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Understanding the dynamics of financial and economic crises: a comprehensive analysis

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ABSTRACT

This paper aims to assess the nature of the link between financial and economic crises. To do this, we develop a continuous measure for crisis probability. The methodology employed distinguishes short- from long-term relationships, enhancing the analysis's depth and fortifying the results for autoregressive processes. The study addresses endogeneity and potential simultaneity between different crises using a sample of 49 developed and emerging countries spanning 1984–2016. The empirical investigation incorporates a simultaneous equation, Bayesian Model Averaging (BMA) approach, a Panel Autoregressive Vector (P-VECM), an Autoregressive Distributed Lag (ARDL) technique, as well as Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) methods. Findings indicate that while all crisis types may stem from unfavorable conditions, there exists a time lag in triggering and duration. Specifically, economic crises tend to be more persistent and are typically preceded by financial crises. Granger-causality test results support a robust bidirectional causality between financial and real difficulties, with the financial sector influencing the real economy more significantly. Moreover, the study reveals that the impact of economic volatility on financial stability is transient and lacks long-term significance. Conversely, the effect of a financial crisis on the real economy is enduring and remains significant in the long run. Additionally, exchange market volatility emerges as a crucial determinant for both financial and economic crises.

IMPACT STATEMENT

Our interest in this paper is to focus in the interdependency between economic and financial spheres. In particular, we aim to participate in the construction of a supervisory platform for politicians and policymakers by sequencing the triggering order of any fragility both in financial or real sectors and specifying potential transmission channels. The idea is to increase preventive actions to reduce likelihood of systemic crises by quickly acting to separate the two spheres and reduce possible contagion.

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1. Introduction

In examining the historical impact of financial and economic crises on potential output, valuable insights and stylized facts emerge, offering a basis for scenario identification and policy recommendations. However, the consequence of the subprime crisis necessitates a reevaluation of conclusions drawn from historical assessments (Abadli et al., 2020). While some studies posit simultaneous origins of economic and financial crises, others suggest a chronological shift, indicating potential causality. Against this backdrop, our study aims to elucidate the mechanisms through which financial shocks impact the real sphere and how economic difficulties manifest in the financial sector, drawing on recent global vulnerabilities, notably the subprime crisis.

The aftermath of the subprime crisis, still echoing in numerous countries, resulted in a profound global recession triggered by a severe financial crisis. A vicious cycle unfolded in the United States, marked by falling property prices, increased mortgage foreclosures, and the collapse of securitization transactions. This turmoil led to adverse feedback loops, intensifying downward pressure on housing prices and culminating in a wave of bankruptcies as financial institutions struggled to securitize risky mortgages.

The repercussions extended to consumer spending, reducing household savings and net assets, translating into lower consumer spending, declining company profitability, layoffs, increased unemployment, and an economic recession (Claessens et al., 2010; Furceri & Mourougane, 2009). As financial institutions faced losses, solvency problems triggered rapid deleveraging, forced asset sales, and a collapse in confidence. The opacity of balance sheets increased, contributing to the freezing of interbank markets and further sales of securities to raise funds.

While numerous countries managed to overcome this situation, its essence and implications persist as central topics of discussion and research. Varied perspectives exist, with some attributing the crisis to excessive global savings funneled through an unregulated shadow banking market, while others note a common rise in debt before the crisis (Krugman, 2009; Reinhart & Rogoff, 2008). The crisis's global spread was facilitated by financial openness and globalization, causing economic recessions, systemic banking crises, and falls in property and equity prices. Regardless of the similarities or differences, the crisis has been very costly for the real and financial sectors, especially for consumption and investment. Reinhart and Rogoff (2009) argue that, on average, real GDP has fallen from peak to peak by more than 9% and that the duration of the recession has averaged approximately two years. Moreover, unemployment rose by 7% points during the contracting phase.

Financial crises, though infrequent, incur high economic and social costs, sparking significant academic and political debate. Determinants and transmission modes remain debated, with some works emphasizing economic, financial, and institutional factors, while others highlight the role of defective resolution policies (Caprio & Klingebiel, 1997). Indeed, resolving one crisis can increase the likelihood of another. For example, the intensive and massive support of the financial sector by public funds can hamper the sustainability of public finance and the solvency of countries. In addition, the fragility of a sector will reduce the effectiveness of an intervention initiative. Our study aims to fill gaps in the literature by analyzing the dynamic independence between financial and economic vulnerabilities, distinguishing short- and long-term relationships through a continuous measure of crisis probability.

Existing attempts to assess financial crisis costs face challenges in accounting for structural causalities. While macroeconometric models could provide a rigorous approach, we favor VAR-type modeling, demonstrating significant effects of financial shocks on economic activity and vice versa using the generalized response functions method (Pesaran & Shin, 1998). Despite the acknowledged costs of previous crises, the medium- and long-term effects have not been extensively studied.

Our study extends previous research by examining both short- and long-term interactions and causality between economic and financial crises, employing a continuous variable for a panel of 49 countries (22 developed and 27 emerging) from 1984 to 2016. Utilizing a panel vector autoregression (P-VAR) model, we find that financial fragility generally precedes and interacts with economic crises. By combining the logit model with a continuous measure of crisis, we enhance the robustness of our conclusions, offering a nuanced understanding of the intricate relationship between financial and economic vulnerabilities.

This work is structured as follows: [Section 2](#) provides an overview of the theoretical connection between the economic and financial spheres. [Section 3](#) encompasses empirical evidence, beginning with a presentation of the methodology, followed by a discussion of results and interpretations, and including a description of the data and the rationale behind variable selection. Finally, in [Section 4](#), we draw conclusions from the findings.

2. Literature review

The recent financial crisis, characterized by stock market declines, real estate price slowdowns, and inter-bank market paralysis, had profound effects on consumption and investment decisions (Spilimbergo

et al., 2008). This analysis underscores the complex mechanisms through which the crisis impacted the real economy and how financial sector is affected by economic situation and vulnerabilities of borrowers.

2.1. Transmission of the financial fragility to the real economy

The nature of financial shocks, varying across crises, necessitates a comprehensive understanding of their transmission mechanisms. While changes in the cost of capital and interest rates play a role, the subprime nature of the shocks centralizes the financial sphere. The financial accelerator, acting as a vector, induces a fall in investment and consumption. Borrowers experience an external financing premium¹ tied to their financial situation, leading to restructuring effects favoring large companies over small ones.

The crisis's impact extends to securitization activity. Reduced possibilities in securitization revive the credit channel (Altunbas et al., 2009), coinciding with a decline in bank loans due to the risk of a loan portfolio adjustment. The crisis, starting in 2007, accentuates effects related to bank capital, defaults on real estate loans, illiquid structured products, and a decline in stock market values.

The recent global crisis amplifies uncertainty, influencing growth and employment outlooks. Heightened risk prompts businesses and households to adopt a cautious, wait-and-see approach. In the face of uncertainty, households increase savings for precautionary reasons, as seen in consumption equations linked to changes in the unemployment rate. For companies, the argument put forwards is linked to the irreversibility of investment spending (Pindyck, 1988). Since the decision is irreversible, the firm gives up the opportunity to invest in order to do so at a more opportune time. The overall uncertainty around the macroeconomic situation should therefore encourage companies to postpone their investment decisions, thus slowing demand and production.

Consumption decisions are intricately tied to the wealth effect, grounded in Friedman's theory of permanent income. Individuals, with wealth derived from salary, financial assets, and real estate, experience lasting consumption changes in response to shocks. The perceived permanence of negative shocks significantly reduces permanent income and, consequently, leads to enduring decreases in consumption.

Theoretical perspectives on financial crises' impact on production highlight uncertainties in medium-term labor market participation. Factors include discouragement of job seekers, early retirements, and potential shifts in the structural unemployment rate. Long jobless spells affect skills, contributing to hysteresis effects (Blanchard & Wolfers, 2000; Nickell et al., 2005).

Financial crises induce a prolonged depression in capital accumulation by restricting credit supply, imposing stricter lending standards, and increasing effective borrowing costs (Bernanke & Gertler, 1989). Asset price declines further hinder corporate balance sheets and collateral values (Kiyotaki & Moore, 1997). Total factor productivity faces ambiguity, with potential negative impacts on innovation and research and development spending during difficult times (Guelllec & van Pottelsberghe de la Potterie, 2001).

In the aftermath of a financial crisis, the process of reallocation can adversely affect both the level and the rate of growth of total factor productivity. This point of view is generally accepted since the crisis lastingly slowed down certain activities such as financial services, construction and industry. Thus, these transformations can affect total factor productivity through a compositional effect. They can lead to a limited industrial sector that is characterized by a high rate of productivity growth in favor of the development of the service sector, which is less labor intensive. Likewise, a slow restructuring process due to structural rigidities or credit constraints can affect total factor productivity. The delay in processing toxic assets and the restarting of the banking sector or an ineffective subsidy policy can lead to strict credit conditions for companies with a strong innovative capacity, potentially profitable and with prospects for growth. However, ill-structured banks can support businesses that are unprofitable but hold more political pressure or can fear not being bailed out by the government in the event of major difficulties. This type of loan leads to an inefficient reallocation of capital at the expense of innovative but vulnerable companies and to a slow industrial restructuring of large companies, which are more likely to be politically protected against bankruptcy (Caballero et al., 2006).

Total productivity growth could sustain permanent damage due to reduced innovative activities stemming from pro-cyclical private investment behavior (Guelllec & van Pottelsberghe de la Potterie, 2001). The relationship between crisis-induced reduction in expected returns on research and development and

its impact on innovation is likely protracted. The deferral of key investments in innovation could have lasting effects on productivity and growth.

The role of 'learning by doing' in the growth process suggests that recessions, characterized by skill loss during periods of unemployment, can have enduring consequences. Activities fostering production and productivity are complementary, and the reduction in the growth rate may persist over the long run (Martin & Rogers, 2000).

This comprehensive analysis provides insights into the multifaceted ways financial crises traverse through the economy, impacting various sectors, behaviors, and long-term productivity. We can therefore draw the following hypothesis:

H₁: Financial fragility exerts a negative influence on the real sector, and this impact may endure over an extended period.

2.2. Transmission of economic difficulties to the financial sector

Financial crises are often viewed as consequences of economic deterioration, with indicators such as stock market performance reflecting the state of the real economy. This connection between economic fundamentals and financial sector health has been extensively explored in the literature (Caprio & Klingebiel, 1996; Demirgüç-Kunt & Detragiache, 1998; Gorton, 1988).

Historically, events like the Great Depression have shown that economic downturns, marked by falling raw material prices, unemployment, and declining household consumption, can lead to solvency crises for borrowers and, subsequently, financial institutions. In this context, banking crises can result from insolvency problems, with losses exceeding a bank's equity (Caprio & Klingebiel, 1997). This phenomenon is exacerbated in an ineffective regulatory environment.

In addition to the effect of financial liberalization, internal and external macroeconomic factors play crucial roles in financial stability (Gonzalez-Hermozillo, 1999). Internally, the business cycle, pricing policies (interest rates, inflation), and fiscal policy influence agent solvency and financial sector stability. Externally, current account imbalances, terms of trade, and exchange rate depreciation are key considerations.

Inflation, often a consequence of expansionary monetary policies, can distort decision-making in the credit market. High or unstable inflation makes it challenging for agents to assess risks accurately, hindering investment and solvency analysis. Conversely, a sudden reduction in inflation reduces nominal income and cash flows for financial institutions, increasing liquidity and solvency risks. The phenomenon of 'debt-deflation' or overindebtedness due to deflation, as described by Fisher (1933), can contribute to insolvency crises.

Rising interest rates, particularly short-term rates, are often precursors to banking crises (Mishkin, 1996). Borrowers, especially those with variable-rate loans, become more vulnerable with increased interest rates. The bank, forced to refinance at higher rates, faces heightened maturity risk. Financial liberalization, by promoting credit market competition, may contribute to a credit boom and increased credit risk.

High central government spending and budget deficits can erode confidence in a country's economic situation. A budget deficit may trigger a crisis of confidence among credit market participants, affecting perceptions of banks' solvency and leading to massive fund withdrawals, thereby precipitating a liquidity crisis.

Current account imbalances, often indicated by deficits, can be problematic and have macroeconomic implications (Obstfeld, 2012). Inflows of foreign funds may contribute to moral hazard, with poorly managed institutions obtaining financing (Corsetti et al., 1999; Giannetti, 2007). Exchange rate depreciation and the stability of the fixed exchange rate system are identified as factors affecting the risk of financial crises (Domaç & Martinez-Peria, 2003; Duttagupta & Cashin, 2011; Husain et al., 2005).

Private capital flows, especially in emerging markets, can exhibit a boom-bust phenomenon (Goldfajn & Valdes, 1997). Inflows contribute to a credit boom and potential overinvestment, while outflows can lead to liquidity crises and exchange losses. The Asian crisis is illustrative of how capital flow behaviors can trigger financial crises, transmitting illiquidity from one institution to another.

This literature review suggests that a comprehensive understanding of financial crises requires considering a myriad of economic and macroeconomic factors. The following formulated hypothesis provides a basis for empirical investigations into the dynamics of economic difficulties and their transmission to the financial sector.

H₂: A decline in economic activity heightens the risk of a lasting financial crisis.

2.3. Interdependence between financial and economic spheres

The complex relationship between financial and economic spheres has been a subject of extensive exploration in economic literature. Various perspectives and theories have been developed to understand the interplay between financial events and the broader economic landscape.

Allen and Gale (2007) contribute to the ongoing debate on financial crises by distinguishing between models that perceive crises as the result of mass behavior (self-fulfilling prophecies) and those considering crises as intrinsic parts of the business cycle, resulting from shocks to fundamentals. Minsky (1982) adds a critical perspective, arguing that crises are inherent to capitalism. In prosperous economic times, riskier decisions are often made, leading to behaviors that can contribute to speculative bubbles and, ultimately, financial instability.

Two prominent schools of thought—monetarist and classical—offer distinct explanations for the relationship between the economic cycle and financial crises. The classical perspective views financial crises as random events unrelated to economic activity, often attributed to ‘mass hysteria’ or ‘crowd psychology’ (Diamond & Dybvig, 1983). In contrast, monetarists propose that fluctuations in the financial sector are natural extensions of the business cycle. According to this view, economic downturns reduce the value of assets, increasing the likelihood of agents being unable to meet their liabilities and triggering panics or crises.

A significant body of literature focuses on the role of financial channels in transmitting monetary policy measures to economic activity. Financial accelerator models elucidate how changes in the cost of external resources, influenced by monetary policy, impact investment, consumption, and the overall economic trajectory. These models highlight the dynamic nature of the financial accelerator, where changes in asset prices, interest rates, and credit markets contribute to cyclical swings in the real economy (Bernanke et al., 1999).

The financial accelerator models, pioneered by Bernanke and Gertler (1989), play a crucial role in explaining how financial events impact the real economy (Bernanke et al., 1999; Kiyotaki & Moore, 1997). These models explicitly establish a connection between the cost of external financing, self-financing, and economic fluctuations (Bordo & Haubrich, 2010; Céspedes et al., 2004; Kannan, 2012; Mendoza, 2010; Schneider & Tornell, 2004). They introduce the concept of information asymmetries and limited commitments, emphasizing the role of borrowers’ balance sheets in shaping economic outcomes. In this context, borrowers’ wealth and equity become pivotal factors influencing investment decisions and credit limits. In imperfect economic environments, macroeconomic and financial variables interact through wealth and substitution effects. Credit market changes, reflected in asset prices, impact consumption, investment, and resource allocation. However, perfect market models dismiss the significance of credit market shocks, implying only a minor role in explaining economic cycles.

