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Research Article

A Study on How International Portfolio Investment Flows Affect Macrofinancial Risks and Control Channels

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In the current complex global economic background, international capital flows are becoming more frequent. Based on this, this paper takes international portfolio investment as the research object and empirically tests the causal relationship and control channel between international portfolio flows and macrofinancial risk in emerging economies. It selects the panel data of emerging economies from 2001 to 2020, constructs macrofinancial risk indicators by using contingent claim analysis and the entropy-based TOPSIS method, tests the effect of international portfolio flows on macrofinancial risk by using the panel distributed lag regression model, and explores the management effect of foreign exchange reserves and capital controls on the risk effect by using the panel threshold regression model. The results show that long-term international portfolio flows help reduce macrofinancial risk, but short-term capital flows appear to increase macrofinancial risk. In addition, both foreign exchange reserves and capital controls effectively reduce the risk effect of portfolio flows. However, when considering different types of portfolios, we find that foreign exchange reserves do not effectively control the risk effect of equity securities flows, while stricter capital controls do. This paper argues that emerging economies should be more open to international long-term portfolio flows, focus on the monitoring of short-term portfolio capital flows and equity securities flows, and coordinate the use of foreign exchange reserves and capital control instruments to manage the risk effects of portfolio flows. This paper verifies the risk effect of international portfolio investment flows through empirical analysis, tests the effectiveness of foreign exchange reserves and capital controls, and provides a decision-making reference for emerging economies to timely identify, effectively manage, and prevent the risk effect of international capital flows.

1. Introduction

In the context of the current COVID-19 pandemic and the Russia-Ukraine conflict, recessionary expectations of "high inflation" and "weak growth" in the United States, Europe, and other advanced economies have continued to rise, and global economic activities have been severely impacted [1]. Advanced economies, represented by the United States, implemented quantitative easing and fiscal stimulus policies to stabilize financial markets and protect economic development in response to the resulting economic recession. As high inflation continued to rise under the policy mix, the Federal Reserve began to reduce inflation by significantly increasing interest rates and tightening liquidity. Emerging economies have historically risen with the wave of industrialization through industrial transfer, aided by ample international capital liquidity. However, the Fed's persistent policy of increasing interest rates has resulted in a stronger US dollar and depreciating currencies in emerging economies [2]. When expectations of a decline in the short-term exchange rate rise, the willingness of cross-border capital to invest weakens further, and there is a sudden halt in capital inflows or even capital flight, resulting in a cascade of asset price declines. Under the negative feedback spiral, the wealth of the household sector decreases significantly, corporate solvency declines, and the bank nonperforming loan ratio rises, resulting in heightened instability in the real economy and financial markets. The current complex and volatile

international economic environment increases the frequency and unpredictability of cross-border capital flows, which will cause significant volatility on the financial markets of emerging economies [3].

International capital contributes significantly to the growth of emerging economies, but it is also extremely vulnerable to macrofinancial instability. In every financial crisis, we can see unusual global capital fluctuations. Emerging economies' financial systems are flawed and have insufficient defenses against shocks from global capital flows. Emerging economies are additionally more susceptible to external capital shocks due to internal factors like a high external debt ratio and a mismatch in debt maturities [4]. Considering the current complex global economic context, to investigate how cross-border capital flows affect macroeconomic stability in emerging economies, this paper selects highly speculative international portfolio investment flows as the research object, discusses the effect of international portfolio flows on macrofinancial risk in emerging economies, and further explores how to effectively manage such risk. By revealing the evolution of macrofinancial risks under external shocks and the efficient control tools for identifying the risks of capital flows, it is of great theoretical significance and practical value for emerging economies to identify, manage, and prevent the impact of global capital shocks.

Since the 2008 global financial crisis, a growing number of academics have recognized that macrofinancial correlation plays a crucial role in the transmission of external shocks and crisis mechanisms. External shocks produce macrofinancial system instability, which is then communicated to the current economy. Due to trade and investment, many sectors of the economy are interconnected, and risks are transmitted and exacerbated through these sectors, culminating in a global financial crisis [5–7]. The financial development of emerging economies is inadequate and imperfect compared to that of advanced economies. When international capital flows grow more volatile, emerging economies are frequently less able to adapt than advanced economies. Speculative capital, such as international portfolio investment with its substantial cross-border capital flows, is typically accompanied by a considerable amount of uncertainty and can even precipitate extreme capital flow situations. Extremes are frequently followed or precipitated by severe financial crises, which have a negative impact on national economic development. Even though cross-border capital flows have been more of a "ripple" than a "wave" during the global financial crisis of 2007–2009, the risk associated with the "ripple" is of greater concern. The risk involved in cross-border capital flows is a significant cause for concern [8].

Does the growth of emerging economies face any risks from the international capital flow? Early studies proposed that large international capital flows can cause asset price bubbles, which in turn can cause the Asian financial crisis [9] and that large international capital movements can cause risk transmission. International capital inflows have the potential to lead to an increase in domestic credit, and this erratic domestic credit expansion is what ultimately leads to crises in emerging economies. Numerous academics have suggested that capital flow is associated with financial crises and even questioned how well capital flow performs economically when conditions are calm [10, 11]. Emerging countries are susceptible to boom-and-bust risks from capital movements [12]. Short-term capital flows are a significant source of systemic financial risk among those [13]. Researchers have examined how the mix of international capital affects the returns and volatility of the stock markets in emerging nations, and they have made the case that these markets are sensitive to the flow of foreign capital [14]. Others think that emerging nations with significant exposure to the debt securities market are more susceptible to macroeconomic risk from negative shocks [15]. Additionally, by contrasting the traits of several forms of international capital in a previous study, some academics contend that foreign portfolio investment is the riskiest form of capital due to the wide range of its flows and stocks [16]. This essay aims to shed some light on the long-term and short-term effects that capital flows from overseas portfolio investments have on the macrofinancial risk of emerging economies.

International capital investment is advantageous to national economic development, and it serves as a significant source of inspiration for emerging economies in particular [17–19]. International capital flows, however, may also pose a risk to the stability of the financial system [20, 21]. Then, what are the best ways to properly control potential risks in international capital flows? In the literature, it has primarily been studied from the perspectives of capital control and foreign exchange reserves. Following the Asian financial crisis, emerging economies expanded their foreign exchange reserves significantly to prepare for any national capital shocks. Capital shocks have a smaller impact on economies with strong macroeconomic fundamentals and modest foreign exchange reserves. The opposite is also true: economies with weak macroeconomic fundamentals and limited foreign exchange reserves are more vulnerable to capital shocks [22]. Therefore, a lot of academics think that having large foreign exchange reserves can make up for weak economic fundamentals and successfully handle international capital shocks [23]. According to some academics, foreign exchange reserves can, however, only partially withstand international capital shocks [24–26]. Especially during times of financial stress on the international stage, foreign exchange reserves act as a buffer, playing the role of a stabilizer against international capital movements [27].

Prior to the 2008 financial crisis, neoliberal economic theory advocated less regulation of international capital flows. Academics, however, have increasingly asserted that the management of international capital flows should be enhanced following the financial crisis. Macroeconomic stability can be improved, and emerging economies can better withstand international capital shocks with capital control [28]. According to some academics, capital controls are more effective in high-income nations than in low- or middle-income ones [29]. Some academics disagree, contending that emerging economies are more affected by capital restrictions than rich nations [30]. The importance of capital control measures in preserving monetary policy

independence and exchange rate stability is widely acknowledged by academics [31, 32]. However, the effectiveness of asset control varies depending on the situation, with capital controls being effective for debt inflows when the economy is doing well and for reducing debt inflows and direct investment flow when the economy is doing poorly [33]. According to the results of previous studies, it is impossible to determine whether foreign exchange reserves and capital controls are useful in reducing the macrofinancial risk associated with international portfolio investments in emerging economies. This study further examines how to manage the macrofinancial risk of international portfolio investment flows from the perspective of foreign currency reserves and capital controls after researching the effects of macrofinancial risk on international portfolio investment flows in emerging economies.

The following are the primary contributions to this paper: first, the study combines the contingent claims analysis with the entropy-based TOPSIS method to quantify the macrofinancial risk in emerging economies. This paper not only measures the default risk of the corporate sector, financial sector, government sector, and household sector in emerging economies using the contingent claims analysis method but also obtains the macrofinancial risk indicators using the entropy-based TOPSIS method, which is more reasonable and objective in assigning weights to the four sectors' default risk. Second, it investigates the effect of foreign capital flows on macrofinancial risk from the standpoint of portfolio investment. The impact of international capital movements on macrofinancial risk in terms of external shocks and the mechanism of action are less well studied in the existing literature. This article tests the short- and long-term implications of international portfolio investment on macrofinancial risk in emerging economies using a panel model technique and explores the heterogeneity effect from the capital flow and capital type perspectives, respectively. Third, this paper finds that foreign exchange reserves and capital control can effectively manage the macrofinancial risk that comes from international portfolio investment flows. However, for equity securities, foreign exchange reserves cannot effectively regulate the macrofinancial risk that comes from capital flows, and capital control instruments are needed to change the state of macrofinancial risk so that international capital can play a full and positive role.

The innovation of this paper is that, on the one hand, in the previous studies related to the risk effect of cross-border capital flows, the focus was mainly on the impact effect of the total amount of cross-border capital, while the differences in the paths of action of various types of capital were ignored. Compared with direct investment and other capital, portfolio capital has a shorter turnover period and greater capital flexibility, and its risk effect deserves more attention. Therefore, this paper chooses to study the risk effect of portfolio capital based on relevant studies and discusses the effect of foreign exchange reserves and capital controls in dealing with the risk effect of portfolio investment flows in an innovative way. On the other hand, most of the existing literature focuses on the stability of financial institutions or financial markets but less on the characteristics of the macrofinancial risks that include various sectors affected by capital flows from an economy-wide perspective. In this regard, this paper innovatively combines the contingent claims analysis and the entropy-based TOPSIS method to construct macrofinancial risk indicators based on the existing methods.

The rest of this article is organized as follows: the theoretical analysis and research assumptions are reviewed in Section 2. Section 3 provides the research design, including the introduction of data sources, the construction of core indicators, the benchmark regression model, and the descriptive statistics of variables. Section 4 describes the analysis of benchmark regression results. The effect of the management mechanism from the perspective of foreign exchange reserves and capital control is further discussed in Section 5. Section 6 concludes this article.

2. Theoretical Analysis and Research Assumptions

2.1. International Portfolio Investment Flows and Macrofinancial Risk. Due to the high demand for money, emerging economies frequently have the capacity to attract international investment with a degree of blindness and weak regulation during the process of economic development. The initial influx of capital considerably promotes economic growth and permits higher returns on a variety of assets, but there is a propensity for overheating and asset bubbles, notably for highly speculative money, such as portfolio investing, which can influence economic stability in four ways. Initially, the money supply when international portfolio investment flows occur, they can influence the national foreign exchange reserve, causing unjustified price increases or declines in the capital market and jeopardizing the capital market's stability. The second channel is bank credit. With the enormous influx of international portfolio investments, commercial banks will engage in "excessive lending," exacerbating the surplus domestic liquidity and accelerating the rise in asset prices, such as equities. And when the local and international scenario changes, the enormous withdrawal of money will generate a credit constraint due to the fall in asset prices, resulting in turbulence in the financial markets. The third channel is the interest rate channel. Money inflows boost the availability of liquidity in the market, resulting in a drop in market interest rates and further promoting the flow of capital to the capital market, which leads to an increase in asset prices and potential financial risk. A rise in interest rates will result in a precipitous decline in asset prices and have an impact on financial stability. In addition, the economic fundamentals and investor mood channels have a significant effect. Capital inflow can raise capital accumulation, improve technology, lower the cost of capital, and optimize resource allocation so that the current economy can be developed more effectively. However, capital outflow will cause the real economy to stagnate or possibly shrink, which would exacerbate the market's instability. Due to the immature development of capital markets in emerging economies in general and the

high proportion of retail investors in the investor structure, the herd effect, overconfidence, excessive trading, and other irrational characteristics are evident from the perspective of the investor sentiment channel. The movement of the portfolio will cause shifts in investor mood, which will then influence the capital market. The following assumptions are therefore suggested in this work:

> Hypothesis 1: International portfolio investment flow affects macrofinancial risk in emerging economies, and there are different impacts in the short and long term.

