

# The Application of the Emerging Market Score Model in China During the Global Crisis Period: A Countertrend

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The global economic crisis that blew up at the end of 2006 in the United States has had extremely negative impacts on the social, political, and economic fields. The countries operating in the most affected macro areas—the United States and Europe—have put through the wringer the domestic trade relationships as well as the international ones, by injecting a chain reaction into the global economic scenario. However, there are countries that seem to be free from the economic and financial contagion overflowing over the past years, as they are moved by an "invincible projection toward the growth". The present study aims to analyze how much the main emerging market of China has been effectively involved in this vicious circle. More specifically, the study intends to propose an empirical analysis on the real connection between the macroeconomic data and the strong structure of the Chinese publicly listed companies. This paper investigates the prediction of failure among 3,220 Chinese publicly traded companies (listed companies) during the global crisis period. By analysing the financial accounting data over the past seven years (2008 to 2014), the emerging market score (EMS) has been adopted in order to investigate the impact of the crisis on financial distress in the main emerging market of China. The results confirm the following hypotheses: On one hand, the great majority of companies have not been suffering the downturn, since 71.93% of the entire samples present no risk of financial distress during the global crisis; on the other hand, only 6.18% have a reasonable risk of financial distress.

*Keywords:* emerging market score (EMS), Altman's model, performance measurement, financial distress, global economic crisis

### Introduction

The global financial crisis of 2008 is considered by many economists to have been the worst crisis since the Great Depression of the 1930s. In today's global economic crisis, there is much concern associated in finding the best way to measure the likelihood of bankruptcy. Many studies provided a definition of "bankruptcy" (Ward & Foster, 1997; Van Caillie, 1999; Daubie & Meskens, 2002; Charitou, Neophytou, &

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Charalambous, 2004) and many quantitative models were based on "financial distress" criterion (Keasey & Watson, 1991; Hill, Perry, & Andes, 1996; Kahya & Theodossiou, 1996; Doumpos & Zopoudinis, 1999; H. D. Platt & M. B. Platt, 2002) or on other financial distress events, such as cash-flow insolvency (Laitinen, 1994), loan default (Ward & Foster, 1997), capital reconstructions, informal government support, and loan covenant renegotiations with banks (Taffler & Agarwal, 2003). The aim of this study is to demonstrate whether the global economic crisis has not such an impact on Chinese scenario. This research derives from the intention of examining an emerging market with a huge economic improvement, despite that the global crisis led to different reactions in the worldwide. For the above purpose, the Altman model for emerging countries (the emerging market score—EMS) (Altman, Hartzell, & Peck, 1995) has been applied to the entire population of publicly traded companies belonging to the manufacturing and non-manufacturing industries which operate in China. In this study, China has been chosen, because it represents the main emerging market. In the light of the above, the study found that there is no significant number of Chinese manufacturing firms under financial distress. This is mainly due to Chinese scenario which has shown positive findings because of the growing domestic demand as well as the gross domestic product (GDP). At this point, the application of Altman's EM score confirms the real economic situation of Chinese scenario. The EMS' results met the expectations, since they show high values (mostly far from the threshold of 0) and it is in line with the fact that the majority of publicly traded companies in China recorded a perfect rating of credit risk. The present study contributes to the literature in the following way. The recent crisis has pushed many businesses, either large or small, into bankruptcy or near bankruptcy. Given the current economic environments and potential future global economic downturns, there is an urgent need for a deeper understanding of the reasons behind the Chinese success, in spite of the global crisis. Several studies have been conducted on financial distress using Z-scores and other discriminant analysis tools in Chinese market (Wang & Campbell, 2010a; Zhang, Altman, & Yen, 2010). Although several studies concentrated on the Chinese listed companies, this study provides an application of the EMS in China during the global crisis period. However, the impact of microeconomics, macroeconomics, and institutional factors of financial distress has been already studied over the period from 1995 to 2006 (Bhattacharjee & Han, 2014). In particular, they pointed out that financial distress is influenced by firm characteristics, macroeconomics instability, and institutional factors. This investigation on financial distress during a different period of macroeconomic instability, such as the global crisis period, takes into consideration

the entire population of listed manufacturing and non-manufacturing firms. Considering that the analysis presents an approach to the study of the likelihood of corporate bankruptcy in China, country in an ongoing economic expansion, the hypothesis addressed in this study is the following:

 $H_0$ : There are a significant number of manufacturing and non-manufacturing Chinese listed firms with no risk of financial distress.

