

## EDF™ CASE STUDY

Moody's Capital Markets Research, Inc.

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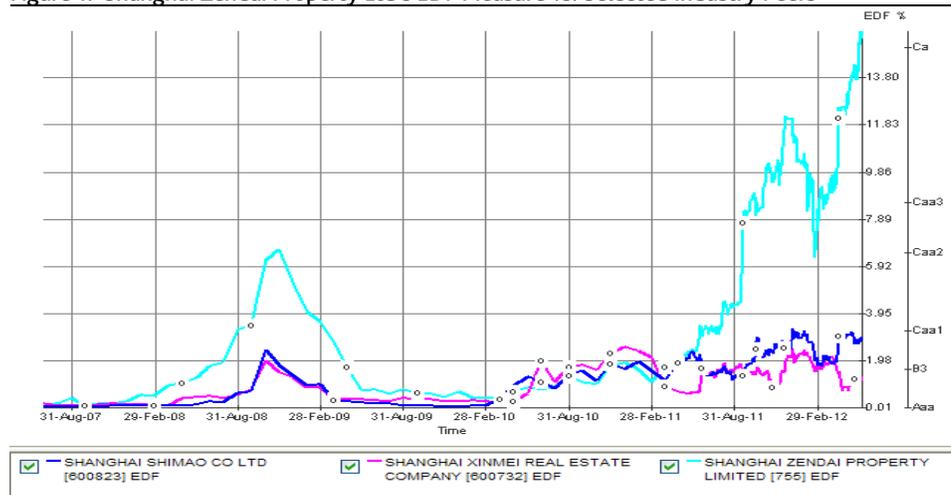
# Shanghai Zendai Property Ltd.

## Default Risk Rises as Property Sector Cools

### Summary

- Shanghai Zendai is a real estate developer that develops, invests in, and manages residential and commercial properties in China. The company was listed on the Hong Kong Stock Exchange in 2002. Similar to many other property developers in China, it is facing a strong headwind of slower economic growth, tight bank credit, and shrinking profit margins. Relative to its peers, it shows substantial credit deterioration over the last year, as measured by its one-year EDF™ measure.
- Shanghai Zendai's one-year EDF first showed signs of heightened risk of default in 2008 during the global financial crisis. The subsequent stimulus injected by the Chinese government, mostly directed at the construction industry, improved its EDF, along with most other developers, over 2009 and 2010. In 2011 its EDF measure began to rise at an accelerated rate, from 1.1% in February 2011 to 12.06% in December 2011. At the time of this writing, its EDF hovers around 15%, signaling a heightened risk of default.
- Shanghai Zendai's elevated default risk is largely caused by its rising financial leverage and worsening operating performance. The company experienced a sharp rise in its short-term debt, driving up its default point. Its declining operating income is reflected in a slow increase in asset values. Combined, these two factors mean that the firm's net worth is approaching zero – the point at which many firms historically default.

**Figure 1: Shanghai Zendai Property Ltd's EDF Measure vs. Selected Industry Peers**



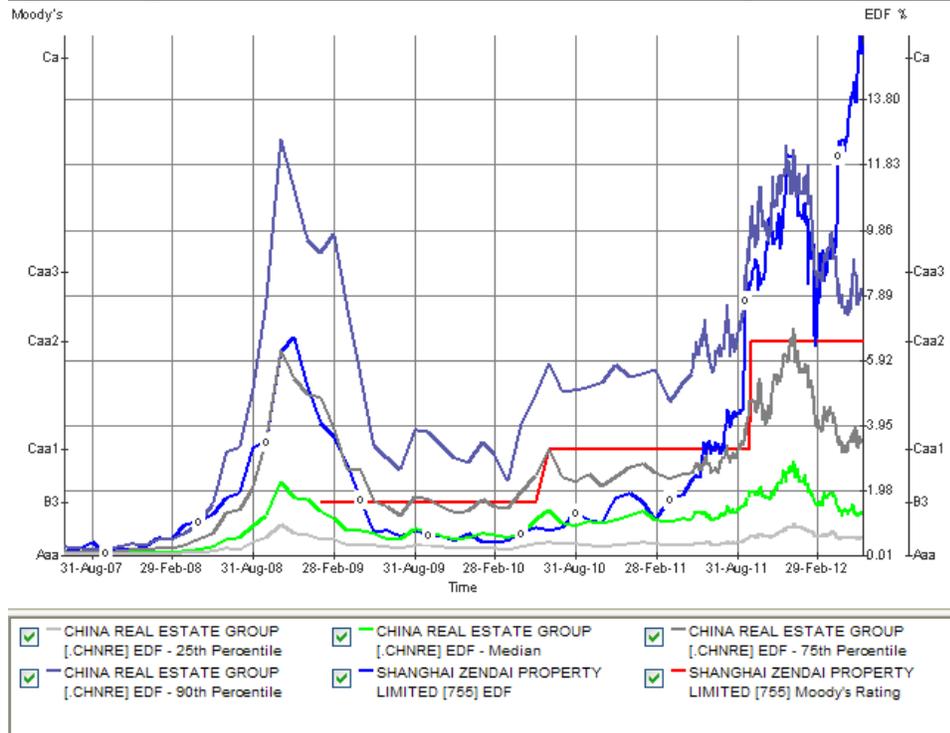
**Slower Economic Growth and Worsening Performance of China's Property Developers**

