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Financial Development and Extreme Capital Flows: Uncovering Resilience

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Abstract: This paper examines the impact of financial developments on extreme international capital inflow events by analyzing annual data for 29 economies from 2000 to 2020. By building on previous research, it reveals a subtle relationship: while financial development has greatly reduced the frequency of sudden stops in capital flows, it has simultaneously increased the likelihood that capital flows will surge. This paper uses the generalized method of Moments (GMM) model to investigate the dual role of financial development in managing extreme capital flow events. Specifically, it clarifies how financial developments can act as a "push and pull" against the potentially destabilizing effects of these events, thereby promoting a more sustainable path to economic growth and strengthening financial stability in the global economy. The study not only sheds light on the complex dynamics between financial development and capital flows, but also provides insights for formulating policies that can mitigate the adverse effects of financial development while maximizing its benefits..

Keywords: Extreme Capital Flows, Financial Development, Financial Markets, Financial Institution, GMM

1. Introduction

Traditional neoclassical economic theory posits that, due to the scarcity of capital in poor countries, the marginal productivity of capital is high, whereas in rich countries, where capital is abundant, its marginal productivity is low. Therefore, capital should flow from rich to poor countries. However, in reality, the flow of capital to rich countries far exceeds that to poor countries, a phenomenon known as the "Lucas paradox"1. This phenomenon is not solely determined by the marginal rate of return on capital but is also influenced by factors such as the quality of institutions, agglomeration effects, the degree of trade openness, and fluctuations in exchange rates and inflation. With the deepening of economic globalization, economies are increasingly affected by the ebbs and flows of international capital. While capital inflows can help alleviate supply and demand imbalances, they not only stimulate economic growth but also sow the seeds of financial instability2. For economies heavily reliant on foreign trade and investment, the surge and sudden stop in capital flows pose a significant challenge to their robust macroeconomic management. Current academic research mainly focuses on the frequency and reasons behind extreme capital flows, lacking consideration for factors that mitigate extreme capital flows. The relationship between financial development and extreme capital flows plays a crucial role; financial development represents the maturity and

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efficiency of financial markets and could act as a moderator for the adverse effects associated with fluctuations in capital flows3. A detailed understanding of the mitigating mechanisms is needed to address the dual challenges of maintaining financial openness and ensuring economic stability. Despite the extensive value of the existing literature, gaps still exist.

2. Literature Review

Based on the behavior of capital inflows and outflows by domestic and foreign investors, extreme capital flows are divided into four types: "surge" refers to a large increase in foreign capital inflows, "sudden stop" refers to a sharp decline in foreign capital inflows, "flight" refers to a significant short-term increase in domestic capital outflows, and "contraction" refers to a rapid decrease in domestic capital outflows. Analyzing the impact of extreme international capital flows requires a distinction between domestic and foreign investors. In this article, we focus on the international extreme capital flows that have a more significant impact on the economy, namely surges and sudden stops4.

In the absence of severe price distortions and a sound financial system, international investors entering global financial markets can effectively hedge their risks. The transmission of international securities capital to the real economy is mainly carried out through financial markets and financial institutions, which may play a crucial role in regulating the impact of extreme international capital flows on economic growth. When a country's financial development level is high, the efficient operation of the financial market provides investors with sufficient and effective information, so that investors can make more rational investment decisions. Capital tends to flow to more efficient sectors and businesses, boosting the real economy. At the same time, the development of financial institutions can improve the efficiency of investment conversion of domestic savings, reduce the mismatch of funds, promote the rational allocation and effective use of resources, alleviate the financing constraints faced by enterprises, and support sustained high economic growth5. Therefore, under different financial development levels, the impact of the flow of international securities capital on the real economy of a country may be different. On the one hand, when the international securities capital flow is suddenly interrupted, the financial market with breadth, depth and sufficient liquidity can provide a variety of risk management tools and methods to hedge the uncertainty of exchange rate and interest rate risk, improve the risk sharing ability, and reduce the negative impact of the sudden interruption of capital flow on macroeconomic growth.