The financial accelerator introduces feedback mechanisms between the financial and real sectors, leading to potentially asymmetric effects on the business cycle. In times of economic downturns, a rise in financing difficulty amplifies the impact of the financial accelerator, creating a powerful negative feedback loop. Conversely, during economic recovery, improved balance sheets and reduced external funding premiums contribute to a more gradual return to internal funds. Borrowers then need sufficient internal capital to attract and retain financing for investment projects (Kooli et al., 2022). Bernanke and Gertler (1989) show that the optimal financial contract, in the presence of information asymmetries, involves an agency cost resulting from the need to control and audit borrowers, both of which are costly for the lender². A high self-financing borrower is not only less dependent on external financing, but also experiences a low premium on external funds. Therefore, there is an inverse relationship between the

well-being of borrowers and their investment costs. In a dynamic investment model, this feedback between the agency cost of investment and the borrower's net worth creates a mechanism by which shocks to economies are amplified and propagated through their effects on borrowers' cash flow. For example, consider an unfavorable productivity shock that lowers the current cash flow. This induces a great need for external financing, increasing the premiums of the external funds of firms and, consequently, the cost of the new investment. Declining investment slows economic activity and revenues in subsequent periods, amplifying and propagating the effects of the initial shock over time.

The intricate relationship between the financial and economic spheres continues to be a subject of ongoing research and debate. The integration of financial accelerator models and considerations of information asymmetries has enriched our understanding of how financial events reverberate through the broader economy. Future research may delve deeper into refining these models, considering additional factors such as direction of effects and persistence of interdependencies, policy responses, and the evolving nature of financial markets. A nuanced comprehension of these interactions is crucial for policymakers, economists, and market participants to navigate the complexities of modern financial systems. For this, our main purpose in this work is to test the following hypothesis:

H₃: The interaction between financial and economic spheres is undeniable, yet the intensity, direction, and duration of their effects vary over time.

3. Empirical framework

The early body of literature indicates that various forms of crises may share common roots in economic vulnerabilities, but their chronological sequence is determined by the propagation mechanism, influencing the order of occurrence. Building on the insights of Jemovic and Marinkovic (2021), who propose that a negative shock affecting production units can lead to a cascade of consequences, including reduced state tax revenues, compromised bank asset quality, and the emergence or worsening of external imbalances, our focus is on assessing and elucidating potential connections between financial and economic crises. This encompasses understanding the order of triggering, propagation dynamics, and the logic of potential causality.

Empirical findings align with theoretical intuitions, as exemplified by Dell'Ariccia et al. (2008), highlighting that real sectors in countries strongly linked to external finance are more profoundly impacted by credit crises. A financial crisis, negatively influencing the real economy, not only has direct budgetary implications but also contributes to fiscal imbalances due to increased expenditures for social reasons in the wake of a diminished tax base. Moreover, if the government has guaranteed bank debt through deposit insurance schemes, the crisis could lead to additional claims. As public debt reaches a critical threshold, it becomes unsustainable, compelling the government, already involved in resolving the banking sector, to implement austerity measures. This, in turn, slows domestic demand and investment, raises unemployment rates, and elevates the risk of borrower insolvency and liquidity crises, ultimately deteriorating the quality of bank assets and yields. According to Reinhart and Rogoff (2014), countries undergoing banking crises are prone to experiencing debt and economic crises. In a similar vein, Jemovic and Marinkovic (2021) contend that countries exposed to public debt face the risk of insolvency if the government loses its ability to refinance its debt.

3.1. Methodological background

The objective of this study is to discern the origins of financial and economic crises and investigate the intricate relationship between the real and financial spheres. A comprehensive understanding of this dynamic is crucial for formulating effective policies to mitigate the social repercussions associated with impending crises. To achieve this, a diverse set of models, including simultaneous equations, Bayesian Model Averaging (BMA), and Vector Error Correction Model (VECM), are employed. The analysis is based on two measures of crises: discrete measures capturing the nature of the link between economic and financial spheres, and the family of Markov switching regression, which utilizes the probability of crises as an outcome.

The methodology involves computing the probability of both financial and economic crises using coefficients estimated through multinomial logit models. Building on the work of Dabrowski et al. (2016), this approach addresses challenges related to signal extraction and qualitative variables models, paving the way for a new avenue in financial and economic crisis literature. Recognizing potential simultaneity between financial and economic crises, initial analyses involve regressing simultaneous equations to gain preliminary insights into potential determinants of each crisis type.

For the identification of early warning indicators, we adopt the BMA approach, which determines factors for use in VECM analysis to study their interactions with corresponding crises. Following the methodology outlined by Jemovic and Marinkovic (2021), an autoregressive vector model is employed, emphasizing the importance of time series models to explore interdependencies and potential causality in the realm of financial and economic crises.

Our research encompasses a comprehensive sample of 49 developed and emerging countries, as outlined in Table A1. The inclusion of major global economies, influential in shaping international policies, ensures coverage of significant crises in recent decades. The temporal scope of our study is primarily dictated by data availability, specifically the political risk measure from ICRG, and data on financial crises from the databases developed by Laeven and Valencia (2020) and Nguyen et al. (2021). Given that none of the countries in our sample has encountered a financial crisis beyond 2015 and the availability of political risk data from 1984 to 2016, we deliberately selected this time frame. We deemed it worthwhile to extend the period up to the present, particularly considering the potential impact of the COVID-19 pandemic, which could introduce substantial changes to the results.

To gauge potential early warnings of financial crises, we selected a set of variables widely acknowledged by economists either individually or collectively (Alessi & Detken, 2011; Dawood et al., 2017; Frankel & Saravelos, 2012; Kaminsky & Reinhart, 1999; Rose & Spiegel, 2011). A detailed list and description of these candidate variables are provided in Table A2. Given the contemporary trend in crisis modeling, we adopt a model averaging approach, a recommended strategy for addressing challenges in identifying determinants of events (Babečy et al., 2014; Crespo-Cuaresma & Slacik, 2009; Feldkircher & Zeugner, 2009; Fernández et al., 2001; Hamdaoui, 2016; Moral-Benito, 2011; Sala-I-Martin et al., 2004). This method offers the advantage of considering uncertainty and determining optimal combinations of variables by assigning weights and classifying models based on their fit.³

3.2. Data

There is no universally accepted definition of a systemic financial crisis, but the widely employed characterization comes from Claessens et al. (2005). They describe a systemic crisis as a situation where a country's corporate and financial sectors witness a significant number of defaults, encountering substantial challenges in meeting contractual obligations on time. This scenario leads to a sharp rise in nonperforming loans, depleting most or all of the aggregate banking system's capital. Such a crisis may coincide with depressed asset prices, such as equity and real estate values, notable increases in real interest rates, and a deceleration or reversal in capital flows. Previous literature has identified various variables as potential determinants of financial crises. For instance, Bussiere (2013) highlights international reserves and exchange rate depreciation, while Kaminsky and Reinhart (1999) focus on the domestic credit growth rate for banking and currency crises. Levy-Yeyati and Panizza (2011) emphasize real per capita GDP as an indicator of insolvency and debt crisis probability. Frankel and Saravelos (2012) identify determinants of the subprime crisis, with a focus on exchange rate appreciation. However, these studies typically treat each type of crisis independently, overlooking potential interactions or simultaneity between financial instability and challenges in the real economy. Reinhart and Rogoff (2009) distinguish between quantitative (exchange) and qualitative crises (banking and debt) and specify conditions for each. A monetary crisis involves a speculative attack on the currency leading to devaluation, substantial spending of international reserves, increased interest rates, or the imposition of capital controls. An external debt crisis occurs when a country struggles to service its external debt, while a domestic public debt crisis arises when a country fails to meet its national budgetary obligations. Systemic banking crises involve actual or potential bank failures requiring public intervention.

This study adopts the classifications from Laeven and Valencia (2020), a widely recognized reference database on various financial disturbances, including banking crises, globally. They establish criteria for defining different types of crises, including banking, exchange, and debt crises, drawing on specific indicators and events. For a banking crisis, they consider two key conditions: significant signs of financial distress and substantial public interventions. Financial distress is identified through factors such as bank runs, losses, or liquidations, with severity indicated by nonperforming loans exceeding 20% of total loans or significant closures of 20% of the banking system. Public interventions, constituting a crisis, involve measures like deposit freezes, bank holidays, nationalizations, and fiscal restructuring costs exceeding 5% of GDP. Similarly, an exchange crisis is characterized by a sharp nominal depreciation against the U.S. dollar, meeting specific thresholds, such as a year-on-year depreciation of at least 30% and at least 10% points higher than the depreciation rate in the year before. For debt crises, events like a country declaring a moratorium, restructuring agreements, or obtaining a major IMF aid program signify a crisis. Sovereign debt default or restructuring is tracked using data from various sources, including Beim and Calomiris (2001), World Bank (2002), Sturzenegger and Zettelmeyer (2006), IMF Staff reports, and media reports. In summary, the authors provide clear criteria and rely on well-established definitions and sources to identify and date episodes of financial, banking, exchange, and debt crises in their analysis. The financial crisis variable categorizes a country as undergoing a financial crisis if it is currently facing any of the specified crises—be it banking, exchange, or debt crises. In other words, the occurrence of any one of these crisis types is deemed indicative of the country experiencing an overarching financial crisis.

To gauge the economic situation, we rely on World Bank data pertaining to GDP at a constant price, with the aim of eliminating the cyclical effect from the trend through the Hodrick-Prescott filter method. Our definition of an economic crisis centers on a scenario marked by a current wealth level falling below the trend. Consequently, we have devised a binary variable denoting the state of the real economy. This variable assumes a value of 1 in the event of a crisis and 0 otherwise. In the subsequent discussion, we outline the rationale behind introducing distinct variables to elucidate various crisis types, commencing with the financial crisis.

3.2.1. Financial crisis

Capital account liberalization, often associated with increased capital flows and heightened competition, may raise the risk of financial crises when capital movements reverse. Consequently, we introduced the variable 'FL' as a proxy for capital account openness.

Exchange rates play a pivotal role in financial crisis models due to their impact on external financing costs, solvency of borrowers, capital flows, trade volume, and current account balance (Babecký et al., 2014; Hamdaoui et al., 2022; Lestano et al., 2003). However, the real exchange rate is not able to reflect all pressures on national money (Jemovic & Marinkovic, 2021). In addition, the international reserve ratio is used many times as an indicator of liquidity, indicating national economies' ability to provide sufficient liquidity (Dawood et al., 2017; Frankel & Saravelos, 2012; Hamdaoui, 2016; Lestano et al., 2003). In this context, we consider the following variables: real effective exchange rate (REER), current account balance (CACCT), transactions of goods and services (TRADE), terms of trade change (TOTC), M2 to international reserve ratio (M2RES), and capital flow volumes (KFLOW).

The economic situation significantly influences agents' profits and solvability, affecting their ability to meet credit commitments, particularly in the banking sector. To capture these dynamics, we introduce variables such as economic growth rate (GDPG) and economic crisis (Ecoc) as determinants of financial crises. Additionally, increased public debt and expansionary fiscal policies are regarded as signs of mismanagement, contributing to a general solvency crisis (Jemovic & Marinkovic, 2021). Therefore, we incorporate variables like total debt (Debt), fiscal balance (Fiscal), and inflation (INFL).

Credit to the private sector is considered an indicator of flexible credit policy and high accumulated risk (Fielding & Rewilak, 2015). In addition to this frequently used indicator in financial crisis models, recent literature emphasizes the concept of excessive credit focusing on the growth rate instead of the volume of credit (Hume & Sentance, 2009). Hence, we include variables like credit to the private sector by banks (CPS) and domestic credit growth (DCG) to assess potential financial risk.

Monetary aggregates, such as M2 to GDP, serve as indicators of liquidity and excessive risk-taking (Fouejieu, 2017). Accordingly, we consider the broad money-to-GDP ratio (Money) to evaluate liquidity levels and risk-taking. The real interest rate reflects a country's attractiveness to international funds and exposure to external risk (Qin & Luo, 2014). Hence, we introduce the variable real interest rate (RIR) as a potential determinant of financial difficulty.

Institutional quality indicators, such as GDP per capita (GDPC), provide insights into political and public policy effectiveness. Variables like depositary insurance scheme (DINS) and political risk (PR) help assess moral hazard behavior, political stability, and the efficiency of government interventions in stabilizing the financial sector (Breuer, 2004; Demirgüç-Kunt & Detragiache, 2005). Similarly, the political regime nature (PREG) is considered due to its impact on financial sector vulnerability, with democratic situations potentially reducing the probability of massive capital withdrawals compared to countries with poor institutional and political environments. In autocratic or anarchy regimes, insolvency procedures may be poorly designed or the judicial system is not able to deal with large-scale financial difficulty in addition to opaque decision-making processes and prevalent corruption (Marshall & Jagers, 2007). Similarly, Lensink et al. (1999) supported that economic growth and financial difficulties depend largely on political stability, civil liberty and the perception of politics. Aisen and Veiga (2013) confirm these results, suggesting that political instability reduces investment decisions because of increased uncertainty and may lead to violence and legitimacy.

3.2.2. Economic crisis

The literature on economic growth underscores the multifaceted interplay of various factors influencing wealth creation at the country level, impacting both supply and demand. Key determinants include the volume of public expenditure, human capital formation, investment levels, the unemployment rate, exchange rates, and inflation. Additionally, non-economic and sociopolitical factors, such as government efficiency and political systems, along with demographic indicators like population growth, play pivotal roles (Acemoglu, 2009).

Trade openness has been recognized as a stimulant for economic growth in prior studies (Al-Raimony, 2011; Barro, 2003; Romer, 1990; Tekin, 2012). For instance, trade reforms are believed to foster technology transfer, competition, and access to international funds, thereby promoting economic growth (Edwards, 1992; Chang et al., 2009; Ynikkaya, 2003). Accordingly, the variable 'TRADE' is introduced to measure the relaxation or removal of trade barriers, and the current account balance 'CACCT' reflects the outcome of external transactions.

The impact of total government spending on economic growth lacks consensus in the literature. Some studies support the positive effects of government spending on education and human capital formation (Barro, 1991; Benos, 2009; Ghosh & Gregoriou, 2007; Sala-I-Martin et al., 2004), while others highlight potential negative effects, particularly related to inappropriate fiscal policies like military spending measures (Hou & Chen, 2014; Pieroni, 2009). The variable 'GSIZE' is used to assess the state's ability to stimulate economic activity and avoid economic difficulties and crises. Education, considered a pivotal factor in growth theory, is represented by the secondary school enrollment variable 'SCHOOL', serving as a proxy for workforce qualification, while population growth rate 'POPG' accounts for the potential effects of human capital on economic growth.

Investment is recognized as a critical factor influencing economic growth, and the variable 'INVEST' captures the contributions of private investment in stimulating industry and economic activities (Easterly & Rebelo, 1993). Additionally, the financial sector's role in financing economic activities is acknowledged (Levine & Zervos, 1998; Beck et al., 1999; Rousseau & Wachtel, 2000), and indicators like credit to the private sector '(CPS)' and domestic credit growth '(DCG)' are chosen to account for these effects. Additionally, we introduced the variable '(M2RES)' to gauge the ratio of money and quasi-money to total international reserves, aiming to assess the potential risk of massive capital flight and the government's capacity to respond to exchange rate pressure.

Likewise, investment decisions are negatively affected by uncertainty, and factors like high inflation or exchange rate volatility make investor expectations challenging. The variables real effective exchange rate '(REER)' and inflation '(INFL)' account for the potential effects of price instability on agents' attitudes toward risk.

Beyond traditional determinants, economic growth and stability may be influenced by public policies, including political, administrative, and institutional systems. For instance, governance quality has been identified as a significant factor affecting economic growth (Arusha, 2009). Considering the broader context, property rights, regulatory frameworks, and conflict resolution systems are recognized as key determinants of economic growth, alongside social and macro-stabilization policies (Acemoglu et al., 2002; Mauro, 1995). In this regard, we incorporated the political regime variable 'PREG' to account for the impact of political systems on economic growth. Democratic regimes are often associated with wider property rights, judicial efficiency, and law adherence, fostering the installation of new projects and economic growth (Mauro, 1995; Murphy et al., 1993). Corruption, as an indicator of governance quality, has been shown to have a negative impact on economic growth by hindering innovation and technology transfer (Shera et al., 2014; Svensson, 2003). Thus, political risk 'PR' is included as a composite indicator representing bureaucracy, corruption, law and order, serving as a proxy for governance and institutional quality in the economic model.

