 12-month periods following their fall.
- We noted a reversal in this pattern in Year 2.
- Due to offsetting effects in Year 1 and Year 2, annualized returns over a full 3-year period based on prior equity returns did not reveal meaningful patterns.
- However, across all periods, falling knife bonds with the highest OAS levels delivered the greatest outperformance.

Next, we investigated the *strength* of the interrelationship between bond and equity performance within the falling knife universe.

### III. Interrelation of Companies' Bond and Equity Returns

Our research also showed that performance for FIFK equities was highly volatile, and the range of potential returns varied considerably. Given these results, we conclude our study by evaluating the most appropriate investment strategies in seeking to capitalize upon FIFK as well as their equity peers, providing evidence that an area of the market typically perceived by investors to be shrouded in risk may in fact yield opportunity for the astute and disciplined investor.

Before examining investment strategies, we summarize our results:

- Cross-sectional regression analysis confirmed a notable increase in the interrelationship of an issuer's equity and debt securities after a falling knife event.
- Coefficient, r-squared, and t-statistic (see Endnotes i, ii, iii) measures between FIFK and their equity counterparts increased materially from pre- to post-falling knife event.
- High OAS FIFK demonstrated a greater degree of conjoined movement with their equity counterparts vs. low OAS FIFK, but these results varied across sectors.
- FIFK at high OAS levels were also effective indicators of future outperformance by their equity complement (relative to the Russell 3000 Index).

### ***The Bond/Equity Relationship after the Falling Knife Event***

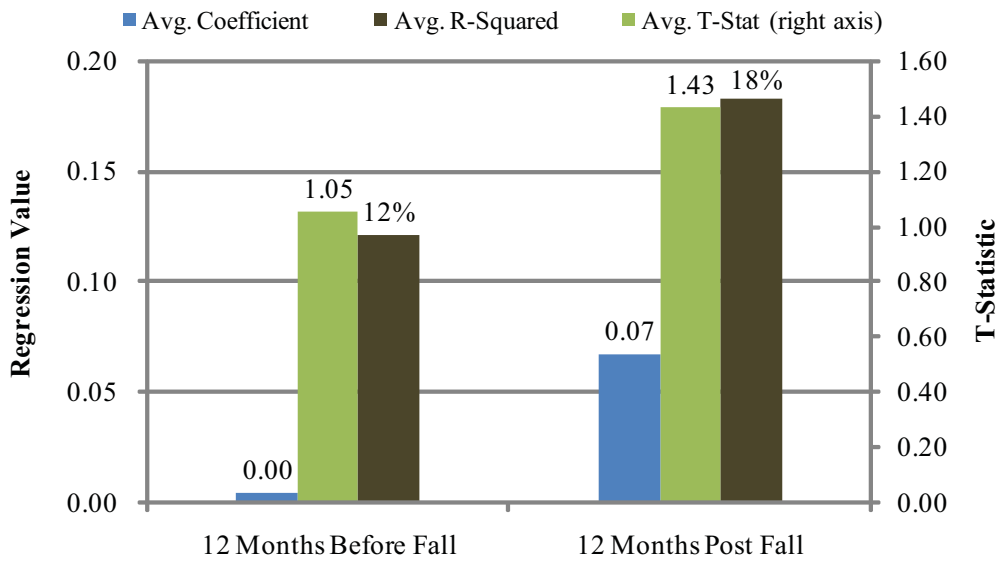
First, we sought to determine whether the relationship between FIFK and their equity counterparts weakened or strengthened in the period surrounding a falling knife event. Our hypothesis was that a rapid spread widening of the debt issue would draw both equity and bond investors toward company-specific information, perhaps concurrent with a decline in the stock price. As a result, both securities might tend to experience similar price fluctuations, or at least move in a similar direction when confronted with a falling knife scenario. Cross-sectional regression analysis of the falling knife bond universe verified that, in aggregate, the relationship between bond and equity price movements of the same issuer strengthened after the onset of a falling knife event.

As shown in Exhibit 7-A, the r-squared based on absolute bond and equity returns 12 months prior to the falling knife event was 12%, meaning 12% of the bond returns could be explained by changes in the equity price. To put this figure into context, from 1980 to 2006 the average r-squared between the S&P 500 Index and the BIG Index was 7%. Between 1990 and 2006, the period under study, the average r-squared between these two indices declined to 5%.

Thus, 12% explanatory power was actually fairly high – nearly double the long-term average r-squared of the S&P 500 Index and the BIG Index. (Note that in Exhibit 7-B, relative performance generates comparable conclusions, equities being measured against the Russell 3000 Index; bonds measured against the BIG Index.)