On the other hand, if the financial institutions of a country (region) are strong, they can continue to play the financial intermediary function of savings and investment, provide sufficient financial support for the development of the real economy, alleviate financing constraints, and prevent the break of the capital chain, even if the international securities capital flow is suddenly interrupted. And significantly reduce the impact of sudden disruptions in international security capital flows on economic development6. Therefore, if a country has a high level of financial development, a relatively comprehensive financial system can better meet the financing needs of market players when international securities capital flows are suddenly interrupted, thus reducing the impact on output. Conversely, if a country has a low level of financial development, an imperfect financial system may amplify the negative impact of a sudden interruption of capital flows, exacerbating its impact on the real economy.

This paper supplements the existing literature on extreme international capital flows from four aspects. First of all, the previous research data was up to 2009, which could not analyze the abnormal phenomenon of international capital flow after the subprime crisis and the European debt crisis. Based on quarterly data from the first quarter of 2000 to the fourth quarter of 2020 for 29 economies, this paper constructs a new database of extreme international capital flow events. The strength of the database is that it follows Forbes and Warnock's approach by extending the time

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frame to the fourth quarter of 2020, thus incorporating the post-international financial crisis period into the analytical framework. Secondly, previous studies have investigated the phenomenon of extreme international capital flows without studying its influencing factors. Therefore, based on a newly constructed database, this paper explores the impact of financial developments on extreme international capital flows.

3. Methods and measurements

3.1. Empirical method

This paper analyzes the influence of financial development on extreme inflow of international capital by establishing GMM model. The dependent variables were sudden stop and surges. The specific model is as follows:

$$Stops_{it} = \alpha_0 Stops_{it-1} + \alpha_1 FD_{it} + \alpha_2 GDP_{it} + \alpha_3 Reer_{it} + \alpha_4 TO_{it} + \alpha_5 Ka_{it} + \alpha_6 PV_{it} \quad (1)$$

$$Surges_{it} = \alpha_0 Surges_{it-1} + \alpha_1 FD_{it} + \alpha_2 GDP_{it} + \alpha_3 Reer_{it} + \alpha_4 TO_{it} + \alpha_5 Ka_{it} + \alpha_6 PV_{it} \quad (2)$$

Where i represents the country and t represents the year.

3.2. Measurement of variables and data sources

3.2.1. Measurement of extreme international capital inflow events

As a measure of extreme international capital inflow events, early studies focused primarily on significant declines in net capital inflows. However, with the progress of research, the net capital inflow alone can no longer fully capture the investment and financing behavior of domestic and foreign investors. Therefore, the analysis of capital inflow events gradually turns to the total capital inflow as a proxy variable. In particular, this paper focuses on total international capital inflows (as a share of GDP)78, based on data from the International Monetary Fund's database.

Considering the dynamic changes of international capital flows, this study also argues that international capital inflows follow a process of regime change, including normal periods and two extreme periods. Based on the behavior of international capital inflows, we define above-normal international capital flows as a "surge" and below-normal flows as a "stop loss." Our definition of extreme international capital inflow events strictly follows the statistical criteria adopted in the previous literature and uses a three-state Markov transformation model. In other words, a country's capital inflow status is determined by changes in the mean of capital inflows, and the dynamics of extreme and normal international capital inflows are fundamentally different9. Through parameter estimation, we are able to obtain probability classifications of observed values in different states, which are estimated based on international capital inflow data.

3.2.2. Measurement of financial development

The measurement of financial development involves the comprehensive consideration of multiple dimensions and factors to comprehensively assess the degree of development of a country's financial system10. This includes, but is not limited to, the stability and health of financial markets and institutions, thereby providing a comprehensive measure of the overall level of development of the financial system. In order to construct a comprehensive financial development index, this study uses data available from the International Monetary Fund's (IMF) Financial Development database. The database is a collection of indicators related to financial market activity and the performance of

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financial institutions. Through detailed statistical analysis of these indicators, we can construct indicators that reflect the comprehensive development level of each country's financial system, and then obtain valuable insights in international comparison.

3.2.3. Measurement of control variables

Based on the existing literature, the following control variables are selected in this paper. The definitions and data sources are shown in Table 1.