This is mainly due to the Chinese scenario which has shown a massive development, in spite of the global crisis. According the macro-economic data, Chinese listed firms expected to show EMS results which are way far from financial distress conditions.

In the first section, the economic background of China is provided in detail. The main goal is to highlight the macro-indicators to be put in relation with the empirical results of this study. In the second section, the prior literature and the different versions of Altman's model<sup>1</sup> are shown. In the third and fourth sections, the

<sup>&</sup>lt;sup>1</sup> Indeed, it has been modified in order to be more adaptable to different scenarios.

sampling process and the research methodology are presented as well as the empirical findings. The fifth and last sections provide conclusions and comments to the paper along with several suggestions for further research.

## China: Economic Outlook During the Global Economic Crisis

In order to develop a comprehensive analysis on a country's economic scenario, it is important to take into account many factors that indicate the business evolution accomplished by the companies over time.

According to Guatri's perspective (1998), this analysis cannot disregard the macroeconomic environment within which companies operate. If possible, this analysis should be framed in social, political, institutional, ecological, and ethical aspects by developing geopolitics and geo-economics background.

This preliminary investigation is even more essential, if authors consider the case of the BRICs<sup>2</sup>, and more specifically their "standard for excellence", China, which belongs to a far larger context. These countries have occupied the global economic scenario over the last decade, highlighting the impressive growth that has marked them.

In the economic and financial crisis that has engulfed their business partners, the BRICs have demonstrated a singular temperament within the global context in which they operate.

Unlike other major nations, China was the first to recover from the economic downturn (Ji, 2010). Consequently, it is proper to address: How can BRIC countries become invulnerable to the wave of crisis that has invested the most important macro areas? Yet, is this economic strength real? Nevertheless, in a widely interconnected world, it is impossible to believe that certain countries can be totally immune from generalised crisis conditions.

Since the end of the 70's, China has chosen to follow a path of peaceful growth through a system of international relations that led the Chinese giant to hold about  $\notin$ 1,250 billion of American public debt, according to estimates of November 2014 (Fabbri, 2015).

However, this is just one aspect of a wider project regarding the development of energy resources as well as sustainability and expenditure reduction of raw materials in industrial processes. In the light of the above, it is framed in a context of dynamic economic progress with new solutions to improve both internal social conditions and the wider respect of environmental protection.

In this last regard, China has emerged in the context of BRICs showing a massive adaptability to unstable international conditions and to economic needs.

Although there is no possibility to remain untouched by the effects of the global crisis, there are still more suitable conditions for development and economic profitable choices compared to the western countries. The chance to operate within a market with preferential treatments but also competitive in terms of lower costs of production factors (i.e., raw materials, wages, and utilities) provides basic conditions for the development of companies and for the subsequent performance, more particularly for those with an international profile.

Indeed, they not only can take advantage of low production costs and tax breaks, but can also benefit from the high prices of sale featuring more developed markets. This is the basic principle by which many Western companies with a high transnational profile at the beginning of the 70s have developed offshore production processes, moving almost entirely from their country of origin.

<sup>&</sup>lt;sup>2</sup> BRIC is the acronym that refers to the countries of Brazil, Russia, India, and China, which are all deemed to be at a similar stage of newly advanced economic development. It is typically named as "the BRICs" or "the BRIC countries" or alternatively as the "Big Four".

Another fundamental point consists of the strategic political-economic choices.

People from all over the world have been living in an interconnected business environment and this means that companies as well as governments should always be very careful about choosing their trading partners with which they operate from either an economic or political perspective.

An example consists in quantitative easing programs promoted by the Federal Reserve Bank for recovering a compromised financial situation caused by the practice of speculation.

In support of a compromised economic situation, in which the chain reaction spread over the real economic, the decision of the Federal Reserve Bank was to promote a capital injection so as that the recovery of the real economy would align the financial rescue.

