Influencing Factors Study on Green Development Using Principal Component Analysis and Factor Analysis

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Abstract. The rapid economic development and high incidence of crises in emerging economies make them play an increasingly important role in the transmission of global financial risks. As a new trend in the development of the financial industry, the development of green finance also indicates the direction of the future development of the financial industry. Faced with the increasingly concerned environmental issues, it is necessary for emerging economies, mainly represented by developing countries, to learn from the experience of developed countries in this field. In this paper, principal component analysis (PCA) and factor analysis (FPM) are applied to study the factors influencing financial fragility of emerging economies at different stages of development, and then the degree of fragility is analyzed and compared. The empirical results show that there are differences in the influencing factors of financial fragility in emerging economies at different stages of development. For middle- and low-income economies, credit security, social stability and the development of capital market are the priorities they should consider at present. For the Middle- and high-income economies, we should be alert to the malignant changes in a certain indicator. For high-income economies, macroeconomic stability is the focus of their financial security. The research results provide a basis for the emerging economies to reduce economic vulnerability according to local conditions, which is of great significance to avoid the outbreak of global financial crisis.

1. Introduction
In the wake of the 2008 financial crisis, developed economies have been unable to boost economic growth, while emerging economies have been booming, contributing over 50% to world economic growth and becoming an important force in promoting world economic growth. However, emerging economies are generally facing difficulties such as increasing pressure for transformation, increasing inflationary pressure, rising overall debt level, frequent financial market turbulence and accumulation of financial fragility. In addition, the environmental risk brought by the deterioration of the ecological environment has a significant impact on the stock, bond, credit assets and real estate by making asset prices fall and supply chain disruptions, thus threatening the financial stability and security. According to the statistics of IMF, from the 1970s to the 1990s, there were 234 crises around the world, among which 174 occurred in emerging economies, accounting for 74.36 of the total number of crises. In the
context of globalization, all countries in the world are more and more closely connected. The financial crisis that breaks out in one country tends to spread to other countries through trade, finance and other channels and leads to the financial fragility of each country keeps accumulating and further evolves into a global financial crisis. The rapid development and high incidence of crises of emerging economies make them play an increasingly important role in the transmission of global financial risks. However, there is still a gap in the level of economic development among different economies within emerging economies. For emerging economies at different stages of economic development, there are also some differences in the factors affecting their degree of financial fragility. Therefore, it is of great theoretical and practical significance to study the factors influencing the financial fragility of emerging economies at different stages of economic development to reduce the degree of vulnerability and prevent the occurrence of systemic financial crisis.

At present, the synthetic index method of macroeconomic and financial indexes is used to measure the financial fragility at home and abroad. Liu and Zhang use BSF (Banking Sectors Fragility) to measure the fragility of China's system. Here, the BSF is average value of standardization values of CPS (the annual velocity of variation of total actual financial claim of banking system for private sector), FL (the annual velocity of variation of actual foreign debts of banking system) and DEP (the annual velocity of variation of actual deposit of banking system) [1]. Tymoigne uses the following indicators to construct a measure of financial vulnerability, namely, home mortgage of households relative to gross domestic product (GDP) (L), home price index (P), mortgage – financial-obligation ratio or interest – obligation ratio (MOR), the proportion of home equity loans in all mortgages (HELOC), the cumulative value of home equity withdrawals relative to outstanding mortgages (HEW), the proportion of cash-out refinance mortgages among refinance mortgages (COR), and the ratio of mortgage debt to monetary assets (MMR) [2]. Sensoy et al. combined principal component analysis method and dynamic conditional correlation analysis method, and proposed a new financial fragility index framework for emerging market countries from the perspective of five major variables: stock market, exchange rate, credit default swap, overnight interest rate between Banks and long-term government bond yield [3]. Berger et al. used principal component analysis and regression analysis to measure vulnerability, and used VIX, default spread, term spread and three-month Treasury bills to measure market stress, and found that taking market stress and vulnerability into consideration at the same time can improve the information content of risk measurement [4]. Polat and Ozkan developed the high-frequency (daily) financial stress index for Turkey by using the CISS method based on DCC-GARCH, which is composed of 13 daily financial market indicators [5]. Chadwick and Ozturk aggregate five different markets, i.e. the money market, the bond market, the foreign exchange market, the equity market and the banking sector, by using a variety of techniques, including principal component analysis (PCA), basic portfolio theory, variance equal weights and the Bayesian dynamic factor model [6]. Miglietta and Venditti develop a measure of systemic stress for the Italian financial markets that aggregates information from five major segments of the whole financial system, i.e. the money market, the bond market, the equity market, the foreign exchange market and the market for stocks of financial intermediaries [7].