3.3. Results and discussions

3.3.1. Discrete analysis⁴

In the preliminary analysis of our data before conducting regression, we aimed to assess multicollinearity among explanatory variables. We employed two commonly used techniques: the correlation matrix and Variance Inflation Factors (VIFs). The correlation matrix facilitated a pairwise examination of variable correlations, with a coefficient exceeding 0.5 considered indicative of potential multicollinearity issues. Additionally, we calculated VIFs by determining $(1-R^2)$ for each regression and assessing the degree of independence of each variable from others through $(1/(1-R^2))$. A VIF value greater than or equal to 10, or an average VIF exceeding 2 (Kutner et al., 2004), suggests strong correlation and potential multicollinearity. If neither of these two conditions is met, the impact of multicollinearity is not worrisome, and all the explanatory variables can be simultaneously introduced in the model without distorting the results.

For the analysis of financial crisis determinants (Table 1), the variable 'GDPC' exhibited strong correlations with 'FI', 'CPSB', and 'PR'. Consequently, we opted to exclude 'GDPC' from the regression to mitigate multicollinearity concerns. Furthermore, 'CPSB' displayed strong correlation with 'Money', prompting its exclusion from the analysis. These decisions were informed by the elevated VIF values associated with these variables. Despite observing correlations greater than 0.5, the robustness of our conclusions regarding financial crisis determinants remains unaffected since none of the corresponding VIFs exceeded 10, and the average VIF remained below 2 even before excluding the specified variables. Therefore, any combination of these variables is possible without flawing or affecting the robustness of our conclusions regarding the determinants of the financial crisis.

It seems that some variables such as TRADE, TOTC, M2RES and KFLOW share similar components inside. We recognize the importance of addressing concerns related to shared components and overlapping information in the chosen indices. However, the decision to use these variables in their original form, rather than decomposing them into real values, was guided by considerations of consistency with established literature and methodologies widely accepted in the field. Retaining these variables in their original form aligns with traditional practices and ensures practical interpretability for policymakers and practitioners accustomed to working directly with these measures.

To address multicollinearity concerns, the careful assessment of VIFs was conducted for all included variables. While VIFs provide a measure of multicollinearity, we acknowledge that they do not offer a theoretical explanation for the inclusion of specific variables as themselves. Nevertheless, our decision was made to maintain consistency with established practices and ensure the practical relevance of our findings. In this case, the models to be estimated are as follows:

$$\begin{aligned} \mathbf{Fincit} = & a_1 + a_1 \mathbf{Ecocit} + a_2 \mathbf{FLit} + a_3 \mathbf{GDPGit} + a_4 \mathbf{CACCTit} + a_5 \mathbf{DCGgit} + a_6 \mathbf{TOTCit} + a_7 \mathbf{KFLOWit} + a_8 \mathbf{M2RESit} \\ & + a_9 \mathbf{INFLit} + a_{10} \mathbf{REERit} + a_{11} \mathbf{RIRit} + a_{12} \mathbf{PREGit} + a_{13} \mathbf{DINSit} + a_{14} \mathbf{PRit} + a_{15} \mathbf{TRADEit} + a_{16} \mathbf{MONEYit} \\ & + a_{17} \mathbf{Debtit} + a_{18} \mathbf{Fiscalit} \end{aligned} \quad (1)$$

Table 3. Simultaneous equation regression results.^a

Dependent variable: financial crisis/endogenous variable: Economic crisis						Dependent variable: Economic crisis/endogenous variable: Financial crisis					
	Full sample	Developed	Emergent	Bank	Market	Full sample	Developed	Emergent	Bank	Market	
EcoC	-.052 (.49)	.053 (.57)	-.092 (.38)	-.080 (.61)	-.042 (.60)	FinC	.691 (.00)	.866 (.15)	.932 (.00)	.348 (.18)	.634 (.02)
FL	-.027 (.00)	.001 (.86)	-.036 (.00)	-.034 (.00)	-.030 (.00)	FL	.016 (.30)	-.016 (.59)	.020 (.32)	.006 (.77)	.024 (.28)
GDPG	-.013 (.00)	-.010 (.03)	-.013 (.00)	-.017 (.00)	-.009 (.00)	CPS	-.001 (.04)	-.001 (.12)	-.002 (.04)	-.001 (.90)	-.001 (.01)
CACCT	-.005 (.09)	-.012 (.01)	-.002 (.55)	-.007 (.21)	-.005 (.22)	M2RES	-.001 (.14)	.001 (.90)	-.011 (.02)	.001 (.47)	-.001 (.11)
DCG	-.055 (.13)	-.033 (.52)	-.033 (.53)	-.187 (.01)	.009 (.98)	INFL	.008 (.15)	-.003 (.01)	.001 (.10)	.002 (.11)	.008 (.18)
CPSB						REER	.002 (.68)	.009 (.70)	-.001 (.83)	.007 (.24)	-.001 (.36)
TOTC	.316 (.00)	.220 (.15)	.328 (.00)	.201 (.01)	.510 (.00)	PREG	.116 (.03)	-.162 (.67)	.091 (.12)	.045 (.58)	.210 (.00)
KFLOW	.009 (.21)	.001 (.13)	.008 (.53)	.001 (.34)	.004 (.63)	PR	-.002 (.09)	-.001 (.63)	-.002 (.23)	-.005 (.77)	-.006 (.02)
M2RES	.001 (.03)	.002 (.59)	-.006 (.79)	.002 (.08)	.001 (.02)	TRADE	-.002 (.00)	-.006 (.00)	-.002 (.01)	-.002 (.05)	-.002 (.00)
INFL	-.003 (.18)	.001 (.09)	-.004 (.18)	-.002 (.02)	-.001 (.58)	POPG	-.042 (.16)	.005 (.92)	-.054 (.22)	.004 (.99)	-.042 (.29)
REER	.005 (.01)	.001 (.17)	.005 (.03)	.006 (.00)	-.007 (.89)	Gsize	.025 (.00)	.029 (.11)	.029 (.00)	.026 (.00)	.040 (.00)
RIR	.006 (.00)	-.003 (.90)	.006 (.00)	.009 (.00)	.007 (.00)	INVEST	-.041 (.00)	-.050 (.00)	-.037 (.00)	-.033 (.00)	-.051 (.00)
PREG	-.003 (.89)	.028 (.83)	.008 (.79)	-.019 (.57)	.007 (.83)	SCHOOL	.001 (.24)	.002 (.36)	.008 (.63)	.001 (.48)	-.004 (.79)
GDPC						CACCT	.012 (.00)	.024 (.03)	.009 (.07)	.015 (.02)	.010 (.08)
DINS	.003 (.88)	-.010 (.76)	-.003 (.91)	-.010 (.77)	.023 (.43)	DCG	-.128 (.12)	-.199 (.11)	-.023 (.84)	-.260 (.06)	-.044 (.66)
PR	.001 (.01)	-.003 (.82)	.002 (.00)	.009 (.19)	.002 (.01)	cons	1.33 (.00)	1.70 (.00)	1.43 (.00)	.851 (.00)	1.83 (.00)
TRADE	.007 (.05)	.002 (.00)	.003 (.54)	.001 (.01)	.003 (.58)						
Money	-.005 (.04)	-.004 (.16)	-.005 (.21)	-.005 (.17)	-.006 (.15)						
Debt	.005 (.02)	-.006 (.10)	.001 (.01)	.007 (.01)	.002 (.65)						
Fiscal	-.005 (.85)	-.004 (.924)	.001 (.68)	-.001 (.81)	-.002 (.9)						
Cons	-.042 (.83)	-.172 (.64)	-.268 (.34)	.024 (.94)	-.098 (.71)						

Our approach is Instrumental variables and two-stage least squares for panel-data models. After conducting the Hausmann test for the fixed or random effect we use the two-stage least-squares within estimator.

by excluding relevant variables. In addressing this challenge, Bayesian Model Averaging (BMA) has emerged as a useful technique, as demonstrated by Sala-i-Martin et al. (2004) and Hamdaoui (2016). BMA provides an optimal combination of indicators by detecting potential variables from a large set. The 'Posterior Inclusion Probability (PIP)' statistic in BMA measures the importance of each variable, where high PIP values indicate robust indicators and low values suggest irrelevance. Kass and Raftery (1995) classify the significance of variables based on PIP values, ranging from weak to decisive⁵.

The 'Model Probability' (PMP) statistic in BMA aids in selecting the best-performing model with optimal variable combinations. In this study, BMA is employed to choose potential indicators of different crises and their best combinations. Variables selected through BMA are then utilized to compute crisis probabilities and explore potential causal links between financial disturbances and economic recession. BMA begins with a broad array of candidate variables, applying statistical methods to identify potential predictors of different events, as highlighted by Madigan and Raftery (1994) and Raftery (1995). The list of variables, along with their descriptions and sources, is detailed in Table A2.

The BMA results (Table 4) for the full sample indicate that the opening of the capital account and robust economic growth decrease the likelihood of a financial crisis. Conversely, the depreciation of the national currency and the rise in the real interest rate increase the likelihood of a financial crisis. Economic growth and the real interest rate level emerge as common determinants of financial crises. However, while there is an interaction between financial and economic crises in some countries, no significant

Table 4. BMA results.^a

Variable	Dependent variable: financial crisis										Dependent variable: economic crisis										
	Full		Developed		Emergent		Bank		Market		Variable	Full		developed		Emergent		Bank		Market	
	PIP	TM	PIP	TM	PIP	TM	PIP	TM	PIP	TM		PIP	TM	PIP	TM	PIP	TM	PIP	TM	PIP	TM
EcoC	.73 ⁻	1.0	.97 ⁻	1.0	.01 ⁻	.00	.35 ⁻	.00	.24 ⁻	.00	FinC	.05 ⁻	.00	.84 ⁻	1.0	.07 ⁻	.00	.09 ⁻	.00	.05 ⁻	.00
FL	1.0 ⁻	1.0	.05 ⁻	.00	.87 ⁻	1.0	.89 ⁻	1.0	.99 ⁻	1.0	FL	.05 ⁻	.00	.05 ⁻	.00	.06 ⁻	.00	.03 ⁻	.00	.04 ⁻	.00
GDPG	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	.80 ⁻	1.0	CPS	.03 ⁺	.00	.06 ⁺	.00	.03 ⁺	.00	.14 ⁺	.00	.07 ⁻	.00
CACCT	.07 ⁻	.00	.19 ⁻	.00	.02 ⁻	.00	.21 ⁻	.00	.04 ⁻	.00	M2RES	.08 ⁻	.00	.20 ⁻	.00	.07 ⁻	.00	.03 ⁻	.00	.32 ⁻	.00
DCG	.04 ⁻	.00	.14 ⁻	.00	.03 ⁻	.00	.55 ⁻	.00	.02 ⁻	.00	INFL	.04 ⁺	.00	.09 ⁺	.00	.11 ⁺	.00	.03 ⁺	.00	.03 ⁺	.00
TOTC	1.0	1.0	.15 ⁺	.00	1.0 ⁺	1.0	.71 ⁺	1.0	1.0 ⁺	1.0	REER	.09 ⁺	.00	.01 ⁻	.00	.07 ⁺	.00	.04 ⁺	.00	.02 ⁻	.00
KFLOW	.09 ⁺	.00	.18 ⁺	.00	.08 ⁺	.00	.34 ⁺	1.0	.04 ⁺	.00	PREG	.03 ⁻	.00	.10 ⁻	.00	.03 ⁺	.00	.11 ⁻	.00	.15 ⁺	.00
M2RES	.05 ⁺	.00	.12 ⁺	.00	.02 ⁺	.00	.04 ⁻	.00	.30 ⁺	.00	PR	.05 ⁻	.00	.05 ⁻	.00	.05 ⁻	.00	.11 ⁻	.00	.08 ⁻	.00
INFL	.04 ⁻	.00	.45 ⁺	.00	.02 ⁻	.00	.03 ⁺	.00	.05 ⁻	.00	TRADE	.05 ⁻	.00	.35 ⁻	.00	.12 ⁻	.00	.04 ⁻	.00	.05 ⁻	.00
REER	.75 ⁺	1.0	.42 ⁺	.00	.17 ⁺	.00	.81 ⁺	1.0	.05 ⁺	.00	POPG	.04 ⁻	.00	.05 ⁻	.00	.08 ⁻	.00	.04 ⁻	.00	.09 ⁻	.00
RIR	1.0 ⁺	1.0	.26 ⁺	1.0	1.0 ⁺	1.0	.96 ⁺	1.0	1.0 ⁺	1.0	Gsize	.07 ⁺	.00	.06 ⁻	.00	.35 ⁺	.00	.05 ⁺	.00	.03 ⁺	.00
PREG	.04 ⁺	.00	.07 ⁺	.00	.05 ⁺	.00	.05 ⁺	.00	.05 ⁺	.00	INVEST	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
DINS	.15 ⁺	.00	.02 ⁻	.00	.08 ⁺	.00	.21 ⁺	.00	.03 ⁺	.00	SCHOOL	.01 ⁻	.00	.02 ⁺	.00	.12 ⁻	.00	.04 ⁻	.00	.02 ⁺	.00
PR	.05 ⁺	.00	.02 ⁺	.00	.13 ⁺	.00	.06 ⁺	.00	.06 ⁺	.00	CACCT	1.0 ⁺	1.0	.35 ⁺	.00	.99 ⁺	1.0	.89 ⁺	1.0	.98 ⁺	1.0
TRADE	.01 ⁻	.00	.09 ⁺	.00	.07 ⁻	.00	.04 ⁺	.00	.04 ⁻	.00	DCG	.94 ⁻	1.0	.65 ⁻	1.0	.28 ⁻	.00	.62 ⁻	1.0	.30 ⁻	.00
BMoney	.05 ⁻	.00	.03 ⁻	.00	.05 ⁻	.00	.05 ⁻	.00	.01 ⁻	.00											
Debt	.03 ⁺	.00	.05 ⁻	.00	.19 ⁺	.00	.14 ⁺	.00	.05 ⁻	.00											
Fiscal	.06 ⁻	.00	.08 ⁻	.00	.06 ⁻	.00	.46 ⁻	.00	.02 ⁺	.00											
PMP		.31		.09		.28		.04		.28		.50		.17		.26		.31		.31	
(Exact)																					

^aSigns (-) and (+) corresponds to post mean (PM) indicating the nature (the sign) of the relationship between variable to be explained and explanatory variable. TM implies top model and corresponds to the best combination.

relationship is observed in others. Moreover, terms of trade changes and capital account liberalization are crucial in emergent, bank-based, and market-based countries but are inconsequential in advanced economies.

Turning to the determinants of economic crises, the BMA results highlight that an increase in the share of private investments and the growth of domestic credit reduce the probability of triggering such crises, especially in the full sample and developed countries. Notably, the results of the inferential BMA method suggest a departure from the frequentist method of simultaneous equations, indicating that economic crises are no longer significantly dependent on financial crises in the most studied sample. However, recognizing the static nature of these techniques and their limitation in accounting for the temporal evolution of relationships, an extension of the analysis is undertaken to enhance the reliability of the results.

Our methodology involves leveraging the outcomes of the Bayesian Model Averaging (BMA) method for each type of crisis to conduct a nuanced analysis of the relationships between each crisis type and its potential determinants, as well as the interplay among different types of crises. To achieve this, we employ VAR panel regressions, focusing on the variables identified by the BMA method as crucial explanatory factors for various crises. Our objective is to scrutinize how each crisis type responds to fluctuations in its potential determinants and other forms of financial vulnerabilities, considering both short-term and long-term dynamics. The most appropriate method for this analysis is the Vector Error Correction Model (VECM), particularly the restricted VECM, contingent upon the characteristics of our data.

The decision to use the VECM model is contingent on certain criteria, notably whether all variables are integrated of order one (I(1)) and not integrated of order two (I(2)), and whether there is potential cointegration. If these conditions are met, the VECM model is suitable; otherwise, an unrestricted Panel-VAR is employed. This method serves as a powerful tool for scrutinizing the dynamics of financial crisis occurrences. We adopt two analytical approaches, the first of which relies on a binary indicator of the financial situation—a commonly used technique. However, this approach falls short of capturing the intermediate evolution of financial vulnerabilities, spanning from the initial signs of fragility to the onset of a crisis.