2.2. Reconciliation Mechanism Based on Foreign Exchange Reserve and Capital Control. After the Asian financial crisis, an increasing number of emerging economies understood that foreign exchange reserves could be an important instrument to combat the crisis [34]. As a result, some emerging nations expanded their foreign exchange reserves out of an abundance of caution [35]. A foreign exchange reserve can reduce capital flow volatility and function as a stabilizer [27]. The capital flow for portfolio investment is affected by the foreign exchange reserves through three channels: the interest rate channel, the exchange rate channel, and the economic expectation channel. Foreign exchange reserves are the foreign currency asset that an economy owns. International trade balances are turned into foreign exchange reserves by the issuance of domestic currency. International capital flow is positively connected with the interest rate under the condition of a constant expected exchange rate, and a rise in foreign exchange reserves can attract capital inflow. Second, foreign exchange reserves can affect international capital flows via exchange rate stability and foreign currency demand and supply. Sufficient foreign exchange reserves can contribute to the stability of the domestic currency, and a rise in foreign exchange reserves can also stimulate expectations of currency appreciation, attract international capital inflows, and reduce domestic currency outflows. Moreover, foreign exchange reserves can balance the balance of payments, and large foreign exchange reserves also imply a stronger ability to repay debts, which helps to convey the message of good economic fundamentals, attract additional foreign capital, and prevent capital flight, thereby achieving the smoothing of volatility caused by capital flow. Consequently, this study proposes the following research hypotheses:

> Hypothesis 2a: Foreign exchange reserves can help manage macrofinancial risk caused by international portfolio investment, which plays a positive regulatory role, and there are effectiveness differences when holding foreign exchange reserves at different intervals.

Capital controls are swift and highly focused, able to respond quickly to unanticipated shocks, and have a temporary regulatory function. Capital controls can be subdivided into control over the stock market, the bond market, the currency market, collective investment securities, and derivatives and instruments. Capital controls are primarily used to control capital flow by increasing international capital flow transaction fees. Changes in the level of capital control correspond to alterations in the international capital flow transaction costs. As the degree of capital controls increases, transaction costs continue to grow, the net profit of international speculative capital decreases due to increasing costs, and the dropping rate of return can effectively dissuade the enormous flood of investment capital. The influx of portfolio investment can have a substantial impact on the asset prices of countries and potentially cause asset bubbles, posing a substantial financial risk. The increase in transaction costs of capital flows subject to capital controls effectively mitigates the impact of international portfolio investment flows on asset prices, thereby lowering the macrofinancial risk presented by international portfolio investment flows from the standpoint of asset prices. However, when the degree of capital controls is low, the increase in transaction costs is significantly less than the return on invested capital, particularly when the impact of falling international capital flows on asset prices under capital control is insufficient to mitigate the effect of rising asset prices on macrofinancial risk. When capital controls are below a specific threshold, the moderating effect of capital control on the link between foreign portfolio investment flow and macrofinancial risk is not substantial. Therefore, there is a moderating effect and a threshold effect of capital controls between international portfolio investment flows and macrofinancial risk. When capital control is below the threshold level, the increase in transaction costs caused by capital control is insufficient to compensate for the risky shocks caused by increases in capital prices, and international portfolio investment flows continue to have a moderating effect on macrofinancial risk. Capital controls cause an increase in transaction costs and a drop in yields when they exceed the threshold level. This decreases the beneficial influence of international portfolio investment flows on asset values, which in turn reduces macrofinancial risk. When capital control exceeds the threshold level, the beneficial impact of international portfolio investment flow on asset prices diminishes, resulting in a reduction in macrofinancial risk, indicating that international portfolio investment flow mitigates macrofinancial risk. The following research hypothesis is therefore proposed:

> Hypothesis 2b: Capital controls have a moderating mechanism between international portfolio investment flows and macrofinancial risk, with international portfolio investment flows exhibiting a facilitating effect on macrofinancial risk when capital control is below the threshold and a mitigating effect on macrofinancial risk when capital control is above the threshold.

3. Study Design

3.1. Sample Selection. This paper selects quarterly data between 2001 and 2020 from 20 emerging economies in Argentina, Brazil, China, Russia, Korea, Mexico, South Africa, Turkey, India, Indonesia, Bulgaria, Chile, Croatia, the Czech Republic, Hungary, Malaysia, the Philippines, Poland, Sri Lanka, and Thailand as the sample. The data used in this

study was obtained from the CEIC database, the World Bank database, the IMF database, the UN National Accounts Main Aggregates database, the WIND database, and the national statistical offices of the sample countries.

3.2. Variable Definition

3.2.1. Macrofinancial Risk. In contrast to financial risk, systemic risk, and systematic financial risk, macrofinancial risk emphasizes the transmission of risk between the financial sector and other sectors of the economy in the presence of external shocks, which not only measures the risk of the financial sector but also emphasizes the overall risk across sectors (systemic risk focuses on describing market risk arising from investor behaviour in financial markets, and systemic financial risk focuses on important financial institutions). The macrofinancial risk index is derived on this basis by combining contingent claims analysis with the entropy-based TOPSIS method (TOPSIS is short for "Technique for Order Preference by Similarity to an Ideal Solution"). Using contingent claims analysis, this study measures the default risk of the corporate sector, financial institutions, government sector, and household sector in the economy. Then use the entropy-based TOPSIS method to synthesize the default risk of each sector to obtain the macrofinancial risk indicator.

(1) The Contingent Claims Analysis. Using the contingent claims analysis, it measures the uncertainty of debt solvency, or default risk, for each sector. The cause of default in relation to explicit debt maturity commitment repayment is uncertainty in asset value. Figure 1 depicts the link between the distribution of asset value (A_t) fluctuations and the default likelihood, where the horizontal solid line represents the maturity commitment payments (B_t) (the maturity commitment payment is the value of the debt without risk of default, which is the book value of the debt), and the asset value (A_t) changes follow a stochastic process, with the specific expressions being:

$$\frac{\mathrm{dA}}{\mathrm{A}} = \mu_{\mathrm{A}}\mathrm{dt} + \sigma_{\mathrm{A}}\varepsilon\sqrt{\mathrm{t}}, \tag{1}$$

where μ_{A} is the rate of return on assets, and σ_A is the volatility of return on capital. Default occurs when the asset value falls below the promised repayment ($A_t \le B_t$), and the default probability is as in equation (2) (as the contingent claims analysis method uses the probability of default between assets and liabilities to measure default risk, it focuses more on measuring potential default risk):

$$\mathrm{Prob}\,(\mathrm{A})_{\mathrm{t}} \le \mathrm{B}_{\mathrm{t}}) = \mathrm{Prob}\left\{\mathrm{A}_0\mathrm{epx}\left[\left(\mu_{\mathrm{A}}\frac{-\sigma_{\mathrm{A}}^2}{2}\right)\mathrm{t} + \sigma_{\mathrm{A}}\varepsilon\sqrt{\mathrm{t}}\right] \le \mathrm{B}_{\mathrm{t}}\right\}$$

$$\mathrm{Prob}\left\{\varepsilon \le -\mathrm{d}_{2,\mu}\right\},$$

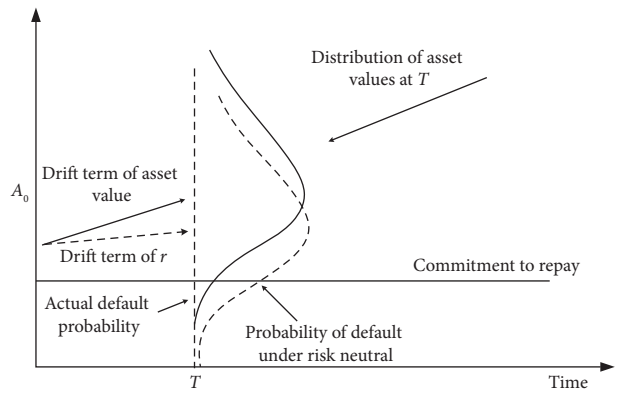


Figure 1: Asset value and default risk.

$$\begin{aligned}\mathrm{d}_{2,\mu} &= \frac{\ln\left(\mathrm{A}_0/\mathrm{B}_{\mathrm{t}}\right) + \left(\mu_{\mathrm{A}} - \sigma_A^2/2\right)\mathrm{t}}{\sigma_{\mathrm{A}}\sqrt{\mathrm{t}}},\\ \mathrm{d}_2 &= \frac{\ln\left(\mathrm{A}_0/\mathrm{B}_{\mathrm{t}}\right) + \left(\mathrm{r} - \sigma_A^2/2\right)\mathrm{t}}{\sigma_{\mathrm{A}}\sqrt{\mathrm{t}}},\end{aligned} \tag{2}$$

where $\varepsilon \sim N(0, 1)$, $N(\cdot)$ is the cumulative function of the standard normal distribution, the actual default probability is $N(-d_{2,\mu})$, and the default probability under risk neutrality is $N(-d_2)$, and the distribution of default probability under risk neutrality takes the risk-free rate r as the expected return. Considering the data availability and weighted processing achievability, this paper selects the default distance under risk neutrality as the default risk indicator for each sector with reference to Gong [36].

(2) Entropy-Based TOPSIS Method. This paper first calculates the default risk of the corporate, financial, governmental, and household sectors using the contingent claims analysis, and then we combine the default risk of each sector using the entropy-based TOPSIS method to provide macrofinancial risk indicators. The indicators are fairer and more objective thanks to the entropy-based TOPSIS method, which combines the quantitative ranking of TOPSIS with the benefits of the entropy weighting method in weight assignment. Specifically, the measurement index M_{it} is standardized as follows:

$$\mathrm{N}_{\mathrm{it}} = \begin{cases} \dfrac{\mathrm{M}_{\mathrm{it}} - \min\,(\mathrm{M})_{\mathrm{it}})}{\max\,(\mathrm{M})_{\mathrm{it}} - \min\,(\mathrm{M})_{\mathrm{it}})}, \\ \dfrac{\max\,(\mathrm{M}_{\mathrm{it}}) - \mathrm{M}_{\mathrm{it}}}{\max\,(\mathrm{M}_{\mathrm{it}}) - \min\,(\mathrm{M}_{\mathrm{it}})}. \end{cases} \tag{3}$$

Next, the information entropy E_j and weight W_j of N_{it} are calculated, and the weighting matrix R is constructed as follows:

$$
\begin{aligned}
E_j &= \ln \frac{1}{n} \sum_{i=1}^{n} \left[\left(\frac{N_{it}}{\sum_{i=1}^{n} N_{it}} \right) \ln \left(\frac{N_{it}}{\sum_{i=1}^{n} N_{it}} \right) \right], \\
W_j &= \frac{\left(1 - E_j\right)}{\sum_{j=1}^{m} \left(1 - E_j\right)}, \\
R &= \left(r_{ij}\right)_{n \times m}, \\
r_{ij} &= W_j \times N_{ij}.
\end{aligned}
\tag{4}
$$

Thirdly, determine the optimal solution Q_j^+ and the worst solution Q_j^- and their Euclidean distances d_i^+ and d_i^- as follows:

$$
\begin{aligned}
Q_t^+ &= (\max r_{i1}, \max r_{i2}, L, \max r_{im}), \\
Q_t^- &= (\min r_{i1}, \min r_{i2}, L, \min r_{im}), \\
d_i^+ &= \sqrt{\sum_{j=1}^{m} \left(Q_j^+ - r_{ij}\right)^2}, \\
d_i^- &= \sqrt{\sum_{j=1}^{m} \left(Q_j^- - r_{ij}\right)^2}.
\end{aligned}
\tag{5}
$$

Finally, we calculate the relative proximity C_i (its value is between (0,1). The larger the C_i is, the greater the macrofinancial risk is, and vice versa):

$$
C_i = \frac{d_i^-}{d_i^+ + d_i^-}. \tag{6}
$$

(3) Asset and Liability Indicators and Data Description. The default risk of the corporate sector, financial sector, government sector, and household sector must be assessed in this contingent claim analysis using equity assets and liabilities. We divide each sector's assets and liabilities in this work in accordance with Gary et al. [37], and in addition, to ensure that the standard is consistent across nations, the deposit rate for each nation in the International Financial Statistics of the IMF is chosen as its risk-free rate. Additionally, the risk-free rates for each nation are determined using the deposit rates from the IMF's International Financial Statistics. The specific selection of sectoral assets and liabilities is shown in Table 1.