In terms of influencing factors of financial fragility, Nilsen and Rovelli believed that for a given fundamental change, a sudden reversal of capital flow would make investors more inclined to avoid risks and withdraw capital subsequently, and then increasing financial fragility [8]. Armand and Foujeuie took 26 emerging economies as samples and compared the quarterly data of 13 inflation target countries and non-target countries from 2000 to 2010. They found that compared with non-target countries, countries with inflation target were more vulnerable to financial shocks and their financial vulnerabilities were relatively stronger [9]. Rhee and Kim use panel data from 68 countries from 1973 to 2010 to study whether the widening of income gap will lead to banking crisis. The results show that in developing countries, with the increase of income inequality, the possibility of banking crisis greatly increases [10]. Bagliano and Morana used the FVAR method, it is found that Whether in the long term or the short term, the observed fluctuations in the financial fragility index can be attributed to identified (global and domestic) macroeconomic (20%), financial disturbances (40–50%), oil-supply shocks in the long-term (25%). Economies and financial systems are highly interconnected [11]. The shock propagation not only
depends on the interconnection patterns among economic agents but also on the legal environment (Hellwig, 2009) [12]. Yildirim examines the effects of global financial conditions on the asset markets of five fragile emerging economies—Brazil, India, Indonesia, South Africa, and Turkey, found that Global financial risk shocks have significant effects on government bond yields, equity prices, CDS spreads, and exchange rates in the Fragile Five [13].

In conclusion, domestic and foreign scholars' research on the measurement and influencing factors of financial fragility has been relatively mature, mainly using various macro variables and financial market indicators to measure financial fragility, and studies how to infect, prevent and control it. However, there are still few literatures on the study of the factors affecting financial fragility of emerging economies at different stages of economic development and comparative analysis of the differences between the factors affecting financial fragility. In addition, in the context of increasing attention to environmental issues, financial institutions and intermediaries in developing countries, represented by China, have a low greening degree, unbalanced development of green financial products, insufficient ability to assess environmental risks and inadequate environmental information disclosure. Therefore, this paper takes emerging economies (“E11”) as the research samples, using the principal component analysis to measure the financial fragility of emerging economies and the result is taken as the explained variable. Then, the factor analysis is used to find out several common factors and take them as the explanatory variable, and the factors affecting different stages of economic development in the past year are summarized and analyzed. Besides that, the development of green finance in countries with different levels of development is appropriately combined to explore new directions of financial development in the future. Then, we measured the impact of macro, medium and income distribution indicators on the financial fragility of “E11”, analyzed the specific differences of the factors affecting the vulnerability of economies group at different stages of development, and finally put forward relevant suggestions for the financial development of emerging economies based on the empirical results and the concept of green development.

2. Model design and data description

2.1. Division of economic structure
Taking into account the difficulty of dividing the stages of economic development, this paper will adopt the view of economic structure division of totalism. On the basis of this view and in reference to the World Bank classification, the “E11” are divided into three categories: (1) Low- and middle-income economies: India, Indonesia; (2) Middle- and high-income economies: Brazil, China, Mexico, South Africa, Turkey, Russia; (3) High income economies: Argentina, South Korea, Saudi Arabia.