To address this limitation and fulfill the requirements for applying methods that distinguish between short-term and long-term situations (e.g. the Autoregressive Distributed Lag (ARDL) technique) and account for endogeneity in cointegrating models (e.g. Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) methods), we undertake a continuous analysis. This involves determining the probability of different crises based on the coefficients estimated using all the included variables (following correlation testing) through logit regression.⁶ This method not only overcomes criticisms related to the use of binary

variables but also allows us to assess long-term interactions and the response and causality between different indicators.

Before proceeding with the regressions, a unit root test is conducted to determine the most appropriate method for our analytical goals. This comprehensive approach ensures a thorough investigation into the relationships and dynamics surrounding various types of financial crises, considering both short-term fluctuations and long-term interactions among the identified determinants.

All the variables in our study exhibit stationarity in level or become stationary in the first difference, as indicated in Table 5. Specifically, these variables are stationary of order (1) and not of order (2), allowing us to employ Panel-VAR (P-VAR) or Vector Error Correction Model (VECM) based on the results of the cointegration test.

For the financial crisis model, our findings (Table 6) reveal that nine out of eleven statistics indicate cointegration at the 0.05 significance level. This implies a long-run relationship among the series. Even in the presence of short-run shocks that may impact individual variables, these variables would

Table 5. Unit root tests.

Methods	Financial crisis							Economic crisis			
	ECOC	FL	D(FL)	GDPG	TOTC	REER	RIR	INVEST	D(INVEST)	CACCT	DCG
Null: Unit root (assumes common unit root process)											
Levin, Lin &Chu t*	.000	.451	.000	.000	.000	.033	.000	.002	.000	.000	.000
Null: Unit root (assumes individual unit root process)											
ADF – Fisher Chi-square	.000	.206	.000	.000	.000	.062	.000	.871	.000	.000	.000
PP – Fisher Chi-square	.000	.172	.000	.000	.000	.138	.000	.920	.000	.000	.000

Note. values presented in the table are p-values¹⁰.

Table 6. Pedroni cointegration test.

	Financial crisis									
	Null Hypothesis: No cointegration									
	Full sample	Developed		Emergent		Bank	Market			
Alternative hypothesis: common AR coeffs. (within-dimension)										
	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat
Panel v-Statistic	-47.9 (1.0)	-6.97 (1.0)	-41.8 (1.0)	-3.86 (.99)	-40.9 (1.0)	-4.75 (1.0)	-30.9 (1.0)	-5.42 (1.0)	-16.1 (1.0)	-4.74 (1.0)
Panel rho-Statistic	-2.48 (.00)	-3.04 (.00)	-11.4 (.00)	-10.3 (.00)	-2.54 (.00)	-2.86 (.00)	-2.55 (.00)	-2.52 (.00)	-2.19 (.01)	-2.56 (.00)
Panel PP-Statistic	-26.1 (.00)	-26.0 (.00)	-22.9 (.00)	-20.8 (.00)	-16.4 (.00)	-13.4 (.00)	-21.4 (.00)	-20.9 (.00)	-12.1 (.00)	-14.7 (.00)
Panel ADF-Statistic	-8.24 (.00)	-7.81 (.00)	-20.2 (.00)	-18.1 (.00)	-14.1 (.00)	-12.5 (.00)	-15.9 (.00)	-15.3 (.00)	-11.0 (.00)	-13.5 (.00)
Alternative hypothesis: individual AR coeffs. (between-dimension)										
Group rho-Statistic	-1.38 (.08)		-10.2 (.00)		-1.57 (.05)		-1.87 (.03)		-1.80 (.03)	
Group PP-Statistic	-41.0 (.00)		-28.3 (.00)		-24.1 (.00)		-33.2 (.00)		-20.2 (.00)	
Group ADF-Statistic	-11.6 (.00)		-24.8 (.00)		-14.5 (.00)		-19.4 (.00)		-12.6 (.00)	
Economic crisis										
Null Hypothesis: No cointegration										
Full sample	Developed		Emergent		Bank	Market				
Alternative hypothesis: common AR coeffs. (within-dimension)										
	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat	Stat	W-Stat
Panel v-Statistic	-.972 (.83)	-2.87 (.99)	.170 (.43)	-1.04 (.85)	.467 (.32)	-1.40 (.91)	-.119 (.54)	-1.58 (.94)	.613 (.26)	-1.42 (.92)
Panel rho-Statistic	-.998 (.15)	-1.74 (.04)	-1.91 (.02)	-2.28 (.01)	-2.40 (.00)	-3.08 (.00)	-1.98 (.42)	-.722 (.23)	-3.20 (.00)	-3.51 (.00)
Panel PP-Statistic	-6.82 (.00)	-8.71 (.00)	-4.82 (.00)	-5.39 (.00)	-5.96 (.00)	-7.60 (.00)	-4.19 (.00)	-5.46 (.00)	-6.25 (.00)	-7.04 (.00)
Panel ADF-Statistic	-4.89 (.00)	-5.62 (.00)	-4.52 (.00)	-5.08 (.00)	-5.76 (.00)	-6.47 (.00)	-4.79 (.00)	-5.88 (.00)	-6.70 (.00)	-7.68 (.00)
Alternative hypothesis: individual AR coeffs. (between-dimension)										
Group rho-Statistic	1.09 (.86)		-.354 (.36)		-.916 (.17)		1.46 (.92)		-1.66 (.04)	
Group PP-Statistic	-8.31 (.00)		-5.18 (.00)		-7.49 (.00)		-5.67 (.00)		-6.56 (.00)	
Group ADF-Statistic	-4.67 (.00)		-4.64 (.00)		-5.94 (.00)		-4.84 (.00)		-7.34 (.00)	

eventually converge over time. Consequently, the suitable techniques for estimating both short-run and long-run relationships are Vector Error Correction Models (VECM). These models offer a robust framework for capturing the dynamics and interactions among the variables, considering both short-term fluctuations and the long-term equilibrium relationships. This analytical approach aligns with established econometric principles and enhances the reliability of our findings⁷.

The findings in the study highlight several interesting dynamics between economic and financial crises across different types of economies (bank-based, market-based, developed, and emergent countries). Across all categories of countries, the coefficients associated with lagged variables indicating financial crises are consistently negative and statistically significant, as outlined in Table 7. This aligns with the works of Claessens et al. (2005) and Kaminsky and Reinhart (1999) who have highlighted the importance of historical experiences and crisis memory in shaping future crisis probabilities. This suggests that a country experiencing a financial crisis is less likely to face a new crisis in the subsequent years. This idea aligns with the notion of crisis resolution and the implementation of reforms such as, Reinhart and Rogoff (2009) discussed the aftermath of financial crises and the subsequent recovery. Notably, in the full sample and bank-based economies, an economic crisis reduces the probability of triggering a financial crisis in the following two years. This study's observation corresponds with Bussiere's (2013) emphasis on the role of domestic credit growth in banking crises. However, for developed countries, the economic crisis significantly increases the likelihood of a financial crisis in the next year, although this effect loses significance in the second year. This finding is interesting and may be connected to the nature of advanced financial systems. This is consistent with research suggesting that economic downturns can expose vulnerabilities in well-developed financial markets (Reinhart & Rogoff, 2009).

In emergent countries, experiencing an economic crisis significantly reduces the probability of a financial crisis only in the next year. Surprisingly, the effect of experiencing an economic crisis on the probability of a financial crisis is not significant in market-based economies. This lack of a significant short-term impact aligns with the idea that market-based economies might be more resilient to short-term economic shocks (Frankel & Saravelos, 2012).

In all models, there is evidence of a long-run relationship from economic instability to financial crisis, with the coefficients associated with the error correction term being consistently negative and significant. This suggests that, in the long run, economic instability contributes to the likelihood of a financial crisis. However, the short-run effect indicated by the Wald test is not significant for market-based economies, suggesting no immediate impact. This evidence is consistent with theories suggesting that economic instability can contribute to systemic issues in the financial sector over time (Kaminsky & Reinhart, 1999). The GDP growth rate (GDPG) is not significant in the short term for all subsamples, except for developed countries, but becomes a potential determinant of financial crises in the long run. This aligns with the idea that sustained economic growth is crucial for financial stability (Reinhart & Rogoff, 2009).

A key finding is that the effect of economic crises on financial crises is substantial and persistent, particularly in bank-based economies. Additionally, the effect of the interest rate is not transitory; a rise in the interest rate significantly increases the frequency of financial crises, and this effect persists in the long term across all samples. This persistent effect of the interest rate aligns with literature that emphasizes the role of monetary policy and interest rates in shaping financial stability (Qin & Luo, 2014). The depreciation of the exchange rate increases the likelihood of a financial crisis within the next two years. This finding corresponds to the extensive literature on the impact of exchange rate movements on financial vulnerabilities (Lestano et al., 2003; Frankel & Saravelos, 2012; Hamdaoui, 2016). It appears that in developed countries, financial crises are a consequence of economic crises, while in other economies, economic crises precede financial crises.

Regarding the occurrence of economic crises, our P-VECM model results reveal that the determinants vary based on economic structure and development which is consistent with the idea that different types of economies may exhibit distinct vulnerabilities and responses to economic shocks (Levy-Yeyati & Panizza, 2011). Unlike financial crises, countries experiencing economic crises may be more exposed to a new cycle of recession. For the full and emergent country samples, coefficients associated with the lagged economic crisis variable are positive and significant, indicating that economic crises are persistent and challenging to resolve. This resonates with research emphasizing the lingering effects of economic downturns (Reinhart & Rogoff, 2009). In bank-based systems, the effect is positive, and in market-based

Table 7. VECM results.

		Full sample			Developed				Emergent					
		LTIE ¹¹	coef	Prob	Wald	LTIE	Coef	Prob	Wald	LTIE	coef	Prob	Wald	
Financial crisis	ECT		.026	.00			-.042	.00			.030	.000		
	FINC(-1)		-.610	.00	533.2		-.698	.00	362.3		-.551	.000	231.0	
	FINC(-2)		-.265	.00	(.00)		-.281	.00	(.00)		-.277	.000	(.00)	
	ECOC(-1)	-.008	-.044	.00	13.2	-.634	.054	.03	6.47	-.163	-.057	.005	7.81	
	ECOC(-2)	(.00)	-.042	.00	(.00)	(.00)	-.004	.82	(.03)	(.000)	-.016	.455	(.02)	
	FL(-1)	-.942	-.039	.03	8.24						-.911	-.040	.070	7.22
	FL(-2)	(.00)	.029	.10	(.01)						(.000)	.041	.058	(.02)
	GDPG(-1)	-.941	-.001	.94	.630	-1.02	.008	.03	13.9	-.920	-.004	.167	3.22	
	GDPG(-2)	(.00)	-.001	.61	(.72)	(.00)	.014	.00	(.00)	(.000)	-.004	.114	(.19)	
	TOTC(-1)	.008	.176	.08	14.8						-.010	.422	.000	13.2
	TOTC(-2)	(.00)	.152	.03	(.00)						(.000)	.237	.004	(.00)
	REER(-1)	-.893	.002	.00	6.32									
	REER(-2)	(.00)	.002	.00	(.04)									
	(RIR(-1)	-.778	-3E-6	.74	6.07	-1.00	.005	.02	6.52	-.732	9.4E-7	.939	5.98	
	(RIR(-2)	(.00)	2E-5	.03	(.04)	(.00)	.004	.07	(.03)	(.000)	2E-05	.024	(.05)	
	C		.002	.68			.001	.89			.002	.795		
	AIC		28.2				9.34				22.3			
R-Squared		.307				.394				.282				
Economic crisis	ECT		-.670	.00			-.239	.00			-.603	.000		
	ECOC(-1)		.124	.00	23.6		-.136	.00	1.24		.060	.144	10.0	
	ECOC(-2)		.124	.00	(.00)		-.096	.03	(.53)		.119	.001	(.00)	
	FINC(-1)	-.679	.169	.00	14.8	-.290	.969	.00	84.4	-.561	-.375	.000	31.5	
	FINC(-2)	(.00)	.051	.24	(.00)	(.00)	.493	.00	(.00)	(.000)	-.248	.000	(.00)	
	INVEST(-1)	-.693	-.027	.00	16.2	-.650	-.097	.00	57.8	-.700	-.009	.267	1.27	
	INVEST(-2)	(.00)	-.009	.17	(.00)	(.00)	-.031	.02	(.00)	(.000)	-.002	.795	(.52)	
	CACCT(-1)	-.700	-.010	.06	3.56						-.696	-.009	.169	5.00
	CACCT(-2)	(.00)	.001	.75	(.16)						(.000)	-.012	.061	(.08)
	DCG(-1)	-.694	-.090	.12	3.44	-.645	.377	.00	18.6					
	DCG(-2)	(.00)	.018	.75	(.17)	(.00)	.254	.00	(.00)					
	C		-.005	.60			-.026	.14			.005	.715		
	AIC		8.90				3.74				10.3			
	R-Squared		.317				.198				.308			
			Bank				Market							
			LTIE	coef	Prob	Wald	LTIE	coef	Prob	Wald				
	Financial crisis	ECT		.043	.000			-.080	.001					
FINC(-1)			-.631	.000	270.		-.515	.000	150.					
FINC(-2)			-.274	.000	(.000)		-.237	.000	(.000)					
(ECOC(-1)		-.377	-.057	.003	10.6	-.800	-.005	.980	1.04					
(ECOC(-2)		(.000)	-.037	.058	(.004)	(.000)	-.020	.316	(.592)					
(FL(-1)		-.928	-.080	.001	12.5	-.970	-.001	.916	2.22					
(FL(-2)		(.000)	.047	.066	(.001)	(.000)	.027	.138	(329)					
GDPG(-1)		-.935	-.003	.339	.921	-.932	.001	.571	1.01					
GDPG(-2)		(.000)	-.009	.764	(.630)	(.000)	-.002	.540	(.602)					
TOTC(-1)		-.006	.366	.002	13.6	.023	-.677	.000	17.7					
TOTC(-2)		(.000)	.306	.000	(.001)	(.000)	-.432	.000	(.000)					
REER(-1)		-.895	.001	.040	12.0									
REER(-2)		(.000)	.002	.027	(.002)									
RIR(-1)		-.350	1E-5	.523	1.06	-.824	-5E-5	.006	12.5					
RIR(-2)		(.000)	1E-5	.305	(.588)	(.000)	2E-5	.176	(.001)					
C			.002	.760			.004	.633						
AIC			28.9				20.9							
R-squared		.323				.298								
Economic crisis	ECT		-.510	.000			-.247	.000						
	ECOC(-1)		.033	.478	4.04		-.065	.113	2.72					
	ECOC(-2)		.083	.047	(.132)		-.039	.302	(.256)					
	FINC(-1)	-.437	.726	.000	89.3	-.089	.623	.000	54.4					
	FINC(-2)	(.000)	.374	.000	(.000)	(.000)	.189	.009	(.000)					
	INVEST(-1)	-.695	-.046	.000	18.5	-.627	-.004	.556	.471					
	INVEST(-2)	(.000)	-.011	.305	(.000)	(.000)	-.002	.728	(.790)					
	CACCT(-1)	-.711	-.025	.002	9.08	-.629	.019	.005	7.94					
	CACCT(-2)	(.000)	-.002	.975	(.010)	(.000)	-.009	.900	(.018)					
	DCG(-1)	-.721	.147	.167	2.32									
	DCG(-2)	(.000)	.009	.925	(.312)									
	C		-.004	.795			.013	.420						
	AIC		8.60				10.4							
	R-Squared		.268				.148							

Values in parentheses correspond to *p*-values.

systems, it is negative, but not statistically significant, suggesting no short-run effect. The financial crisis appears to increase the likelihood of economic crises in both the short and long term, especially for emergent countries consistently to hypothesis 1.