3.2.2. International Portfolio Investment Flow. The ratio of net flow in international capital to GDP is chosen as the indicator of international portfolio investment flow. International portfolio investment flow is the main explanatory variable in this study. The ratio of capital inflow and outflow of international portfolio investment to GDP is also used as an indicator of capital inflow and outflow to analyse the heterogeneous influence of capital flow direction. With 2000 serving as the base year, the data are deflated.

3.2.3. Other Variables. In this study, there are two threshold adjustment factors. One is foreign exchange reserves. As a gauge of each nation's foreign exchange reserves, the foreign exchange reserve to GDP ratio is chosen, and the base year 2000 is used to deflate it. The other is capital control. For choosing the indicator better, it refers to Yu et al. who use the capital controls data derived by Fernández from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions [38]. This research chooses the Fernández data as the indicator of capital controls since it calculates the degree of control on both the input and outflow sides of capital as well as the overall capital flows. A larger value denotes a higher degree of capital control (since 2017 is the most recent year for which capital control indicator data has been updated, this article will use quarterly data from 2001 to 2017). To fully investigate the regulatory impact of capital control, this article also chooses capital outflow control and capital inflow control as supplemental indicators. Additional control factors include the degree of external debt, the level of the exchange rate, the capital adequacy ratio, the degree of trade openness, and the degree of credit. The data are deflated using 2000 as the base period. The main variables used in this paper and their calculation methods are given in Table 2.

3.3. Model Design. This paper builds a dynamic panel autoregressive distribution lag model for analysis to explore the short- and long-term equilibrium links between international portfolio investment flow and macrofinancial risk [39–41], and the dynamic panel ARDL model (p, q, m, n, l, k, h) is as follows:

$$
\begin{aligned}
MR_{it} = {} & \sum_{j=0}^{p} \lambda_{ij} MR_{i,t-j} + \sum_{j=0}^{q} \alpha_{ij} IPIF_{i,t-j} + \sum_{j=0}^{m} \varphi_{ij} EDL_{i,t-j} + \sum_{j=0}^{n} \theta_{ij} ERL_{i,t-j} + \sum_{j=0}^{l} \gamma_{ij} CAR_{i,t-j} \\
& + \sum_{j=0}^{k} \delta_{ij} TO_{i,t-j} + \sum_{j=0}^{h} \sigma_{ij} CL_{i,t-j} + u_i + \varepsilon_{it},
\end{aligned}
\tag{7}
$$

where λ, α, φ, θ, γ, δ, and σ denote the regression coefficients of the respective variables, μ_i and ε denote the cross-sectional fixed effects and random error terms, respectively, and j denotes the lag order. When the

Table 1: Indicators of assets and liabilities in four departments.

Department	Assets (E)	Liabilities (B)
Corporate	Carrying amount of nonfinancial enterprises value of owner's equity	Bonds, stocks, loans
Financial	Loans (to business, household, and government) and reserves	Bonds, deposits
Government	Foreign exchange reserves, fiscal balance (taxes less expenditures)	Government debt (local and foreign currency)
Household	Household deposits and savings in the form of other financial assets	Household debt

variables in equation (7) are smooth series with a cointegration relationship, there is a long-term equilibrium relationship for the error terms, and the error correction model can be constructed as follows:

$$\begin{aligned}\Delta \mathrm{MR}_{\mathrm{it}} = {} & \phi_i\left(\mathrm{MR}_{i,t-1} + \beta_{1t}\mathrm{IPIF}_{\mathrm{it}} + \beta_{2t}\mathrm{EDL}_{\mathrm{it}} + \beta_{3t}\mathrm{ERL}_{\mathrm{it}} + \beta_{4t}\mathrm{CAR}_{\mathrm{it}} + \beta_{5t}\mathrm{TO}_{\mathrm{it}} + \beta_{6t}\mathrm{CL}_{\mathrm{it}}\right) \\ & + \sum_{j=0}^{p}\lambda_{ij}\mathrm{MR}_{i,t-j} + \sum_{j=0}^{q}\alpha_{ij}\mathrm{IPIF}_{i,t-j} + \sum_{j=0}^{m}\varphi_{ij}\mathrm{EDL}_{i,t-j} + \sum_{j=0}^{n}\theta_{ij}\mathrm{ERL}_{i,t-j} \\ & + \sum_{j=0}^{l}\gamma_{ij}\mathrm{CAR}_{i,t-j} + \sum_{j=0}^{k}\delta_{ij}\mathrm{TO}_{i,t-j} + \sum_{j=0}^{h}\sigma_{ij}\mathrm{CL}_{i,t-j} + u_i + \varepsilon_{\mathrm{it}},\end{aligned} \tag{8}$$

where ϕ_i is the error correction coefficient, and β is the long-run equilibrium coefficient.

3.4. Descriptive Statistics. The results of the descriptive statistics for the key variables in this study are displayed in Table 3. The table shows that the distribution of macrofinancial risk values is reasonably smooth and less volatile, with a low standard deviation, a mean that is near the median, and a tiny extreme difference between the minimum and maximum. Corporate default risk is below average in most nations and higher in a few, increasing the mean level of overall default risk. The mean value for corporate default risk is 22.460, while the median value is 14.920. The mean and median default risk values for the financial and government sectors are similar, and both variables' data concentration trends are improving. According to the fact that the mean value of default risk for the household sector is higher than the median, only a small number of countries have a higher risk of household default. The mean and median values of the international equity flow indicators IPIF, IPII, and IPIO are generally similar, and the data distribution is stable. As can be seen from the wide range between the maximum and minimum values of foreign exchange reserves and the fact that the mean is higher than the median, most nations have below-average foreign exchange reserve ratios, while only a small number of nations, including Bulgaria, China, Croatia, and other nations, have above-average reserve ratios. The mean values of the capital control indicators CC, CIC, and COC are all lower than the median, indicating that most nations have low levels of capital control, whereas a small number of countries impose more strict capital control measures. The data are comparatively evenly distributed across the other control variables, which include the degree of foreign debt, capital adequacy ratio, degree of trade development, and degree of credit. Due to the greater exchange rate of the Indian rupee versus the US dollar (using the indirect markup technique), the exchange rate level (ERL) has an interesting mean value of 1219.097 and a maximum value of 16367, with a minimum value of 8285 and a maximum value of 16367.01 for the sample period. Additionally, the Sri Lankan rupee has a mean value of 124.57 against the US dollar, the Hungarian forint has a mean value of 236.22 against the US dollar, and other nations with a higher exchange rate help to raise the average level of the exchange rate globally.

4. Empirical Results

4.1. Empirical Analysis

4.1.1. Unit Root Test. To prevent potential pseudoregression issues, the LLC, IPS, and Fisher-ADF methods used for long panel data testing were chosen for smoothness testing in this study before the regression estimate of the model was carried out, and the results are shown in Table 4. All variables pass the unit root test, indicating the series is smooth and stable according to the test findings.

4.1.2. Main Results. The coefficient estimation methods of the panel autoregressive distributed lag model include the mean estimation method (MG), the dynamic fixed effect method (DFE), and the mixed group mean estimation method (PMG), among which PMG was proposed by Pesaran et al. [40]. The PMG estimator combines the characteristics of the MG estimator and the DFE estimator, which allow inter-group differences in the intercept term, short-term coefficients, and error variables between different groups while the long-term coefficients are consistent. In addition, the main advantage of PMG is that it can reduce the impact of endogenous problems, so this paper uses PMG to estimate the parameters of the benchmark regression model.

Table 2: Variable definition.

Variable name	Variable symbol	Variable definition
Macrofinancial risk	MR	Using the entropy-based TOPSIS method to synthesize default risk across sectors yields
Corporate default risk	CDR	Measuring the default distance between corporates' assets and liabilities by contingent claims analysis
Financial default risk	FDR	Measuring the default distance between financial sectors' assets and liabilities by contingent claims analysis
Government default risk	GDR	Measuring the default distance between governments' assets and liabilities by contingent claims analysis
Household default risk	HDR	Measuring the default distance between households' assets and liabilities by contingent claims analysis
International portfolio investment flow	IPIF	International portfolio investment netflow/gross domestic product
International portfolio investment inflow	IPII	International portfolio investment inflow/gross domestic product
International portfolio investment outflow	IPIO	International portfolio investment outflow/gross domestic product
Foreign exchange reserve	FER	Foreign exchange reserve/gross domestic product
Capital control	CC	Calculated with reference to Yu et al. [38], and the data time dimension is from the first quarter of 2001 to the fourth quarter of 2017
Capital inflow control	CIC	
Capital outflow control	COC	
External debt level	EDL	Ratio of operating income to gross domestic product
Exchange rate level	ERL	The exchange rate of each country's currency against the U.S. dollar and expressed uniformly using the indirect markup method
Capital adequacy ratio	CAR	Capital adequacy ratio of domestic commercial banks
Trade openness	TO	Total national trade import and export/gross domestic product
Credit level	CL	Total deposits and loans of domestic financial institutions/gross domestic product

Table 3: Descriptive statistics.

Variable	N	Mean	sd	min	p25	p50	p75	max
MR	1600	0.433	0.120	0.170	0.340	0.415	0.505	0.902
CDR	1600	22.330	35.730	3.482	10.530	14.920	21.700	265.900
FDR	1600	22.460	13.840	1.466	15.180	21.040	28.780	60.970
GDR	1600	10.440	14.130	3.850	6.695	10.140	14.810	25.030
HDR	1600	9.597	16.660	1.170	1.622	4.187	10.630	175
IPIF	1600	0.005	0.041	−0.257	−0.015	0.004	0.025	0.303
IPII	1600	0.013	0.038	−0.249	−0.005	0.008	0.030	0.300
IPIO	1600	0.008	0.021	−0.093	−0.001	0.003	0.013	0.147
FER	1600	0.785	0.446	0.118	0.451	0.669	1.006	3.247
CC	1360	0.599	0.298	0.000	0.413	0.650	0.825	1.000
CIC	1360	0.546	0.292	0.000	0.300	0.600	0.750	1.000
COC	1360	0.651	0.333	0.000	0.450	0.750	0.950	1.000
EDL	1600	0.243	0.150	0.021	0.136	0.194	0.334	0.792
ERL	1600	631.800	2277	1.000	3.800	18.080	79.740	14657
CAR	1600	15.050	3.345	6.750	13.040	14.890	16.890	32.080
TO	1600	0.695	0.378	0.148	0.428	0.591	0.898	1.908
CL	1600	2.780	1.453	0.640	1.620	2.496	3.429	9.078

Table 4: Results of unit root test.