2.2. The selection of financial fragility index
Combined with the previous literature on the impact factors of financial fragility analysis, this paper mainly analyzes from the perspectives of macro-economy, banking system, capital market, exchange rate market, foreign debt and terms of trade, considering the representativeness and feasibility of the data, 17 indicators are selected in this paper. For the missing data of some countries, the missing data of some indicators are processed according to the missing data in SPSS. Specific indicators are selected as shown in Table 1 below.
Table 1. Index system of factors affecting financial fragility.

| Level indicators               | The secondary indicators               |
|-------------------------------|---------------------------------------|
| Macroeconomic indicator       | GDP growth rate                        |
|                               | inflation rate                         |
|                               | unemployment rate                      |
|                               | Annual growth rate of broad money      |
|                               | Real interest rate change              |
|                               | Gini coefficient                       |
| Banking system indicators     | Bank capital to assets ratio           |
|                               | non-performing loan ratio              |
| Capital market indicator      | Total stock trading /GDP               |
|                               | securitization ratio                   |
|                               | Stock market turnover rate             |
|                               | Annual rate of change of stock index   |
| Exchange rate market indicator| Growth rate of net inflow of foreign direct investment |
|                               | Nominal effective exchange rate volatility |
|                               | International reserve growth rate      |
| External debt and terms of trade indicators | Short-term external debt/total reserves |
|                               | Net barter terms of trade index        |

The index system of factors affecting financial fragility consists of five first-level indicators and 17 second-level indicators. Macroeconomic indicators mainly reflect the overall situation of a country's economic operation, since the research on the financial market of emerging economies mainly focuses on the capital market, foreign exchange market and the banking system as the main body of the financial market, this paper selects three indicators: the banking system, the capital market and the foreign exchange market. In addition, considering the strengthening of trade links among countries under the backdrop of globalization and the influence of international hot money and its own market openness behind the Southeast Asian financial crisis in 1997, this paper sets up external debt and terms of trade indicators.

Under the macroeconomic indicators, there are six indicators, namely, GDP growth rate, inflation rate, real interest rate change, unemployment rate, Gini coefficient and broad money annual growth rate, which reflect a country's economic development, monetary policy, income distribution and unemployment.

Under the banking system index, two indexes, non-performing loan ratio and capital to total capital ratio, are set to measure the bank's risk bearing capacity and the lender's default rate.

Under the capital market index, the ratio of total stock transactions to GDP, securitization rate, stock market turnover rate and annual change rate of stock index are set to reflect the volatility of the stock market as an important part of the capital market.

Under the index of exchange rate market, three indexes are set, namely, the growth rate of net foreign direct investment inflow, the volatility of nominal effective exchange rate and the growth rate of international reserves, which are used to measure the impact of capital flows, reserve changes and exchange rate fluctuations on financial fragility.

The ratio of short-term external debt to GDP and the net barter terms of trade index are set under the external debt and terms of trade index, which are used to measure a country's ability to cope with shocks. When a country's terms of trade and its solvency deteriorate, financial fragility increases.

2.3. Data sources and processing

Based on the data of 2018, “E11” as the research sample, with data mainly comes from Wind database, UNCTAD database, the IMF and world bank database, for the processing of missing data of some countries, the sequence average of the first six years is mainly used to fill in. Meanwhile, as the data has not been updated, the data of non-performing loan ratio in 2017 is selected. Since the indexes in this paper are divided into positive and negative indexes, the lower the negative index value, the better, so
the negative value is processed forward. In addition, due to dimensional differences between the data, standardized processing is carried out, and the processed data is analyzed to reduce the error.

3. Empirical analysis of factors affecting financial fragility

Table 2. Total Variance Explained.

| Component | Initial Eigenvalues | Extraction Sums of Squared Loadings |
|-----------|---------------------|-------------------------------------|
|           | Total               | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1         | 5.884               | 34.614        | 34.614       | 5.884 | 34.614        | 34.614       |
| 2         | 3.575               | 21.032        | 55.646       | 3.575 | 21.032        | 55.646       |
| 3         | 2.798               | 16.459        | 72.105       | 2.798 | 16.459        | 72.105       |
| 4         | 1.716               | 10.093        | 82.198       | 1.716 | 10.093        | 82.198       |
| 5         | 1.261               | 7.418         | 89.616       | 1.261 | 7.418         | 89.616       |
| 6         | .716                | 4.214         | 93.830       |       |               |              |
| 7         | .509                | 2.995         | 96.825       |       |               |              |
| 8         | .311                | 1.830         | 98.655       |       |               |              |
| 9         | .152                | .893          | 99.548       |       |               |              |
| 10        | .077                | .452          | 100.000      |       |               |              |
| 11        | 2.171E-16           | 1.77E-15      | 100.000      |       |               |              |
| 12        | 1.614E-16           | 9.493E-16     | 100.000      |       |               |              |
| 13        | 8.646E-17           | 5.086E-16     | 100.000      |       |               |              |
| 14        | 3.451E-17           | 2.030E-16     | 100.000      |       |               |              |
| 15        | -1.194E-16          | -7.023E-16    | 100.000      |       |               |              |
| 16        | -2.820E-16          | -1.659E-15    | 100.000      |       |               |              |
| 17        | -3.575E-16          | -2.103E-15    | 100.000      |       |               |              |

