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EDF™ CASE STUDY

Sharp Corporation

High EDF Measure Raises Doubts about Ability to Continue as a Going Concern

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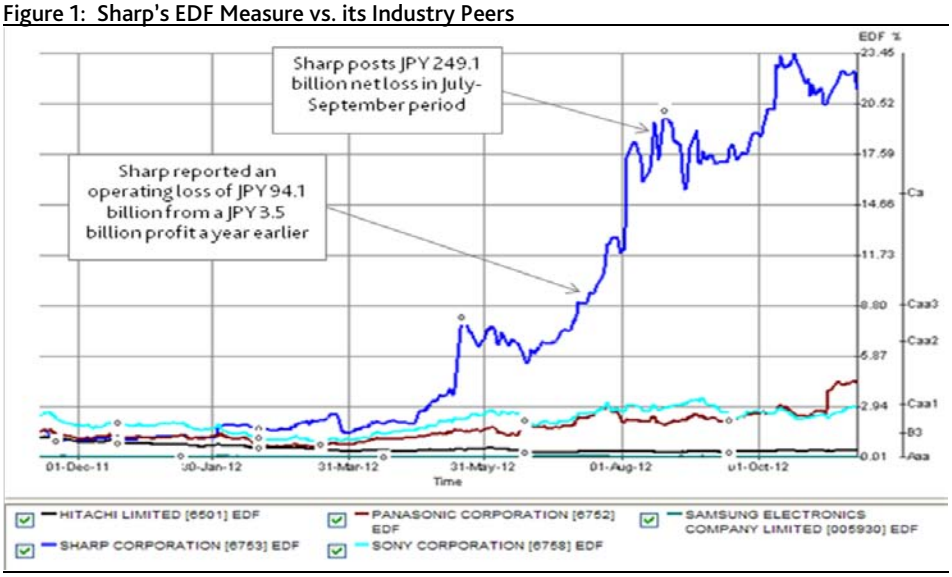
Summary

- Sharp Corporation, founded in 1912, is a Japanese multinational company that designs and manufactures electronic products, primarily televisions and displays. Sharp does not have any long-term debt rated by Moody's. However, Moody's Analytics' public EDF model provides a unique tool to assess the credit risk of the company.
- Sharp's probability of default has jumped significantly since the start of year. As of November 15, its one-year EDF measure stood at 20.85%, up from 1.2% in January. In August 2012, Sharp Co. announced a JPY 94.1 billion operating loss – its worst ever – compared to a JPY 3.5 billion profit just a year earlier. The company has struggled with low profitability and cash flow since March 2012, due to a decline in both its LCD panel and solar cells businesses.
- Increased competition, slowed growth in the global economy, and the strong yen, has led to a significant rise in its probability of default, both in absolute terms as well as relative to its other major competitors. The rise in Sharp's EDF level has been caused by a jump in its market leverage (financial risk) as well as asset volatility (business risk). Since May 2010 Sharp Co.'s market leverage has risen by 64%, driven by a 30% decline in its market value of assets and 16% rise in the firm's default point. The firm's current level of asset volatility of 15.90% is beyond the 75th percentile of firms in the Japan large corporates group.

