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Long-Term Capital Management, L.P. (C)

On Sunday, August 23, 1998, the principals of Long-Term Capital Management, L.P. ("LTCM") gathered at the firm's offices in London, Tokyo, and Greenwich, Connecticut for a conference call. The fund that LTCM managed, Long-Term Capital Portfolio, L.P. ("the Fund"), was down nearly 40% since the beginning of 1998. Two days earlier, the Fund had sustained its worst daily loss ever, an estimated $550 million, which had brought the Fund's equity capital below $3 billion. The principals discussed the reasons for the Fund's sharp decline, evaluated the Fund's liquidity, and considered alternative courses of action. LTCM's possible choices included attempting a rapid reduction of many of the Fund's positions, and trying to raise additional capital.

Chronology of Events in 1998

Following a successful 1997, LTCM began the year with about $4.8 billion in Fund capital, having just returned $2.7 billion to outside investors. The first few months of 1998 had been relatively quiet. Year-to-date through the end of April, the Fund was up 2.4% before fees, and the Fund's volatility of profits had remained at a daily standard deviation of approximately $45 million. (See **Exhibit 2** for the Fund's capital and monthly returns since inception, and **Exhibit 3** for the Fund's daily profit and losses during 1998 through August 21.)

In May and June the Fund experienced its two worst months ever, with gross returns of -6.7% and -10.1% respectively. (Prior to May, the Fund's worst monthly performance had been -3.9% in June 1994 when the portfolio was not yet well diversified, and the next to worst month had been June 1997 when the Fund returned -1.8% gross.) The Fund's losses in May and June were distributed across many positions, with no single trade experiencing a large loss. LTCM's principals could identify no obvious causal events to explain this very poor performance. For example, the world's financial markets generally seemed relatively calm, and the major equity markets were making new all-time highs. (See **Exhibit 5**.) Even the emerging markets appeared to be quite stable in the wake of the Asian financial crises of 1996 and 1997. Because of the diversified nature of the fundamental risks of the Fund's positions, the principals found the breadth of the losses to be quite surprising.

Near the end of June, in response to the losses, LTCM's principals decided to reduce the risk of the portfolio. Over the next few weeks they decreased some of the relative-value positions that offered the least attractive risk-to-reward ratios, and also trimmed the directional trades in the portfolio. (These tended to be among the more liquid of the Fund's positions.) Although LTCM maintained, or even increased slightly, those convergence trades that had moved to extreme misvaluations, by mid July the Fund's overall volatility had been reduced by 10%. And by July 21, the Fund was up 7.5% on the month, erasing about half of the losses incurred in May and June.

Professor André F. Perold prepared this case as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

Of potential significance during this period was the decision by Salomon Smith Barney Inc. to disband its U.S. bond arbitrage group. On July 7, the news media reported that Salomon Smith Barney had circulated a memorandum to employees saying the firm was significantly lowering its risk profile and integrating the U.S. bond arbitrage unit's 30 traders into other parts of the firm. The firm commented that global-arbitrage results for the second quarter would show "a small loss, a swing of about $100 million over the last quarter, in large part driven by reduced performance of the U.S. arbitrage unit. … The U.S. capital markets have matured, and the opportunity for arbitrage profits has lessened over time while the risks and volatility have grown." The memorandum reportedly stressed that Salomon Smith Barney believed that there would continue to be significant proprietary trading opportunities in other regions of the world.[1]

On July 22, market valuations began once more to move adversely, and the Fund's NAV again eroded. By the end of July the Fund had given up all of the gains it had experienced intra-month. Despite the mark-to-market losses, there was no indication that the fundamentals underlying the Fund's major convergence trades had changed. For example, the Fund had a swap-spread trade in which it was short U.S. Treasury bonds versus receiving fixed on interest-rate swaps. The fundamental risk of this position is that the spread of Libor over Treasury repo rates will be larger than anticipated over the life of the bonds. However, three-month Libor was still twenty basis points above the three-month term repo rate, as it had been for quite some time. Moreover, if market participants were anticipating a banking crisis in which Libor would rise dramatically relative to repo rates, one would expect the swap-spread widening to be more pronounced in the two-year sector than the ten-year sector, contrary to what was happening in the market. Thus, the widening of the swap spread seemed to reflect the attempt by some market participants to unwind their arbitrage positions, rather than a change in fundamental valuation.