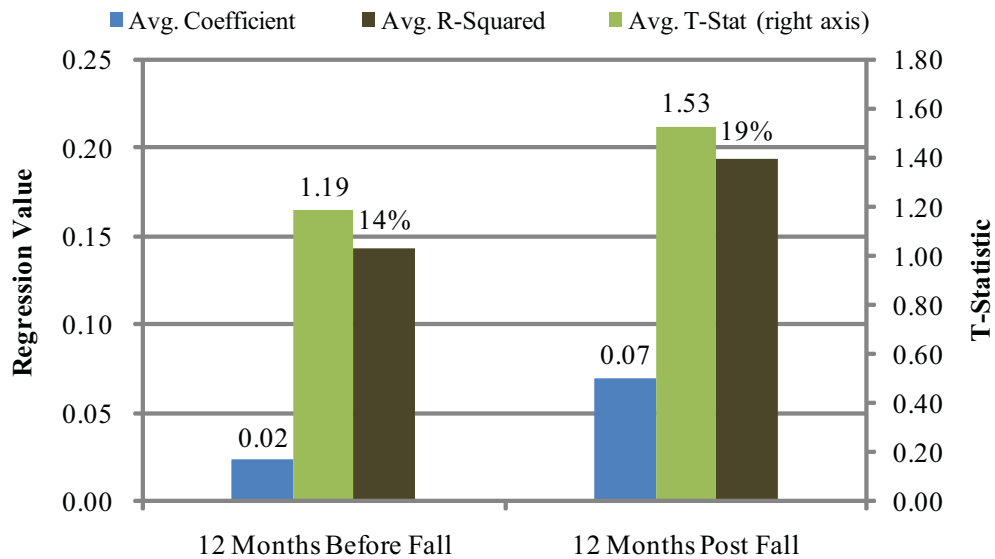
More importantly, Exhibit 7-A points to a strengthening in these securities' average coefficient, r-squared, and t-stat measures in the 12 months *after* the falling knife event. To continue the observation above, the 12% r-squared prior to the event jumped to 18% after the bond's 3-month spread widening. The magnitude of this post-event shift was apparent in regression coefficients and t-statistics based on absolute bond and equity performance or performance relative to their respective benchmarks. While we note these regression values by themselves are not statistically significant (particularly t-stats), we do find significance in the *change* in these values post-falling knife events. This data lends support to the notion that falling knife events may bring similar issuer-specific concerns to the forefront for investors of both security types.

**Exhibit 7-A: FIFK and Equity Cross-Sectional Regression Analysis,  
Based on Absolute Performance, 1990 - 2006**



Source: BIG Index; Russell 3000 Index; FactSet; The Brandes Institute, as of 12/31/06

**Exhibit 7-B: FIFK and Equity Cross-Sectional Regression Analysis,  
Based on Relative Performance, 1990 - 2006**



Source: BIG Index; Russell 3000 Index; FactSet; The Brandes Institute as of 12/31/06

A natural extension was to consider the relationship between fixed income falling knife returns and the return patterns of their corresponding *equities* across sectors and through time. While the episodic nature of the FIFK universe did not allow for a conclusive time series analysis, the relationship between bond and equity returns appeared to strengthen regardless of the calendar year in which the event took place. As shown in Exhibit 8, results varied in our sector-based analysis. However, a general strengthening in return co-movements was evident post-fall. For example, in the information technology and consumer staples sectors, we found meaningfully stronger regression statistics 12 months post-fall, in contrast to the statistics 12 months pre-fall. This contrasts to the relatively insignificant strengthening of the materials sector.

### Exhibit 8: FIFK Sector-Based Bond and Equity Regression Analysis, 1990 - 2006

Sector	# of Securities	12-Month Pre-Fall Coefficient	12-Month Pre-Fall R-Squared	12-Month Pre-Fall T-Statistic	12-Month Post-Fall Coefficient	12-Month Post-Fall R-Squared	12-Month Post-Fall T-Statistic
Consumer Discretionary	131	0.01	0.16	1.29	0.09	0.22	1.63
Consumer Staples	31	(0.01)	0.08	0.79	0.10	0.22	1.56
Energy	40	0.03	0.09	0.93	0.06	0.20	1.49
Financials	106	(0.00)	0.11	0.98	0.04	0.15	1.24
Health Care	23	(0.00)	0.12	1.04	0.08	0.14	1.18
Industrials	62	0.00	0.11	0.95	0.04	0.21	1.56
Information Technology	22	0.02	0.12	1.06	0.12	0.22	1.66
Materials	65	(0.01)	0.10	0.88	0.02	0.10	0.95
Telecommunication Services	57	0.03	0.13	1.13	0.07	0.19	1.60
Utilities	66	(0.01)	0.12	1.05	0.09	0.18	1.42
<b>Total</b>	<b>603</b>	<b>0.00</b>	<b>0.12</b>	<b>1.05</b>	<b>0.07</b>	<b>0.18</b>	<b>1.43</b>

Source: FactSet; The Brandes Institute as of 12/31/06

Extending this analysis to consider issuers of various OAS levels showed the degree of strengthening in the equity-bond relationship was greatest for FIFK at high OAS levels. As illustrated in Exhibit 9, regression statistics increased most materially from pre- to post-falling knife event for bonds at high OAS levels.

A closer examination of the high OAS group revealed that HL bonds demonstrated exceptional co-movement with their corresponding equities post-falling knife event. For instance, this group's average r-squared increased from 13% pre-fall to 34% post-falling knife event. Relative to bonds with middle- and higher-returning related equities, stronger regression statistics existed for bonds in the *low* equity returns group at each OAS level as well (i.e., ML and LL) illustrating that, regardless of spread, FIFK had the greatest co-movement with equities when their corresponding stocks struggled in the 12 months prior to the fall. Note that the statistics referenced in this paragraph are not included in any exhibit in this paper.

### Exhibit 9: FIFK Bond and Equity Regression Analysis by OAS Group 1990 - 2006

OAS Group	12-Month Pre-Fall Coefficient	12-Month Pre-Fall R-Squared	12-Month Pre-Fall T-Statistic	12-Month Post-Fall Coefficient	12-Month Post-Fall R-Squared	12-Month Post-Fall T-Statistic
High	0.02	0.14	1.14	0.10	0.22	1.66
Mid	0.01	0.11	0.98	0.06	0.19	1.44
Low	(0.02)	0.11	1.01	0.03	0.14	1.17

Source: FactSet; The Brandes Institute as of 12/31/06

Looking at constituents of our entire fixed income falling knife universe and their equity counterparts, our research revealed that a fixed income falling knife issuer's debt tended to outperform more consistently than the equity across various, post-fall periods. Although there are inherent differences in the return volatility of equity and debt of falling knife issuers, Exhibit 10 illustrates that debt actually was more likely to outperform than was the case for the same issuer's equity. For example, over the 3-year annualized period, debt outperformed 87% of the time (50% plus 37%) whereas equity outperformed 54% of the time. Across all periods post-fall, debt was more likely to outperform than was its corresponding equity.