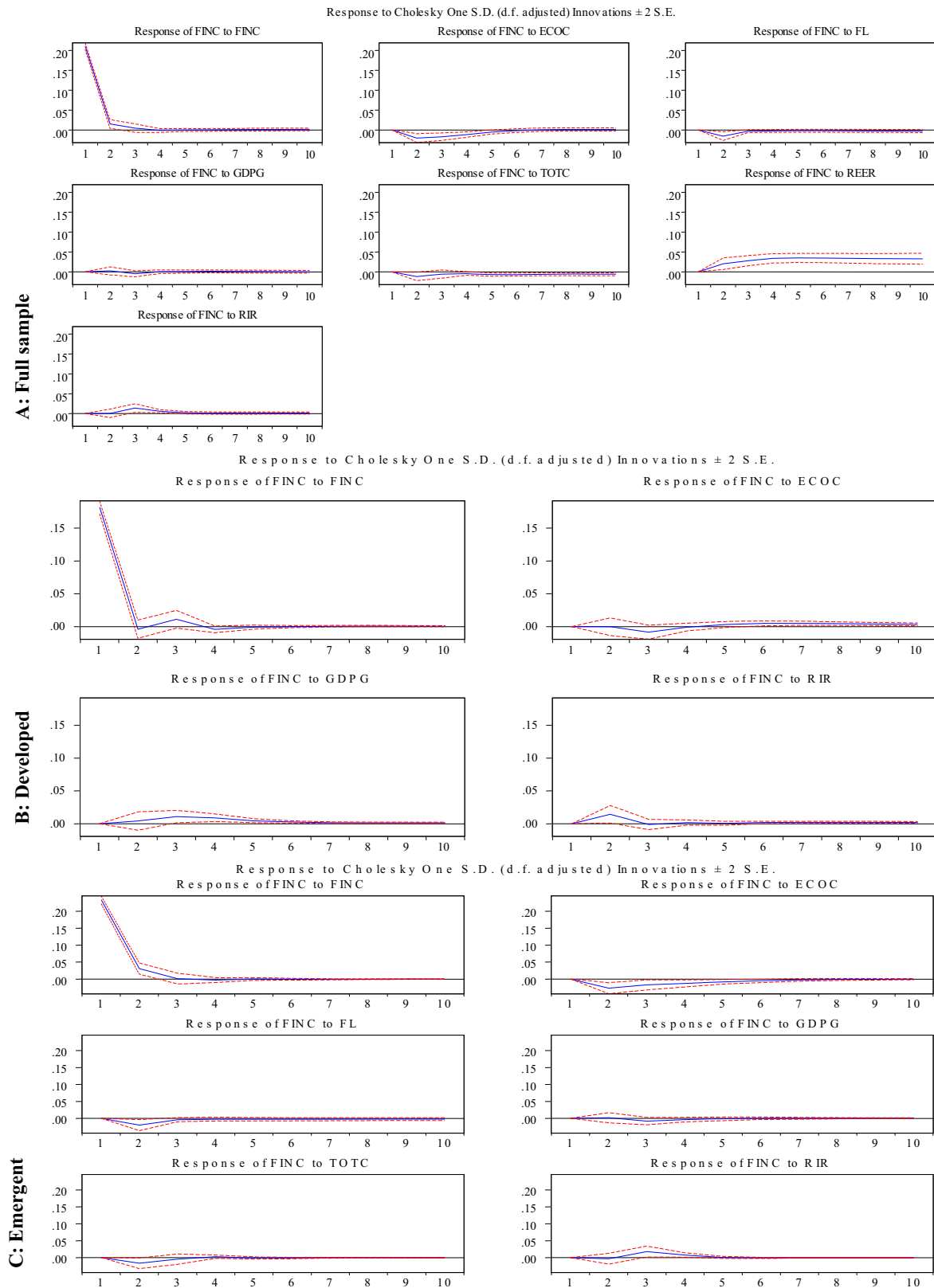


Figure 1. Impulses response function: financial sector.

The findings presented in Figure 1 and the subsequent discussion provide valuable insights into the persistence and dynamics of financial shocks and economic shocks across different types of economies. It is evident from Figure 1 that financial shock, on average, are not highly persistent and tend to last

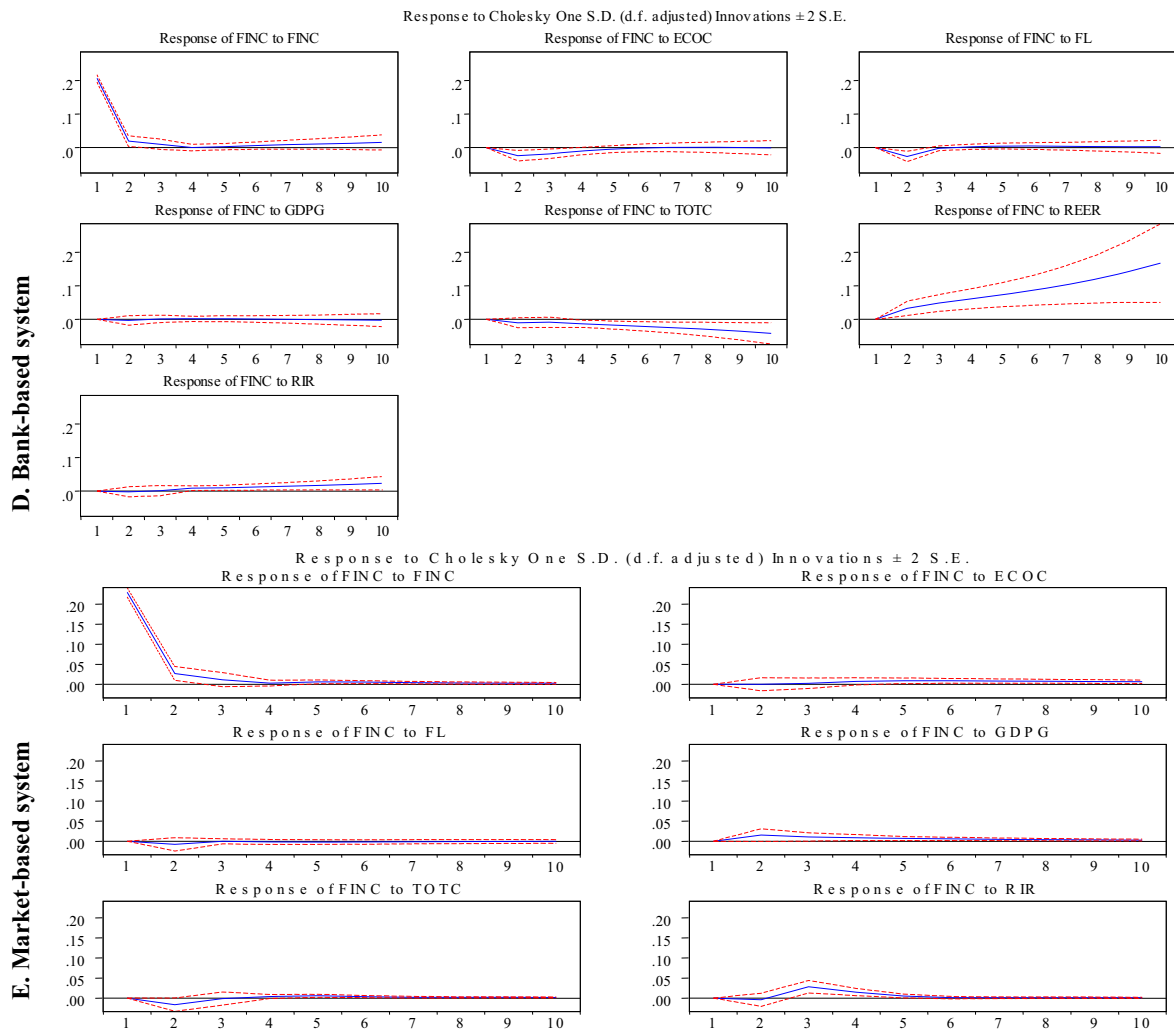


Figure 1. Continued.

around 3 years. This observation is consistent with existing literature that recognizes the cyclical nature of financial crises (Reinhart & Rogoff, 2009). Financial crises often involve acute disruptions followed by recovery periods. Interestingly, an increase in the likelihood of an economic shock significantly reduces the likelihood of a financial fragility for the next 5 years in the full sample, emergent countries, and bank-based systems. This implies that adverse economic conditions prompt cautious behavior, and this memory effect persists for 5 years before diminishing in the sixth year. This aligns with the literature on the impact of economic conditions on risk aversion and financial decision-making (Malmendier & Nagel, 2011). This suggests that economic shocks have a prolonged influence on financial behavior. This delay suggests a time lag in the transmission of economic shocks to the financial sphere, indicating long-term effects. This resonates with studies highlighting the delayed and lasting impact of economic downturns on the financial sector (Reinhart & Rogoff, 2009).

Furthermore, our findings reveal that the effect of a currency shock on financial sector is not only persistent but also exacerbates over time in bank-based systems. This revelation is an important contribution to the literature in line with research emphasizing the vulnerability of banking systems to external shocks, especially in economies closely connected to the external environment (Lestano et al., 2003). Conversely, the real interest rate emerges as the most significant destabilizing factor in market-based economies in line with the literature on the sensitivity of market-based financial systems to interest rate movements (Qin & Luo, 2014). High-interest rates can impact borrowing costs and financial stability

Specifically, the depreciation of the exchange rate significantly and enduringly increases the likelihood of a financial vulnerability in bank-based economies that are closely connected to the external environment. Other factors, such as capital account liberalization, economic growth, terms of trade, and the

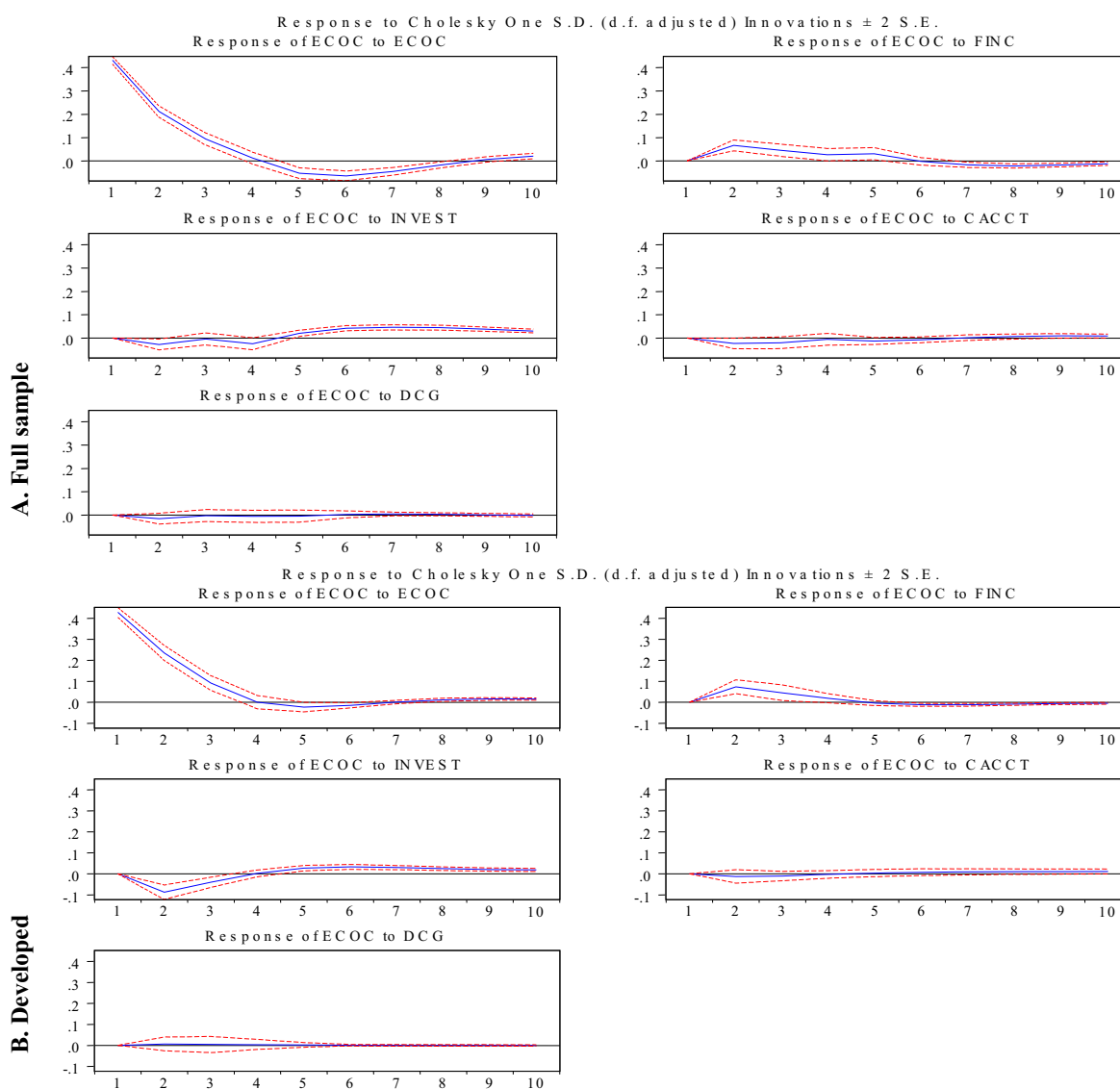


Figure 2. Impulse response functions: economic situation.

economic growth rate, exhibit similar effects across all countries and do not distinctly influence the stability of the financial sector. These findings contribute to our understanding of universal determinants of financial stability. The non-distinct influence of certain factors across countries aligns with studies that emphasize the importance of global and systemic factors in shaping financial stability, transcending specific economic structures (Claessens et al., 2005).

Figure 2 illustrates that the economic shock exhibits greater persistence, lasting for more than 4 years compared to the 3-year duration of financial one. This aligns with the understanding that economic downturns can have long-lasting effects on the real economy emphasizing the lingering impact of economic crises on growth and development (Reinhart & Rogoff, 2009). Moreover, the impact of a shock in the financial sphere on the economic sphere is immediate, positive, significant, and enduring for at least 5 years, with more pronounced importance observed in emergent markets. This finding is consistent with research indicating that financial disruptions can quickly spill over into the real economy (Kaminsky & Reinhart, 1999). The greater importance observed in emergent markets underscores the vulnerability of developing economies to financial shocks, as documented in studies highlighting the impact of financial instability on emerging markets (Frankel & Saravelos, 2012). This outcome implies that, generally, economic crises are preceded by financial vulnerabilities and fluctuations. This supports the literature on the financial amplification mechanism, where disruptions in the financial sector can exacerbate economic downturns (Bernanke et al., 1999). However, it is noteworthy that a financial shock does not necessarily

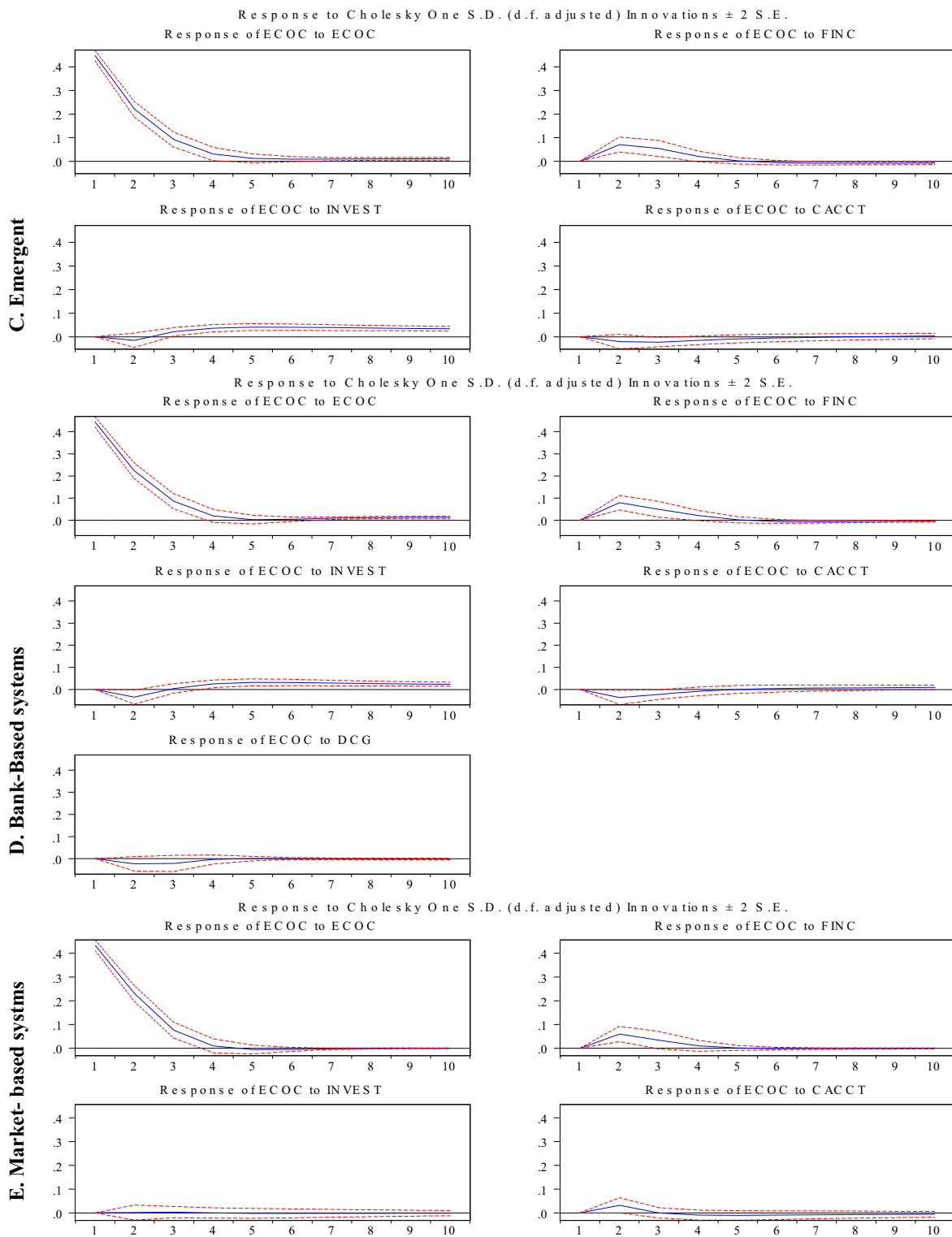


Figure 2. Continued.

lead to a subsequent deterioration of economic conditions; instead, it can be self-fulfilling. This recognition echoes the concept of confidence-driven recessions and the role of expectations in economic dynamics (Minsky, 1992).