The month of August was a continuation of the same, with losses occurring broadly across positions virtually every day. Again, LTCM began to reduce risk by cutting positions where possible, although still holding onto the best trades. By mid-August, overall positions had been cut by an additional 5%.

On Monday, August 17, 1998, in an event that stunned the world, Russia defaulted on its government debt. The surprise of the event was underscored by the fact that Russia had issued $3.5 billion of 11% dollar-denominated Euro bonds only three and a half weeks earlier on July 24. It also was a shock that a country would default on debt denominated in its *own* currency. LTCM had only a small exposure to Russian government credit, and the Fund suffered a correspondingly small loss in these positions.

Friday, August 21, 1998

As previously mentioned, Friday, August 21 was the worst day in the Fund's history, as many of the Fund's trades moved adversely and substantially. For example, during the morning the U.S. Treasury swap spread widened by 19 basis points, compared to a typical daily move of less than a basis point, before recovering somewhat in the afternoon. The U.K. gilt swap spread also widened dramatically that day. The Fund had large short positions in both of these swap spreads. (See **Exhibit 1** for the Fund's major trades as of August 23, 1998. See **Exhibit 6** for a history of the ten-year U.S. Treasury swap spread since 1994.)

In addition, LTCM suffered a significant loss in a risk arbitrage position related to the planned acquisition of telephone-equipment maker Ciena Corp by Tellabs, Inc.. On August 21,

[1] See, for example, *The Wall Street Journal*, 7/7/98, p. C1.

Tellabs abruptly canceled the shareholder vote required to complete the acquisition, and the spread between the two firms' stock prices widened dramatically.

LTCM estimated that the combination of the risk-arbitrage loss and the unprecedented widening of the U.S. and U.K. swap spreads and other spreads had resulted in a one-day loss of about $550 million. The Fund's capital was now about $2.95 billion. Because of the decline in its equity base, the Fund's leverage ratio, which had increased from approximately 19 to 28 upon the distribution of capital at the end of 1997, now stood at about 42. (See **Exhibit 4**.)

Sunday, August 23, 1998

On Sunday, August 23, the principals of LTCM gathered to evaluate the situation and to consider the firm's options. Less than a week earlier, the principals had believed that the widening of spreads would soon be reversed, as arbitrage capital was drawn to convergence trades that had moved to extremely attractive levels. LTCM's response had therefore been to reduce risk by shrinking the Fund's least attractive positions at a rate dictated by market liquidity, while preserving the most misvalued convergence trades. The Fund's nearly $4 billion of equity capital and vast working capital had seemed adequate to weather any storm.

This perception was changed by the events of the week that ended on August 21. For one thing, the Fund's capital was now significantly smaller. In addition, contrary to the principals' expectation of opportunistic position taking by hedge funds and the proprietary trading desks at Wall Street firms, it seemed that market participants were disinclined to increase their positions, and were in many cases shrinking them in order to reduce risk. This gradual risk reduction had reached a crescendo on Friday as many market participants, stung by losses, unwound positions at any price.

Whether and how much spreads continued to widen would depend, in the near term, largely on the extent to which hedge funds and dealers with positions similar to the Fund's would choose to reduce risk. Because this factor was unknown, and because the Fund's capital was down sharply, LTCM's principals had to face the possibility that the Fund could soon find itself in financial distress. They spent a considerable part of Sunday analyzing the Fund's working capital situation. The Fund still had $4.08 billion of working capital, consisting of $2.95 billion of equity, $230 million of unsecured term debt, and a credit facility which had been increased to $900 million in the spring. Since only $2.1 billion was presently tied up in uses of working capital (financing haircuts on bond positions, margin requirements for equity and futures positions, and miscellaneous operational needs), the Fund's excess liquidity was still substantial. However, the principals recognized that if the NAV continued to decline, the operational needs for working capital would increase, due to concerns in the dealer community about the Fund's creditworthiness. On a typical day, the Fund would send out and receive collateral in about 60 distinct flows. The Fund's net P&L could be flat for the day, yet through the process of two-way marking to market, there might be $500 million of collateral coming in, and $500 million going out. As mentioned previously,[2] LTCM would usually have to manage multiple collateral flows with the same dealer because most large global firms were unable to net collateral flows across legally distinct entities within the dealer. Should a dealer begin to get nervous about the Fund's credit, an entity within the dealer which owed collateral to the Fund might conceivably wait to release that collateral to the Fund until another entity within the same dealer, which was owed collateral by the Fund, had received its collateral. The possibility of such actions would not only necessitate extra working capital directly, but would eventually cause the Fund's clearing agent, Bear Stearns, to worry about its own credit exposure and to require the Fund to keep extra cash at Bear Stearns affiliates.