Variable	LLC	IPS	Fisher-ADF
MR	−4.4742***	−12.9329***	35.5482***
CDR	−2.1115**	−4.0594***	17.8740***
FDR	−4.5861***	−3.9041***	23.0387***
GDR	−4.5961***	−10.5229***	67.8204***
HDR	−8.6811***	−12.1828***	23.6285***
IPIF	−9.4257***	−13.4588***	58.2469***
IPII	−8.7066***	−14.3161***	58.2513***
IPIO	−10.2575***	−15.7074***	72.1873***
FER	−2.3528***	−3.0917***	14.6832***
CC	−2.1700**	−1.4221*	12.1738***
CIC	−1.9804**	−2.4978***	11.0225***
COC	−2.9024***	−1.7672**	10.9519***
EDL	−2.6760***	−1.9406*	11.7625***
ERL	−1.5939*	7.1581	1.3356*
CAR	−3.8321***	−5.0581***	10.4108***
TO	−3.3094***	−4.1046***	23.3981***
CL	−2.1076*	−3.3733***	16.8297***

Note. *, **, *** are the statistics' significance levels, representing significance at 10%, 5%, and 1% levels.

The test findings of international portfolio investment flow on macrofinancial risk are shown in Table 5. While columns (2) to (5) show the short- and long-term dynamic relationships between international portfolio investment flow and default risk in the corporate, financial, governmental, and household sectors, respectively, column (1) shows the short- and long-term dynamic relationships between international portfolio investment flow and macrofinancial risk. The short-term portfolio investment flow has a catalytic effect on macrofinancial risk, and an increase in portfolio investment flow in the short run results in a corresponding increase in macrofinancial risk, as shown in column (1), where the coefficient of ΔIPIF on MR is 0.0115 and significant at the 1% statistical level. Long-term portfolio investment flow has a dampening influence on macrofinancial risk, and an increase in portfolio investment flow over time will somewhat reduce macrofinancial risk. The coefficient of IPIF on MR is −0.0010, which is significant at the 5% level of significance. The estimated coefficient of ECT is −0.5760 and statistically significant at the 1% level based on the results of the error correction term. This means that there is a reverse adjustment mechanism and strong convergence of the model, where the macrofinancial risk will quickly return to the long-term equilibrium after being pushed away by short-term effects, and this deviation can be fixed by 57.6% in the short run.

The impact of short-term portfolio investment flow on corporate default risk is negligible in column (2), while the impact of long-term portfolio investment flow is 0.5716. The nonsignificant ECT estimation result suggests that there is no moderating mechanism. The estimated ΔIPIF coefficient on FR in column (3) is 0.0066, which indicates that larger portfolio investment flows over the near term increase the risk of default in the financial sector. The long-term coefficient of ΔIPIF on GR is 0.0260, indicating that an increase in portfolio investment flow over the long term will result in a similar increase in default risk in the government sector. In column (4), the influence of IPIF on GR is not significant. Additionally, column (5) displays the regression findings of portfolio investment flow on default risk in the household sector, and the results reveal that this influence is negligible in both the short and long terms.

According to the findings, there is a short-term and long-term impact of international portfolio flow on macrofinancial risk. Rising portfolio flows increase macrofinancial risk over the near term, but they reduce it over the long term, which confirms Hypothesis 1. Short-term crossborder capital flows, especially portfolio capital, will affect the vulnerability of the financial system through the degree of the credit boom. Due to the close financial correlation among various sectors, this impact will be transmitted to various sectors of the economy and cause macrofinancial risk to rise. This result is consistent with the findings of Forbes and Warnock [8]. On the other hand, unlike short-term capital flows, long-term securities investment flows will not cause frequent fluctuations in the financial market but

Table 5: Main results.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
IPIF	−0.0010**	−0.5716**	0.1080**	0.0260*	−0.0224
	(0.0041)	(0.2220)	(0.0459)	(0.0150)	(0.0226)
EDL	0.1457**	29.6551**	4.0984***	0.9019	0.3001
	(0.057)	(14.3690)	(1.5091)	(0.7668)	(0.9796)
ERL	0.0001	−0.030*	−0.0001	−0.0001***	0.0001
	(0.0002)	(0.0016)	(0.0002)	(0.0000)	(0.0009)
CAR	0.0061***	0.6596*	0.0013	−0.0075	−0.0573*
	(0.0020)	(0.3683)	(0.0514)	(0.0161)	(0.0302)
TO	0.1221***	−8.0480	−3.3641	0.6780***	1.3221***
	(0.0413)	(6.3039)	(1.1153)	(0.1620)	(0.3761)
CL	−0.0040	5.6373***	0.1412	−0.085	−0.3748***
	(0.057)	(2.0817)	(0.1678)	(0.0864)	(0.0856)
ECT	−0.5760***	−0.0567	−0.0887***	−0.5580***	−0.5078
	(0.0630)	(0.0545)	(0.0090)	(0.1450)	(0.1578)
ΔIPIF	0.0115***	−0.2073	0.0066*	−0.0506	0.056
	(0.0005)	(0.2206)	(0.0034)	(0.1375)	(0.0223)
ΔEDL	0.0258	−6.8172	0.0720	59.7352	3.2416
	(0.1243)	(4.1974)	(0.4490)	(47.6760)	(4.6818)
ΔERL	−0.0101	−1.0151	0.0001	7.2803	0.0251
	(0.0090)	(1.0639)	(0.0008)	(6.7509)	(0.0802)
ΔCAR	0.0005	−0.2124	−0.0280**	1.1234	0.0886***
	(0.0068)	(0.1758)	(0.0115)	(1.4335)	(0.0292)
ΔTO	0.0383	−1.8047	−0.1487	−22.4584	−0.5063
	(0.1428)	(2.8020)	(0.1138)	(32.1938)	(1.3458)
ΔCL	−0.0017	−0.5158	−0.0112	2.6216	0.3396
	(0.0239)	(0.3522)	(0.0262)	(2.0568)	(0.2248)
Constant	0.1425***	0.3373	2.0069***	2.5728**	2.4233
	(0.0277)	(0.7277)	(0.2231)	(1.1342)	(0.6116)
N	1600	1600	1600	1600	1600

Note. The standard deviation of the estimated regression coefficients is in parentheses; *, **, *** a are the statistics' significance levels, representing significant at 10%, 5%, and 1% level, respectively; Δ is the estimated result of the short-term impact coefficient, and those without Δ are the estimated result of the long-term impact coefficient, and ECT is the correction term of the error correction model.

will inject liquidity into the financial market to ease the relationship between assets and liabilities among various departments, and the risk of default among various departments will be reduced, further reducing macrofinancial risk. Therefore, long-term securities investment flows will reduce macrofinancial risks, and this result is also similar to Tang and Wang [42] and Tong and Zhang [43].

4.2. Heterogeneity Test

4.2.1. Heterogeneity Test of Different Capital Flow Direction. This research explores the influence of international portfolio investment on macrofinancial risk from two viewpoints, capital inflow and outflow, to study the effect of the heterogeneity of international portfolio investment flows. The impact of capital inflow is seen in the results of the regression in Table 6. The coefficient of IPII's effect on MR in column (1) is 0.0012, and the coefficient of ΔIPII's effect on MR is −0.0022. It shows that macrofinancial risk is catalysed by short-term portfolio investment inflows and that a rise in short-term portfolio investment inflow results in an equal increase in macrofinancial risk. On the other hand, macrofinancial risk is dampened by long-term portfolio inflow, and macrofinancial risk will be somewhat reduced as portfolio inflow increases over time. According to the coefficient estimation results of ECT, the model has a reverse adjustment mechanism and strong convergence. Macrofinancial risk will adjust to the long-term equilibrium more quickly after deviating from it due to short-term effects, and this deviation can be corrected in the short run by 59.18%.

Compared with long-term capital flows, short-term capital flows are more unstable and often carry a higher level of risk. Bruno and Shin believe that crossborder capital inflows release financial risk spillover effects by affecting the level of bank leverage [44]. From the research results of this paper, when portfolio flows into the financial market on a large scale in the short term, it promotes the credit prosperity of financial institutions to a certain extent, and people have good expectations for the future market, resulting in potential debt, leverage, maturity, and liquidity. The degree of mismatch among them increases [45, 46]. Due to the excessive expansion of credit, the potential default risk among various sectors of the economy has increased, which ultimately increases the macrofinancial risk level of the

Table 6: International portfolio inflow.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
IPII	−0.0022*	−0.1680	−0.0261**	0.0345**	−0.0481**
	(0.0007)	(0.2191)	(0.0108)	(0.0165)	(0.0245)
EDL	0.1347***	−67.4187***	0.0025	0.4944	0.3543
	(0.0230)	(8.6253)	(0.1406)	(0.7881)	(0.9798)
ERL	0.0001	−0.1251*	−0.0001	−0.0001***	0.0001
	(0.0011)	(0.0659)	(0.0009)	(0.0000)	(0.0012)
CAR	0.0030**	−2.1106***	−0.0054	−0.0126	−0.0524*
	(0.0012)	(0.3825)	(0.0062)	(0.0164)	(0.0302)
TO	0.0740***	8.6729	0.6775***	0.6430***	1.2436***
	(0.0273)	(8.2695)	(0.1736)	(0.1631)	(0.3711)
CL	−0.0049*	−6.4577***	−0.0785**	−0.1032	−0.3720***
	(0.0029)	(1.0666)	(0.0388)	(0.0886)	(0.0869)
ECT	−0.5918***	−0.1094	−0.0412	−0.5566***	−0.5091***
	(0.0327)	(0.0707)	(0.0391)	(0.1442)	(0.1590)
ΔIPII	0.0012**	−0.0934	0.0007	−0.0473	0.0511
	(0.0006)	(0.1194)	(0.0007)	(0.1150)	(0.0372)
ΔEDL	0.0535	−3.4914	−0.0392	59.6536	3.1605
	(0.0749)	(3.8247)	(0.0727)	(47.8153)	(4.6736)
ΔERL	−0.0000	−0.9966	−0.0053	7.2422	0.0233
	(0.0020)	(1.0474)	(0.0040)	(6.7760)	(0.0906)
ΔCAR	−0.0015	−0.0203	−0.0008*	1.1197	0.0842***
	(0.0031)	(0.0616)	(0.0005)	(1.4137)	(0.0289)
ΔTO	−0.0319	−3.6419	0.0557	−22.2868	−0.3391
	(0.0700)	(3.5855)	(0.0585)	(32.0976)	(1.3820)
ΔCL	0.0009	−0.1691	−0.0054	2.5839	0.2790
	(0.0073)	(0.1997)	(0.0042)	(2.0459)	(0.2005)
Constant	0.1932***	20.9873	0.0553	2.6766**	2.3943***
	(0.0222)	(18.0023)	(0.0548)	(1.1321)	(0.6255)
N	1600	1600	1600	1600	1600

economy as a whole [47]. Long-term portfolio inflows will fill the market's liquidity for a long time, which is conducive to the initial accumulation of corporate capital, increase the production scale of enterprises, and improve the utilisation efficiency of domestic labour factors. With the improvement of enterprise productivity and the continuous expansion of market size, the development of industrial agglomeration and the industrial cluster model will be promoted, and enterprises will further increase their demand for financial markets, forcing financial markets to deepen reform and optimise capital allocation efficiency [48]. Gradually improve the level of risk management in a multicompetition environment, as well as the financial system's ability to withstand risks. At the same time, the development and improvement of the financial system will help reduce market operations, "rent-seeking" behaviour, and other transaction risks caused by illegal operations and reduce the potential macrofinancial risk level of the economy.

The findings of the portfolio investment outflow regression on macrofinancial risk are shown in Table 7. As can be observed, there are both immediate and long-term implications of portfolio investment outflows on macrofinancial risk. In the long term, higher portfolio investment outflows reduce macrofinancial risk, whereas higher portfolio investment flows do the opposite in the short term. The subpectoral results suggest that all sectors are insensitive to short-term portfolio investment outflows. On the other hand, default risk in the financial sector responds favourably to portfolio investment outflows in the long term, while default risk in the corporate and household sectors reacts negatively to it. This means that higher portfolio outflow over time not only exacerbates default risk in the financial sector but also mitigates default risk in the corporate and household sectors. Furthermore, neither a short-term nor a long-term portfolio outflow has a significant impact on the probability that the government sector will not be able to pay its obligations.