It can be seen that the first five principal components y1, y2, y3, y4, y5 concentrate 89.616% of the original variable information, with good effects. Therefore, we choose these five principal components as the first to the fifth principal components, and the indicators have been changed from the original 17 to 5, playing a role in dimension reduction. The factor load matrix obtained by SPSS is shown in the following table.

Table 3. Component Matrix.
Divide each element in the ith column by the square root of the ith characteristic root respectively to obtain the coefficient of the ith principal component in the principal component analysis, as shown in Table 3.

### Table 4. Index system of factors affecting financial fragility.

|       | Principal component 1 | Principal component 2 | Principal component 3 | Principal component 4 | Principal component 5 |
|-------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| X1    | 0.306716              | -0.02539              | 0.172772              | 0.116797              | -0.42389              |
| X2    | 0.387518              | 0.091497              | -0.12973              | 0.088552              | -0.02583              |
| X3    | 0.116668              | 0.206265              | 0.488425              | -0.06412              | 0.134468              |
| X4    | -0.37639              | -0.07034              | 0.212828              | 0.098476              | -0.05165              |
| X5    | -0.35371              | 0.127461              | 0.003587              | 0.157256              | -0.01247              |
| X6    | 0.027209              | 0.100488              | 0.491414              | 0.245809              | 0.032949              |
| X7    | -0.06101              | 0.298292              | -0.00897              | -0.56872              | -0.03651              |
| X8    | 0.000825              | -0.22002              | -0.01973              | -0.53208              | 0.495128              |
| X9    | 0.194171              | -0.3406               | 0.00837               | 0.220617              | 0.377579              |
| X10   | 0.089047              | -0.16184              | -0.49022              | 0.203059              | 0.044526              |
| X11   | 0.112957              | -0.37498              | 0.271414              | -0.07023              | -0.00623              |
| X12   | 0.24158               | 0.385558              | -0.12196              | -0.0458               | 0.081928              |
| X13   | -0.00247              | 0.395078              | 0.124946              | 0.006107              | 0.18968               |
| X14   | -0.38504              | -0.12535              | 0.0825               | 0.117561              | -0.00178              |
| X15   | -0.24653              | 0.15655               | -0.05739              | 0.288558              | 0.504033              |
| X16   | 0.280744              | 0.27079               | -0.01136              | 0.274817              | 0.279622              |
| X17   | -0.25766              | 0.280838              | -0.26902              | 0.053437              | -0.17721              |

From the above table, the linear combination of the five principal components \( y_1, y_2, y_3, y_4 \) and \( y_5 \) is:

\[
y_1 = 0.306716x_1 + 0.387518x_2 + 0.116668x_3 + 0.172772x_4 + 0.116797x_5 - 0.42389x_6 - 0.02539x_2 - 0.12973x_3 + 0.116797x_4 + 0.116797x_5 - 0.42389x_6
\]

\[
y_2 = 0.027209x_1 + 0.100488x_2 + 0.491414x_3 + 0.245809x_4 + 0.032949x_5 - 0.56872x_6 - 0.01973x_2 - 0.53208x_3 + 0.220617x_4 + 0.377579x_5 - 0.03651x_6
\]

\[
y_3 = 0.089047x_1 - 0.16184x_2 - 0.49022x_3 + 0.203059x_4 + 0.044526x_5 - 0.03651x_6 - 0.56872x_2 - 0.01247x_3 + 0.495128x_4 + 0.377579x_5 - 0.17721x_6
\]