[2] See Long-Term Capital Management (A), HBS case 9-200-007.

In addition, because trading volume had declined in the markets most important to the Fund, the dealers were likely to be less certain about the mid-market prices (average of bid and ask) of the financial instruments in the portfolio. Since the prices quoted by the dealers determined the NAV and hence the flow of collateral, the increase in uncertainty had the effect of increasing the Fund's working-capital requirements.

A final liquidity consideration involved the covenants on the Fund's $900 million term credit facility with a syndicate of commercial banks. The covenants stated that the amount drawn on the facility could not exceed 50% of the amount by which the Fund's equity exceeded $1 billion, as measured at the last Accounting Period; and that the facility would terminate if, at an Accounting Period, the equity had declined 50% or more from January 1, 1998. The Accounting Periods were defined as the last business day of each calendar quarter, plus any day on which equity capital was contributed to or withdrawn from the Fund. Thus far, the Fund had drawn down only $90 million of its credit line.

LTCM's principals knew that the Fund was still far from experiencing any liquidity strain. However, because of the operational issues described above, they felt that such strains might emerge if the NAV fell below $1.5 billion.[3]

The Key Choices

LTCM's principals explored several alternative courses of action for the Fund. The first alternative was to continue the practices of the last several months—to prudently reduce all but the best positions, and to continue to hold on to the firm's best convergence trades which now looked better than at any previous time.

The second alternative was to try to reduce risk more broadly and aggressively, including reducing some of the Fund's most attractive convergence trades. This would entail very high transactions costs, however, because market liquidity for the Fund's positions, never high during August when so many market participants are on vacation, had all but dried up in the current environment. In effect, LTCM would be contributing to the selling pressures that had already driven spreads so wide. In addition, the principals believed that as market participants came to realize the extent to which LTCM was unwinding positions, many might seek to unwind their own similar positions or even establish opposite positions, in anticipation of further widening of spreads. Such actions would exacerbate the Fund's losses. Finally, a substantial reduction of the Fund's main convergence trades might be misinterpreted by counterparties as a sign that the Fund had liquidity problems.

A third possibility was to attempt to raise additional equity for the Fund. A successful effort would allow LTCM to deleverage the Fund and reduce its risk without taking off positions, which would save substantial transactions costs compared to the previous alternative. A successful fundraising effort also would be very reassuring to the markets and to the Fund's counterparties. Notwithstanding LTCM's track record from 1994 through 1997, the principals were under no illusions about the difficulties of raising new capital rapidly in the Fund's current circumstances and the current market environment. Investors would almost certainly require the inducement of reduced fees, and before a major financial institution would consider a large investment in the Fund, it might demand a share of LTCM itself.

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[3] LTCM was also cognizant of a termination provision in the Fund's contractual agreements that would allow counterparties to terminate the contractuals at mid-market prices if the Fund's NAV fell below $500 million. However, it seemed very unlikely that this provision would ever come into play, simply because the Fund would almost certainly be in default due to insufficient liquidity long before the NAV got that low.

Finally, the LTCM principals discussed whether, as a precautionary measure, the Fund should draw down part or all of the remaining $810 million of its credit facility, even though it might seem unwise to send such a negative signal to the banks at a time when the Fund in fact had substantial excess working capital.

In addition to these broad alternatives, the principals discussed how and when LTCM should communicate the Fund's poor performance to counterparties, regulators and the Fund's investors. Under its normal timetable, LTCM would report August's results only after the precise NAV had been calculated, typically ten days after month end. LTCM had departed from that timetable in June by reporting an estimate of that month's performance on July 1, as well as explaining to counterparties and investors the firm's strategy of reducing overall risk while maintaining the best trades. Also, in mid August LTCM had notified counterparties that the Fund was down about 12% on the month. LTCM's principals had to decide whether to provide an estimated NAV at the end of August, or even an additional interim report before month end. Thus far, none of the counterparties had sought to reduce its secured lending to the Fund.