Figure 1: Sharp's EDF Measure vs. its Industry Peers



Sharp's EDF Metric Signals High Degree of Financial Distress

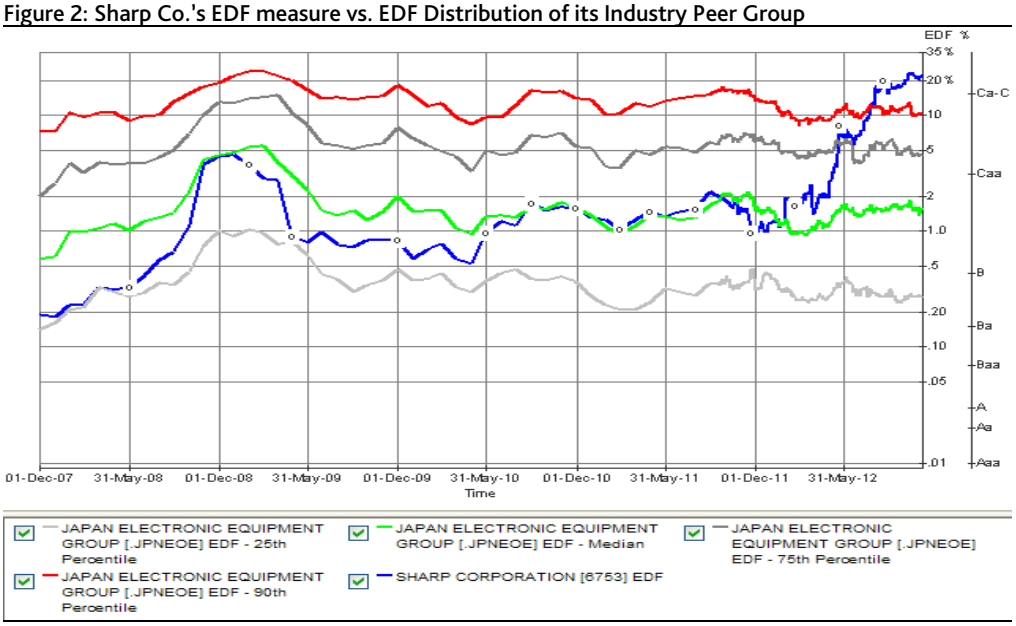
Sharp Corporation's ability to continue as a going concern is questionable following its reported negative operating results, high refinancing risk, and a significant increase in its probability of default measure. As of November 15, 2012, Sharp's one-year Expected Default Frequency (EDF) measure stood at 20.85%, up by a factor of eleven times from its 1.2% January level. The pace of deterioration in its EDF metric accelerated in May, when the company reported extremely poor operating performance, particularly in its core LCD television and display panel businesses, which make up over 60% of the company's total revenue.

Sharp does not have any long-term debt rated by Moody's Investors Service.[1] Moody's Analytics public EDF model, however, provides a unique tool to assess the credit risk of the company. Sharp's current 20.85% EDF level translates into an implied rating of Ca on Moody's rating scale – a rating level historically consistent with firms either in or imminently in danger of being in default.

Once dominated by the Japanese suppliers, the television market has suffered lower demand and a rise in competitors from South Korea, which benefit from a more favorable exchange rate. As shown in Figure 1 on the cover of this report, the failure of Sharp to keep pace with changes in consumer tastes, slowed growth in the global economy, and the strong yen, has led to a significant rise in its probability of default, both in absolute terms as well as relative to its other major competitors like Samsung Electronics and Panasonic Corp.

Sharp's problems deepened in October, when it announced a net loss of JPY 249.1 billion in the July-September quarter, and an expected full year net loss of JPY 450 billion versus an August projection of a JPY 250 billion loss. Facing a severe liquidity shortage, the firm secured JPY 360 billion in loans in September from Mizuho Financial Group and Mitsubishi UFJ Financial Group Inc, which is expected to sustain the company thorough it next fiscal year. Sharp's JPY 741 billion in assets will serve as the collateral for the loan.

Figure 2: Sharp Co.'s EDF measure vs. EDF Distribution of its Industry Peer Group



The problems that Sharp is facing are clearly represented in the evolution of the level of the firm's EDF credit measure. However, an analysis of the trend and relative movement against its industry sector sheds additional light on just how risky the firm has become. In addition to the level of Sharp's EDF measure, Figure 2 shows the median, 25th, 75th, and 90th percentiles of the EDF for Sharp's industry peer group, the Japan electronic equipment group. From 2007 to 2011, Sharp's EDF measure closely tracked the approximately 1.5% median EDF of its industry sector. The company announced JPY 24.45 billion operating

[1] Moody's Investors Service rates Sharp Corporation's commercial paper Not Prime (NP) as of September 2012.

loss for the October-December 2011 quarter, compared to JPY 23.03 billion operating profit in the year-ago period. Since the announcement, Sharp's EDF measure has increased from 1.2% on January 18, 2012 to its current level of 20.85%. Starting in May, Sharp's EDF measure began trending above the 75th percentile of its industry sector. Its EDF metric continued to rise rapidly, and by August, when Sharp announced a JPY 94.1 billion operating loss – its worst ever – compared to a JPY 3.5 billion profit just a year earlier, its EDF measure pierced the 90th percentile of its industry peer group.