Zhang believes that short-term capital outflows have limited impact on the financial system. When the foreign market is expected to be good, domestic investors rush into the foreign market [49]. Large-scale portfolio investment outflows will reduce the activity of the domestic financial market, thereby crowding out the speculative bubble in the financial market and bringing asset prices back to the fundamental value of the economy. From this perspective, the outflow of short-term securities capital does not have a significant impact on macrofinancial risk, which is consistent with the empirical results of this paper. In the long

Table 7: International portfolio outflow.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
IPIO	−0.0075*	−0.9565*	0.2063**	0.0250	−0.1280**
	(0.0044)	(0.5023)	(0.0948)	(0.0192)	(0.0626)
EDL	−0.2794***	28.4909*	4.8954***	1.7254***	−0.0357
	(0.0735)	(14.8985)	(1.5287)	(0.6153)	(0.9908)
ERL	−0.0001	0.0486	−0.0001	0.0047***	0.0001
	(0.0001)	(0.0321)	(0.0002)	(0.0008)	(0.0001)
CAR	−0.0024	0.8102**	0.0079	−0.1215***	−0.0500
	(0.0022)	(0.3546)	(0.0512)	(0.0252)	(0.0309)
TO	0.0614	−13.3313*	−3.6427***	0.1156	1.1466***
	(0.0376)	(6.9174)	(1.1127)	(0.2627)	(0.3864)
CL	0.0258***	4.2839***	0.0665	−0.6404***	−0.3670***
	(0.0092)	(1.6392)	(0.1673)	(0.1216)	(0.0896)
ECT	−0.5052***	−0.0536	−0.0889***	−0.5192***	−0.4952***
	(0.1149)	(0.0509)	(0.0090)	(0.1410)	(0.1557)
ΔIPIO	0.0025	−0.1018	−0.0020	0.0159	0.1270
	(0.0019)	(0.1557)	(0.0064)	(0.3775)	(0.1232)
ΔEDL	0.1992	−7.6041*	−0.1277	57.2720	3.7166
	(0.1494)	(3.9935)	(0.4481)	(45.3513)	(4.7437)
ΔERL	0.0015	−0.8587	0.0000	7.1289	0.0059
	(0.0015)	(0.9114)	(0.0000)	(6.7789)	(0.0562)
ΔCAR	−0.0012	−0.1732	−0.0307***	1.1626	0.0896***
	(0.0036)	(0.1485)	(0.0115)	(1.4189)	(0.0320)
ΔTO	−0.0246	−3.1386	−0.1204	−20.9180	0.1634
	(0.0814)	(3.7810)	(0.1136)	(31.4890)	(1.3937)
ΔCL	−0.0171	−0.2045	−0.0141	2.1938	0.2537
	(0.0191)	(0.3094)	(0.0261)	(1.8484)	(0.2374)
Constant	0.1955***	0.6470	2.0132***	4.0677***	2.3751***
	(0.0447)	(0.7652)	(0.2228)	(1.2549)	(0.6268)
N	1600	1600	1600	1600	1600

run, domestic financial markets and foreign financial markets are in a competitive relationship. Portfolio outflows can help domestic financial institutions reduce asset portfolio risks through rational asset allocation. In addition, it also helps financial investment institutions acquire foreign capital market service resources, advanced technology, and experience to feed back to the domestic financial industry, improve the level of the domestic financial market, and enhance the ability of the financial market to resist capital shocks. Capital outflows force the domestic financial market to a certain extent development and improve the financial system's ability to resist shocks, thereby reducing macrofinancial risks.

4.2.2. Heterogeneity Test for Different Capital Types. This article further explores the impact of capital flows on macrofinancial risk from the perspectives of both equity securities and debt securities. An international portfolio investment comprises both equity securities and debt securities. The regression results for the flow of equity securities and debt securities are displayed in Tables 8 and 9, respectively. It can be seen from the result in column (1) of Table 8 that the coefficient of the relationship between EIF and MR is 0.0037, which is significant at the 10% level of statistical significance. This result shows that the flow of long-term equity securities has a catalytic effect on macrofinancial risk and that an increase in the capital flow of equity securities increases macrofinancial risk. The coefficient of the short-term effect of ΔEIF on MR is 0.0013, which shows that an increase in the flow of short-term equity securities will also increase macrofinancial risk.

Fang et al. believe that speculative capital flows can easily lead to asset price fluctuations, and asset price fluctuations are an important cause of risk, so speculative capital flows will increase financial risks [50]. Compared with bond capital, equity capital is more speculative, more flexible, and has a higher risk effect, so both short-term and long-term equity capital flows have a promoting effect on macrofinancial risks. This conclusion is consistent with the conclusions of Bai and Bathia et al. [14, 51].

The impact of the flow of debt securities on macrofinancial risk is depicted in Table 9 by the regression results. In column 1, the estimated coefficients for the effects of the flow of long-term debt securities and short-term debt securities on macrofinancial risk are −0.0164 and −0.0024, respectively. As opposed to equity securities, debt securities' capital flow has the potential to lower rather than increase macrofinancial risk. The movement of debt securities has varying effects on default risk across industries, with no

Table 8: Equity securities flow.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
EIF	0.0037*	0.0767*	−0.3619***	0.0884***	0.0150
	(0.0022)	(0.0430)	(0.1307)	(0.0322)	(0.0411)
EDL	0.1203***	−2.3388	5.3274***	1.1691*	0.2113
	(0.0422)	(2.7945)	(1.6861)	(0.6772)	(0.9671)
ERL	0.0001	−0.0450*	0.0030	−0.0001***	0.0001
	(0.0011)	(0.0242)	(0.0045)	(0.0006)	(0.0004)
CAR	0.0004	−0.2452**	−0.0070	−0.0027	−0.0576*
	(0.0015)	(0.1067)	(0.0348)	(0.0145)	(0.0311)
TO	0.0669**	−0.7892	−5.3158***	0.5920***	1.2704***
	(0.0316)	(1.6633)	(1.3414)	(0.1497)	(0.3917)
CL	−0.0094*	−2.2409***	0.9970***	−0.0620	−0.3626***
	(0.0049)	(0.4614)	(0.1814)	(0.0792)	(0.0889)
ECT	−0.5730***	−0.1323***	−0.0360	−0.5662***	−0.4994***
	(0.0307)	(0.0390)	(0.0271)	(0.1447)	(0.1562)
ΔEIF	0.0013*	−0.2005	−0.0411	−1.0578	0.0092
	(0.009)	(0.2489)	(0.0497)	(1.3868)	(0.0680)
ΔEDL	−0.0216	−1.7942	−0.1457	58.5355	2.6917
	(0.0850)	(5.5328)	(0.4128)	(47.7406)	(4.7327)
ΔERL	−0.0101**	−0.7583	−0.0205	7.3891	0.0250
	(0.0005)	(0.8087)	(0.0180)	(6.9622)	(0.0656)
ΔCAR	−0.0001	−0.0756	−0.0228***	1.0221	0.0698**
	(0.0022)	(0.0867)	(0.0063)	(1.3472)	(0.0319)
ΔTO	0.0006	−5.0024	−0.5195	−20.2656	−0.2236
	(0.0216)	(4.7820)	(0.3652)	(33.6384)	(1.3464)
ΔCL	0.0041	−0.2694	−0.0788	1.7196	0.2590
	(0.0050)	(0.2567)	(0.0753)	(1.5165)	(0.1951)
Constant	0.2198***	5.9870*	0.6235	2.5840**	2.3580***
	(0.0220)	(3.0899)	(0.3997)	(1.1498)	(0.6071)
N	1600	1600	1600	1600	1600

Table 9: Debt securities flow.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
DSF	−0.0164***	−0.5599*	0.1909***	0.0040	−0.0456
	(0.0044)	(0.3200)	(0.0594)	(0.0128)	(0.0293)
EDL	0.0215	−67.5924***	3.8365**	1.5277**	0.4642
	(0.0533)	(7.6736)	(1.5073)	(0.7054)	(0.9928)
ERL	0.0001	0.0019**	−0.0001	0.0041***	0.0001
	(0.0010)	(0.0009)	(0.0002)	(0.0008)	(0.0006)
CAR	0.0052**	−1.6649***	−0.0020	−0.1137***	−0.0529*
	(0.0022)	(0.3003)	(0.0514)	(0.0246)	(0.0301)
TO	−0.1224**	10.0174	−3.3168***	−0.0157	1.2081***
	(0.0557)	(6.1128)	(1.1137)	(0.2530)	(0.3708)
CL	−0.0169***	−7.2408***	0.1226	−0.5618***	−0.3732***
	(0.0060)	(0.8853)	(0.1673)	(0.1240)	(0.0868)
ECT	−0.4999***	−0.1251	−0.0882***	−0.5125***	−0.5037***
	(0.0832)	(0.0765)	(0.0090)	(0.1385)	(0.1579)
ΔDSF	−0.0024*	0.0137	−0.0096**	−0.1528	0.0201
	(0.0012)	(0.0784)	(0.0043)	(0.2624)	(0.0582)
ΔEDL	0.1055	−3.3535	0.1214	65.1673	3.2205
	(0.1334)	(2.6476)	(0.4474)	(51.4468)	(4.6406)

Table 9: Continued.

	MR (1)	CR (2)	FR (3)	GR (4)	HR (5)
ΔERL	−0.0063	−1.0289	0.0000	7.3937	−0.0025
	(0.0054)	(1.0721)	(0.0000)	(6.9158)	(0.0608)
ΔCAR	0.0000	−0.0520	−0.0270**	1.1397	0.0607*
	(0.0040)	(0.0892)	(0.0115)	(1.4227)	(0.0327)
ΔTO	0.0978	−1.3304	−0.1541	−23.9527	−0.1511
	(0.1539)	(1.8203)	(0.1135)	(34.0757)	(1.3945)
ΔCL	0.0123	−0.0992	−0.0104	2.6800	0.3187
	(0.0409)	(0.2293)	(0.0261)	(2.1197)	(0.2231)
Constant	0.2196***	22.2113	2.0098***	3.8701***	2.3776***
	(0.0408)	(19.2870)	(0.2222)	(1.2082)	(0.6056)
N	1600	1600	1600	1600	1600

discernible effects in the government and household sectors. Long-term debt security flows reduce default risk for the corporate sector. In contrast, the flow of long-term debt securities lowers default risk for the financial sector, while the flow of short-term debt securities increases it.

Since the financial crisis in 2008, emerging economies have been favoured by bond capital [52], but cross-border bond capital flows have seldom triggered financial volatility in emerging economies. Unlike the characteristics that say equity capital promotes asset price fluctuations, bond capital flows help reduce asset price volatility, and asset prices are an important factor affecting macrofinancial risks [53]. Therefore, both long-term and short-term bond capital liquidity can help reduce macrofinancial risk, which is consistent with the research results of this paper.

4.2.3. Capital Inflow and Outflow of Different Capital Types. Table 10 illustrates how debt and equity securities affect macrofinancial risk in terms of capital inflows and outflows. The impact of the inflow of equity securities on macrofinancial risk is depicted in Column (1). The inflow of equity securities on macrofinancial risk over the short term is 0.0040, while the inflow over the long term is −0.0116. The results of the impact of equity security outflows on macrofinancial risk are displayed in Column (2). The macrofinancial risk is not significantly impacted by the short-term outflow of equity securities, but it is significantly impacted by the long-term outflow, which is −0.0081. Given that capital inflow will increase the potential mismatch between debt, leverage, maturity, and liquidity, increase the risk of default across sectors, and significantly increase macrofinancial risk, equity inflow will increase macrofinancial risk in the short term, while both capital outflow and inflow will reduce it in the long run. On the other hand, when equity securities are sold off, asset prices overlap and fall with more pronounced asset price movements and tighter market credit, somewhat alleviating the macro debt leverage mismatch and lowering the risk of default across sectors, ultimately eliminating potential macrofinancial risk.