However, according to the McKinsey Global Institute, this programme has not had the real effects predicted by scholars and then spread over civil society, but it is leading to evident risks. This because, although the "Quantitative Easing" programme aims at increasing the interest rate and so the return of the advanced countries, the investors are more willing to invest in emerging countries. Investors still search for yields higher than the ones offered by the advanced countries. Consequently, capital flows increase in emerging countries where more favourable conditions are, for example, thanks to the substantial variation of investment that has characterized the emerging countries, from US \$92 billion in 2007 to US \$264 billion in 2012 (McKinsey Global Institute, 2013). Nevertheless, the distortion of the investment portfolios hides many risks and cannot be considered just as a change in the usage of capital. These overwhelmed risks may be identified in the weaknesses of the domestic demand which has been replaced by the emerging market opportunities: Sudden withdrawals could lead to difficult macroeconomic conditions and serious credit risk. This scenario could be even worse if the Federal Reserve Bank stopped the "Quantitative Easing" practice.

Summing up, BRICs did experience the effects of crisis but still with less trouble compared to the western and more advanced economies, thanks to the indirect injection of capital above mentioned.

At this point, it is proper to argue what political and economic choices, BRICs, especially China, made. BRICs establish a new bank for the development (the so-called New Development Bank), in order to avoid flattening on International Monetary Fund (IMF) and World Bank decisions. Once explained how BRICs avoided the majority of effects of the global financial crisis, the study goes to analyse where BRICs' (China in the lead) real economic strength originates from. During the period from 2000 to 2014, China showed a massive growth in economic data compared to the whole world.

Figure 1 indicates the extraordinary growth featuring China's nominal GDP in comparison with other BRICs. The survey shows that, on one hand, the GDP has reached US \$9,494.59 billion from 2000 to 2013, while the forecasts estimated the GDP overtook US \$10 trillion in 2014. On the other hand, the GDP growth of Russia, Brazil, India, and South Africa is sharply lower: between US \$1 and \$2 trillion during the same period. Further analysis made during 2014 (Central Intelligence Agency, 2015) demonstrates that China's GDP at 2013 is composed by and used as follows:

- 36.8% household consumption;
- 14% government consumption;
- 46% investment in fixed capital;
- 1.1% investment in inventories;
- 23.9% exports of goods and services;
- 21.7% imports of goods and service.



*Figure 1.* China's GDP in comparison with other BRIC countries, values in U.S. dollars (billions). Source: Own elaboration on World Economic Outlook's data by IMF.



*Figure 2*. China's GDP for current prices and GDP deflator. Source: Own elaboration on World Economic Outlook's data by IMF.

However, it is also interesting to observe the growth rate year by year featuring the China's GDP as well as the comparison between the GDP for current price and GDP deflator in China (Figure 2).

Through the analysis of Table 1, different series of values featuring the period during the global crisis can be determined.

According to the above table, each sector of GDP has always reached a positive annual variation from 2009 to 2014, even if the growth rates slightly decrease. By going into details, public and private consumption touched their highest point respectively in 2009 with 30.5% and 2011 with 10.6% and these data confirm an

ongoing growth. This is because Chinese economic growth has always been stimulated by high government investments that confirm the success of a country whose urbanization rate has been fast for more than 40 years. In addition, the highest single point of industrial production was in 2010 of 15.70%. Moreover, it is proper to highlight the data of import and export whose maximum value was, respectively, 31.30% and 38.70% both in 2010. Export is one of the most important "cash machine" of the Chinese economy. As a matter of fact, China is the major importer of the United States as well as the major owner of the United States public debt (Fabbri, 2015). This was reflected and confirmed by the high surplus of the balance of trade.

Even if characterized by a slow growth during the crisis period, those areas have never shown negative values. In this last regard, it is not possible to talk about recession during the crisis period. Despite the amazing growth of China that has its roots in the 70s, the consequences of the crisis itself did affect the Chinese economy mainly because of the export-oriented nature of the economy, making its dependence on international trade and commerce greater and greater over the years (Wang & Campbell, 2010b). This point is confirmed by the negative variation of import and export during the first step of crisis (2008) respectively with -11.2% and -16%. This could be the significant data expressing a sort of initial negative influence from international economic instability. According to Bibow (2012), China carried out two important policies. First, Chinese government acted as a growth leader in the global recovery by boosting domestic demand to offset the slump in exports. Then, they strengthened private consumption. Following these brief premises, the present investigation intends to clarify through an empirical investigation, if the macroeconomic data really reflect the current strong economic condition in China, more particularly of Chinese publicly traded companies.