Furthermore, the effect of investment on the real economy only becomes positive and significant in the long term, specifically from the fifth year in the full sample, and is never significant for the market-based system. This finding suggests that the impact of investment decisions on economic growth

may take time to materialize in line with the literature on the time lags in the transmission of investment effects on economic activity (Easterly & Rebelo, 1993). Although the volatility of investment is transmitted to economic volatility from the fourth year in developed countries, this effect becomes more distinctly significant and immediate, starting from the second year. This observation supports the notion that investment fluctuations can contribute to economic instability (Eberly & Krishnamurthy, 2014).

In summary, the study's findings contribute to the literature by providing empirical evidence on the persistence of economic shocks, the immediate impact of financial shocks on the real economy, and the time dynamics of investment effects. These insights enhance our understanding of the complex interactions between the financial and real sectors, offering implications for policymakers in managing and mitigating the impact of shocks on economic stability. The discussion underscores the importance of considering temporal aspects and system-specific characteristics in analyzing the dynamics of economic and financial interactions.

The vulnerability decomposition analysis presented in Table 8 offers insights into the short-term and long-term determinants of financial and economic vulnerabilities across different subsamples. Our analysis reveals that in the short term, the variance of the probability of a financial crisis is primarily influenced by its own evolution across all subsamples. This observation is consistent with the idea of self-reinforcing dynamics in financial markets, where recent developments and sentiments play a crucial role. Conversely, in the long term, more than half of this variance in the bank-based system and over a quarter in the full sample is explained by fluctuations in the exchange rate, and to a lesser extent by changes in the terms of trade and the vulnerabilities of economic fundamentals that determine the probability of an economic crisis. This finding aligns with research emphasizing the role of external factors in shaping financial vulnerabilities (Lestano et al., 2003). Changes in the terms of trade and vulnerabilities of economic fundamentals contributing to the long-term variance in financial vulnerability support the notion that both external and internal factors contribute to the sustained vulnerability of financial systems (Reinhart & Rogoff, 2009).

Regarding economic vulnerability, our findings indicate that it predominantly depends on its own evolution and on financial stability for all subsamples. This indication is consistent with the literature on the self-reinforcing nature of economic downturns and the persistence of economic challenges (Reinhart & Rogoff, 2009). The finding that financial stability influences economic vulnerability aligns with the concept that disruptions in the financial sector can have direct and immediate consequences for the real economy, especially in times of crisis (Bernanke et al., 1999). Notably, the level of investment plays a more significant role in developed countries compared to emergent nations, and in bank-based economies relative to market-based systems. This observation suggests that the impact of investment decisions on economic vulnerability may vary across different economic structures (Easterly & Rebelo, 1993). The results highlight the importance of financial stability and investment dynamics in shaping economic vulnerability, underscoring the need for coordinated policies that address both financial and real sector challenges.

The vulnerability decomposition analysis provides valuable insights into the short-term and long-term determinants of financial and economic vulnerabilities across different subsamples. The findings align with existing literature on the complex interplay between financial and real sectors, the role of external factors in financial stability, and the varied impact of investment on economic vulnerability across different economic structures. These insights contribute to a more nuanced understanding of the factors driving vulnerability and can inform policy decisions aimed at enhancing both financial and economic resilience.

The findings presented in Tables 9(A,B) provide insights into the causal relationships among various economic and financial indicators across different subsamples. Table 9(A) highlights that a financial crisis can be instigated by an economic crisis across all subsamples consistent with the literature that highlights the linkages between economic downturns and financial instability (Reinhart & Rogoff, 2009). The result supports the idea that economic crises can lead to financial crises through channels such as reduced creditworthiness, increased default rates, and disruptions in financial markets (Bernanke et al., 1999). Similarly, inappropriate capital account liberalization, a deterioration of terms of trade, and an increase in the real interest rate cause a financial crisis in the full sample and market-based systems. The identification of specific indicators causing financial crises aligns with existing literature on the role of capital account liberalization, terms of trade, and interest rates in financial instability, as noted by various

Table 8. Variance decomposition.

Period	Financial crisis																
	Full							Developed				Emergent					
	FINC	ECOC	FL	GDPG	TOTC	REER	RIR	FINC	ECOC	GDPG	RIR	FINC	ECOC	FL	GDPG	TOTC	RIR
1	100	.000	.000	.000	.000	.000	.000	100	.000	.000	.000	100	.000	.000	.000	.000	.000
2	97.2	.747	.219	.077	.504	1.10	.103	99.3	.000	.050	.625	97.5	1.27	.710	.004	.479	.017
3	91.5	1.14	.254	.207	.843	5.76	.193	98.7	.215	.401	.623	96.2	1.77	.727	.121	.506	.587
4	86.9	1.00	.200	.408	1.46	9.81	.159	98.5	.216	.642	.630	95.8	2.05	.734	.144	.518	.692
5	82.5	.962	.172	.463	1.97	13.7	.136	98.4	.245	.703	.631	95.7	2.16	.744	.148	.519	.692
6	78.5	.930	.151	.525	2.45	17.2	.117	98.3	.317	.723	.642	95.6	2.21	.755	.148	.521	.692
7	75.2	.900	.134	.586	2.77	20.2	.101	98.2	.391	.730	.654	95.6	2.22	.765	.148	.521	.692
8	72.4	.866	.122	.627	3.06	22.7	.089	98.1	.449	.734	.669	95.6	2.22	.775	.149	.521	.692
9	70.1	.837	.112	.661	3.33	24.7	.079	98.0	.493	.739	.682	95.6	2.22	.783	.149	.521	.692
10	68.2	.816	.103	.691	3.54	26.5	.071	98.0	.527	.743	.694	95.6	2.22	.791	.149	.521	.692
Period	Bank							Market									
	FINC	ECOC	FL	GDPG	TOTC	REER	RIR	FINC	ECOC	FL	GDPG	TOTC	RIR				
	1	100	.000	.000	.000	.000	.000	100	.000	.000	.000	.000	.000				
2	94.5	1.31	1.57	.027	.241	2.32	.010	98.4	.702	.166	.142	.464	.059				
3	89.0	1.97	1.48	.028	.377	7.04	.012	96.0	1.47	.217	.265	.473	1.47				
4	82.1	2.04	1.38	.028	.684	13.5	.146	95.3	1.82	.294	.266	.474	1.76				
5	74.0	1.88	1.27	.030	1.12	21.3	.299	95.2	1.91	.365	.267	.473	1.77				
6	64.9	1.65	1.14	.028	1.66	30.0	.478	95.1	1.92	.431	.275	.473	1.77				
7	55.5	1.40	.999	.024	2.23	39.0	.668	95.0	1.92	.488	.280	.473	1.77				
8	46.2	1.17	.841	.021	2.80	48.0	.855	95.0	1.92	.538	.283	.473	1.77				
9	37.5	.947	.687	.019	3.36	56.3	1.02	94.9	1.92	.583	.284	.473	1.77				
10	29.8	.749	.547	.019	3.86	63.7	1.18	94.9	1.92	.623	.284	.473	1.77				
Period	Economic crisis.																
	Full					Developed					Emergent						
	ECOC	FINC	INVEST	CACCT	DCG	ECOC	FINC	INVEST	CACCT	DCG	ECOC	FINC	INVEST	CACCT			
1	100	.000	.000	.000	.000	100.	.000	.000	.000	.000	100.	.000	.000	.000			
2	96.9	1.80	.887	.163	.217	94.7	2.17	3.04	.062	.019	97.7	1.96	.083	.159			
3	95.7	2.53	1.09	.325	.263	93.4	2.85	3.51	.104	.024	96.4	2.97	.252	.343			
4	95.5	2.69	1.12	.381	.263	93.3	2.98	3.51	.107	.031	95.7	3.09	.743	.421			
5	95.5	2.69	1.12	.397	.267	93.1	2.97	3.77	.11	.033	95.1	3.07	1.35	.445			
6	95.5	2.69	1.12	.406	.268	92.6	3.01	4.15	.133	.034	94.5	3.06	1.94	.450			
7	95.4	2.69	1.12	.413	.268	92.2	3.05	4.46	.165	.034	93.9	3.07	2.48	.449			
8	95.4	2.69	1.12	.421	.268	92.0	3.07	4.66	.203	.033	93.5	3.08	2.96	.446			
9	95.4	2.69	1.13	.429	.268	91.8	3.07	4.80	.247	.033	93.0	3.09	3.40	.445			
10	95.4	2.69	1.13	.437	.268	91.6	3.07	4.92	.297	.033	92.6	3.09	3.80	.447			
Period	Bank					Market											
	ECOC	FINC	INVEST	CACCT	DCG	ECOC	FINC	INVEST									
	1	100.	.000	.000	.000	.000	100.	.000	.000								
2	96.3	2.43	.458	.509	.209	98.1	1.45	.000									
3	95.2	3.23	.448	.678	.372	97.7	1.86	.003									
4	94.8	3.37	.688	.702	.375	97.6	1.89	.003									
5	94.4	3.36	1.07	.699	.373	97.6	1.89	.005									
6	94.1	3.36	1.43	.704	.372	97.5	1.89	.007									
7	93.7	3.37	1.74	.717	.370	97.5	1.89	.008									
8	93.5	3.37	2.00	.736	.369	97.5	1.89	.009									
9	93.2	3.36	2.22	.762	.368	97.5	1.89	.010									
10	93.0	3.36	2.42	.795	.368	97.4	1.89	.011									

studies (Hamdaoui et al., 2022; Frankel & Saravelos, 2012). The significance of inappropriate capital account liberalization, a deterioration of terms of trade, and an increase in the real interest rate as factors causing a financial crisis in the full sample and market-based systems aligns with research highlighting the role of external factors and interest rate movements in financial stability (Lestano et al., 2003; Qin & Luo, 2014). However, the real interest rate does not significantly cause a financial crisis in emergent and bank-system economies. This may suggest that interest rate dynamics have a varied impact on financial stability in different economic contexts. Additionally, the economic growth rate is not a significant factor causing a financial crisis, while real exchange depreciation triggers financial vulnerabilities in the full sample and emergent countries. The finding contrasts with some literature that emphasizes the importance of economic growth in mitigating financial instability (Levine & Zervos, 1998). This result may indicate that other factors play a more prominent role in triggering financial crises such as the real exchange depreciation consistent with the literature highlighting the impact of currency fluctuations on financial

Table 9. Granger causality tests.

9A: Financial crisis								
	Variables	FINC	ECOC	FL	GDPG	TOTC	REER	RIR
Full sample	FINC		(7E-09)	(.029)	(2E-17)	(3E-15)	(.047)	(6E-06)
	ECOC	(8E-7)		(.011)	(2E-83)	(9E-06)	(.125)	(.254)
	FL	(.000)	(.731)		(.002)	(.0495)	(.158)	(.064)
	GDPG	(.870)	(5E-15)	(.068)			(.005)	(.911)
	TOTC	(.033)	(.047)	(.056)	(1E-21)	(3E-7)	(.000)	(.012)
	REER	(.000)	(.366)	(.416)	(6E-08)	(3E-5)		(.130)
	RIR	(.029)	(.557)	(.785)	(.1507)	(.0428)	(.008)	
Developed		FINC	ECOC	GDPG	RIR			
	FINC		(3E-5)	(7E-12)	(.211)			
	ECOC	(3E-5)		(7E-33)	(.386)			
	GDPG	(.557)	(2E-13)		(.131)			
Emergent		FINC	ECOC	FL	GDPG	TOTC	RIR	
	FINC		(4E-5)	(.064)	(3E-10)	(9E-13)	(3E-5)	
	ECOC	(.001)		(.001)	(5E-53)	(.001)	(.285)	
	FL	(.014)	(.793)		(.497)	(.034)	(.257)	
	GDPG	(.478)	(1E-7)	(.344)		(.000)	(.815)	
	TOTC	(.025)	(.620)	(.240)	(5E-16)		(.068)	
	RIR	(3.07)	(.527)	(.865)	(.289)	(0.135)		
Bank		FINC	ECOC	FL	GDPG	TOTC	REER	RIR
	FINC		(3E-5)	(.105)	(1E-12)	(2E-10)	(.212)	(6E-5)
	ECOC	(.000)		(.308)	(1E-37)	(.003)	(.401)	(.485)
	FL	(.001)	(.949)		(7E-05)	(.125)	(.063)	(.525)
	GDPG	(.500)	(8E-5)	(.028)		(3E-6)	(.005)	(.458)
	TOTC	(.466)	(.683)	(.095)	(3E-14)		(.004)	(3E-5)
	REER	(.004)	(.771)	(.116)	(6E-5)	(.015)		(.934)
Market		FINC	ECOC	FL	GDPG	TOTC	RIR	
	FINC		(.000)	(.741)	(.000)	(4E-6)	(.004)	
	ECOC	(.004)		(.264)	(1E-38)	(.011)	(.519)	
	FL	(.020)	(.884)		(.381)	(.049)	(.101)	
	GDPG	(.714)	(8E-12)	(.991)		(.054)	(.412)	
	TOTC	(.018)	(.000)	(.966)	(1E-7)		(.001)	
	RIR	(.000)	(.800)	(.831)	(.891)	(.011)		
9B: Economic crisis								
	Variables	ECOC	FINC	INVEST	CACCT	DCG		
Full sample	ECOC		(8E-07)	(2E-24)	(.000)	(.001)		
	FINC	(7E-9)		(7E-20)	(2E-12)	(.000)		
	INVEST	(9E-7)	(.271)		(2E-8)	(.004)		
	CACCT	(.261)	(6E-5)	(2E-18)		(.872)		
	DCG	(.024)	(.190)	(.000)	(.567)			
	Developed		ECOC	FINC	INVEST	CACCT	DCG	
ECOC			(3E-5)	(2E-13)	(.003)	(.015)		
FINC		(3E-5)		(4E-8)	(.003)	(.270)		
INVEST		(1E-9)			(.003)	(.368)		
CACCT		(.289)	(.043)	(2E-7)		(.575)		
DCG		(.921)	(.738)	(.293)	(.336)			
Emergent		ECOC	FINC	INVEST	CACCT			
	ECOC		(.001)	(6E-13)	(.012)			
	FINC	(4E-5)		(3E-13)	(3E-11)			
	INVEST	(.017)			(2E-7)			
Bank		ECOC	FINC	INVEST	CACCT	DCG		
	ECOC		(.000)	(1E-15)	(.019)	(.006)		
	FINC	(3E-5)		(7E-11)	(8E-9)	(4E-5)		
	INVEST	(.004)			(3E-6)	(.005)		
	CACCT	(.733)	(.216)	(1E-13)		(.642)		
	DCG	(.172)	(.633)	(.004)	.391(.676)			

(Continued)

Table 9. Continued.