### Exhibit 10: FIFK Bond and Equity Relative Returns Analysis for Post-Fall Periods, 1990 - 2006

	3-Month	Year 1	Year 2	Year 3	3-Year Annualized
Debt & Stock Outperform	34%	43%	43%	43%	50%
Debt Out-/Stock Underperform	24%	29%	27%	23%	37%
Debt Under-/Stock Outperform	14%	8%	14%	17%	4%
Debt & Stock Underperform	27%	19%	17%	18%	8%

Source: BIG Index; Russell 3000 Index, FactSet; The Brandes Institute as of 12/31/06

Given our results in section II of this paper where we noted high OAS as being a worthy indicator of future FIFK outperformance, irrespective of prior equity performance or time period measured, we were curious if this could be extended to the issuer's equity. Could a fixed income falling knife's OAS portend future *stock* performance of the same issuer?

As shown in Exhibit 11, fixed income falling knife bonds with high OAS tended to show higher returns relative to the BIG Index vs. low OAS groups. While it was already shown that FIFK with high OAS tended to deliver better subsequent returns vs. low OAS bonds, no matter the measurement period, the same was found to be true for the equity.

Regardless of prior equity returns, FIFK at high OAS levels yielded *equity* counterparts that outperformed, as seen in the top right total column in each time period in Exhibit 11. For instance, over the 3-year annualized period

after the falling knife event, the equity of issuers at high OAS levels outperformed on average 6.33% compared to 2.61% for issuers at low OAS levels. This relationship of better equity performance at higher OAS levels persisted throughout the measurement periods post-fall.

However, when looking at post-fall equity returns of FIFK across prior equity performance groups, returns tended to have a mixed distribution pattern, as seen in Exhibit 11. With debt, returns were higher among high-performing equity groups in early periods (3-month and Year 1), but reversed rather dramatically in Year 2. Using the same grouping convention, equity performance across prior equity return segments was found to be more random than the patterns found among bonds for a given OAS level. In gauging future equity performance of FIFK, prior equity performance provided little indication.

### Exhibit 11: FIFK Bond and Equity Relative Returns Analysis by OAS Level, 1990 - 2006

#### Bond Returns (Rel. to BIG Index)

3-Month	Prior 3-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	3.60	1.98	(3.02)	1.34
Mid	2.27	(0.43)	(2.33)	(0.25)
Low	0.01	(0.22)	(1.78)	(0.49)
Total	1.95	0.42	(2.36)	0.18

#### Equity Returns (Rel. to Russell 3000 Index)

3-Month	Prior 3-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	(0.95)	3.77	(8.44)	0.41
Mid	(2.26)	0.02	4.44	0.42
Low	0.03	(3.56)	(1.33)	(2.38)
Total	(1.06)	0.02	(1.68)	(0.54)

#### Bond Returns (Rel. to BIG Index)

Year 1	Prior 12-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	9.61	12.00	2.04	9.54
Mid	4.70	4.88	(2.63)	3.33
Low	1.51	1.12	(2.43)	0.46
Total	5.25	5.92	(1.06)	4.37

#### Equity Returns (Rel. to Russell 3000 Index)

Year 1	Prior 12-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	(0.81)	8.16	15.92	7.92
Mid	(1.32)	9.59	2.09	5.97
Low	2.35	4.21	(0.98)	2.79
Total	0.09	7.31	5.49	5.53

#### Bond Returns (Rel. to BIG Index)

Year 2	Prior 12-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	3.51	5.54	18.30	7.84
Mid	1.37	3.58	14.94	5.57
Low	0.57	0.84	2.09	1.05
Total	1.83	3.34	11.91	4.85

#### Equity Returns (Rel. to Russell 3000 Index)

Year 2	Prior 12-Month Equity Performance			
	High	Mid	Low	Total
OAS Group				
High	14.75	6.29	33.74	13.73
Mid	6.11	5.63	27.90	10.45
Low	5.87	5.76	19.05	8.46
Total	8.96	5.90	27.15	10.92

### Bond Returns (Rel. to BIG Index)

Year 3	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total
High	2.23	1.62	5.25	2.63
Mid	1.91	(0.72)	1.84	0.34
Low	0.09	0.45	1.31	0.57
Total	1.47	0.39	2.89	1.15

### Equity Returns (Rel. to Russell 3000 Index)

Year 3	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total
High	19.72	5.61	35.56	15.23
Mid	22.86	2.99	11.43	8.58
Low	11.60	7.80	10.82	9.06
Total	18.45	5.38	19.80	10.90

### Bond Returns (Rel. to BIG Index)

3-Year Annualized	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total
High	6.32	5.37	8.50	6.25
Mid	3.55	2.83	2.71	2.93
Low	1.28	1.06	1.13	1.11
Total	3.98	3.07	4.01	3.45

### Equity Returns (Rel. to Russell 3000 Index)

3-Year Annualized	Prior 12-Month Equity Performance			
OAS Group	High	Mid	Low	Total
High	12.14	2.93	9.92	6.33
Mid	4.65	2.78	3.35	3.25
Low	7.09	1.91	0.90	2.61
Total	7.96	2.55	4.91	4.06

Source: BIG Index; Russell 3000 Index, FactSet; The Brandes Institute as of 12/31/06

To conclude this section, we reiterate that within our falling knife bond universe, prior related-equity performance was not found to be a useful indicator of subsequent bond performance. However, analysis of which bonds had high OAS relative to others with the same rating might indeed be valuable. Falling knife bond spreads were found to be an indicator of subsequent equity returns. Specifically, the *equities* of issuers with higher OAS bonds tended to outperform over the 3-year period after the *bond's* initial fall.