The increase in Sharp's EDF measure was in sharp contrast to the changes in the median EDF level for the Japan electronic equipment group as a whole, which was essentially flat over the same period. Moody's Analytics' research has shown that firms that underperform their industry sectors, regardless of the level of their EDF measure, tend to experience higher default rates. Based on data from 1992 to 2011, we calculated actual default rates conditioned on a firm's relative performance versus its sector. Relative performance is measured by the difference in the change in a firm's EDF measure and the change in its industry median EDF measure. Figure 3 shows the results. Firms whose EDF measures increase by 3% more than their sectors experienced a default rate 11 times higher than firms that tracked their sector (a difference of zero).

Between January 2012 and November 2012, Sharp Co.'s EDF measure increased by about 1,760%, while the Japan electronic equipment group's median EDF increased by 2% over the same time period. Hence, the trend versus its industry group shows the heightened risk of default for the company. The firm's high and rising level of EDF measure on both actual and relative basis indicates that the firm is undergoing significant distress and appears highly likely to experience a credit event.

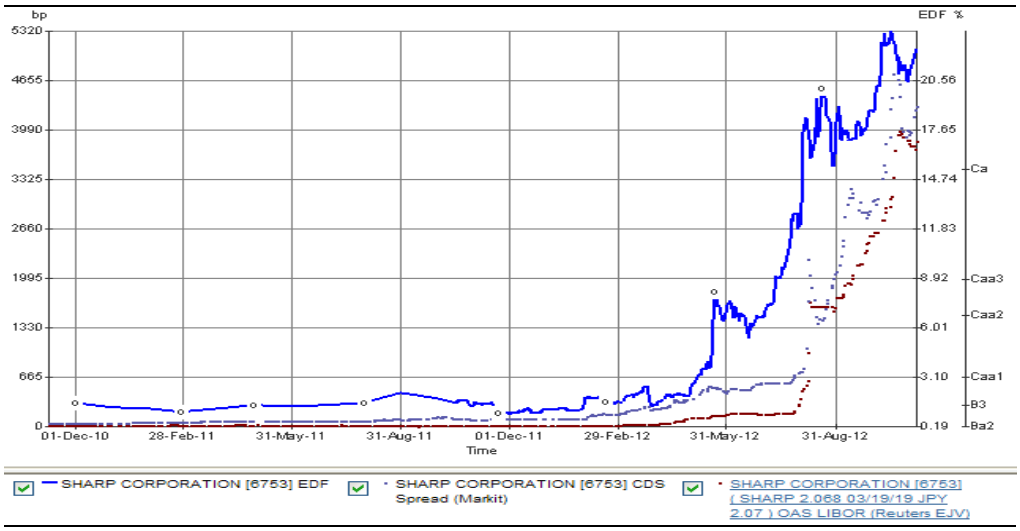
Figure 3: Average Realized Default Rates by EDF Level and Relative Performance vs. Industry Sector