Although the global financial crisis has contracted capital inflows and private investment and the consuming of durable goods declined, there was no fundamental damage to China's economy.

	2009	2010	2011	2012	2013	2014	
GDP (annual year %)	9.20%	10.50%	9.30%	7.70%	7.70%	7.40%	
Private consumption	11.40%	10.60%	14.60%	10.10%	8.80%	8.10%	
Government consumption	30.50%	24.50%	24.00%	20.60%	19.60%	18.10%	
Industrial production	11.00%	15.70%	13.90%	10.00%	9.70%	9.20%	
Public debt	17.70%	16.80%	15.20%	14.90%	15.60%	16.10%	
Export	-16.00%	31.30%	20.20%	8.00%	7.90%	6.90%	
Import	-11.20%	38.70%	25.00%	4.30%	7.30%	7.30%	

#### Table 1 China's Economic Data

Source: Own elaboration on Focus Economics' data.

## Literature Review and Following Contributions

#### **Prior Literature**

A substantial volume of literature has focused on financial distress. Many scholars have investigated on business failure prediction: The pioneers were Beaver (1966) and Altman (1968).<sup>3</sup> By using a univariate approach, Beaver (1966) showed that five years prior to bankruptcy, insolvent companies presented a decrease in sales volume, a decrease in cash flow and income levels, and growing debt compared to healthy companies.

<sup>&</sup>lt;sup>3</sup> The first attempted to use the behaviour of financial ratios for predictive purposes based on statistical univariate approaches, characterised by the separate observations of various financial ratios in the years immediately prior to the bankruptcies of companies compared with those of sound firms (Hickman, 1957).

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Altman (1968), through a multivariate discriminant analysis, found that the financial ratios of healthy companies were different from those companies that are insolvent as well as this diversity became progressively stronger as the date of bankruptcy approached. Since the initial work of Altman (1968), the number of studies on business failure prediction has seen an exponential increase. From the work of Beaver (1966) until 2007, there were more than 165 related models published in English alone (Bellovary, Giacomino, & Akers, 2007). Kosmidis and Stavropoulos (2014) pointed out that in the following decades after Altman's contribution, academics were concentrated on maximising the accuracy and predictive power of their models (Altman, Haldeman, & Narayanan, 1977; Altman, 1984; Johnsen & Melicher, 1994) and testing these models in different industry sectors and markets (M. J. Peel & D. A. Peel, 1988; Keasey, McGuinness, & Short, 1990; Tamari, 1984; Ugurlu & Aksoy, 2006). Charitou et al. (2014) resumed the subsequent extensions including: (a) the assignment of prior probability membership classes (Deakin, 1972); (b) the use of a more appropriate quadratic classifier (Altman et al., 1977); (c) the use of cash flow-based models (Casey & Bartczak, 1984); (d) the use of quarterly information (Baldwin & Glezen, 1992); and (e) the use of current cost information (Aly, Barlow, & Jones, 1992).

In 1980, Ohlson employed a logistic regression in order to predict business bankruptcy, a technique that avoids some of the problems of the multiple discriminant analysis (MDA) approach. Extensions to Ohlson's technique (1980) include the development of industry-specific models (H. D. Platt, M. B. Platt, & Pedersen, 1994) as well as the adoption of a multinomial logit approach to reduce misclassification error by adding to the outcome space used to predict bankruptcy, a "weak" state of financial distress (Johnsen & Melicher, 1994). M. J. Peel and D. A. Peel (1988) and, consequently, Keasey et al. (1990) investigated whether it was possible to discriminate simultaneously between healthy and failing firms for a number of reporting periods prior to failure, by applying multi-logit models. Lennox (1999) validated that the industry sector, company size, and the economic cycle have substantial effects on the likelihood of business bankruptcy. Those kinds of companies are expected to increase when the company in question is unprofitable, is largely leveraged and without liquidity problems.

Since Beaver (1966), Altman (1968), and Ohlson (1980), the financial ratios have become a vital element of failure prediction methods. According to Wu (2010), financial ratios can be categorized according to several aspects in order to measure the business performance or competence of a firm, for example, financial ratios can be used to measure a firm's profitability, liquidity, capital structure, and efficiency. Huang, Tsai, Yen, and Cheng (2008) pointed out that financial ratios are relevant tools in prediction bankruptcy and they are also commonly used to develop the models or classifiers.