However, in general, the *related-equity* returns of FIFK issuers prior to the falling knife event were not found to be a good indicator of equity returns *after* that event. These findings strengthen our conclusion regarding the importance of analyzing the OAS of falling knife bonds. Those with a high OAS for their rating were associated not only with better subsequent bond returns, but also better subsequent equity returns.

### *Strategies for Investing in Falling Knives*

Given the empirical findings for FIFK performance and their equity counterparts, we sought to determine the practical extension of these results for investors within this universe. As a practitioner, would it be most advantageous to pursue investments in FIFK, their equity counterparts, or some combination of the two? We explored three potential investment strategies to determine their merit: long equity, long debt/short equity, and long debt.

#### *Long Equity*

While returns for the equity counterparts of high OAS FIFK can be quite attractive, the distribution of potential returns was found to be exceptionally wide. For example, during Year 1, equities of high OAS FIFK had an

average total return of 14.87%. However, the average volatility<sup>13</sup> during this period was 60.63%. More importantly, the standard deviation of potential outcomes was 59.34%, producing returns of +74.21% and -44.47% one standard deviation from the mean.

Simply put, some equities returned in excess of 74% while other equities fell 45%. Although increased volatility can be expected for securities within a falling knife universe, this range of outcomes for a 1-year period was exceptionally broad.

The significant volatility and return dispersion among these equities may have tested the conviction of even the most confident investor who purchased these securities during our period of study. Results and standard deviation data can be reviewed in the Appendix. Equity returns of HL bonds were found to be especially volatile. On average, this group experienced volatility of returns of 115.24%, 105.98%, and 66.88% over the subsequent 3-month, Year 1, and Year 2 periods respectively. The standard deviation of potential return outcomes from this group was also notably high.

### *Long Debt/Short Equity*

With the goal of decreasing volatility, we tested the effectiveness of a long debt/short equity strategy to potentially capitalize on the downside movements of the equity and relatively strong returns of the corresponding debt. Thus, if an investor sized positions in each of the falling knife companies' securities appropriately, would the investor have fared more favorably than by owning only the bonds or the related equities exclusively?

Our results showed that the benefits of reduced volatility through partially offsetting positions were greatly outweighed by the reduction in return, even when appropriately sized, as demonstrated in Exhibit A-4 in the Appendix. Our findings suggest that being short any amount of equity was not particularly effective. Thus, a long debt/short equity strategy does not appear to be a viable approach when applied on a broad basis to a universe of FIFK.

### *Long Debt*

Last in our comparison was a long-only debt strategy. Performance results confirmed that being long debt in a fixed income falling knife universe captured the return potential outlined in previous sections, minus the severe levels of volatility experienced by being long the equities.

An investor employing a long-debt strategy would likely have obtained the bulk of falling knife outperformance vs. comparable duration Treasuries or a maturity-matched credit index within the first two years after a falling-knife event, with Year 3 feasibly continuing to yield relative outperformance. Results of the advantages of a long-debt strategy can be seen in the returns, volatility, and standard deviation of possible outcomes illustrated in Exhibit A-5 of the Appendix. For instance, high-OAS debt returned 18.57% in Year 1 with concurrent volatility of 16.72% and a standard deviation of potential outcomes of 19.54%. These long debt results compared favorably by each metric (returns, volatility, and standard deviation of possible outcomes) to the same performance measures of the average equity security in a long equity strategy (14.87%, 60.63%, and 59.34%, respectively) and

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<sup>13</sup> Volatility was defined as the monthly standard deviation of total returns. The standard deviation of potential outcomes measured cross-sectional variation in returns, or the extent to which an issuer's security return differed from the group's average. Higher values indicate there was greater variability in returns across issuers for that group.

the average results for a long debt/short equity (10.30%, 17.04%, and 13.07%, respectively) strategy during the same period. This favorable comparison for a long debt approach relative to the other two strategies described in this paper extended to periods beyond Year 1, as well.

In all, the HH and HL groups of FIFK offered the most compelling opportunities, based on likelihood of success and level of excess returns. We note, however, that the existence of outsized returns amid varied outcomes of HH bonds, and especially within the HL segment, advocates for an active and astute security selection process in seeking to increase return. Furthermore, in the context of managing a corporate bond portfolio, returns generated by low fixed income falling knife issues with low OAS should not be overlooked, as they too can be attractive investment opportunities.

## Conclusion

In this paper, we sought to combine elements of previous studies of equity and FIFK and test whether equity returns prior to a fixed income falling knife bond's fall provided any indication of subsequent falling knife bond returns at the issuer-specific level. Adapting the ESPRI methodology developed by Lehman Brothers, we applied it to our FIFK universe.

Our results confirmed that falling knife bonds linked to high-performing equities prior to their fall notably outperformed bonds whose issuing companies generated less compelling prior equity returns over 3- and 12-month periods. These results were especially robust for the high- and mid-level OAS bonds.

We also extended the time frame for measuring future bond performance to include the two subsequent 12-month periods for a 3-year evaluation. In doing so, we found the extended results reflected a significant reversal, or shifting of relative outperformance. Bonds with *low* prior equity performance generated better results than bonds with *high* prior equity performance in periods past 12 months.