Exhibit 1 Major Positions of the Fund on August 21, 1998[a]

1. **U.S. swap spreads.** The Fund was short Treasury bonds with maturities of nine years and longer, hedged by receiving fixed on interest-rate swaps, at a swap spread of 62 basis points. This trade is discussed in more detail in the body of this case, as well as in Long-Term Capital Management, L.P. (A), HBS case 200-007.

2. **IOs**. The Fund was long interest-only strips of Agency-backed pools of fixed-rate residential mortgages, called IOs, dynamically hedged by receiving fixed on interest-rate swaps. The main fundamental risk was that over the life of the IOs, the prepayments on the underlying mortgages might be substantially larger than those predicted by LTCM's prepayment model. A discussion of mortgage trades is contained in Long-Term Capital Management, L.P. (A), HBS case 200-007.

3. **Commercial mortgages.** The Fund was long the AAA-rated tranches of structured products backed by commercial mortgages, versus paying fixed on interest-rate swaps. These tranches were trading at Libor plus 35 basis points, even though they financed at Libor plus 3 basis points, providing significant positive carry.

4. **Differential swap-spread trade in Europe.** The Fund was short long-maturity U.K. government bonds versus receiving fixed on sterling-denominated interest-rate swaps, at a swap spread of 62 basis points; and long German and French government bonds versus paying fixed on French Franc- and Deutchmark-denominated interest-rate swaps, at a swap spread of 23 basis points. The primary intrinsic risk factor for swap-spread trades -- the credit spread of bank deposit rates over repo rates -- canceled out in this trade, because similar panels of banks were polled for the indices used to determine the floating resets of the swaps denominated in the three currencies.[b] Also, this trade would immediately converge almost completely if the UK joined the Economic and Monetary Union (EMU). See Long-Term Capital Management, L.P. (A), HBS case 200-007 for discussion of swap-spread trades.

5. **Yield-curve relative-value trades.** In the U.K. the Fund was paying fixed in the 20-year sector and the 3-year sector versus receiving fixed in the 7-year sector, with the opposite trade on in Germany. In both trades the proportions were adjusted so that the positions had exposure neither to a uniform rise or fall in yields, nor to a typical steepening or flattening of the yield curve. The misvaluation relative to LTCM's term-structure model was 21 basis points. For more discussion of these "butterfly" trades, see Long-Term Capital Management, L.P. (A), HBS case 200-007.

6. **Purchasing fixed-income volatility.** The Fund was long 5-year options on Deutchmark-denominated interest-rate swaps, dynamically hedged with swaps so as to be market neutral. These options were trading at implied volatilities of about 3 basis points per day, even though the observed volatility of the German fixed-income market was approximately 5 basis points per day.

7. **Swap of Italian treasury bill rates versus lira Libor.** The Fund entered into floating-for-floating swaps of about 7 years in which the Fund paid lira Libor, and received the auction rate on Italian treasury bills plus about 40 basis points. LTCM felt that as a result of increasing efficiency in the Italian capital markets, and the arrival of EMU, auction rates on Italian treasury bills in the future

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[a] All spreads and valuations referred to in these trade descriptions are as of August 21, 1998.
[b] The index that determined the floating reset on an interest-rate swap was calculated as the average of the offer rates on interbank loans quoted by a panel of banks. Generally some number of the highest and lowest quotes were omitted before the average rate was calculated. The panel of banks polled varied depending on the particular index and currency. A bank could be replaced on a panel, for example if its creditworthiness deteriorated.

would be much closer to Libor than 40 basis points, providing significant positive carry for this trade.

8. **Differential swap-spread trade in Japan.** The Fund was long 7-year Japanese Government Bonds (JGBs) versus paying fixed on 7-year yen-denominated interest-rate swaps, and short 10-year JGBs versus receiving fixed on 10-year yen interest-rate swaps. This trade was motivated by the very wide implied 3-year swap spread, 7 years forward.

9. **Equity risk arbitrage.** Following the announcement of the acquisition of one corporation by another, the target company's shares tended to trade at a discount to the consideration offered—usually shares of the acquirer or cash. Only some of the discount could be explained by the time value of money or the risk of the acquisition not being consummated. The Fund had positions designed to capture this discount. For details, see Long-Term Capital Management, L.P. (A), HBS case 200-007.