Altman (2005) has employed a new version of his original model: the EMS model. This is an enhancement of the revised Altman's score model (Z' score) (Altman, 1993), resulting in an EMS and its associated rating. This rating was modified according to three main factors: the firm's vulnerability to currency devaluation, its industry affiliation, and its competitive position in the industry (Altman & Hotchkiss, 2006).

According to Altman (2005), the EMS requires the firm to have publicly traded equity and it is primarily for manufacturing firms. In the following decades of experience in testing and using the EMS for a variety of purposes, the original model has been modified and adapted in order to make it applicable for private companies and non-manufacturing companies. The following sub-paragraph shows how the model's version has been changed and makes it more adaptive to different scenarios.

#### **Altman's Model Versions**

The original Altman's model (1968) has been revised along the way in order to make it more reliable and applicable to most of cases. This original study of Altman (1968) considered two groups of companies of the same size and, basis on a linear relationship, identified five variables for each subject in the sample. These, weighted by coefficients, give rise to a score that should be noted the proximity to a group, rather than the other. The variables are five financial ratios covering the areas of profitability, liquidity, and solvency. The model has been revised several times by Altman (1984; 1993; 2005) who has constantly updated the parameters and adapted indices in different populations. In 1993, Altman proposed a revise of his original model which consists of an adjustment in order to make it suitable for the manufacturing listed companies. In the original model, the cut-off is equal to 2.67 but, after the revision, the area of uncertainty is between 1.23 and 2.90. A score lower than 1.23 indicated a high likelihood of failure and a higher score than 2.90 shows a lower likelihood of failure and the area in between indicates uncertainty.

In the later model revision of Altman (1993), the retained earnings were replaced by the proxy "net profit" (retained earnings + dividends). In addition, market value of equity (MVE) was replaced by the book value of equity (BVE) concentrating on only financial statements. This was made by Altman (1993) and resumed by Altman, Danovi, and Fallini (2013) in analysing Italian companies subject to extraordinary administration.

 Table 2

 Original and Revised Z-score Based on Altman (1968: 1993)

Original Z-score		Revised Z-score		
Coefficient	Ratio	Coefficient	Ratio	
1.2 Working capital/total assets		0.717	Working capital/total assets	
1.4 Retained earnings/total assets		0.847	Retained earnings/total assets	
3.3 Operating profit (EBIT)/total assets		3.107	Operating profit (EBIT)/total assets	
0.60 MVE/total liabilities		0.420	BVE/total liabilities	
0.99 Sales revenues/total assets		0.998	Sales revenues/total assets	
Original- $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.60X_4 + 0.99X_5$		Revised- $Z = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$		

Source: Own elaboration.

Another version of Altman's model was made in 1995. Altman et al. (1995) introduced it for the non-manufacturing and manufacturing companies operating in developing countries and they investigated a sample of Mexican companies. They called the new model as EMS. The variables of the EMS were the same as the revised Z-score with the exclusion of the variable  $X_5$  (sales revenues/total assets) in order to filter the function from the possible distortion related to the sector and country. Thus, the weighted coefficients are presented as follows.

Table 3EMS Based on Altman et al. (1995) and Altman (2005)

Coefficient	Ratio
6.56	Working capital/total assets
3.26	Retained earnings/total assets
6.72	Operating profit (EBIT)/total assets
1.05	BVE/total liabilities
$EMS = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.0$	)5X <sub>4</sub> + 3.25

Source: Own elaboration.

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Several studies have been conducted on financial distress using Z-scores and other discriminant analysis tools in Chinese market. Some of these studies are made by Wang and Campbell (2010a). In the first contribution, they provided an evidence of failure prediction power of various Z-score models using Chinese publicly traded companies. In another investigation, they also expanded the application of Ohlson model (1980) to Chinese listed companies. In doing so, they provided applicable measures for predicting firms delisting events in China stock markets. In addition, Zhang et al. (2010) developed a model called  $Z_{CHINA}$  score to support identification of potential distress among listed firms in China.

In the light of the above investigations, the previous studies, regarding Chinese listed companies, missed to examine companies which are not included in a stock exchange market. For this reason, the authors overcame the literature gap by applying the Altman's model (2005) for emerging countries to Chinese listed companies.