Annualized performance over the entire 3-year period affirmed that high OAS remained a valid indicator of future falling knife bond performance. This result was robust regardless of prior equity performance. When compared with a maturity-matched credit index (rather than duration-matched Treasuries), results were similar. They also were similar using “proxy” falling knife bonds. (Proxy bonds reduced the influence on results from multiple debt securities from the same issuer.)

Using cross-sectional regression analysis, our research confirmed a notable increase in the coefficient, r-squared, and t-statistic measures between FIFK and their equity counterparts, both pre- and post-falling knife events, relative to their respective benchmarks. This increase indicated the relationship between bond and equity of the same issuer on average strengthened after the advent of a fixed income falling knife event.

We also discovered that high OAS FIFK demonstrated a greater degree of conjoined movement with their equity counterparts vs. FIFK with low OAS, but found that these results varied across sectors. FIFK that exhibited elevated OAS levels also were found to be effective indicators of future outperformance for their equity complement. However, our research illustrated that performance for *equities* of the same issuer as a fixed income falling knife were highly volatile, and the range of potential outcomes varied considerably.

We believe the greatest benefits of buying falling-knife bonds accrue to those investors who have the best issue-selection skills, and we believe these investors can now add “high OAS” as an additional tool to their work.

In addition, based on our conclusions in this research, we looked at three different approaches for investing in the bonds and equities of FIFK issuers and concluded that a “long debt” strategy offered a more compelling risk-reward trade-off than a “long equity” or “long debt/short equity” approach.

Market conditions over the past five years generally have not generated many new knives. As noted in our previous research, a significant number of falling knife securities tend to be created during event-driven market downturns (1998 and 2002 for bonds, for example). Such downturns do not happen frequently. As such, these events and the corresponding large number of falling knives they may generate can heavily influence overall results. In addition, the availability of historical, issuer-specific debt information is relatively short (15 years).

Given the limitations of the data and the typically episodic creation of falling knives, we plan to re-visit the relationship between falling knife stock and bond prices after the next event-specific market decline with the goal of better assessing any relationship between the two.

Until then, we note that select falling knife securities continue to be created. And this creates opportunities for astute, bottom-up investors who can identify opportunity where many others may see only risk.

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Citigroup U.S. Broad Investment Grade Corporate Bond Index: The Citigroup U.S. Broad Investment Grade (“BIG”) Corporate Bond Index (formerly the Salomon Smith Barney BIG Index) is an unmanaged index that tracks the performance of bonds issued in the U.S. investment-grade bond market and as such does not include U.S. Treasury, government-sponsored, mortgage, and asset-backed securities. It includes the reinvestment of income but does not reflect fees, brokerage commissions, withholding taxes, or other expenses of investing.

The Lehman Brothers U.S. Corporate Index is an unmanaged index that tracks U.S. dollar-denominated, investment-grade, fixed-rate, taxable securities sold by industrial, utility and financial issuers. It includes publicly issued U.S. corporate and foreign debentures and secured notes that meet specified maturity, liquidity, and quality requirements. It includes the reinvestment of income but does not reflect fees, brokerage commissions, withholding taxes, or other expenses of investing.

Russell 3000 Index: The Russell 3000 Index is an unmanaged index that measures the performance of 3000 U.S. companies. The Index combines the Russell 1000 Index, a measure of larger-cap companies, and the Russell 2000 Index, a measure of smaller-cap companies. The Russell 3000 Index includes the reinvestment of dividends and income, but does not reflect fees, brokerage commissions, withholding taxes, or other expenses of investing.

S&P 500 Index: The S&P 500 Index is an unmanaged index that consists of 500 stocks and is designed to form a representative sample of the United States stock market. This index often is used as a benchmark for U.S. equity portfolios and includes dividends and distributions, but does not reflect fees, brokerage commissions, withholding taxes, or other expenses of investing.

#### *Endnotes*

<sup>i</sup>Coefficient: Measures the slope of the “line of best fit” between two related variables. In a simple linear regression, the coefficient evaluates the linear relationship between an independent variable (e.g. X) and the dependent variable (e.g. Y). As a slope estimate, it gauges the change in the dependent per unit of change in an independent variable. It is often denoted as b or  $\beta$ .

<sup>ii</sup>R-squared: Measures the proportion of variability in the dependent variable captured by the statistical model. It is commonly referred to the model's "goodness of fit" or the coefficient of determination. Computationally, r-squared is equal to one minus the sum of the squared errors divided by the total sum of squares. Its values range from 0 to 1, the closer to 1 the better the "goodness of fit."

<sup>iii</sup>T-statistic: After an estimation of a coefficient, computationally the t-statistic for that coefficient is the ratio of the coefficient to its standard error. That can be tested against a t-distribution to determine how probable it is that the true value of the coefficient is really zero (or another hypothesized value). Critical values for t-statistics will depend on the degrees of freedom (based on number of observations); higher t-statistics indicate greater probability the coefficient's true value is statistically different than zero.

## Appendix

In seeking to decrease the influence of falling knife generation during specific years and to develop a measurement basis more comparable to Lehman Brothers', we made the following adjustments:

- We created net OAS groupings (high, mid, and low) relative to the overall credit market's OAS, as measured by the BIG Index. This allowed us to mitigate the effects episodic bond market volatility would have on placing bonds in OAS groups. (For example, without this provision 1998 and 2002 would have dominated the high-OAS group because of overall widening of credit.)
- We calculated equity performance *relative* to the Russell 3000 Index, which we believe is fairly representative of the broad U.S. equity market and capitalization range represented by issuers in the falling knife universe. This adjustment enabled us to control for episodic equity market volatility. (For example, without this provision falling equity markets of 2001 and 2002 would have unduly represented the low prior equity performance groups.)