		EDF Change Relative to Industry Peer Group Change										
		1	2	3	4	5	6	7	8	9	10	ALL
Firm EDF Level	1	0.05%	0.03%	0.02%	0.00%	0.00%	0.01%	0.03%	0.00%	0.00%	0.00%	0.02%
	2	0.10%	0.05%	0.06%	0.06%	0.00%	0.00%	0.02%	0.07%	0.11%	0.27%	0.05%
	3	0.10%	0.06%	0.01%	0.03%	0.01%	0.03%	0.07%	0.06%	0.03%	0.18%	0.05%
	4	0.28%	0.12%	0.17%	0.15%	0.09%	0.10%	0.08%	0.09%	0.17%	0.30%	0.15%
	5	0.32%	0.23%	0.24%	0.32%	0.22%	0.24%	0.21%	0.27%	0.22%	0.46%	0.27%
	6	0.62%	0.44%	0.45%	0.34%	0.44%	0.56%	0.44%	0.72%	0.51%	0.97%	0.55%
	7	0.71%	0.56%	0.66%	0.80%	0.64%	0.72%	0.73%	1.06%	1.18%	1.63%	0.89%
	8	1.01%	1.01%	1.19%	1.25%	1.27%	1.44%	1.58%	1.65%	2.05%	3.10%	1.68%
	9	3.14%	2.22%	4.83%	5.16%	5.25%	4.34%	4.87%	5.75%	6.37%	8.39%	5.60%
	10	6.43%	4.68%	5.76%	7.70%	7.70%	6.96%	7.67%	9.31%	9.99%	13.70%	8.94%
	All	0.66%	0.63%	1.08%	1.73%	1.73%	1.83%	2.24%	2.92%	3.13%	5.96%	2.16%

One of the advantages of the public EDF measure is that it uses equity market information to estimate probabilities of default. The liquidity of the public equity market relative to the bond or even credit default swap market enables EDF credit measures to signal sudden changes in default risk. This was apparent in Figure 1 above. As we show in Figure 4, the bond and CDS market was slower to re-price the risk of default following certain key events. In Figure 4 we show the public EDF measure for Sharp Co. together with the spread over Libor on its 2% bonds maturing in 2019, and its 5-year CDS spread.

Credit spreads (both bond and CDS) are often used as proxies for early warning of credit risk. However, as shown in figure 4, earlier this year the EDF measure of the company began to rise sharply, while the bond and CDS market had a more gradual increase in its spread level. Over the first quarter 2012, which was followed by the announcement of JPY 94.1 billion operating loss, Sharp's EDF measure worsened by 533%. Bond and CDS spreads also started to rise, but by far less than the increase in Sharp's EDF metric. Fears of an increased likelihood that Sharp may experience a credit caused both bond and CDS spread to exhibit significant deterioration after the second-quarter earnings results in August. Sharp's bond spread is currently 3,834 bp, while its CDS spread is 4,313 bp. In addition, traders now demand to receive their fees upfront, which only happens for entities with high yields or hightened credit risk.

Figure 4: Sharp Co.'s EDF Measure, its CDS Spread and Bond Spread Over Libor



A Deeper Dive: Understanding the Drivers of Sharp's EDF Credit Measure

An analysis of the drivers of Sharp's EDF metric sheds additional light on how and why the firm became financially distressed and may potentially need assistance to repay its debt obligations. In this section we examine the drivers of Moody's Analytics EDF model and show that they have direct connections to basic concepts of fundamental credit analysis.