From the results in Table 10, we can see that in terms of long-term capital flows, whether they are equity securities inflows, equity securities outflows, debt securities inflows, or debt securities outflows, they can all reduce macrofinancial risks. In terms of short-term capital flows, all kinds of one-way capital flows have a positive effect on the performance of macrofinancial risks. This shows that for the one-way capital flow of equity and debt capital, long-term capital flow has a negative risk effect, while short-term capital flow has a positive risk effect. Short-term capital flow is an important source of macrofinancial risk, which is consistent with the conclusion of Gang et al. [13].

5. Further Analysis

Prior empirical findings demonstrate that, particularly in the short term, the flow of international portfolio investments has a major impact on macrofinancial risk. The flow of international portfolio investments has the potential to significantly enhance macrofinancial risk, which warrants consideration and caution. So, the rest of this paper talks about how to control the macrofinancial risk that short-term portfolio investment flows cause.

5.1. Model Building

5.1.1. Foreign Exchange Reserve. To investigate the moderating role exerted by foreign exchange reserves in international portfolio investment and macrofinancial risk, the paper constructs a panel threshold model as follows:

$$\mathrm{MR}_{it} = \delta_0 + \delta_1 \mathrm{IPIF}_{it} \cdot I(\mathrm{FER} \le \gamma) + \delta_2 \mathrm{IPIF}_{it} \cdot I(\mathrm{FER} > \gamma) + \delta_i \mathrm{Controls}_{it} + \varepsilon_{it}, \quad (9)$$

Table 10: Inflow and outflow of equity securities and debt securities.

	MR (1)	MR (2)	MR (3)	MR (4)
EII	−0.0116*** (0.0039)			
EIO		−0.0081** (0.0040)		
DSI			−0.0018*** (0.0006)	
DSO				−0.0046** (0.0018)
EDL	0.1411*** (0.0469)	0.1232*** (0.0417)	0.1366*** (0.0221)	0.5162*** (0.0206)
ERL	0.0001 (0.0003)	0.0001 (0.0007)	0.0001 (0.0009)	0.0001 (0.0001)
CAR	0.0012 (0.0017)	0.0006 (0.0015)	0.0030** (0.0012)	−0.0118 (0.0170)
TO	0.1818*** (0.0462)	0.0656** (0.0312)	0.0628** (0.0270)	0.6364*** (0.1695)
CL	0.0013 (0.0050)	−0.0096** (0.0048)	−0.0059** (0.0028)	−0.0916 (0.0921)
ECT	−0.5483*** (0.0648)	−0.5820*** (0.0308)	−0.5804*** (0.0358)	−0.5162*** (0.0206)
ΔEIF	0.0040** (0.0018)			
ΔEIO		0.0007 (0.0019)		
ΔDSI			0.0020* (0.0011)	
ΔDSO				0.0034** (0.0013)
ΔEDL	−0.0528 (0.2298)	−0.0202 (0.0855)	0.0452 (0.0805)	0.1684 (0.4419)
ΔERL	−0.0068 (0.0137)	−0.0011** (0.0001)	−0.0005 (0.0017)	0.0001 (0.0003)
ΔCAR	−0.0062 (0.0084)	−0.0000 (0.0022)	−0.0019 (0.0029)	−0.0265 (0.0214)
ΔTO	−0.1230** (0.0607)	−0.0003 (0.0217)	−0.0318 (0.0680)	−0.1687 (0.1123)
ΔCL	0.0409 (0.0478)	0.0040 (0.0050)	0.0008 (0.0069)	−0.0082 (0.0258)
Constant	0.1436*** (0.0210)	0.2240*** (0.0221)	0.2023*** (0.0224)	0.1011*** (0.0103)
N	1600	1600	1600	1600

where FER_{it} is the foreign exchange reserve of country i in period t.

5.1.2. Capital Control. In addition to foreign exchange reserves, this paper also considers the control effect of capital controls, for which a panel threshold model is constructed as follows:

$$\mathrm{MR}_{it} = \beta_0 + \alpha_1 \mathrm{IPIF}_{it} \cdot I(CC \le \gamma) + \alpha_2 \mathrm{IPIF}_{it} \cdot I(CC > \gamma) + \beta_i \mathrm{Controls}_{it} + \varepsilon_{it}, \tag{10}$$

where CC_{it} is the capital control of country i in period t.

5.2. Analysis of the Foreign Exchange Reserve Effect

5.2.1. Threshold Effect Test. Prior to performing the regression analysis, the number of thresholds should be established, and the precise model form should be obtained. When foreign exchange reserve is employed as the threshold variable, Table 11 displays the results of the threshold effect test for each model. The results in the table show that the threshold effect is significant when there is only one threshold. This suggests that a single threshold model can be used for all three models when the main variables that explain them are, respectively, international portfolio flow, equity securities flow, and debt securities flow.

After defining the number of model thresholds, it is required to estimate the model's threshold values and assess their validity (the threshold estimate is the value obtained when the LR value of the likelihood ratio test statistic is zero, and the 95% confidence interval indicates that the LR statistic has a 95% probability of being within this interval, i.e., the LR value is less than the interval constituted by the critical value at the 5% significance level, the estimate is within the original hypothesis acceptance interval, and the single threshold estimate is consistent with the actual). The estimates and confidence intervals for the threshold variables are shown in Table 12, and the threshold estimates of FER are 0.8699 in the IPIF model, 0.9194 in the EIF model, and 0.8102 in the DSF model. Figure 2 demonstrates that the likelihood ratio plots can further illustrate the threshold characteristics of each model. Approaching the threshold value reveals that the models have a large single threshold effect. The threshold values of the models are selected based on the findings of the threshold effect test and the likelihood ratio plots, and the validity of the threshold values is checked in this work so that additional regression analysis may be conducted.

5.2.2. Analysis of the Foreign Exchange Reserve Threshold Model Result. This study tests the control effect and the impact of foreign exchange reserves on international portfolio investment and macrofinancial risk using a panel threshold model. Table 13 displays the results of the regression estimation of the foreign exchange reserve in the models of the flows of equity and debt securities, as well as international portfolio investments. The international portfolio investment flow and macrofinancial risk regression results based on the foreign exchange reserve threshold model are displayed in Column (1). The conclusion shows that the coefficient of the effect of international portfolio investment flow on macrofinancial risk is 0.0019 when foreign exchange reserve is less than the threshold value of 0.8699, and this result is significant at the 5% level. The conclusion shows that the coefficient of the effect of international portfolio investment flow on macrofinancial risk is 0.0019 when foreign exchange reserve is more than the threshold value of 0.8699, and this finding is significant at the 1% level. This finding suggests that as foreign exchange reserves increase, the influence of international portfolio investment flows on macrofinancial risk changes from promoting to suppressing, and that foreign exchange reserves play a significant role in controlling macrofinancial risk resulting from such flows.

Column (2) shows the control effect of foreign exchange reserves on equity securities flow and macrofinancial risk, with EIF_1 of 0.0255 and EIF_1 of 0.003. This indicates that foreign exchange reserves can reduce the macrofinancial risk generated by equity securities flows to some extent but still cannot fully mitigate this risk. In column (3), debt security flows have a dampening effect on macrofinancial risk when foreign exchange reserves are below the threshold, and this dampening effect is stronger when foreign exchange reserves are above the threshold.

After the Asian financial crisis, developing countries summed up the lessons of insufficient foreign exchange reserves and increased their foreign exchange reserves to cope with the impact of national capital. Tornell believes that high foreign exchange reserves can make up for weak economic fundamentals to deal with the impact of international capital [23]. The results of portfolio and debt securities in this paper strongly support this conclusion. But other scholars believe that foreign exchange reserves can cope with the impact of international capital, but the effect is limited [24, 26]. Judging from the empirical results of equity securities, foreign exchange reserves have not effectively reduced macrofinancial risks, which proves that foreign exchange reserves have a certain role as a stabilizer in response to capital flow shocks, but the effect is effective.

5.3. Analysis of the Capital Control

5.3.1. Threshold Effect Test. Combining the results in Tables 14 and 15 with Figures 3 to 5, it appears that in the international portfolio flow model, the single threshold model should be selected for capital control, capital inflow control, and capital outflow control. For the equity securities model, there is no threshold for capital inflow control, and the rest should be selected as a single-threshold model. For the debt security model, all should choose the single threshold model.

5.3.2. Analysis of the Capital Control Threshold Model Result. From the coefficient estimation results in Table 16, it is obvious that capital control, including control of capital inflows and outflows, is effective in reducing macrofinancial risks brought on by the movement of international portfolio investments. The results of numerical regressions show that, from the two stages before and after the threshold, foreign exchange reserve and capital control have roughly the same effect coefficient on macrofinancial risk from international portfolio investment flow, with foreign exchange reserve focusing on mild responses and capital control focusing on strong control. Moreover, Domanski et al. believed that foreign exchange reserves can effectively deal with capital shocks, but the cost of holding foreign exchange reserves is relatively high, and many countries tend to reduce foreign exchange reserves [54]. When it comes to controlling the link between the flow of international portfolio investments

Table 11: Result of threshold effect test (foreign exchange reserve).

Core explanatory variable	Type	F-statistics	P value	Critical-value		
				1%	5%	10%
IPIF	Single threshold	24.69**	0.0020	19.7002	15.7174	14.3832
	Double threshold	7.21	0.4780	19.4085	15.9517	13.8931
EIF	Single threshold	11.51***	0.0020	9.5719	6.9493	5.7681
	Double threshold	0.01	1.0000	17.7026	7.9714	5.8837
DSF	Single threshold	30.86***	0.0001	14.8916	11.1265	9.2316
	Double threshold	8.13	0.1400	16.5070	10.7325	9.2061

Note. The critical value is obtained by repeated sampling using the bootstrap method; *, **, *** are the statistics' significance levels, representing significant at 10%, 5%, and 1% levels, respectively.

Table 12: Threshold estimator and confidence intervals (foreign exchange reserve).

Explained variables	Core explanatory variable	Type	Estimator	95% confidence intervals
MR	IPIF	Single threshold	0.8699	/0.7921, 0.8736/
	EIF	Single threshold	0.9194	/0.8905, 0.9232/
	DSF	Single threshold	0.8102	/0.7222, 0.8146/