After making these adjustments to the falling knife universe, we found the results were comparable to our initial findings. The adjusted results for 3-month, Year 1, Year 2, Year 3, and annualized over the full 3-year period are shown in Exhibit A-1.

**Exhibit A-1: Average Relative Performance for Falling Knife Bonds,  
Adjusted for Methodological Differences, 1990 - 2006**

3-Month		Prior 3-Month Equity Performance				Year 1		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total	OAS Group	High	Mid	Low	Total	
High		5.43	0.98	(2.29)	1.25	High	13.40	13.11	2.98	11.12	
Mid		2.92	0.45	(2.00)	0.36	Mid	8.77	8.17	0.39	6.33	
Low		1.57	(0.13)	(0.49)	0.17	Low	3.94	4.51	(2.08)	3.46	
Total		3.18	0.43	(1.62)	0.58	Total	8.25	8.45	0.67	6.88	

Year 2		Prior 12-Month Equity Performance				Year 3		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total	OAS Group	High	Mid	Low	Total	
High		6.04	9.37	21.12	11.59	High	3.90	2.73	6.68	4.03	
Mid		2.58	5.14	14.03	7.02	Mid	3.65	(0.93)	1.49	0.76	
Low		2.53	3.29	(1.27)	2.46	Low	2.61	0.91	5.34	1.84	
Total		3.52	5.92	13.06	7.03	Total	3.36	0.83	4.21	2.11	

3-Year Annualized		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total
High		9.50	7.68	8.48	8.27
Mid		5.86	4.59	3.49	4.62
Low		3.22	3.27	2.60	3.16
Total		6.09	4.98	4.98	5.23

Source: FactSet; The Brandes Institute, as of 12/31/06

We also sought to verify that FIFK performance results were not unjustly influenced by the generally lower quality nature of the falling knife universe. To adjust for this factor, we compared the performance of each falling knife bond to a maturity-matched credit index instead of duration-matched Treasuries.

As Exhibit A-2 shows, the results across all segments were consistent with earlier results, indicating even when measured against the overall credit market, the relationship of falling knife returns and prior equity returns remained intact.

**Exhibit A-2: Average Performance for Falling Knife Bonds,  
Relative to Maturity-Matched Credit Index, 1990 - 2006**

3-Month		Prior 3-Month Equity Performance				Year 1		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total	OAS Group	High	Mid	Low	Total	
High		4.33	0.16	(2.52)	0.47	High	9.99	9.76	1.34	8.11	
Mid		1.72	(0.27)	(2.77)	(0.46)	Mid	6.20	4.67	(0.86)	3.63	
Low		0.29	(0.91)	(1.59)	(0.77)	Low	0.72	1.10	(4.59)	0.25	
Total		1.98	(0.35)	(2.33)	(0.27)	Total	5.22	5.04	(1.04)	3.91	

Year 2		Prior 12-Month Equity Performance				Year 3		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total	OAS Group	High	Mid	Low	Total	
High		3.77	7.39	20.42	9.87	High	2.04	1.48	4.27	2.38	
Mid		0.75	3.63	13.99	5.76	Mid	0.87	(2.27)	1.30	(0.57)	
Low		0.62	1.06	(1.20)	0.61	Low	0.80	(0.70)	2.34	0.01	
Total		1.54	3.99	12.80	5.42	Total	1.16	(0.59)	2.62	0.51	

3-Year Annualized		Prior 12-Month Equity Performance			
OAS Group		High	Mid	Low	Total
High		6.77	5.04	7.27	6.01
Mid		3.39	2.26	3.20	2.84
Low		0.98	0.95	1.36	1.03
Total		3.62	2.56	4.18	3.20

Source: FactSet; The Brandes Institute, as of 12/31/06

**Exhibit A-3: Equities Average 3-Month, Year 1, and Year 2 Return,  
Volatility of Returns, and Standard Deviation of Outcomes, 1990 - 2006**

3-Month Return	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	(0.54)	6.01	(12.12)	1.12
<b>Mid OAS</b>	0.88	2.07	7.37	2.86
<b>Low OAS</b>	2.51	(1.67)	2.59	0.04
<b>Total</b>	<b>0.96</b>	<b>2.07</b>	<b>(0.50)</b>	<b>1.34</b>

3-Month Volatility of Returns	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	30.55	41.05	115.24	54.09
<b>Mid OAS</b>	24.22	34.06	50.01	35.40
<b>Low OAS</b>	23.41	32.26	51.31	34.43
<b>Total</b>	<b>26.12</b>	<b>35.79</b>	<b>72.19</b>	<b>41.33</b>

3-Month Standard Deviation of Outcomes	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	25.04	32.01	47.06	34.82
<b>Mid OAS</b>	19.91	22.31	36.05	25.15
<b>Low OAS</b>	18.13	20.07	30.60	22.29
<b>Total</b>	<b>21.10</b>	<b>25.35</b>	<b>38.85</b>	<b>27.80</b>

Year 1 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	0.67	19.42	15.34	14.87
<b>Mid OAS</b>	0.64	17.60	14.36	13.67
<b>Low OAS</b>	11.06	13.86	1.75	10.84
<b>Total</b>	<b>4.17</b>	<b>16.94</b>	<b>10.36</b>	<b>13.11</b>