When it comes to analysing the financial distress causes, several scholars found that firms with higher top management turnover have higher default risk (Wei, 2011). In this study, the Altman's model (2005) for emerging countries (EMS) has been used within all the manufacturing and non-manufacturing Chinese publicly traded companies during the global financial crisis period (2008-2014). This is with the purpose of identifying and grouping companies in the three different zones (distress, grey, and safe) in order to predict business failure during the global economic crisis.

## Sampling Process and Research Methodology

Financial accounting data were gathered from Orbis Bureau Van Dijk database. For each of the selected companies, all the appropriate ratios required by EMS model were computed.

For the data collection, the coding sheet was developed on an Excel spreadsheet, including the name of the company, the financial accounting data required for computing the EMS: working capital, total assets, net profit, operating profit (EBIT), BVE, total liabilities, and sales revenues.

The final EMS of the firm i was computed as the average of all of its EMS obtained from 2008 to 2014.

$$\text{EMS}_{i} = 6.56 \times \frac{\text{WC}}{\text{TA}} + 3.26 \times \frac{\text{RE}}{\text{TA}} + 6.72 \times \frac{\text{EBIT}}{\text{TA}} + 1.05 \times \frac{\text{BVE}}{\text{TA}} + 3.25$$

where WC is working capital; TA is total assets; RE is retained earnings<sup>4</sup>; EBIT is earnings before interest and taxes (operating profit); BE is BVE (shareholders' funds); TL is total liabilities computed as current liabilities + non-current liabilities; and 3.25 is a constant.<sup>5</sup>

These companies are observed over a period of seven years from 2008 to 2014. The original population of Chinese listed companies is composed by 4,127. The analysis excluded 907 companies with no financial data available (907 in total) covering the 78.02% of the entire population (3,220 out of 4,127). Tables 4 and 5 show, respectively, the sampling process selection and the frequency of companies in each industry.

The EMS is based on fundamental financial review derived from a quantitative risk model as well as on Altman's evaluations (2005) of specific credit risks in the emerging market in order to arrive at a final modified rating (Table 6). By analysing the rating from in depth data corporation financial statements, Altman and Hotchkiss (2006) proposed the average EMS and equivalent rating and it has been elaborated in Table 6 as follows.

<sup>&</sup>lt;sup>4</sup> The retained earnings were computed as net profit less ordinary dividends. This account has been proxied by the value of net profit since no financial data were available.

<sup>&</sup>lt;sup>5</sup> In computing the EMS, Altman et al. (1995) and Altman (2006) proposed to add a constant (+3.25) in order to standardize the results. Scores that are equal or less than 0 would be equivalent to the default situation.

Table 4

Sample Selection Process

Country	China
Standardized legal form	Publicly traded companies (listed)
Industry sector	All industries
Sample coverage	78.02%

## Table 5

### Sample of Industries Examined

Industries	Companies	%
A—Agriculture, forestry, and fishing	62	1.50%
B—Mining and quarrying	68	1.65%
C—Manufacturing	2,419	58.61%
D-Electricity, gas, steam, and air conditioning supply	80	1.94%
E-Water supply; sewerage, waste management, and remediation activities	20	0.48%
F—Construction	73	1.77%
G-Wholesale and retail trade; repair of motor vehicles and motorcycles	572	13.86%
H—Transportation and storage	101	2.45%
I—Accommodation and food service activities	24	0.58%
J—Information and communication	253	6.13%
K—Financial and insurance activities	53	1.28%
L—Real estate activities	80	1.94%
M-Professional, scientific, and technical activities	144	3.49%
N-Administrative and support service activities	65	1.57%
O-Public administration and defence; compulsory social security	5	0.12%
P—Education	2	0.05%
Q—Human health and social work activities	6	0.15%
R—Arts, entertainment, and recreation	16	0.39%
S—Other service activities	8	0.19%
TOTAL	4,051	98.16%
Companies with missing values	76	1.84%
TOTAL	4,127	100.00%

## Table 6

EMS and Equivalent	<i>Rating</i> <sup>6</sup>
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	EMS score	Rating
	> 8.15	AAA
	7.6-8.15	AA+
	7.3-7.6	AA
	7-7.3	AA-
Safe zone	6.85-7	A+
	6.65-6.85	А
	6.4-6.65	A-
	6.25-6.4	BBB+
	5.85-6.25	BBB

<sup>6</sup> Inspired by Altman et al. (1995) and Altman (2006).