\[
y_4 = 0.24158x_1 + 0.385558x_2 - 0.12196x_3 + 0.081928x_4 + 0.18968x_5 - 0.26902x_6 - 0.0458x_2 + 0.081928x_3 + 0.18968x_4 + 0.504033x_5 - 0.17721x_6
\]

\[
y_5 = 0.194171x_1 - 0.3406x_2 + 0.00837x_3 - 0.0458x_4 + 0.17721x_5 + 0.00178x_1 + 0.504033x_2 + 0.279622x_3 - 0.17721x_4 + 0.17721x_6
\]
Where $x_1^*, x_2^*, x_3^*, x_4^*, x_5^*, x_6^*, x_7^*, x_8^*, x_9^*, x_{10}^*, x_{12}^*, x_{13}^*, x_{14}^*, x_{15}^*, x_{16}^*$, and $x_{17}^*$ are the normalized variables. The principal component score is as follows when the data is substituted into the above equation. Among them, the comprehensive score $Y$ reflects the degree of financial security.

### Table 5. Principal component score.

| Sample       | First  | Second | Third  | Fourth | Fifth  | Synthesis score | Ranking |
|--------------|--------|--------|--------|--------|--------|-----------------|---------|
| Argentina    | -2.6773| 0.0555 | 0.4529 | 0.0798 | 0.7555 | -0.77642        | 11      |
| Brazil       | 0.1546 | 0.2614 | -0.5874| -0.1137| 0.4082 | 0.030608        | 8       |
| China        | 0.8329 | -1.0794| 0.4892 | -0.0138| -0.0553| 0.136315        | 6       |
| India        | 0.5343 | 0.2175 | 0.4981 | 1.7156 | -1.3654| 0.384522        | 2       |
| Indonesia    | 0.4096 | 0.7124 | 0.0950 | -1.1807| -0.9209| 0.119766        | 7       |
| Korea        | 0.8858 | -0.8088| 0.8770 | 0.7588 | 2.0610 | 0.510308        | 1       |
| Mexico       | 0.4626 | 0.2097 | 0.0272 | -0.7497| 0.2595 | 0.152273        | 5       |
| Russia       | -0.2911| 1.5607 | 0.1689 | 1.3135 | -0.3609| 0.361092        | 3       |
| Saudi Arabia | 0.4650 | 1.3711 | -0.3529| -1.2704| 0.6618 | 0.312107        | 4       |
| South Africa | -0.2145| -1.0633| -2.656 | 0.4448 | -0.1643| -0.70233        | 10      |
| Turkey       | -0.5618| -1.4368| 0.9881 | -0.9841| -1.2794| -0.52825        | 9       |

With the above indicators as variables, common factors were selected according to the principle that the eigenvalue was greater than 1. As shown in Table 2 a total of 5 common factors were selected. To magnify the difference between factors, orthogonal rotation of variance maximization is performed for common factors, and the rotated factors are shown in Table 6.

### Table 6. Component Matrix.

| Component | 1     | 2     | 3     | 4     | 5     |
|-----------|-------|-------|-------|-------|-------|
| X1        | 0.445 | -0.223| 0.238 | -0.672| 0.365 |
| X2        | 0.921 | -0.169| -0.079| -0.273| 0.131 |
| X3        | 0.227 | 0.029 | 0.932 | -0.072| -0.06 |
| X4        | -0.926| 0.066 | 0.211 | 0.28  | 0.117 |
| X5        | -0.623| 0.32  | 0.023 | 0.533 | 0.25  |
| X6        | -0.052| -0.218| 0.836 | 0.02  | 0.27  |
| X7        | 0.081 | 0.842 | 0.165 | -0.027| -0.392|
| X8        | -0.075| -0.116| -0.092| -0.035| -0.97 |
| X9        | 0.221 | -0.889| -0.115| -0.053| -0.21 |
| X10       | 0.279 | -0.282| -0.843| 0.096 | 0.092 |
| X11       | -0.185| -0.611| 0.199 | -0.526| -0.264|
| X12       | 0.871 | 0.372 | 0.115 | 0.108 | 0.081 |
| X13       | 0.301 | 0.408 | 0.477 | 0.395 | 0.079 |
| X14       | -0.92 | 0.008 | -0.021| 0.343 | 0.077 |
| X15       | -0.229| 0.01  | 0.046 | 0.928 | 0.051 |
| X16       | 0.874 | -0.136| 0.248 | 0.258 | 0.212 |
| X17       | -0.231| 0.672 | -0.309| 0.459 | 0.328 |