Year 1 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	33.75	51.65	105.98	59.34
<b>Mid OAS</b>	35.71	41.40	66.88	45.65
<b>Low OAS</b>	30.91	37.32	60.28	40.67
<b>Total</b>	<b>33.44</b>	<b>43.50</b>	<b>78.13</b>	<b>48.66</b>

Year 1 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	35.84	58.71	81.59	60.63
<b>Mid OAS</b>	33.70	49.57	44.29	46.15
<b>Low OAS</b>	37.35	42.68	48.81	43.13
<b>Total</b>	<b>35.77</b>	<b>50.59</b>	<b>60.06</b>	<b>50.39</b>

Year 2 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	24.84	15.76	37.64	22.13
<b>Mid OAS</b>	14.07	16.11	38.85	20.56
<b>Low OAS</b>	8.32	17.09	23.42	16.67
<b>Total</b>	<b>15.81</b>	<b>16.31</b>	<b>33.59</b>	<b>19.83</b>

Year 2 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	33.88	33.48	66.88	40.21
<b>Mid OAS</b>	32.26	31.86	48.61	35.36
<b>Low OAS</b>	29.14	29.27	53.53	33.97
<b>Total</b>	<b>31.77</b>	<b>31.55</b>	<b>56.33</b>	<b>36.53</b>

Year 2 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	34.68	44.20	71.77	50.47
<b>Mid OAS</b>	39.66	41.29	90.04	55.65
<b>Low OAS</b>	35.61	38.52	78.67	48.84
<b>Total</b>	<b>37.07</b>	<b>41.34</b>	<b>80.26</b>	<b>51.73</b>

Year 3 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	35.45	15.35	38.60	24.50
<b>Mid OAS</b>	33.70	11.27	3.95	13.88
<b>Low OAS</b>	22.48	14.98	9.51	15.25
<b>Total</b>	<b>30.91</b>	<b>13.77</b>	<b>17.75</b>	<b>17.77</b>

Year 3 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	25.79	29.95	60.60	35.06
<b>Mid OAS</b>	29.39	24.92	40.51	29.02
<b>Low OAS</b>	23.96	23.08	46.12	27.63
<b>Total</b>	<b>26.38</b>	<b>26.02</b>	<b>49.06</b>	<b>30.61</b>

Year 3 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	45.94	36.12	159.48	84.39
<b>Mid OAS</b>	44.61	33.20	49.04	40.47
<b>Low OAS</b>	32.41	31.59	46.94	35.21
<b>Total</b>	<b>41.80</b>	<b>33.61</b>	<b>102.91</b>	<b>57.60</b>

Source: FactSet; The Brandes Institute as of 12/31/06

**Exhibit A-4: Long Debt/Short Equities Average 3-Month, Year 1, and Year 2 Return, Volatility of Returns, and Standard Deviation of Outcomes, 1990 - 2006**

3-Month Return	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	4.60	1.76	3.00	2.56
<b>Mid OAS</b>	3.16	1.32	(3.00)	0.94
<b>Low OAS</b>	1.20	1.87	(0.85)	1.19
<b>Total</b>	<b>3.00</b>	<b>1.65</b>	<b>(0.36)</b>	<b>1.57</b>

3-Month Volatility of Returns	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	12.26	12.03	36.73	16.36
<b>Mid OAS</b>	8.77	9.62	18.09	11.08
<b>Low OAS</b>	4.86	8.01	10.62	7.89
<b>Total</b>	<b>8.71</b>	<b>9.95</b>	<b>21.39</b>	<b>11.85</b>

3-Month Standard Deviation of Outcomes	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	7.04	7.79	14.11	9.03
<b>Mid OAS</b>	5.58	5.07	11.43	7.00
<b>Low OAS</b>	3.05	4.54	5.20	4.53
<b>Total</b>	<b>5.63</b>	<b>6.00</b>	<b>10.83</b>	<b>7.13</b>

Year 1 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	12.75	10.16	7.98	10.30
<b>Mid OAS</b>	9.25	6.93	0.52	6.19
<b>Low OAS</b>	4.32	4.06	3.46	3.99
<b>Total</b>	<b>8.86</b>	<b>7.08</b>	<b>3.99</b>	<b>6.83</b>

Year 1 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	13.41	14.45	28.41	17.04
<b>Mid OAS</b>	9.77	10.57	18.57	11.98
<b>Low OAS</b>	5.90	8.81	13.06	9.13
<b>Total</b>	<b>9.81</b>	<b>11.35</b>	<b>20.12</b>	<b>12.81</b>

Year 1 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	9.69	13.63	14.25	13.07
<b>Mid OAS</b>	8.28	11.12	13.14	11.37
<b>Low OAS</b>	7.51	8.66	9.18	8.53
<b>Total</b>	<b>9.20</b>	<b>11.58</b>	<b>12.50</b>	<b>11.43</b>

Year 2 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	1.20	4.48	14.03	5.76
<b>Mid OAS</b>	3.57	4.79	12.87	6.15
<b>Low OAS</b>	3.62	2.72	5.93	3.58
<b>Total</b>	<b>2.73</b>	<b>4.03</b>	<b>10.92</b>	<b>5.18</b>

Year 2 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	10.82	10.27	16.27	11.71
<b>Mid OAS</b>	9.73	7.88	14.60	9.64
<b>Low OAS</b>	6.39	6.63	11.75	7.71
<b>Total</b>	<b>9.15</b>	<b>8.28</b>	<b>14.29</b>	<b>9.75</b>

Year 2 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	13.43	23.90	23.68	22.52
<b>Mid OAS</b>	13.29	11.97	25.38	15.96
<b>Low OAS</b>	7.98	7.31	11.74	8.61
<b>Total</b>	<b>11.83</b>	<b>16.19</b>	<b>21.21</b>	<b>16.88</b>