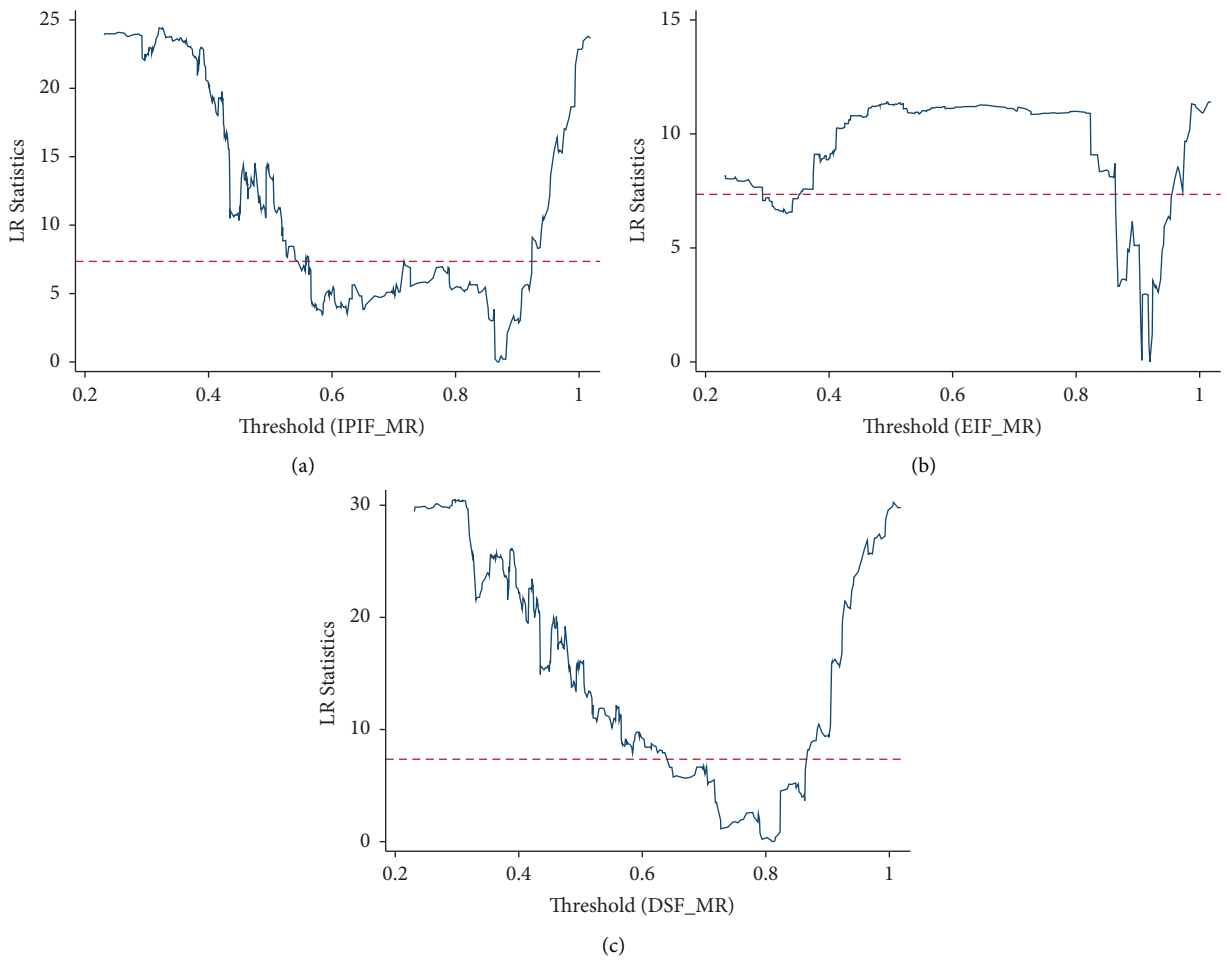


Figure 2: Threshold effect test likelihood ratio.

and macrofinancial risk, both foreign exchange reserves and capital controls are effective.

The capital control regression results for the models using debt and equity securities are displayed in Table 17. Based on the regression results in the previous section, the promotion effect of equity securities flows on macrofinancial risk can only be somewhat reduced by foreign exchange reserves. The effect of equity securities flows on

Table 13: Regression results of the threshold model (foreign exchange reserve.).

	IPIF_MR (1)	EIF_MR (2)	DSF_MR (3)
IPIF_1	0.0019** (0.0008)		
IPIF_2	−0.0082*** (0.0018)		
EIF_1		0.0255*** (0.0063)	
EIF_2		0.0030* (0.0022)	
DSF_1			−0.0047*** (0.0010)
DSF_2			−0.0087*** (0.0021)
Debt	0.0742*** (0.0272)	0.0756*** (0.0273)	0.0841*** (0.0270)
ER	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
CAR	0.0001 (0.0010)	0.0002 (0.0010)	0.0002 (0.0009)
TO	0.0492*** (0.0189)	0.0602*** (0.0188)	0.0470** (0.0187)
Credit	−0.0101*** (0.0031)	−0.0078** (0.0032)	−0.0123*** (0.0030)
Constant	0.4190*** (0.0195)	0.4054*** (0 0.0199)	0.4212*** (0.0194)
F	9.04	7.62	11.09
P	0.0001	0.0001	0.0001
N	1360	1360	1360

Table 14: Result of the threshold effect test (capital control).

	Threshold variable	Type	*F*-statistics	*P* value	Critical-value		
					1%	5%	10%
IPIF	CC	Single threshold	13.03**	0.0280	14.4575	11.2570	8.8839
	CC	Double threshold	0.06	1.0000	33.9216	25.5066	20.5075
	CIC	Single threshold	12.18**	0.0260	14.0402	11.0242	9.3040
	CIC	Double threshold	−0.57	1.0000	26.3311	20.5022	17.9194
	COC	Single threshold	11.75**	0.0260	13.1011	9.9220	7.5220
	COC	Double threshold	−4.17	1.0000	29.0623	19.9344	14.5064
EIF	CC	Single threshold	6.67*	0.0720	8.7039	7.3756	6.0450
	CC	Double threshold	3.18	0.6280	7.7916	6.7612	6.0526
	CIC	Single threshold	2.38	0.2800	5.2992	4.9106	3.6933
	CIC	Double threshold	7.63	0.1260	18.2422	10.7227	8.6141
	COC	Single threshold	9.57**	0.0480	12.8105	9.4907	8.1098
	COC	Double threshold	2.25	0.6120	13.6687	10.1475	8.2926
DSF	CC	Single threshold	31.99***	0.0001	21.9656	16.8313	13.2775
	CC	Double threshold	−7.00	1.0000	26.5358	19.9088	15.6000
	CIC	Single threshold	31.64***	0.0001	25.2277	16.4464	13.9511
	CIC	Double threshold	−26.09	1.0000	24.0250	17.6705	13.8573
	COC	Single threshold	29.44***	0.0001	22.3958	17.0954	12.9700
	COC	Double threshold	−9.65	1.0000	25.0810	17.7958	13.7571

macrofinancial risk can only be somewhat reduced by foreign exchange reserves. Capital controls can effectively affect the structure of capital inflows to host countries [55, 56], especially for emerging economies, which are more effective at coping with international capital shocks than developed countries [30]. In managing macrofinancial risks

Table 15: Threshold estimator and confidence intervals (capital control).

	Threshold variable	Type	Estimator	95% confidence intervals
IPIF	CC	Single threshold	0.1750	/0.1500, 0.2000/
	CIC	Single threshold	0.2000	/0.1500, 0.2500/
	COC	Single threshold	0.2500	/0.2500, 0.2500/
EIF	CC	Single threshold	0.2750	/0.2250, 0.3000/
	CIC	None	—	—
	COC	Single threshold	0.5833	/0.4750, 0.6000/
DSF	CC	Single threshold	0.1750	/0.1500, 0.2000/
	CIC	Single threshold	0.2000	/0.1500, 0.2500/
	COC	Single threshold	0.2500	/0.2500, 0.2500/

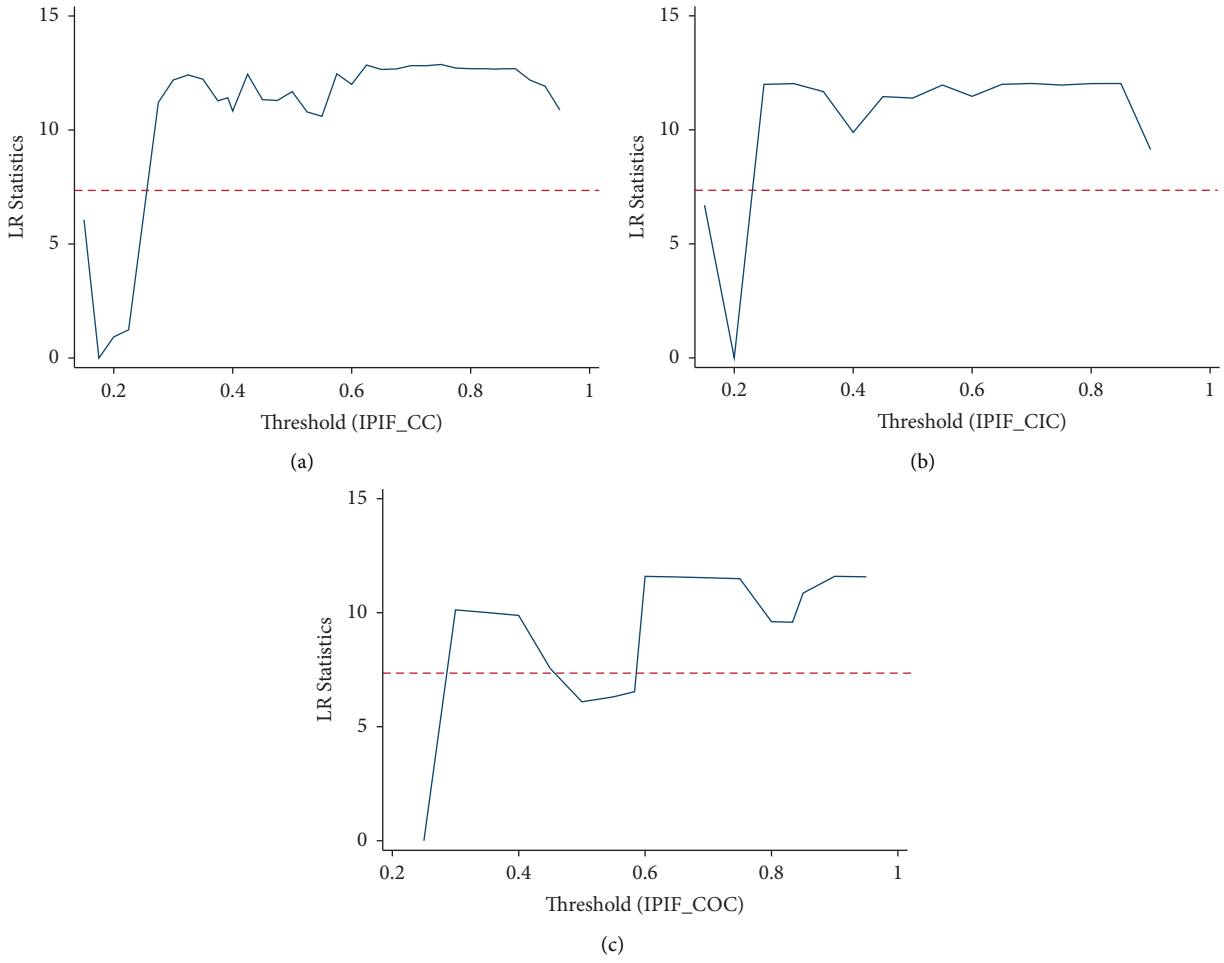


Figure 3: Threshold effect test likelihood ratio (IPIF).

resulting from equity securities flows, capital control is more effective. Li and Rajan believe that direct investment outflow control can affect the volatility of its inflow [57]. It is important to keep in mind, though, that the macrofinancial risk brought on by capital flow can only be effectively eliminated when the capital control on the flow of equity securities, particularly the capital outflow control, rises above 0.5833. To effectively control the relationship between the flow of equity securities and macrofinancial risk, strict capital outflow control is required.