	EMS score	Rating
	5.65-5.85	BBB-
	5.25-5.65	BB+
Crow zono	4.95-5.25	BB
Grey Zolle	4.75-4.95	BB-
	4.5-4.75	B+
	4.15-4.5	В
	3.75-4.15	В-
	3.2-3.75	CCC+
Distress zone	2.5-3.2	CCC
	1.75-2.5	CCC-
	< 1.75	D

Table 6 continued

Source: Own elaboration.

# **Empirical Results**

## **General Findings: Categorization of EMS**

Table 7

Results on Average EMS

Average EMS of	class (2008-2014)	Rating	Number of Chinese listed companie	es %
	> 8.15	AAA	1,080	33.54%
Safe zone	7.6-8.15	AA+	297	9.22%
	7.3-7.6	AA	176	5.47%
	7-7.3	AA-	181	5.62%
	6.85-7	A+	77	2.39%
	6.65-6.85	А	111	3.45%
	6.4-6.65	A-	126	3.91%
	6.25-6.4	BBB+	74	2.30%
	5.85-6.25	BBB	194	6.02%
Companies in "	'safe zone''		2,316	71.93%
	5.65-5.85	BBB-	99	3.07%
	5.25-5.65	BB+	182	5.65%
Crow come	4.95-5.25	BB	131	4.07%
Grey zone	4.75-4.95	BB-	87	2.70%
	4.5-4.75	B+	91	2.83%
	4.15-4.5	В	115	3.57%
Companies in "	grey zone"		705	21.89%
	3.75-4.15	В-	98	3.04%
	3.2-3.75	CCC+	54	1.68%
Distress zone	2.5-3.2	CCC	23	0.71%
	1.75-2.5	CCC-	7	0.22%
	< 1.75	D	17	0.53%
Companies in "distress zone"			199	6.18%
Total companie	es		3,220	100.00%

Source: Own elaboration.

The general findings of EMS model for China, conducted on manufacturing and non-manufacturing Chinese publicly traded companies, were compared and reported in Table 7 which shows the allocation of the

average EMS (period from 2008 to 2014) in the three zones (safe, grey, and distress). It is also important to note that this analysis is an application of the EMS model elaborated by Altman et al. (1995) and reviewed by Altman (2005). This means that the parameters of this study derives from the EMS and provides a final value of EMS for Chinese listed companies. Descriptive statistics for each independent variable and EMS are presented in the Appendix.

This is what emerged from the results:

In total, on one hand, 6.18% have a high likelihood of financial distress over the past seven years (global crisis period), since only 199 companies out of 3,220 show an EMS less than 4.15. On the other hand, the overwhelming majority (71.93%) of Chinese publicly traded companies achieve an EMS greater than 5.85, so that they can be considered "safe".

The remaining group of Chinese publicly traded companies which covers 21.89% belongs to the "grey zone", since 705 companies out of 3,220 show an EMS between the values of 5.85 and 4.15. It is further important to note that, on one hand, 33.54% of Chinese companies present a rating of AAA meaning the minimum level of risk; on the other hand, only 0.53% of companies show the maximum level of risk (rating D). This confirms that the main emerging market of China seems to be free and invulnerable from the economic and financial contagion overflowing over the past years of economic crisis. The above analysis demonstrates that Chinese companies have not been suffering the global economic crisis, while the vast majority of countries in the world are not able to react.

## Conclusions

The contribution of this study is to shed further light on how relevant is the opposite impact of the recent economic crisis, in China.

As mentioned above, several studies highlighted the bankruptcy prediction model applied to Chinese listed companies (Wang & Campbell, 2010a; 2010b; Zhang et al., 2010). They missed to examine companies which are not included in a stock exchange market. For this reason, the study overcame the literature gap by applying the Altman's model for emerging countries to the Chinese listed companies.

The results seek to evaluate the impact of global financial crisis on Chinese manufacturing and non-manufacturing publicly traded companies. As demonstrated in this study with the EMS (Altman et al., 1995; Altman & Hotchkiss, 2006), the Chinese scenario is composed by the 68.86% of the entire sample with no risk of financial distress during the global crisis, and only 9.47% has a reasonable risk of financial distress.