Property development is a key driver, as well as a beneficiary, of China's rapid economic growth over the last decade. As of 2011, Investment in properties account for 13% of China's economy and it has been growing at about 28% (roughly 20% in real return) a year. A zero growth rate in real estate construction in 2012 (assuming the rest of the economy is unaffected) would bring the GDP growth rate from 9.2% of 2011 to 6.6% in 2012 – a decent growth rate by western standard but nonetheless would push the Chinese economy to "hard landing" territory.<sup>1</sup>

Since 2011, GDP growth has slowed from 9.7% of Q1 2011 to 9.5% in Q2, 9.1% in Q3, 8.9% in Q4, and 8.1% in Q1 2012. The deceleration in economic growth has in turn cast a cold spell on real estate developers. Property sales growth has drop from 18.3% in 2010 to 12.1% in 2011, and -14.6% in Q1 of 2012. Average new home prices also began to decline starting in late 2011. There is also deteriorating trend in construction starts, land sales and investment in properties. In addition to slow sales and shrinking profit margins, banks have tightened lending to real estate investment and the growth rate of foreign funding for property development also dropped from 66.0% in 2010 to 2.9% in 2012 and -22.4% in Q1 2012.

The deteriorating performance in this sector is reflected in worsening credit conditions, as shown by the 25<sup>th</sup>, median, 75<sup>th</sup> and 90<sup>th</sup> percentiles of the EDF distribution in Figure 2 for China Real Estate Group (a group consisting of 172 companies). Chinese real estate developers showed signs of financial stress via elevated EDF levels during the 2008 global economic downturn. The Median EDF of the group rose to 2% at the time. The RMB 4 trillion government stimulus package in 2009, largely directed at infrastructure construction and property development, reinvigorated economic growth, and hence reduced the default risk of property developers, in 2009 and 2010. However, as economic growth has slowed down since the second half of 2011, EDF measures for real estate developers began to rise again – the median EDF rose above 2% by late 2011 – and has remained at an elevated level.

**Figure 2: Shanghai Zendai's EDF measure vs. EDF Distribution of its Industry Peer Group**



According to calculations by Professor Patrick Chovanec of Tsinghua University in Beijing.

### Sharp Increase in Shanghai Zendai's Default Risk

Shanghai Zendai Property Limited is an investment holding company, with a focus on developing, investing and managing residential and commercial properties in China. It was first listed on the Hong Kong Stock Exchange in 2002. Amid economic slowdown in China, Shanghai Zendai has experienced particularly acute difficulties in both operating performance and financial stress. Its revenue and earnings in 2011 dropped by 29% and 21%, respectively, relative to figures in 2010. Since 2011 the company has also faced severe short-term financing constraints, including USD150 million notes due June 2012 (which was paid off on June 6). The company gained much attention in February 2010 when it paid RMB 9.2 billion for a prime lot south of Shanghai's Bund. It had planned to develop the 45,472 sq meter site into 270,000 sq meter of above-ground and 100,000 sq meter of underground space. However, In October and December 2011, the company sold 65% and 35%, respectively, of its right to the land with little profit, in an apparent effort to relieve itself of cash shortage.

The Expected Default Frequency (EDF) measure for Shanghai Zendai has experienced a roller coaster ride over the last five years, initially following the industry trend but lately breaking away from the pack to signal an elevated risk of default. The company's EDF rose to 6.6% in November 2008, matching 75<sup>th</sup> percentile of its peer EDFs, at the time of the financial crisis. Its EDF then dropped to levels below 1 % for the second half of 2009 and much of 2010, as a result of the construction boom generated from the government's stimulus package. For much of the same period, its EDF level was largely in line with the median EDF level of China Real Estate Group. Since March 2011, the company's EDF began to rise at a much faster rate than its peers: in mid-June it rose to 3%, surpassing the 75<sup>th</sup> percentile of its peer EDFs; by late September it reached the level of 8%, catching up with the 90<sup>th</sup> percentile of its peer EDFs. Since then, they have moved largely in lock steps and both peaked in late December 2011 around the level of 11%. After a short retreat until March 2012, Shanghai Zendai and the 90<sup>th</sup> percentile of the group began to diverge at an accelerating rate: over the course of less than two months from April 13 to June 7, Shanghai Zendai's EDF rose quickly from 9.37% to 15.74%. While over the same period the 90<sup>th</sup> percentile EDF level of its peers bounced between 7.5% and 9%. The diverging trend clearly shows that the model is signaling elevated default risk specific to Shanghai Zendai.