Year 3 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	(5.15)	(0.01)	(1.30)	(1.28)
<b>Mid OAS</b>	0.11	2.25	9.04	3.30
<b>Low OAS</b>	1.60	1.50	8.75	3.02
<b>Total</b>	<b>(1.29)</b>	<b>1.28</b>	<b>5.27</b>	<b>1.68</b>

Year 3 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	8.28	9.73	15.50	10.69
<b>Mid OAS</b>	8.11	6.38	12.85	8.12
<b>Low OAS</b>	6.91	6.07	10.45	7.18
<b>Total</b>	<b>7.87</b>	<b>7.42</b>	<b>13.08</b>	<b>8.75</b>

Year 3 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	21.47	10.80	52.55	27.91
<b>Mid OAS</b>	11.50	7.67	9.91	9.41
<b>Low OAS</b>	8.19	7.27	9.92	8.51
<b>Total</b>	<b>15.23</b>	<b>8.72</b>	<b>32.50</b>	<b>17.84</b>

Source: FactSet; The Brandes Institute as of 12/31/06

**Exhibit A-5: Falling Knife Bonds Average 3-Month, Year 1, and Year 2 Return, Volatility of Returns, and Standard Deviation of Outcomes, 1990 - 2006**

3-Month Return	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	6.11	4.90	0.56	4.31
<b>Mid OAS</b>	4.17	2.09	0.14	2.13
<b>Low OAS</b>	1.93	2.29	0.24	1.80
<b>Total</b>	<b>4.06</b>	<b>3.06</b>	<b>0.31</b>	<b>2.72</b>

3-Month Volatility of Returns	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	15.12	15.01	33.16	18.79
<b>Mid OAS</b>	8.81	10.69	20.09	12.24
<b>Low OAS</b>	3.50	6.19	10.41	6.51
<b>Total</b>	<b>9.18</b>	<b>10.60</b>	<b>21.22</b>	<b>12.50</b>

3-Month Standard Deviation of Outcomes	Prior 3-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	8.37	9.85	13.29	10.47
<b>Mid OAS</b>	5.58	5.95	10.82	7.18
<b>Low OAS</b>	1.76	4.17	6.68	4.54
<b>Total</b>	<b>6.08</b>	<b>7.11</b>	<b>10.44</b>	<b>7.80</b>

Year 1 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	18.97	20.49	12.36	18.57
<b>Mid OAS</b>	11.79	13.72	3.73	11.33
<b>Low OAS</b>	8.43	8.81	4.52	7.85
<b>Total</b>	<b>13.03</b>	<b>14.26</b>	<b>6.77</b>	<b>12.50</b>

Year 1 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	15.03	16.54	32.33	19.54
<b>Mid OAS</b>	10.54	11.53	19.59	13.04
<b>Low OAS</b>	5.30	7.78	12.15	8.20
<b>Total</b>	<b>10.29</b>	<b>11.95</b>	<b>21.41</b>	<b>13.60</b>

Year 1 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	12.33	14.31	24.43	16.72
<b>Mid OAS</b>	8.01	11.17	15.10	12.16
<b>Low OAS</b>	5.90	7.31	10.33	7.95
<b>Total</b>	<b>10.08</b>	<b>12.20</b>	<b>17.74</b>	<b>13.46</b>

Year 2 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	11.19	11.12	23.95	13.84
<b>Mid OAS</b>	9.30	9.21	21.19	11.76
<b>Low OAS</b>	6.07	6.91	8.82	7.14
<b>Total</b>	<b>8.87</b>	<b>9.10</b>	<b>18.11</b>	<b>10.94</b>

Year 2 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	10.95	9.75	16.16	11.51
<b>Mid OAS</b>	9.51	7.83	13.15	9.34
<b>Low OAS</b>	4.84	6.10	11.03	6.95
<b>Total</b>	<b>8.64</b>	<b>7.87</b>	<b>13.54</b>	<b>9.30</b>

Year 2 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	15.28	27.95	35.69	28.32
<b>Mid OAS</b>	14.03	11.02	30.21	17.97
<b>Low OAS</b>	6.10	6.79	16.34	9.49
<b>Total</b>	<b>12.60</b>	<b>17.88</b>	<b>29.28</b>	<b>20.36</b>

Year 3 Return	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	7.08	6.62	13.28	8.35
<b>Mid OAS</b>	8.82	6.78	12.05	8.34
<b>Low OAS</b>	6.45	5.68	10.92	6.90
<b>Total</b>	<b>7.54</b>	<b>6.37</b>	<b>12.16</b>	<b>7.89</b>

Year 3 Volatility of Returns	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	6.85	8.50	8.84	8.24
<b>Mid OAS</b>	7.52	5.79	10.50	7.17
<b>Low OAS</b>	4.93	4.95	9.18	5.92
<b>Total</b>	<b>6.59</b>	<b>6.39</b>	<b>9.55</b>	<b>7.15</b>

Year 3 Standard Deviation of Outcomes	Prior 12-Month Equity Performance			
OAS Group	High Return	Mid Return	Low Return	Total
<b>High OAS</b>	5.05	11.77	12.60	11.37
<b>Mid OAS</b>	7.18	10.19	11.96	10.33
<b>Low OAS</b>	5.88	7.11	9.60	7.75
<b>Total</b>	<b>6.18</b>	<b>9.83</b>	<b>11.53</b>	<b>9.97</b>

Source: FactSet; The Brandes Institute as of 12/31/06