10. **Capital-structure trades.** In these trades the Fund was either long a corporate bond and short the common stock of the same company (dynamically hedged to maintain zero exposure to the company), or short the bond and long the stock, or short one of the company's bonds and long another. These trades would be initiated when there was a substantial misvaluation of one instrument relative to the other, as measured by LTCM's capital-structure model.

11. **Equity pairs trades in Europe.** These relative-value trades were of three types. The first related to firms like the Royal Dutch /Shell Group, whose operating assets were held through two distinct companies representing economically equivalent claims on the operating assets in terms of voting rights, share of profits, and share of dividends. Often one of the companies traded at a substantial discount relative to the other. A second type of trade arose when a company's non-voting "savings shares" traded at a discount to their fair value relative to the common stock. The third type of trade related to holding companies, particularly in France, which often traded at a substantial discount to the market value of their holdings. In each case, LTCM structured a trade in which the Fund was long the relatively cheap asset and short the relatively overpriced asset. For details on Royal Dutch/Shell, see Long-Term Capital Management, L.P. (A), HBS case 200-007.

12. **Selling stock-index volatility.** The Fund was short four-year put and call options on broad stock market indexes (principally the U.S. S&P 500, the French CAC, the German DAX, and the U.K. FTSE indexes), dynamically hedged to be market neutral. For details, see Long-Term Capital Management, L.P. (A), HBS case 200-007.

13. **Japanese equity derivatives.** The Fund was long the preference shares issued by Japanese banks, versus being short the common stock. The preference shares often traded cheap relative to the common, in part because they had complicated embedded options.

Exhibit 2 Fund Capital and Monthly Returns (June, 1994 to July, 1998)

	Fund Capital ($billions)	Gross Monthly Performance[a]	Net Monthly Performance[b]	Index of Net Performance
				1.00
Mar-94	$1.1	-1.1%	-1.3%	0.99
Apr-94	$1.1	1.4%	0.8%	1.00
May-94	$1.2	6.8%	5.3%	1.05
Jun-94	$1.2	-3.9%	-2.9%	1.02
Jul-94	$1.4	11.6%	8.4%	1.10
Aug-94	$1.5	3.8%	3.0%	1.14
Sep-94	$1.5	-0.4%	-0.3%	1.13
Oct-94	$1.5	1.0%	0.4%	1.14
Nov-94	$1.6	7.7%	6.1%	1.21
Dec-94	$1.6	-0.8%	-0.5%	1.20
Jan-95	$1.8	6.5%	4.5%	1.25
Feb-95	$1.8	-0.8%	-0.6%	1.25
Mar-95	$1.8	3.2%	2.5%	1.28
Apr-95	$2.2	2.4%	1.7%	1.30
May-95	$2.4	6.2%	4.9%	1.36
Jun-95	$2.5	1.2%	1.0%	1.37
Jul-95	$3.0	5.3%	4.0%	1.43
Aug-95	$3.1	3.5%	2.7%	1.47
Sep-95	$3.3	8.3%	6.6%	1.56
Oct-95	$3.5	4.1%	3.0%	1.61
Nov-95	$3.7	3.5%	2.8%	1.66
Dec-95	$3.6	4.2%	3.4%	1.71
Jan-96	$4.0	8.8%	6.2%	1.82
Feb-96	$4.1	4.2%	3.2%	1.88
Mar-96	$4.1	1.4%	1.1%	1.90
Apr-96	$4.7	11.1%	8.1%	2.05
May-96	$4.6	1.7%	1.4%	2.08
Jun-96	$5.1	6.6%	5.3%	2.19
Jul-96	$5.2	1.9%	1.1%	2.21
Aug-96	$5.2	-0.3%	-0.2%	2.21
Sep-96	$5.5	7.1%	5.7%	2.33
Oct-96	$5.5	-0.3%	-0.6%	2.32
Nov-96	$5.6	1.3%	1.1%	2.34
Dec-96	$5.2	3.5%	2.9%	2.41
Jan-97	$5.6	6.1%	4.2%	2.51
Feb-97	$5.7	0.6%	0.5%	2.52
Mar-97	$5.8	2.1%	1.6%	2.56
Apr-97	$5.9	1.8%	1.0%	2.59
May-97	$6.0	4.2%	3.2%	2.67
Jun-97	$6.2	-1.8%	-1.4%	2.63
Jul-97	$6.2	1.8%	1.0%	2.66
Aug-97	$6.7	0.8%	0.7%	2.68
Sep-97	$6.8	4.5%	3.5%	2.77