By the picture above you can see, the common factor F1 in X2 (inflation), X4 (broad money growth rate), X12 rate (stock index), X14 (nominal effective exchange rate volatility), X16 (short-term foreign debt/total reserves) in the load is very big, can be summarized as macroeconomic stability factor, reflects
a country's macroeconomic stability. The common factor F2 has a large load on X7 (ratio of bank capital assets) and X9 (total stock transaction /GDP), which can be summarized as risk bearing and stock market financing capacity factor. The common factor F3 has a large load on X3 (unemployment rate), X6 (Gini coefficient) and X10 (securitization rate), which can be summarized as a factor of social stability and capital market development, reflecting the social security degree and capital market development degree of a country. The common factor F4 has a large load on X1 (GDP growth rate) and X15 (international reserve growth rate), and can be summarized as the economic development capacity factor. The common factor F5 has a large load only on X8 (non-performing loan ratio) and can be named as the credit security factor. The scores of each factor are shown in the table below.

Table 7. Score table of factors.

| Country   | F1       | F2       | F3       | F4       | F5       |
|-----------|----------|----------|----------|----------|----------|
| Argentina | -2.19967 | 0.44729  | 0.3508   | 1.64239  | -0.30697 |
| Brazil    | 0.46791  | 0.16267  | -0.3871  | 0.39405  | -0.25753 |
| China     | 0.11645  | -1.0656  | 0.13787  | -0.92239 | -0.28715 |
| India     | 0.1988   | -0.51592 | 0.37723  | -0.5419  | 2.1556   |
| Indonesië | 0.39329  | 1.29044  | 0.23742  | -1.00815 | -0.18345 |
| Korea     | 0.63781  | -2.09779 | 0.8841   | 0.83001  | -0.86795 |
| Mexico    | 0.5002   | 0.30336  | 0.16922  | -0.23252 | -0.68056 |
| Russia    | 0.33956  | 0.58943  | 0.6118   | 0.94121  | 1.6376   |
| Saudi Arabia | 1.15061 | 1.31528  | 0.27111  | 0.37109  | -1.00371 |
| South Africa | 0.01927 | -0.36349 | -2.86466 | 0.29603  | 0.17081  |
| Turkey    | -1.62424 | -0.06566 | 0.21221  | -1.76982 | -0.3767  |

According to the results of factor analysis Table 7, “E11” can be divided into low- and middle-income economies, middle- and high-income economies and high-income economies three categories, analyzes the main factors affecting its financial stability, and further compared with the country's financial safety degree, study what kind of factors on the financial fragility played a leading role.

Table 8. Common factor ranking and financial security ranking.

| Country      | F1 | F2 | F3 | F4 | F5 | Degree of financial security |
|--------------|----|----|----|----|----|------------------------------|
| Argentina    | 11 | 4  | 4  | 1  | 7  | 11                           |
| Brazil       | 4  | 6  | 10 | 4  | 5  | 8                            |
| China        | 8  | 10 | 9  | 9  | 6  | 6                            |
| India        | 7  | 9  | 3  | 8  | 1  | 2                            |
| Indonesië    | 5  | 2  | 6  | 10 | 4  | 7                            |
| Korea        | 2  | 11 | 1  | 3  | 10 | 1                            |
| Mexico       | 3  | 5  | 8  | 7  | 9  | 5                            |
| Russia       | 6  | 3  | 2  | 2  | 2  | 3                            |
| Saudi Arabia | 1  | 1  | 5  | 5  | 11 | 4                            |
| South Africa | 9  | 8  | 11 | 6  | 3  | 10                           |
| Turkey       | 10 | 7  | 7  | 11 | 8  | 9                            |