		9A: Financial crisis						
Variables		FINC	ECOC	FL	GDPG	TOTC	REER	RIR
Market		ECOC	FINC	INVEST	CACCT			
		ECOC	(.004)	(.536)	(.040)			
		FINC	(.000)	(.477)	(6E-6)			
		INVEST	(.985)	(.908)	(.325)			
		CACCT	(.048)	(9E-5)	(.527)			

stability (Frankel & Saravelos, 2012). Moreover, it is observed that a financial crisis causes modifications in all its determinants, except for financial liberalization in the case of bank and market systems, real interest rates for developed countries, and real exchange rates for bank-based systems, as indicated by its significant effect presented in the first line. This observation suggests a feedback loop between the economic sphere and the financial sector in line with the concept of financial amplification, where disruptions in the financial sector can exacerbate economic challenges and vice versa (Bernanke et al., 1999). The specific cases where financial liberalization in the case of bank and market systems, real interest rates for developed countries, and real exchange rates for bank-based systems are not significantly affected by a financial crisis may indicate that certain factors are more resilient to the immediate impact of financial shocks. This suggests a causal relationship from the economic sphere to the financial sector for all economies.

Table 9(B) supports bidirectional causality between financial and economic crises for all subsamples consistent with hypothesis 3. This resonates with the literature emphasizing the feedback loops and interconnectedness between financial and real sectors (Reinhart & Rogoff, 2009). We also observe a two-way causal relationship between the economic crisis and investment, except for market-based economies. The two-way causal relationship supports the idea that economic downturns can lead to reduced investment, contributing to a further contraction in economic activity (Easterly & Rebelo, 1993). On the other hand, the current account balance does not cause an economic crisis, while the economic crisis leads to the deterioration of the current account for all types of countries. This suggests that external imbalances may be a consequence rather than a cause of economic crises in the studied economies. While there are significant causal relationships between different indicators at conventional thresholds, we do not detail them here due to paper length constraints. Despite the importance of these findings, further precision is needed since financial situations are represented by binary variables indicating the presence or absence of a crisis without emphasizing intermediate situations. Thus, the P-VECM allows for both short- and long-term studies. In the next part, we delve into the continuous variables measuring the probability of a financial crisis to explore the long-term interactions of our variables of interest. The shift to exploring continuous variables measuring the probability of a financial crisis in the long term using P-VECM reflects an effort to overcome the limitations of binary representations, allowing for a more detailed examination of long-term interactions.

In summary, the findings are in line with established theories and empirical evidence on the interconnectedness between economic and financial variables. The results emphasize the importance of considering bidirectional causality and feedback effects in understanding the dynamics of financial and economic crises. The shift towards exploring continuous variables in the long term reflects a methodological advancement to provide more detailed insights into the interactions among key variables.

3.3.2. Continuous analysis

Table 10 illustrating the outcomes of the simultaneous equations method utilizing continuous indicators to characterize economic and financial conditions, closely aligns with the earlier findings employing the same methodology. Notably, the persistence of the observation that an economic crisis does not exert a significant impact on explaining the occurrence of a financial crisis is retained, while conversely, a financial crisis significantly diminishes the likelihood of an economic crisis. Firstly, this resonates with studies such as those conducted by Dabrowski et al. (2016) who found that economic variables may not be strong predictors of financial crises. This consistency in results underscores the complex and multifaceted

Table 10. Simultaneous equation regression.

Dependent variable: financial crisis/endogenous variable: Economic crisis						Dependent variable: Economic crisis/endogenous variable: Financial crisis					
	Full sample	Developed	Emergent	Bank	Market		Full sample	Developed	Emergent	Bank	Market
PrEcoC	-.014 (.53)	-.008 (.69)	.037 (.27)	-.057 (.08)	-.006 (.78)	PrFinC	-.041 (.00)	-.048 (.15)	-.039 (.00)	-.057 (.00)	-.019 (.10)
FL	-.022 (.00)	-.014 (.00)	-.026 (.00)	-.025 (.00)	-.021 (.00)	FL	.002 (.00)	.003 (.74)	.002 (.00)	.002 (.00)	.003 (.00)
GDPG	-.011 (.00)	-.008 (.00)	-.011 (.00)	-.010 (.00)	-.012 (.00)	CPS	.006 (.00)	.005 (.00)	.006 (.00)	.008 (.00)	.007 (.00)
CACCT	-.004 (.00)	-.004 (.00)	-.005 (.00)	-.003 (.00)	-.004 (.00)	M2RES	-.001 (.00)	-.001 (.00)	-.001 (.00)	-.002 (.00)	-.002 (.00)
DCG	-.040 (.00)	-.013 (.06)	-.053 (.00)	-.031 (.00)	-.028 (.00)	INFL	.006 (.00)	.002 (.61)	.006 (.00)	.007 (.00)	.005 (.00)
CPSB						REER	.001 (.00)	-.007 (.37)	.001 (.00)	.004 (.03)	.003 (.47)
TOTC	.296 (.00)	.131 (.00)	.309 (.00)	.368 (.00)	.200 (.00)	PREG	-.001 (.56)	-.005 (.66)	-.001 (.48)	-.013 (.00)	-.017 (.00)
KFLOW	.001 (.00)	.001 (.00)	.001 (.00)	.001 (.00)	.001 (.00)	PR	-.001 (.00)	-.001 (.00)	-.002 (.00)	-.002 (.00)	-.001 (.00)
M2RES	.004 (.00)	.003 (.00)	.002 (.00)	-.002 (.90)	.006 (.00)	TRADE	-.002 (.00)	-.004 (.00)	-.002 (.00)	.001 (.00)	.001 (.00)
INFL	-.001 (.00)	.003 (.00)	-.003 (.00)	-.003 (.07)	-.002 (.00)	POPG	-.036 (.00)	-.030 (.00)	-.038 (.00)	-.040 (.00)	-.038 (.00)
REER	.006 (.00)	.002 (.00)	.006 (.00)	.007 (.00)	-.008 (.39)	Gsize	.003 (.00)	.004 (.00)	.003 (.00)	.003 (.00)	.001 (.00)
RIR	.006 (.00)	-.005 (.01)	.006 (.00)	.005 (.00)	.007 (.00)	INVEST	-.020 (.00)	-.021 (.00)	-.019 (.00)	-.023 (.00)	-.023 (.00)
PREG	-.007 (.12)	-.019 (.16)	-.003 (.57)	-.004 (.52)	-.016 (.00)	SCHOOL	-.006 (.00)	-.005 (.00)	-.007 (.00)	-.004 (.00)	-.003 (.00)
GDPC						CACCT	.012 (.00)	.013 (.00)	.012 (.00)	.006 (.00)	.002 (.35)
DINS	.014 (.00)	.024 (.00)	.007 (.23)	.014 (.03)	.020 (.00)	DCG	-.271 (.00)	-.253 (.00)	-.286 (.00)	.002 (.02)	-.003 (.38)
PR	.006 (.00)	.003 (.01)	.001 (.00)	.003 (.01)	.001 (.00)	cons	1.15 (.00)	1.18 (.00)	1.15 (.00)	1.20 (.00)	1.21 (.00)
TRADE	-.007 (.33)	-.004 (.57)	-7e-6 (.94)	-3e-6 (.97)	-.006 (.44)						
BMoney	-.002 (.00)	-.001 (.00)	-.002 (.02)	-.001 (.19)	-.004 (.00)						
Debt	.002 (.00)	.006 (.09)	.001 (.11)	.002 (.00)	.002 (.00)						
Fiscal	-.003 (.00)	-.001 (.00)	-.004 (.00)	-.001 (.02)	-.004 (.00)						
cons	.255 (.00)	.151 (.00)	.248 (.00)	.126 (.00)	.384 (.00)						

nature of crisis dynamics, suggesting that factors beyond purely economic indicators may play a pivotal role in triggering financial crises. Moreover, the significant impact of financial crises on reducing the likelihood of economic crises is consistent with research conducted by Reinhart and Rogoff (2009). The findings of the present study contribute to this body of knowledge by employing a simultaneous equations approach, providing additional depth to the understanding of how financial and economic crises interact. Furthermore, a substantial proportion of the control variables, previously deemed significant based on the binary crisis measure, remain statistically significant. Additionally, some variables that were initially non-significant achieve significance. For instance, in the entire sample, the political regime sustains its insignificance, and the transaction volume, previously significant at the 10% threshold, experiences a loss of significance. Despite these nuanced variations, the overall magnitude of changes is not substantial. This also aligns with the broader literature on crisis determinants. For instance, the persistent importance of variables such as political regime aligns with the findings of Lensink et al. (1999) and Aisen and Veiga (2013), emphasizing the role of political stability in mitigating the probability of crises. Transaction volume, although losing significance at the 10% threshold, may still be indicative of broader economic activity, corroborating studies by scholars like Babecký et al. (2014), who highlighted the role of trade and transactions in crisis modeling.

In the context of the probability of an economic crisis, only the variable representing the political regime retains its lack of significance. This persistence in the non-significance of the political regime

Table 11. BMA results.

Variable	Dependent variable: financial crisis										Dependent variable: economic crisis										
	Full		Developed		Emergent		Bank		Market		Full		developed		Emergent		Bank		Market		
PrEcoC	.93 ⁻	1.0	.07 ⁻	.00	.74 ⁻	1.0	.06 ⁻	.00	.93 ⁻	1.0	PrFinC	1.0 ⁻	1.0	.99 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	.64 ⁻	.00
FL	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	FL	.22 ⁺	.00	.04 ⁺	.00	.10 ⁺	.00	.04 ⁺	.00	.67 ⁺	1.0
GDPG	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	CPS	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0
CACCT	1.0 ⁻	1.0	1.0 ⁻	1.0	.44 ⁻	.00	.99 ⁻	1.0	1.0 ⁻	1.0	M2RES	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
DCG	1.0 ⁻	1.0	.18 ⁻	.00	1.0 ⁻	1.0	.51 ⁻	.00	.99 ⁻	1.0	INFL	1.0 ⁺	1.0	.05 ⁺	.00	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0
TOTC	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	REER	1.0 ⁺	1.0	.23 ⁺	.00	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0
KFLOW	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	PREG	.01 ⁻	.00	.06 ⁻	.00	.065 ⁻	.00	.02 ⁺	.00	.04 ⁻	.00
M2RES	.19 ⁺	.00	1.0 ⁺	1.0	.65 ⁺	1.0	.23 ⁻	.00	.89 ⁺	1.0	PR	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
INFL	.03 ⁻	.00	1.0 ⁺	1.0	.02 ⁻	.00	.01 ⁺	.00	.13 ⁻	.00	TRADE	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
REER	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	.05 ⁺	.00	POPG	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
RIR	1.0 ⁺	1.0	.27 ⁻	.00	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	Gsize	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0
PREG	.02 ⁻	.00	.09 ⁺	1.0	.04 ⁻	.00	.06 ⁺	.00	.93 ⁻	1.0	INVEST	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
DINS ¹²	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	SCHOOL	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
PR	.89 ⁺	1.0	.18 ⁺	.00	1.0 ⁺	1.0	.68 ⁺	1.0	.96 ⁺	1.0	CACCT	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0
TRADE	.94 ⁻	1.0	.98 ⁻	1.0	.96 ⁻	1.0	1.0 ⁻	1.0	.13 ⁻	.00	DCG	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0
BMoney	1.0 ⁻	1.0	1.0 ⁻	1.0	.84 ⁻	1.0	1.0 ⁻	1.0	.93 ⁻	1.0											
Debt	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	1.0 ⁺	1.0	.96 ⁺	1.0											
Fiscal	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0	1.0 ⁻	1.0											
PMP		.66		.42		.27		.27		.56			.74		.66		.83		.92		.34
(Exact)																					

variable underscores its limited explanatory power in predicting economic crises. The minor alterations observed in significance levels and the sustained importance of key variables further underscore the robustness of the conclusions drawn from the simultaneous equations method, reinforcing the reliability of the study's analytical framework and the chosen indicators.

These findings corroborate and build upon the earlier conclusions, reinforcing the consistency and reliability of the results obtained through the application of the simultaneous equations method. The maintained significance of key variables, coupled with the limited impact of changes in significance levels, supports the credibility of the study's methodology and the relevance of the continuous indicators in capturing the complex dynamics of economic and financial crises.

In essence, the current findings contribute to and build upon the insights provided by previous works, offering a nuanced understanding of the intricate relationship between economic and financial crises. The alignment of results with established research adds credibility to the study's methodology and reinforces the relevance of continuous indicators in capturing the nuanced dynamics of crises.

The outcomes derived from the probabilistic method, as delineated in Table 11, introduce nuanced variations compared to the frequentist approach. The observed discrepancies between the results of the probabilistic and frequentist methods, particularly in terms of the significance of certain variables and the emergence of economic crisis probability as a determinant of financial crisis probability, resonate with similar challenges noted in previous works. The literature on financial and economic crises acknowledges the complexity of these phenomena, highlighting the need for diverse analytical tools to capture their multifaceted nature. Prior research, such as the works of Dabrowski et al. (2016) and Jemovic and Marinkovic (2021), has underscored the intricate relationship between economic and financial spheres. These studies, similar to the present one, emphasize the importance of employing diverse models to unravel the origins of crises and understand the dynamic interplay between real and financial factors. Notably, the economic crisis probability emerges as a noteworthy determinant of financial crisis probability across the entire dataset, as well as within emergent and market-based economies.

Contrastingly, certain variables, namely M2RES and INFL, which exhibited significance in the frequentist method, lose their significance in many instances under the probabilistic method. This shift in variable importance highlights the sensitivity of results to the chosen method and reinforces the need for a robust analytical framework that considers various statistical techniques. This discrepancy in findings underscores the importance of adopting diverse methodological approaches to comprehensively capture the complex dynamics inherent in financial and economic crises. The variable dynamics observed, where certain indicators lose or gain significance across different methodologies, align with methodological discussions in the broader literature. Scholars like Fernández et al. (2001) and Sala-i-Martin et al. (2004) have highlighted the challenges in identifying determinants of rare events, such as financial and

economic crises. The adoption of model averaging approaches is consistent with the present study's choice to address uncertainty and optimize variable combinations based on their fit.

Moreover, the exclusion of the variable measuring the degree of capital account openness from the list of potential indicators for the probability of an economic crisis in the full sample underscores the methodological choices made in this study. This aligns with concerns raised in the literature about the static nature of these methods and their potential limitations in accounting for endogeneity. Indeed, the absence of dynamic considerations raises questions about the robustness of the findings, prompting the adoption of more sophisticated models in subsequent analyses. Previous works, such as those by Bussiere (2013) and Reinhart and Rogoff (2009), have emphasized the importance of distinguishing between various types of crises and considering their potential interactions, a perspective that resonates with the methodological evolution in this study.

These methodological considerations align with the broader discourse on model robustness and the necessity for approaches that address endogeneity concerns. The subsequent models employed in this study take into account the dynamic and endogenous nature of the relationships under investigation, aiming to enhance the reliability and validity of the results⁸. This strategic choice reflects a commitment to refining the analytical framework to better capture the intricate interplay between economic and financial crises in a more dynamic and comprehensive manner.

In essence, the methodological choices made in this study, informed by previous works and discussions in the literature, reflect a commitment to addressing the complexities of crisis dynamics. The nuanced approach taken, incorporating insights from diverse sources, contributes to the ongoing dialogue on refining methodologies for studying financial and economic crises, ultimately enhancing the robustness and reliability of the research.