Although the study is reliable, several important limitations still exist. Two important limitations should be taken into consideration when it comes to applying the research findings. At first, the prediction of bankruptcy model of Altman (2005) depends on EMS values lower than 1.75, in between 4.15-5.85 and higher than 5.85. Since the findings depend on EMS values, this could make the research findings less reliable, because they are strongly linked to the scores and, so, the model provides little flexibility. Secondly, the period of the global financial crisis is debatable, since it could vary from country to country. The period is based on the trend in GDP worldwide: As the GDP trend shows that there is a huge drop in 2008, this analysis assumes it overlaps with the beginning of the crisis.

To conclude, the inferences are based on comparisons of financial metrics within the broad sample (78.02%) of manufacturing and non-manufacturing publicly traded firms in China.

#### Area for Further Study

There are considerable aims for future studies along this research stream above discussed:

• Examining the EMS of other further emerging markets: In addition to the emerging economy China that has been analysed in this study, Brazil, Russia, and India could be investigated. At the same time, it would be useful to check whether the different findings of BRIC countries achieve similar or opposite results;

• Comparing two countries with different economic scenario (i.e., emerging markets and countries with a huge economic recession, such as Italy, Spain, or Greek);

• Assessing the likelihood of bankruptcy occurring in manufacturing sub-industries and in other sectors such as banking and insurance sectors;

• Exploring each indicator of Altman (2005) in order to provide an insight into specific issues that companies are dealing with.

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		$X_1$ (workin	g capital/total assets	)	
	Ν	Min	Max	Mean	Std. Dev
year_2014	3,220	-0.314	0.893	0.199	0.143
year_2013	3,220	-132.929	0.850	0.165	2.353
year_2012	3,220	-1.391	0.881	0.204	0.179
year_2011	3,220	-91.500	0.931	0.167	1.626
year_2010	3,220	-0.740	0.923	0.186	0.155
year_2009	3,220	-5.972	0.864	0.189	0.185
year_2008	3,220	-4.867	0.934	0.201	0.175
		$X_2$ (retained	l earnings/total asset	s)	
	Ν	Min	Max	Mean	Std. Dev
year_2014	3,220	-9.498	8.380	0.013	0.232
year_2013	3,220	-14.583	12.867	0.025	0.418
year_2012	3,220	-2.066	3.286	0.029	0.126
year_2011	3,220	-2.156	22.005	0.045	0.404
year_2010	3,220	-5.298	2.637	0.037	0.145
year_2009	3,220	-6.147	12.762	0.044	0.280
year_2008	3,220	-20.038	6.163	0.025	0.401
		X <sub>3</sub> (E	BIT/total assets)		
	Ν	Min	Max	Mean	Std. Dev
year_2014	3,220	-1.004	0.448	0.044	0.057
year_2013	3,220	-27.133	0.767	0.040	0.488
year_2012	3,220	-1.937	0.951	0.056	0.085
year_2011	3,220	-0.902	1.515	0.072	0.096
year_2010	3,220	-1.066	2.246	0.076	0.091
year_2009	3,220	-4.109	0.763	0.072	0.134
year_2008	3,220	-2.142	0.705	0.079	0.100
		$X_4$ ( <b>BV</b>	E/total liabilities)		
	Ν	Min	Max	Mean	Std. Dev
year_2014	3,220	-0.736	109.343	2.831	4.007
year_2013	3,220	-1.000	124.485	2.602	5.109
year_2012	3,220	-182.932	89.634	2.652	5.933
year_2011	3,220	-1.000	140.234	2.863	5.536
year_2010	3,220	-0.981	147.723	3.014	6.031
year_2009	3,220	-0.982	578.469	2.045	10.568
year_2008	3,220	-0.990	170.000	1.737	3.795
			EMS		
	Ν	Min	Max	Mean	Std. Dev
year_2014	3,220	-20.829	119.597	7.865	4.399
year_2013	3,220	-934.262	135.714	7.413	17.703
year_2012	3,220	-185.872	100.041	7.843	6.391
year_2011	3,220	-597.353	151.451	7.988	12.287
year_2010	3,220	-15.606	160.977	8.262	6.454
year_2009	3,220	-48.875	611.633	7.267	11.280
year_2008	3,220	-95.813	182.833	7.009	4.668

Appendix A—Descriptive Statistics of Variables X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub> and EMS