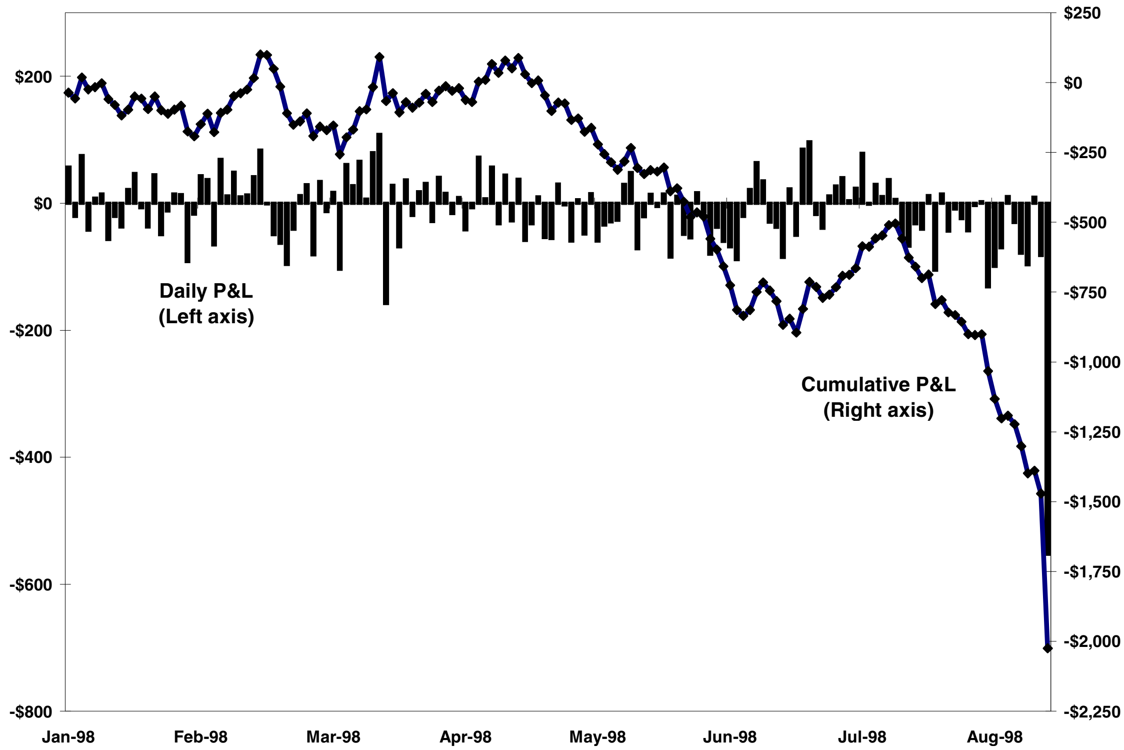
[a] Gross of all fees.
[b] Net of fees paid to LTCM.

Exhibit 2 (Cont.) Fund Capital and Monthly Returns (June, 1994 to July, 1998)

	Fund Capital ($billions)	Gross Monthly Performance	Net Monthly Performance	Index of Net Performance
Oct-97	$7.1	0.9%	0.3%	2.78
Nov-97	$7.1	-1.0%	-0.8%	2.76
Dec-97	$4.7	3.1%	2.4%	2.82
Jan-98	$4.7	-1.3%	-1.8%	2.77
Feb-98	$4.8	1.2%	1.2%	2.81
Mar-98	$4.7	-0.3%	-0.3%	2.80
Apr-98	$4.9	2.7%	1.9%	2.85
May-98	$4.5	-6.7%	-6.4%	2.67
Jun-98	$4.1	-10.1%	-10.1%	2.40
Jul-98	$4.1	0.5%	0.0%	2.40

Source: LTCM

Exhibit 3 Daily Fund Profit and Loss ($millions)



Source: LTCM

Exhibit 4 The Fund's Total Assets, Capital and Leverage (June, 1994 to July, 1998)