3.1. Low- and middle-income economies

As can be seen from the figure above, India and Indonesia rank the second and the seventh respectively in terms of financial security. India is superior to Indonesia in terms of macroeconomic stability, risk bearing, stock market financing capacity and credit security, especially credit security. This has a lot to do with India's increased domestic demand, growing manufacturing sector, better economic situation and its fundamental economic advantages in 2018.
3.2. Middle - and high-income economies
Equations In this group, China, Mexico and Russia have relatively high levels of financial security. Among them, China's risk bearing and stock market financing ability factor ranking is relatively low, which indicates that Chinese enterprises still rely more on indirect financing rather than direct financing, and there is a large room for improvement. South Africa, Turkey and Brazil ranked lower in terms of financial security, and the three countries ranked in the bottom five in terms of social stability and capital market development. In the first half of 2018, Turkey's economy grew rapidly, but its subsequent growth was sluggish due to severe inflation, external debt and currency devaluation. In mid-2018, due to the impact of the economic crisis, Turkey's economic growth rate dropped sharply and remained unchanged at the end of the year. Foreign capital inflows to Brazil have declined in 2018 due to political turmoil and economic instability. In addition, the unemployment rate, which has been troubling Brazil for a long time, is still an important factor affecting Brazil's financial stability.

3.3. High-income economies
Overall, the high-income economies rank in the top four in terms of financial stability, with the exception of Argentina. The stability of macro-economy determines the financial security of a country to a large extent. In 2018, due to severe government fiscal deficits and deteriorating fiscal fundamentals, Argentina's inflation rate reached 40% and the devaluation of the peso reached more than 100% in the short term. In contrast, inflation rates in South Korea and Saudi Arabia remained low during the period and remained stable overall despite some downward economic pressure.

To sum up, the financial security of lower- and middle-income economies is mainly affected by credit security, social stability, capital market development and economic development speed. The factors affecting middle- and high-income economies are relatively dispersed, with several economies with higher vulnerability ranking extremely low on one factor. The main factor affecting the financial security of high-income economies is the stability of macro-economy, and inflation can greatly aggravate the financial fragility of a country. However, it is important to note that the early to avoid the financial risks caused by environmental pollution and puts forward the concept of green finance in developed countries has been developing rapidly, the international financial crisis, both developed countries and emerging economies, focus on industry infrastructure renovation and new energy, green emerging economies is the focus of green bonds into the financial development. In 2015, emerging economies launched green bond markets, led by China and India, and Brazil set up a Green Bond Development Committee to provide a complete market for green bonds. As one of the few developed countries in emerging economies, South Korea as early as 2008 issued green finance related laws and regulations and its domestic financial institutions are also actively involved in the green financial international agreements and diversification of the green industry support, these measures until today is the serious lack of developing countries in the field of green finance.

4. Conclusions
The financial development of emerging economies has its inherent regularity, and the financial development must adapt to its level of economic development. Behind the outbreak of Latin American debt crisis and Mexican financial crisis, the degree of financial openness far exceeded the level of financial development at that time. Excessive financial liberalization led to the continuous accumulation of bubbles in the financial market, and finally led to the collapse of the financial market. In addition, the ecological environment and finance can never be completely separated. Changes in factor prices brought by ecological changes will affect related capital markets such as stocks and bonds, while the rapid development of finance will always have a certain impact on the environment, which is often negative. With the rapid development of economy, developed countries first tasted the bitter fruit of environmental damage. After that, more and more financial institutions began to pay attention to environmental risks.

By studying the financial fragility of emerging economies, it can be found that: countries at different stages of economic development face different risks in financial opening up, and their ability to defend risks is generally proportional to the level of economic development, in addition to the common liquidity
risk, the risk of inflation risks and other closely associated with economic, environmental risk is gradually attracted attention. Therefore, risks should be controlled according to the specific national conditions of each country, and the relationship between the speed of financial opening and the improvement of relevant laws and regulations as well as the development of financial system should be properly handled. In addition, enhanced cooperation among economies can better promote economic development and enhance the ability to withstand risks. The impact of the 2008 global financial crisis on some emerging economies was much less than that of previous crises, and there was no lack of coordination among economies.