Table 1: Source and interpretation of control variables

Variable Name	Definition	Data Source
Kai	Capital Account Liberalization	The Sum of International Capital Inflows and International Capital Outflows (% of GDP)
Gdp	GDP Per Capita Growth (annual %)	World Bank Database
Reer	Real Effective Exchange Rate Index	World Bank Database and BIS Database
TOPEN	Total Trade (% of GDP)	IFS Database
PV	Political Stability and Absence of Violence/Terrorism	IFS Database

3.3. Descriptive Statistics

Based on data availability, we selected annual data for the period 2000 to 2020 for 29 emerging and developing economies. Descriptive statistics of variables are shown in Table 2.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Surges	580	.262	.44	0	1
FD	580	.322	.163	.068	.741
FI	580	.397	.147	.095	.718
FM	580	.234	.213	0	.735
Gdp	580	2.591	4.265	-19.635	14.696
Reer	580	97.496	15.056	54.792	263.483
Topen	580	58.656	65.024	.019	493.465
Ka	580	9.636	15.898	-78.536	189.946
Stops	580	.267	.443	0	1
PV	580	37.5745	22.884	1.005	94.811

The 29 economies mentioned are as follows: Argentina, Armenia, Bolivia, Brazil, Chile, China, Colombia, Dominica, Fiji, Grenada, Hungary, India, Indonesia, Malaysia, Mexico, Moldova, Nicaragua, Nigeria, Paraguay, Peru, Philippines, Poland, Romania, South Africa, Thailand, Togo, Tunisia, Ukraine and Uganda.

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4. Empirical results and enlightenment

In the analysis section, we focus on the impact of financial developments on capital inflow surges and sudden stops. The regression results are summarized in Table 3. The analysis results of models M(1), M(2) and M(3) show that the coefficients of financial development and financial market are statistically significant and negative. This finding suggests that the improvement of financial development and the improvement of financial markets are beneficial to reduce the occurrence of sudden stops. Specifically, when the financial system becomes more sound and efficient, it is able to stabilize capital flows by providing more investment channels and risk diversification tools, reducing the probability of capital flow reversals.

According to the results of models M(4), M(5) and M(6), the financial development coefficient is positive and significant. This suggests that as financial development strengthens, surges in capital inflows are likely to occur more frequently. This may be because a more developed financial system attracts more investment, including short-term capital seeking high returns. However, this also means that capital flows could be more volatile in the event of a change in global investment sentiment or an external economic shock, resulting in a surge in capital inflows.

Table 3: Regression results

	M1	M2	M3	M4	M5	M6
	Stops	Stops	Stops	Surges	Surges	Surges
L.Stops	0.618***	0.620***	0.617***			
	(0.033)	(0.033)	(0.033)			
FD	-0.016			0.246**		
	(0.093)			(0.116)		
Gdp	-0.008**	-0.008**	-0.008**	0.012***	0.013***	0.012***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Reer	-0.003**	-0.003**	-0.003**	0.002	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Topen	-0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ka	-0.005***	-0.005***	-0.005***	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
PV	0.003***	0.003***	0.003***	-0.004***	-0.004***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FI		-0.025			0.235*	
		(0.112)			(0.139)	
FM			-0.009			0.175**
			(0.070)			(0.087)
L.Surges				0.445***	0.448***	0.452***
				(0.039)	(0.039)	(0.039)
_cons	0.302**	0.302**	0.300**	-0.075	-0.046	-0.058
	(0.119)	(0.119)	(0.117)	(0.143)	(0.142)	(0.141)
N	509	509	509	509	509	509
adj. R^2	0.418	0.455	0.939	0.996	0.995	0.996

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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5. Conclusion

Our analysis delineates a nuanced portrait of financial development's impact on capital flow dynamics, illustrating its dual capacity to both stabilize and destabilize. Empirical evidence from models M(1) to M(6) highlights that while enhancements in financial development and market efficiency significantly reduce sudden stops in capital flows, they concurrently increase the likelihood of surges. This bifurcation suggests that while advanced financial systems attract investment and facilitate risk diversification, they also heighten vulnerability to volatile capital inflows driven by shifts in global investment sentiment or economic shocks. Consequently, this study underscores the critical balance policymakers and regulators must achieve: advancing financial development to leverage its stabilizing benefits while devising robust mechanisms to mitigate its potential for inducing capital flow volatility. In essence, the pathway to harnessing the full benefits of financial development necessitates a cautious approach that equally prioritizes economic stability and growth.

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