Moody's Analytics' research has shown that firms that underperform their industry sectors, regardless of the level of their EDF measure, experience higher default rates. Based on data from 1992 to 2011, we calculated one-year default rates conditioned on a firm's EDF level and on the relative EDF change 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. For ease of presentation, we bucketed EDF levels and change versus sector into ten equally sized categories (deciles). Hence, the trend of Shanghai Zendai's EDF measure versus its industry group showed the heightened risk of default for the company.

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

	EDF Change Relative to Industry Peer Group Change										ALL	
	1	2	3	4	5	6	7	8	9	10		
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%	

### Elevated Default Risk Led by Rising Leverage

An analysis of the drivers of the Shanghai Zendai's EDF metric sheds additional light on how and why the company became financially distressed over the last year. In this section we examine the drivers of Moody's Analytics' EDF model and how the EDF measure reflected the deterioration in Shanghai Zendai's credit quality. The EDF model shares many of the same basic approaches to measuring credit risk as fundamental credit analysis. Both approaches can be traced back to the analysis of company balance sheets, and they share common economic intuition in determining a firm's credit worthiness. The key difference between the two lies in their valuation principle – market value-based for EDFs versus accounting value-based for fundamental 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  $\sigma$ ), and its default point,  $X$ . The default point is derived from a firm's short and long-term liabilities, and reflects the notional debt payment due that would trigger a default. 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. In contrast, fundamental credit analysis cannot measure these economic drivers of default risk directly – the accounting value-based financial ratios are at best viewed as their proxies. 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.

There is a key link between the steep rise of Shanghai Zendai's EDF and its rising financial risk, i.e., a decrease in the numerator of the  $DD$  expression above. The smaller the difference between market value of assets and default point, the higher the market leverage, which, by construction, is simply the ratio of a firm's default point to its market value of assets. This in turn implies a higher likelihood of default within the prediction horizon. Essentially, the numerator of the  $DD$  expression is a measure of a firm's net worth in market value, a notion – albeit measured in accounting values – similarly used in fundamental credit analysis.

We demonstrate the link between the company's EDF and its financial risk by plotting the time series of the company's market value of assets, its default point, and its market leverage in Figure 4. The evolution of the company's EDF, to a large extent, parallels the movement of its market leverage. During the financial crisis of 2008, Shanghai Zendai experienced a decline in its market value of asset, while its default point was largely unchanged. This was translated into higher market leverage and consequently higher EDF. As the economy and the real estate sector in particular recovered from the financial crisis, its asset value rose quickly while its default point barely moved, so its EDF declined.

Starting from March 2010, both its market value of assets and default point rose at a quick pace, reflecting the company's strategy of aggressive expansion with borrowed money. The aforementioned acquisition of a prime lot in Shanghai's Bund is a case in point – the purchase price of the land was actually higher than its prior asset base. However, we note that the company's default point rose at a faster rate than its asset value – it is apparent that the gap between the two narrows as time passes. As a result, its market leverage

increases from roughly 38% in March 2010 to almost 90% in June 2012. In contrast, the median market leverage of its peer group is at about 42% in June 2012 and the 90<sup>th</sup> percentile of the same measure for its peer group stands at 68%. This comparison helps to clearly identify the source of the company's default risk. A 90% level of market leverage implies that the firm is barely solvent (on a market value basis). So it is not surprising that its default risk has become very elevated in recent months.