Month	Total Assets ($billions)	Total Capital ($billions)	Leverage Ratio	Capital Ratio
Jun-94	17.4	1.2	14.5	6.9%
Jul-94	18.6	1.4	13.7	7.3%
Aug-94	23.0	1.5	15.7	6.4%
Sep-94	25.8	1.5	17.7	5.6%
Oct-94	26.2	1.5	17.7	5.7%
Nov-94	28.7	1.6	17.9	5.6%
Dec-94	29.5	1.6	18.1	5.5%
Jan-95	31.5	1.8	17.6	5.7%
Feb-95	29.8	1.8	16.7	6.0%
Mar-95	39.7	1.8	21.6	4.6%
Apr-95	43.7	2.2	20.2	5.0%
May-95	49.7	2.4	20.6	4.8%
Jun-95	59.8	2.5	23.8	4.2%
Jul-95	64.8	3.0	21.6	4.6%
Aug-95	72.0	3.1	23.3	4.3%
Sep-95	86.0	3.3	26.1	3.8%
Oct-95	101.3	3.5	28.7	3.5%
Nov-95	106.4	3.7	29.1	3.4%
Dec-95	102.0	3.6	28.3	3.5%
Jan-96	112.2	4.0	28.3	3.5%
Feb-96	115.4	4.1	27.9	3.6%
Mar-96	127.3	4.1	31.2	3.2%
Apr-96	134.7	4.7	28.9	3.5%
May-96	139.2	4.6	30.0	3.3%
Jun-96	125.7	5.1	24.7	4.0%
Jul-96	130.3	5.2	25.0	4.0%
Aug-96	130.8	5.2	25.2	4.0%
Sep-96	129.7	5.5	23.4	4.3%
Oct-96	125.8	5.5	22.7	4.4%
Nov-96	129.0	5.6	22.9	4.4%
Dec-96	132.4	5.2	25.6	3.9%
Jan-97	137.6	5.6	24.6	4.1%
Feb-97	130.1	5.7	22.8	4.4%
Mar-97	121.8	5.8	21.2	4.7%
Apr-97	111.9	5.9	19.1	5.2%
May-97	122.1	6.0	20.3	4.9%
Jun-97	123.4	6.2	19.8	5.1%
Jul-97	128.6	6.2	20.8	4.8%
Aug-97	126.4	6.7	19.0	5.3%

Exhibit 4 (Cont.) The Fund's Total Assets, Capital and Leverage (June, 1994 to July, 1998)

Month	Total Assets ($billions)	Total Capital ($billions)	Leverage Ratio	Capital Ratio
Sep-97	134.1	6.8	19.9	5.0%
Oct-97	136.7	7.1	19.1	5.2%
Nov-97	129.3	7.1	18.3	5.5%
Dec-97	129.2	4.7	27.7	3.6%
Jan-98	124.8	4.7	26.4	3.8%
Feb-98	128.3	4.8	26.8	3.7%
Mar-98	130.3	4.7	27.5	3.6%
Apr-98	134.2	4.9	27.5	3.6%
May-98	134.1	4.5	29.5	3.4%
Jun-98	128.3	4.1	31.3	3.2%
Jul-98	128.2	4.1	31.0	3.2%

Source: LTCM

Exhibit 5 Performance of World Equity Markets in 1998 through late August (Source: Datastream)