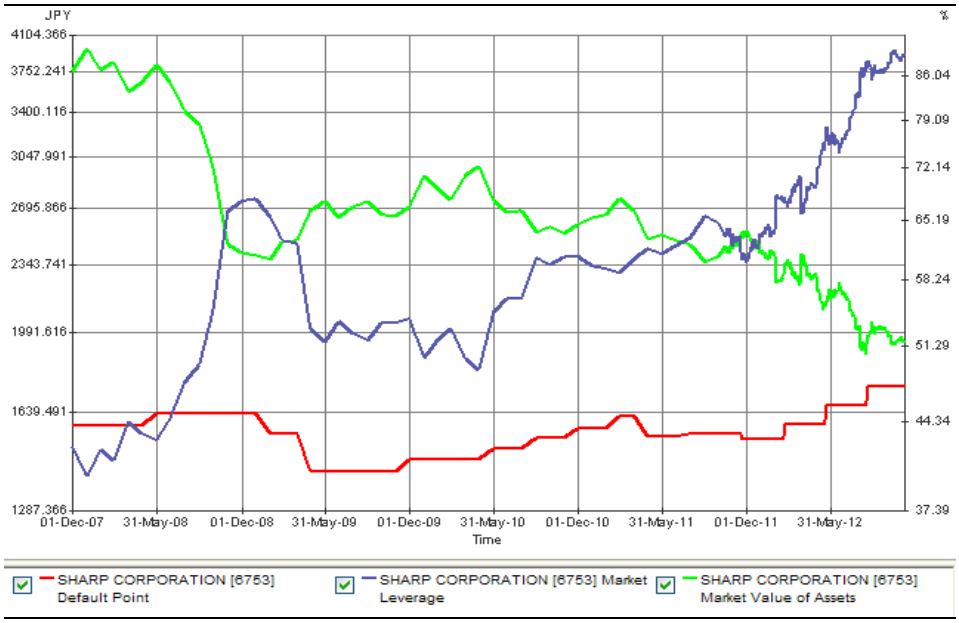
Moody's Analytics' public firm EDF model belongs to a class of credit risk models referred to as structural or asset value models. The basic assumption of asset value models is that there is a causal, economically motivated reason that default occurs. Default is highly likely to occur when the market value of the firm (the sum of the value of its market capitalization and debt) is insufficient to cover its liabilities due at some future date – i.e. firms tend to default when they are insolvent. This follows from the fact that equity holders are residual claimants on the value of the firm. If the market value of the firm is negative, equity holders can and often will "put" the residual value of the firm to creditors.

The above economic intuition can be translated into three quantifiable variables: the expected value of a firm's assets (*A*), the volatility of its assets (denoted by σ), and its default point, *X*, which is determined by a firm's liabilities. The interaction of the three variables is encapsulated by the firm's distance-to-default (*DD*) which, under some largely innocuous assumptions, can be expressed as:

$$DD \approx (\ln(A) - \ln(X)) / \sigma$$

This simple equation essentially states that a firm's relative credit risk (measured by *DD*) is a function of its financial risk and its business risk, two factors that are core concepts of fundamental credit analysis. The numerator of the above equation measures market leverage – i.e. financial risk. All else equal, higher leverage decreases *DD* and hence increases the probability of default. The denominator of the *DD* equation can be viewed as business risk. Firms in industries with high asset volatility tend to exhibit higher risk of default, all else equal. Once we have calculated a firm's *DD*, we can derive its probability of default (its EDF measure) by looking at the historical average default rate consistent with each *DD* level.