Figure 4: Shanghai Zendai's Market Leverage and its EDF

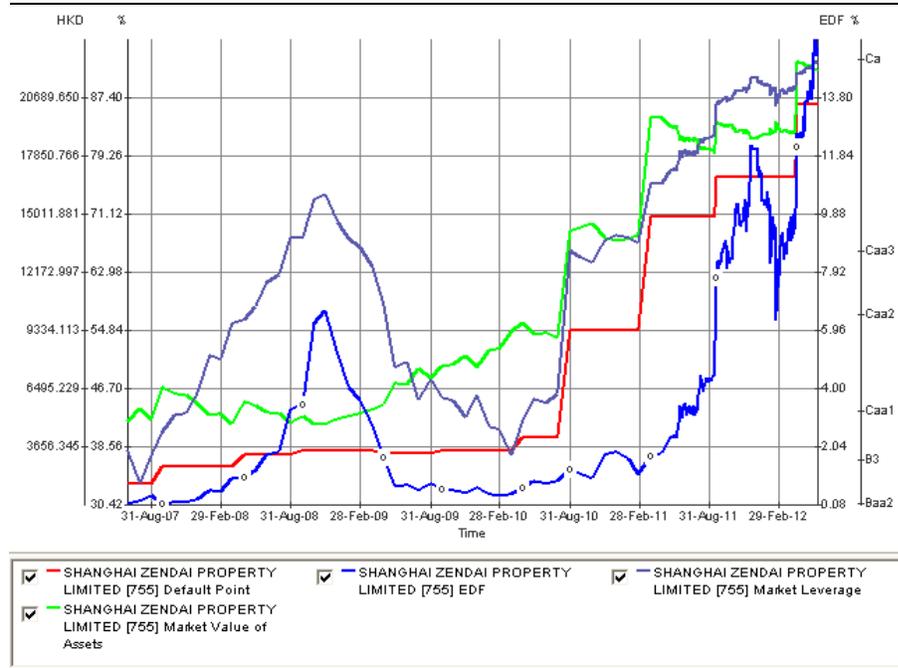
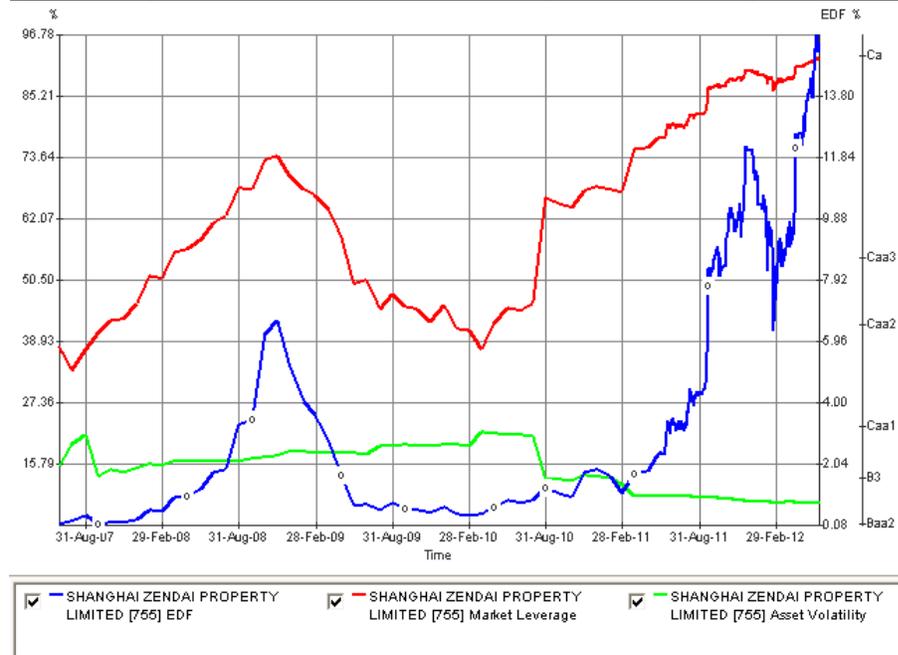


Figure 5: Shanghai Zendai's EDF Metric, Asset Volatility and Market Leverage



Another factor determining the level of *DD* (and EDF) is the firm's asset volatility, a measure of business risk. In the case of Shanghai Zendai, its asset volatility did not contribute to the rise of EDF. If anything, it actually helped offset the recent rise in its market leverage. In Figure 5, we show the company's asset volatility, along with its market leverage and EDF, over last five years. In the summer of 2010 the company's asset volatility dropped, and since 2011 its asset volatility has been very gradually declining. We can therefore conclude that the rise in Shanghai Zendai's risk of default has been wholly due to a sharp increase in financial leverage rather than a deterioration in its operating performance: the sharp rise in market leverage over the same period dwarfed the drop in asset volatility, and hence, lead to a substantial increase in its EDF.

### Summary

The EDF measure for Shanghai Zendai has largely tracked its peer group, China Real Estate Group, prior to March 2011. But since then its EDF has risen at a much faster pace than its peers. From March 31, 2011 to June 7, 2012, Shanghai Zendai's EDF rose from 1.73% to 15.74%, whereas the 90<sup>th</sup> percentile of its peer group EDF increases from 4.64% to 7.96% and the median EDF changed from 1.02% to 1.29%. The sharp rise in the company's default risk is partly attributed to its worsening operating environment, namely, China's slowed economic growth and tightened bank credit toward real estate investment. However, the accelerated rise in its EDF suggests that the company is experiencing particularly acute financial distress. The deteriorating EDF momentum in combination with worsening EDF performance relative to its peers makes the company one of the riskiness names in its peer group. By analyzing the behavior of the drivers to EDF measures, we find that the elevated default risk of the company is caused by its increasing market leverage – the company has borrowed at a faster pace than the increase of its market asset value.

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