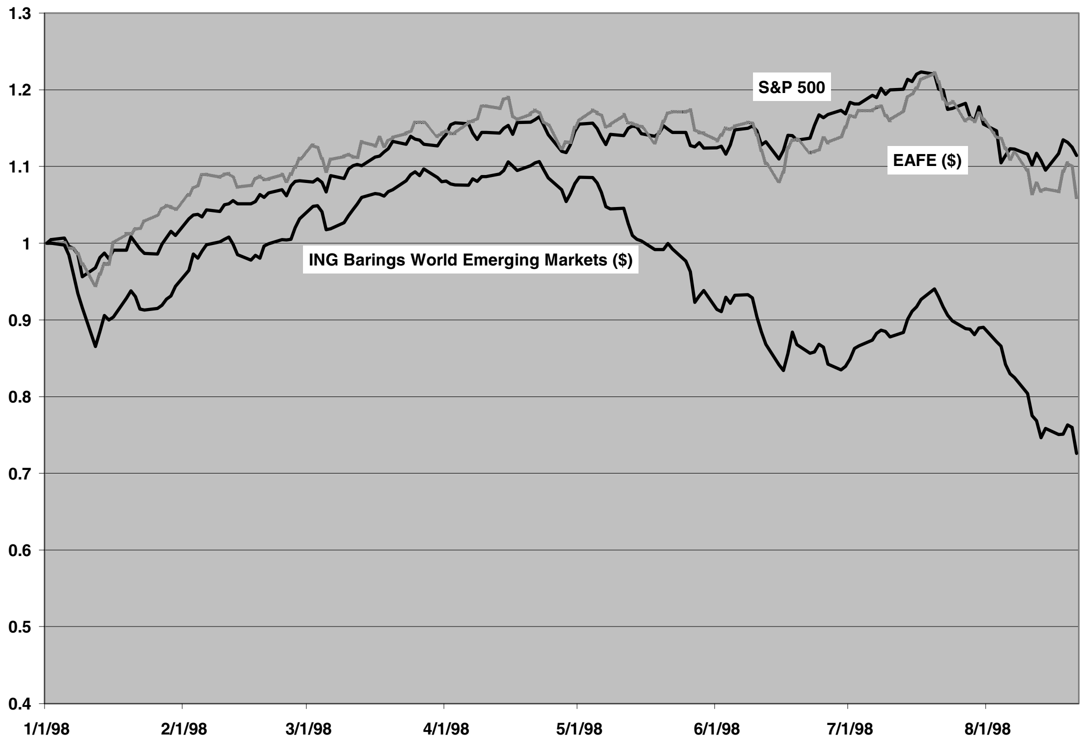
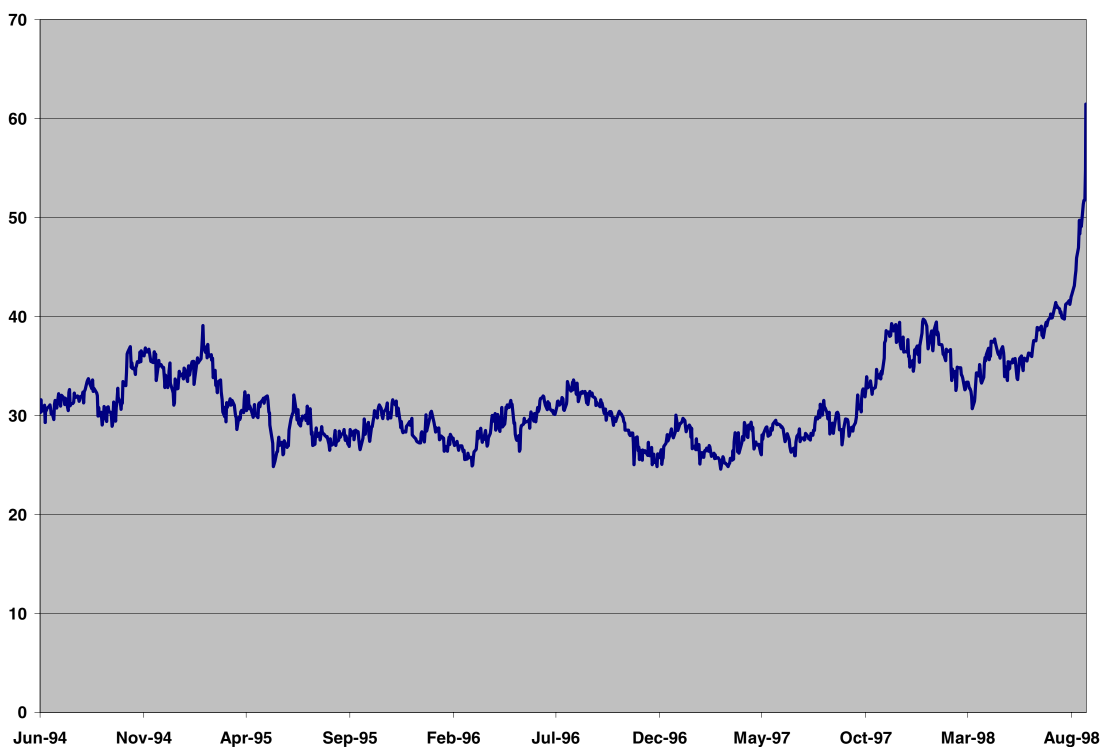


Exhibit 6 Ten-year U.S. Treas. Swap Spread (basis pts, 1994 through August 21, 1998; source: LTCM)



Source: LTCM