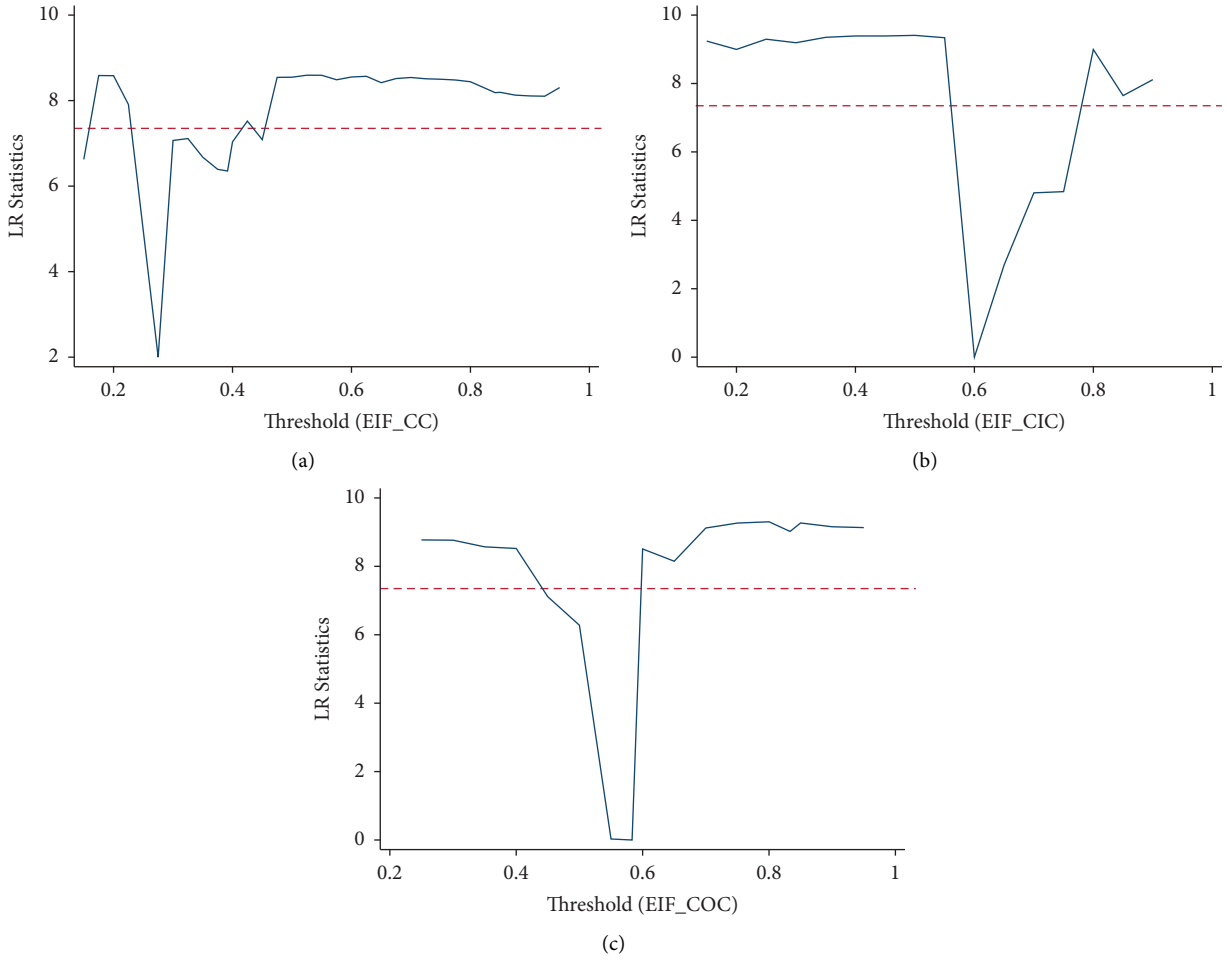


Figure 4: Threshold effect test likelihood ratio (EIF).

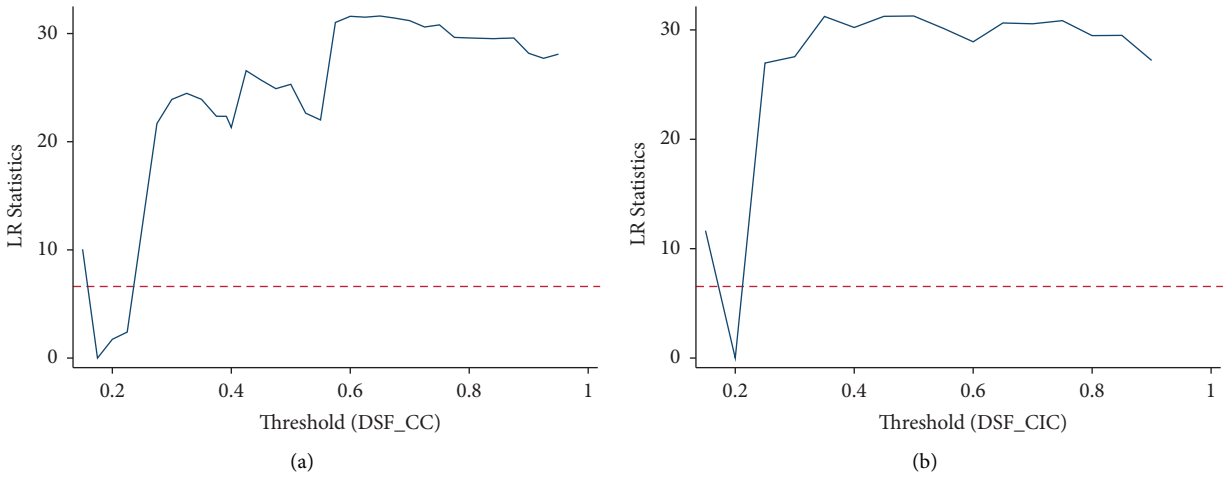
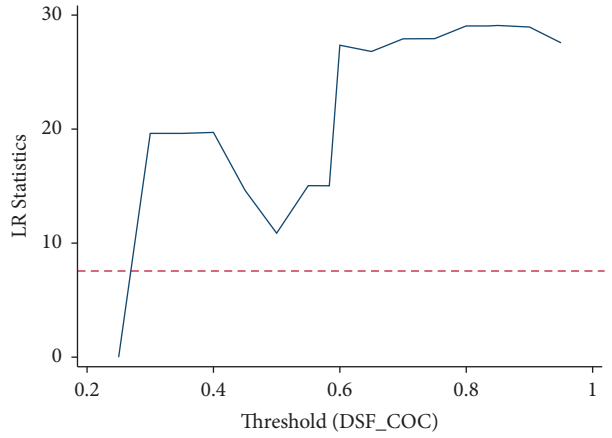


Figure 5: Continued.



(c)

Figure 5: Threshold effect test likelihood ratio (DSF).

Table 16: Regression results of the threshold model (IPIF).

	CC (1)	CIC (2)	COC (3)
IPIF_1	0.0073*** (0.0022)	0.0049** (0.0023)	0.0066** (0.021)
IPIF_2	−0.0015* (0.0008)	−0.0010* (0.0008)	−0.0015* (0.0008)
Debt	0.0766*** (0.0292)	0.0822*** (0.0294)	0.0771*** (0.0292)
ER	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
CAR	0.0002 (0.0011)	0.0001 (0.0011)	0.0001 (0.0011)
TO	0.0490** (0.0211)	0.0542** (0.0211)	0.0496** (0.0211)
Credit	−0.0125*** (0.0042)	−0.0133*** (0.0043)	−0.0123*** (0.0040)
Constant	0.4250*** (0.0231)	0.4279*** (0.0233)	0.4290*** (0.0232)
F	5.31	4.08	5.11
P	0.0001	0.0001	0.0001
N	1360	1360	1360

Table 17: Regression results of the threshold model (EIF and DSF).

	CC (1)	CIC (2)	COC (3)	CC (4)	CIC (5)	COC (6)
EIF_1	0.0040*** (0.0015)	0.0003* (0.0001)	0.0012*** (0.0004)			
EIF_2	0.0001 (0.0000)	0.00001 (0.0005)	0.0001 (0.0000)			
DSF_1				−0.0045*** (0.0011)	−0.0039*** (0.0011)	−0.0044*** (0.0011)
DSF_2				−0.0119*** (0.0026)	−0.0098*** (0.0028)	−0.0109*** (0.0025)
Debt	0.0783*** (0.0291)	0.0790*** (0.0292)	0.0820*** (0.0291)	0.0651** (0.0291)	0.0766*** (0.0292)	0.0671** (0.0291)
ER	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
CAR	−0.0007 (0.011)	−0.0002 (0.0011)	−0.0005 (0.0011)	0.0007 (0.0011)	0.0002 (0.0011)	0.0002 (0.0011)
TO	0.0602*** (0.0209)	0.0573*** (0.0210)	0.0596*** (0.0209)	0.0447** (0.0206)	0.0505** (0.0207)	0.0449** (0.0206)
Credit	−0.0115*** (0.0043)	−0.0121*** (0.0043)	−0.0115*** (0.0042)	−0.0111*** (0.0042)	−0.0130*** (0.0042)	−0.0109*** (0.0042)
Constant	0.4270*** (0.0232)	0.4236*** (0.0232)	0.4238*** (0.0001)	0.4179*** (0.0227)	0.4245*** (0.0229)	0.4239*** (0.0227)
F	4.43	3.74	4.89	9.02	7.01	8.61
P	0.0001	0.0006	0.0001	0.0001	0.0001	0.0001
N	1360	1360	1360	1360	1360	1360

6. Conclusion

Since the 1990s, the process of economic globalisation has accelerated. Emerging economies have gradually assimilated into the global financial market, growing in popularity with foreign capital that prefers the better growth prospects of emerging economies to advanced economies that have finished industrializing. Although international portfolio capital inflows have helped fuel the market boom, they have also caused some worry about the emerging economies' financial stability. Emerging economies' growth is significantly influenced by foreign capital. Open capital accounts in emerging economies make them particularly susceptible to significant shifts in international capital flows, which can either precipitate financial crises there or have a more muted resolution [58]. To explore how international portfolio investment flows affect macrofinancial risk in emerging economies and how to manage this risk effect, this paper develops macrofinancial risk indicators by using contingent claims analysis and the entropy-based TOPSIS method to conduct this study, empirically investigates the short- and long-term effects of international portfolio investment and macrofinancial risk by using a panel distribution lag model, and investigates how capital flow affects the management of macrofinancial risk under capital flow from the standpoint of foreign exchange reserves and capital control by using a panel threshold model.

This paper demonstrates, through an examination of the relationship between macrofinancial risk and international portfolio investment flows, that international portfolio investment flows will increase the macrofinancial risk of emerging economies in the short term but reduce it in the long term. From the perspective of the components of international portfolio investment, high-risk and speculative international speculative capital will have a negative effect on the real economy [51]. Furthermore, this paper examines the management effects of foreign exchange reserves and capital control to mitigate the damage that the risk may cause. This paper argues that foreign exchange reserves can play a positive moderating role in international portfolio flow and macrofinancial risk, but only to a limited extent. Capital controls are tougher, but risk controls work well. Both foreign exchange reserves and capital control have effective risk management capabilities. When equity capital flows frequently, capital control works better at managing macrofinancial risk.

With the change in China's COVID-19 pandemic policy, it is bound to face the uncertain hit of the omicron wave. The Russia-Ukraine conflict is driving up commodity prices, exacerbating supply disruptions, exacerbating inflation, and exacerbating financial vulnerability. These heightened uncertainties and increased geopolitical risks will lead to more frequent global capital flows, and unpredictable short-term shocks will have a huge impact on emerging economies. The results of this paper can provide a theoretical basis for emerging economies to identify and manage international portfolio flow, including equity securities, bond securities, and the risk effects of inflow and outflow, so that they can better deal with the shock of capital flows against the complex global economic background. For example, by

strengthening the deepening reform and improvement of the financial system to improve the ability of emerging economies to resist external risks [59], Compared with long-term portfolio flows, the impact of short-term capital flows, especially equity securities flows, on the macrofinancial risks of emerging economies cannot be ignored. To monitor the impact of cross-border portfolio investment flows on emerging economies, risk early warning indicators should be established. At the same time, since asset price volatility is the main factor affecting macrofinancial risk [60], asset price level can also be used as a monitoring variable for macrofinancial stability. However, in addition to predicting and identifying risk factors, it is more critical for emerging economies to reduce the negative impact of unstable capital flows on macrofinance by strengthening macroprudential measures (liquidity buffers, enriching foreign exchange reserves), or even by implementing necessary capital controls [61]. The conclusion provides data support for emerging economies to identify and effectively manage the risk effect of securities capital, allowing emerging economies to better prevent and cope with the risk of capital shock and maintain sustainable and stable economic development in the complex global economic backdrop.

Data Availability

The data used in this study were obtained from the CEIC database, the World Bank database, the IMF database, the UN National Accounts Main Aggregates database, the WIND database, and the national statistical offices of the sample countries. The data used to support the findings of this study are available from the corresponding author upon request via e-mail (shixue105@dufe.edu.cn).

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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