In general, the emerging economies represented by “E11” have become an important force driving world economic growth at present. In 2018, with the rise in the dollar, the economic growth of “E11” slowed, currency depreciation pressure increased, volatility in financial markets, but, for now, the probability of large-scale crisis emerging economies are still small, financial risk E11 overall economic growth is less likely to be volatile, financial risk is manageable, after the 2008 global financial crisis, emerging economies' ability to resist risk increases, and most emerging economies have taken a more flexible floating exchange rate system, and in the face of pressure on capital outflows greater flexibility. In addition, as IMF and other international organizations have established a more mature crisis response system, regional coordination mechanism has been further improved, and emerging economies have also taken measures to deal with new financial turmoil, the financial market of emerging economies will remain stable in the short term.

5. Measures to improve the financial development of emerging economies

Most emerging economies are more or less in the process of development there is a problem, the reason is that emerging economies exist serious financial repression, the order of financial market construction, talent team construction problems, coupled with the financial market distortions and improper government macroeconomic regulation and control, information asymmetry, exist the problems of the investment and financing channels for a single. The root cause of these problems lies in the problems in the market mechanism construction of emerging economies, which leads to the failure of the market to play its function of effectively allocating resources. Only by starting from the root can we establish a healthy and effective financial market which can promote economic growth. Otherwise, blind implementation of financial liberalization can only cause financial market turbulence.

In general, emerging economies can strengthen cooperation between the two countries, improve the financial laws and regulations construction, and improve the financial supervision and so on to correct the existing financial distortions in emerging markets. In addition, on the relationship between financial development and environmental protection processing, emerging economies can from the experience of developed countries in the financial innovation through the government further promoting the environmental protection, through the government strongly support financial institutions to explore green finance, strengthen the law enforcement and make the enterprise environment cost internalization and other measures to achieve a harmonious ecological coexistence of finance, finally realizes the health of the economy sustainable development.

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References

[1] Z. Liu, “Evaluation on financial fragility and selection of China's financial security policy,” Université Paris1 Panthéon-Sorbonne (Post-Print and Working Papers), vol. 11, pp. 215-219, 2011.

[2] E. Tymoigne, “Measuring macroprudential risk through financial fragility: a Minskian approach,”
Journal of Post Keynesian Economics, vol. 36, pp. 719-744, 2014.

[3] A. Sensoy, K. Ozturk, and E. Hacihasanoglu E, “Constructing a financial fragility index for emerging countries,” Finance Research Letters, vol. 11, pp. 410-419, 2014.

[4] D. Berger, K. Pukthuanthong, “Fragility, stress, and market returns,” Journal of Banking & Finance, vol. 62, pp. 152-163, 2016.

[5] O. Polat, I. Ozkan, “Transmission mechanisms of financial stress into economic activity in Turkey,” Journal of Policy Modeling, vol. 2, pp. 395-415, 2019.

[6] M.G. Chadwic , H. Ozturk, “Measuring financial systemic stress for Turkey: A search for the best compositeindicator,” Economic Systems,” vol. 43, pp. 151–172,2019.

[7] A. Miglietta, F. Venditti, “An indicator of macro-financial stress for Italy,” Questioni di Economia e Finanza (Occasional Papers), 2019.

[8] J.H. Nilsen, R. Rovelli, “Investor risk aversion and financial fragility in emerging economies,” Journal of International Financial Markets Institutions & Money, vol. 11, pp. 443-474, 2001

[9] A. Foueijieu, “Inflation targeting and financial stability in emerging markets,” Economic Modelling, vol. 60, pp. 51-70, 2017.

[10] D.E. Rhee, H. Kim, “Does income inequality lead to banking crises in developing countries? Empirical evidence from cross-country panel data,” Economic Systems, vol. 42, pp. 206-218, 2018.

[11] F.C. Bagliano, C. Morana, “Determinants of US financial fragility conditions,” Research in International Business & Finance, vol. 30, pp. 377-392, 2014.

[12] M.F. Hellwig, “Systemic risk in the financial sector: an analysis of the subprime-mortgage financial crisis,” De Economist, vol. 157, pp. 129-207, 2009.

[13] Z. Yildirim, “Global financial conditions and asset markets: Evidence from fragile emerging economies,” Economic Modelling, vol. 57, pp. 208-220, 2016.