Figure 5: Sharp Co.'s Market Leverage and Market Value of Assets

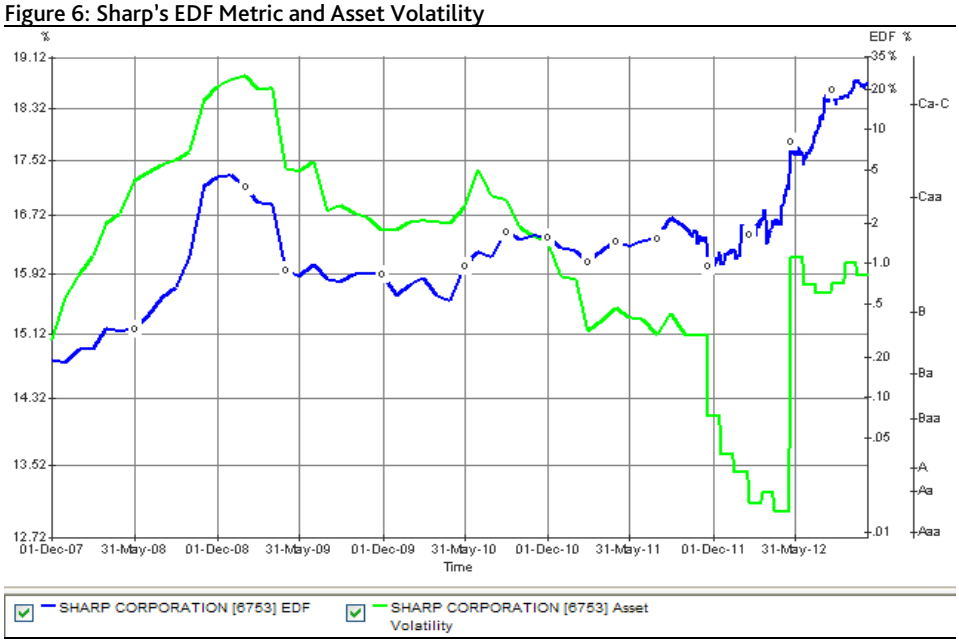


Sharp's high and rising EDM measure has been caused by both rising financial risk and worsening operating performance (equivalently, rising business risk) over the past two years. In figure 5 we show how its financial risk began to increase starting in 2010. Market leverage summarizes a firms financial risk, and is simply the ratio of a firm's default point to its market value of assets. The equity market has responded to the company's increasing troubles by bidding the value of its shares lower, leading to a reduction in the market value of its equity, and, therefore, its market value of assets. Since February 28, 2010 the market value of Sharp's assets dropped by 30% from JPY 2.7 billion to JPY 1.9 billion. Over the same period of time Sharp's default point also increased by 16%, from JPY 1.5 billion to JPY 1.7 billion.

The sharp fall in the market value of assets and the rise in its default point has in turn led to a significant increase in Sharp's market leverage. Sharp's market leverage rose from 53% in February 2010 to its current level of 88.9%. Sharp's current market leverage is in the 99th percentile of Japanese corporates, and in the 99th percentile of the Japan Electronic Equipment sector. The current level of Sharp's market value of assets puts it very close to its default point – on a market value basis, the company is just barely solvent. Historically, when a firm's market value of assets falls below the default point it is highly likely that the firm will be unable to sell assets or raise additional capital to pay its creditors.

Worsening operating performance, which is measured by the firm's asset volatility, also helped drive up Sharp's probability of default. Since 2008, Sharp has spent enormous amount of resources on the investment on building manufacturing facilities in Japan. The firm's asset volatility as shown in figure 6 increased in 2008 to its peak of 18.8% as of January 31, 2009. Although Sharp Co.'s asset volatility has slightly declined since then, it rose again in March 2012, amid the announced JPY 94.1 billion first quarter operating loss. The troubled company is now faced with difficult choices in order to remain solvent, such as future restructurings, cutting salaries, voluntary retirements, selling assets and reducing capital investments. Sharp's current 15.90% asset volatility is beyond the 75th percentile of firms in the Japan large corporates group. The combination of higher leverage and higher asset volatility led to a sharp drop in its distance to default and a material rise in its EDF measure.

Figure 6: Sharp's EDF Metric and Asset Volatility



Summary

Earlier this year Sharp's EDF measure began to trend in a range suggesting very heightened risk of default, rising from 1.21% In January 2012, to 20.85% as of November 15, 2012. The firm's weak liquidity, substantial operating losses, and heightened EDF measure – equivalent to a Ca implied rating – indicates that the likelihood of a credit event in the near future remains high. One of the signals of default risk for the firm is the relative performance of its EDF measure against that of its peers. Between January 2012 and November 2012, Sharp Co.'s EDF measure worsened by about 1,760%, while the Japan electronic equipment group's median EDF increased by 2% over the same time period. The rise in the EDF level of the company is primarily caused by a jump in its market leverage (financial risk) as well as asset volatility (business risk). Since May 2010 Sharp Co.'s market leverage rose by 64%, driven by a 30% decline in its market value of assets and 16% rise in the firm's default point. The firm's current level of asset volatility of 15.90% is beyond the 75th percentile of firms in the Japan large corporates group. Increased competition, slowed growth in the global economy, and the strong yen, has led to a significant rise in its probability of default, both in absolute terms as well as relative to its other major competitors.

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