Table 12 presents the outcomes of the P-VECM estimation for financial and economic crisis probabilities, shedding light on the intricate relationship between these crises and their determinants across various country types. The findings reveal several noteworthy patterns that resonate with previous works in the field.

The results indicate that the experience of a crisis in the preceding years significantly diminishes the likelihood of vulnerability in the present period, pointing towards a learning and prudence effect. This aligns with the findings of earlier studies such as those by Dabrowski et al. (2016) and Jemovic and Marinkovic (2021), emphasizing the importance of considering temporal dynamics in crisis analysis. The negative and significant error correction term associated with the relationship between past crises and the present likelihood of vulnerability supports the existence of a learning and prudence effect. This concept is consistent with the notion that countries may learn from past crises, adopting measures to mitigate future vulnerabilities.

In terms of financial crises, the deterioration of terms of trade emerges as a crucial factor, particularly impacting emerging economies and bank-based systems. This observation aligns with insights from works such as Bussiere (2013), which underscore the significance of external factors in shaping financial vulnerabilities. This highlights the importance of considering global economic conditions in assessing a country's susceptibility to financial crises. The differential impact on developed countries suggests a nuanced understanding of the role of exchange rate depreciation in these contexts.

For economic crises, the study identifies encouraging investment as a key protective factor across all country types. This echoes the emphasis on investment as a driver of economic stability in growth theories (Easterly & Rebelo, 1993) and aligns with the findings of studies emphasizing the multifaceted determinants of economic crises (Acemoglu, 2009).

The negative and significant error correction term associated with the relationship between economic and financial crises for all country types underscores the existence of a long-term connection between these crises. This echoes the findings of scholars like Reinhart and Rogoff (2009), who emphasize the interconnectedness of various crisis types and the importance of considering their dynamic relationships.

Moreover, the study reveals that experiencing an economic crisis has immediate destabilizing financial effects for all countries, while a financial crisis significantly increases the probability of an economic crisis, particularly for emergent countries. This observation aligns with the insights from the literature on the contagious nature of financial and economic crises (Babecký et al., 2014). This

Table 12. VECM results (financial crisis probability).

		Full sample							
		With subprime				Without subprime			
		LTIE	coef	Prob	Wald	LTIE	coef	Prob	Wald
Financial crisis	ECT		.116	.00			.099	.00	
	PrFinC (-1)		-.230	.00	41.0		-.304	.00	55.2
	PrFinC(-2)		-.226	.00	(.00)		-.253	.00	(.00)
	PrEcoC(-1)	-.477	-.241	.00	29.9	-.485	-.188	.00	15.1
	PrEcoC(-2)	(.00)	.060	.20	(.00)	(.00)	-.014	.76	(.00)
	FL(-1)	-.614	-.013	.01	5.88	-.648	-.016	.00	8.67
	FL(-2)	(.00)	-.001	.83	(.05)	(.00)	-.003	.50	(.01)
	GDPG(-1)	-.516	.001	.05	4.39	-.527	.008	.36	2.41
	GDPG(-2)	(.00)	5E-5	.94	(.11)	(.00)	-.005	.48	(.29)
	CACCT(-1)	-.526	.004	.00	12.5	-.545	.003	.02	5.88
	CACCT(-2)	(.00)	-.001	.17	(.00)	(.00)	-.001	.49	(.05)
	DCG(-1)	-.008	-.022	.17	11.4	-.006	-.016	.34	5.25
	DCG(-2)	(.00)	.039	.01	(.00)	(.00)	.028	.09	(.07)
	TOTC(-1)	-.043	.370	.00	115.	-.021	.371	.00	103
	TOTC(-2)	(.00)	.227	.00	(.00)	(.00)	.223	.00	(.00)
	KFLOW(-1)	-.542	-.001	.49	.478	-.576	-.005	.04	4.03
	KFLOW(-2)	(.00)	-6E-5	.78	(.78)	(.00)	-7E-5	.80	(.13)
	REER(-1)	-.507	.001	.00	66.4	-.546	.007	.00	13.2
	REER(-2)	(.00)	-.006	.00	(.00)	(.00)	-.002	.20	(.00)
	RIR(-1)	.027	-2E-5	.59	1.58	.011	5E-6	.19	3.08
	RIR(-2)	(.00)	3E-5	.45	(.45)	(.00)	7E-6	.09	(.21)
	PR(-1)	-.545	-.008	.05	3.64	-.574	-.003	.38	.749
	PR(-2)	(.00)	.001	.71	(.16)	(.00)	5E-5	.88	(.68)
	TRADE(-1)	-.565	-.006	.01	5.59	-.593	-.004	.01	9.00
	TRADE(-2)	(.00)	-8E-4	.77	(.06)	(.00)	-.003	.10	(.01)
	MONEY(-1)	-.560	.001	.00	31.1	-.592	.001	.00	27.6
	MONEY(-2)	(.00)	.007	.00	(.00)	(.00)	.004	.08	(.00)
DEBT(-1)	-.528	-.003	.21	1.58	-.554	-.004	.089	3.87	
DEBT(-2)	(.00)	.001	.61	(.45)	(.00)	.002	.17	(.14)	
FISCAL(-1)	-.558	.001	.39	14.6	-.577	-.005	.68	8.30	
FISCAL(-2)	(.00)	-.004	.00	(.00)	(.00)	-.003	.00	(.01)	
C		-.001	.46			-.006	.77		
AIC		59.8				62.3			
R-Squared		.410				.404			
Economic crisis	ECT		-.006	.00			.067	.00	
	PrEcoC (-1)		-.633	.00	48.4		-.576	.00	31.5
	PrEcoC(-2)		-.372	.00	(.00)		-.380	.00	(.00)
	PrFinC(-1)	.002	.195	.00	37.3	-.001	.220	.00	46.5
	PrFinC(-2)	(.00)	.032	.26	(.00)	(.00)	.070	.02	(.00)
	CPS(-1)	-.138	5E-5	.90	.488	-.164	.003	.29	3.26
	CPS(-2)	(.00)	.003	.50	(.78)	(.00)	.005	.16	(.19)
	M2RES(-1)	-.176	-.002	.71	5.33	-.189	-.007	.25	2.12
	M2RES(-2)	(.00)	-.001	.02	(.06)	(.00)	-.004	.47	(.34)
	INFL(-1)	.003	5E-5	.00	26.7	.004	4E-5	.00	14.6
	INFL(-2)	(.39)	3E-5	.00	(.00)	(.48)	2E-5	.01	(.00)
	REER(-1)	-.175	.001	.50	6.09	-.160	-.002	.43	1.19
	REER(-2)	(.00)	-.006	.01	(.04)	(.00)	-.001	.53	(.55)
	PR(-1)	-.095	-.002	.00	23.7	-.148	-.002	.00	23.8
	PR(-2)	(.00)	-.001	.03	(.00)	(.00)	-.001	.00	(.00)
	TRADE(-1)	-.176	.004	.16	2.30	-.193	.004	.06	5.15
	TRADE(-2)	(.00)	-.001	.57	(.31)	(.00)	.002	.25	(.07)
	POPG(-1)	-.181	-.029	.00	13.8	-.196	-.016	.04	4.16
	POPG(-2)	(.00)	-.010	.17	(.00)	(.00)	-.007	.36	(.12)
	GSIZE(-1)	-.187	.005	.04	4.04	-.205	.001	.48	.778
	GSIZE(-2)	(.00)	.009	.72	(.13)	(.00)	.001	.57	(.67)
	INVEST(-1)	-.264	-.017	.00	65.3	-.313	-.015	.00	44.8
	INVEST(-2)	(.00)	-.011	.00	(.00)	(.00)	-.011	.00	(.00)
	SCHOOL(-1)	-.182	-7E-5	.88	.619	-.197	-.006	.16	2.82
	SCHOOL(-2)	(.00)	-.004	.44	(.73)	(.00)	-.004	.39	(.24)
	CACCT(-1)	-.167	.001	.41	1.22	-.166	.002	.87	.258
	CACCT(-2)	(.00)	-.008	.59	(.54)	(.00)	-.007	.66	(.87)
DCG(-1)	.013	-.209	.00	35.3	.013	-.172	.00	21.3	
DCG(-2)	(.00)	-.106	.00	(.00)	(.00)	-.101	.00	(.00)	
C		.001	.494			.005	.82		
AIC		54.1				57.2			
R-squared		.293				.266			

(Continued)

Table 12. Continued.

		Developed							
		With subprime			Without subprime				
		LTIE	Coef	Prob	Wald	LTIE	coef	Prob	Wald
Financial crisis	ECT		.025	.000			.033	.00	
	PrFinC(-1)		-.105	.034	20.1		-.241	.00	21.8
	PrFinC(-2)		-.213	.000	(.00)		-.022	.66	(.00)
	PrEcoC (-1)	-.324	-.060	.000	15.1	-.318	-.042	.01	6.57
	PrEcoC (-2)	(.00)	.003	.833	(.00)	(.00)	-.009	.54	(.03)
	FL(-1)	-.330	-.005	.240	5.79	-.422	-.002	.28	1.52
	FL(-2)	(.00)	-.007	.066	(.05)	(.00)	-.001	.58	(.46)
	GDPG(-1)	-.203	.002	.000	15.0	-.232	.002	.00	18.8
	GDPG(-2)	(.00)	.002	.696	(.00)	(.00)	.001	.05	(.00)
	CACCT(-1)	-.326	.001	.861	6.59	-.409	-.001	.03	16.3
	CACCT(-2)	(.00)	-.002	.012	(.03)	(.00)	-.002	.00	(.00)
	TOTC(-1)	.037	.155	.000	21.4	.045	.088	.00	10.2
	TOTC(-2)	(.00)	.081	.000	(.00)	(.00)	.008	.70	(.00)
	KFLOW(-1)	-.331	-.001	.344	1.48	-.380	-.002	.07	19.1
	KFLOW(-2)	(.00)	4E-5	.690	(.47)	(.00)	.003	.00	(.00)
	M2RES(-1)	-.419	.003	.098	2.82	-.463	.002	.04	15.3
	M2RES(-2)	(.00)	-.001	.432	(.24)	(.00)	.004	.00	(.00)
	INFL(-1)	-.011	.001	.561	1.15	-.078	-.001	.05	5.39
	INFL(-2)	(.15)	9E-5	.461	(.56)	(.00)	.001	.14	(.06)
	REER(-1)	-.335	.003	.081	3.12	-.404	.001	.52	1.06
	REER(-2)	(.00)	-.001	.531	(.20)	(.00)	-.001	.37	(.58)
	TRADE(-1)	-.329	-.001	.577	1.58	-.399	.001	.13	2.35
	TRADE(-2)	(.00)	-.002	.272	(.45)	(.00)	-5E-5	.65	(.30)
	MONEY(-1)	-.328	-.002	.103	17.2	-.401	-2E-5	.65	.77
	MONEY(-2)	(.00)	.005	.000	(.00)	(.00)	4E-5	.43	(.67)
	DEBT(-1)	-.305	-.002	.127	5.06	-.364	5E-5	.52	.784
	DEBT(-2)	(.00)	-.001	.186	(.07)	(.00)	-4E-5	.56	(.67)
FISCAL(-1)	-.315	2E-5	.981	13.6	-.354	-.002	.00	19.9	
FISCAL(-2)	(.00)	-.003	.003	(.00)	(.00)	-.002	.00	(.00)	
C		.008	.436			.001	.87		
AIC		39.7				53.0			
R-Squared		.350				.390			
Economic crisis	ECT		-.845	.000			.743		
	PrEcoC (-1)		-.247	.081	3.14		-.664	.00	12.4
	PrEcoC (-2)		-.075	.549	(.20)		-.179	.00	(.00)
	PrFinC (-1)	.054	.094	.357	1.35	.022	-.033	.33	.070
	PrFinC (-2)	(.00)	-.053	.566	(.50)	(.00)	-.003	.79	(.96)
	CPS(-1)	-.107	-.008	.158	1.99	-.176	.006	.97	15.8
	CPS(-2)	(.00)	.007	.870	(.36)	(.00)	.007	.01	(.00)
	M2RES(-1)	-.178	-.003	.558	.881	-.213	-.001	.00	15.0
	M2RES(-2)	(.00)	-.003	.527	(.64)	(.00)	-.001	.00	(.00)
	PR(-1)	-.028	-.001	.112	3.58	-.181	-.002	.01	11.7
	PR(-2)	(.00)	-.007	.280	(.16)	(.00)	-.009	.00	(.00)
	TRADE(-1)	-.157	.001	.041	14.65	-.213	.004	.13	6.60
	TRADE(-2)	(.00)	.001	.002	(.00)	(.00)	.007	.17	(.03)
	POPG(-1)	-.170	-.021	.042	4.22	-.226	-.027	.03	6.36
	POPG(-2)	(.00)	.001	.923	(.12)	(.00)	.004	.01	(.04)
	GSIZE(-1)	-.140	.014	.002	9.48	-.212	.004	.68	3.51
	GSIZE(-2)	(.00)	.002	.589	(.00)	(.00)	-.002	.10	(.17)
	INVEST(-1)	-.078	-.009	.009	7.88	-.102	-.016	.35	12.7
	INVEST(-2)	(.00)	-.006	.092	(.01)	(.00)	-.007	.00	(.00)
	SCHOOL(-1)	-.161	.004	.475	.540	-.207	-.009	.08	4.63
	SCHOOL(-2)	(.00)	4E-5	.935	(.76)	(.00)	-.002	.04	(.09)
	CACCT(-1)	-.176	.004	.872	5.75	-.232	.003	.52	2.54
	CACCT(-2)	(.00)	-.005	.026	(.05)	(.00)	-.002	.30	(.28)
	DCG(-1)	.007	-.082	.023	5.14	.012	-.169	.44	7.55
		(.00)			(.07)	(.00)			(.02)
	DCG(-2)		-.037	.277			-.060	.00	
	C		.006	.824			.002	.24	
AIC		27.1				36.1	.92		
R-Squared		.396				.270			

(Continued)

Table 12. Continued.

		Emergent							
		With subprime				Without subprime			
		LTIE	coef	Prob	Wald	LTIE	coef	Prob	Wald
Financial crisis	ECT		.107	.00			.024	.00	
	PrFinC(-1)		-.298	.00	27.6		-.290	.00	27.0
	PrFinC(-2)		-.207	.00	(.00)		-.217	.00	(.00)
	PrEcoC(-1)	-.507	-.163	.00	9.84	-.506	-.049	.29	1.47
	PrEcoC(-2)	(.00)	.027	.60	(.00)	(.00)	.023	.60	(.47)
	FL(-1)	-.660	-.015	.04	4.19	-.671	-.001	.87	.133
	FL(-2)	(.00)	-.003	.96	(.12)	(.00)	.002	.74	(.93)
	GDPG(-1)	-.627	.003	.75	.198	-.633	-.009	.045	.622
	GDPG(-2)	(.00)	.004	.67	(.90)	(.00)	-.006	.57	(.73)
	DCG(-1)	-.010	-.012	.64	1.62	.002	.026	.28	7.87
	DCG(-2)	(.00)	.023	.33	(.44)	(.00)	.065	.00	(.01)
	TOTC(-1)	-.064	.410	.00	68.5	-.090	.402	.00	74.3
	TOTC(-2)	(.00)	.231	.00	(.00)	(.00)	.236	.00	(.00)
	KFLOW(-1)	-.606	-.001	.72	.298	-.617	-.001	.02	6.42
	KFLOW(-2)	(.00)	-.002	.65	(.86)	(.00)	-.001	.04	(.04)
	M2RES(-1)	-.490	.010	.00	57.1	-.554	.008	.00	51.8
	M2RES(-2)	(.00)	.003	.02	(.00)	(.00)	.002	.04	(.00)
	REER(-1)	-.547	.001	.00	34.7	-.577	.007	.00	11.9
	REER(-2)	(.00)	-.007	.02	(.00)	(.00)	-.002	.21	(.00)
	RIR(-1)	.002	-1E-6	.84	.247	.007	3E-6	.53	.487
	RIR(-2)	(.00)	1E-6	.75	(.88)	(.00)	3E-6	.57	(.78)
	PR(-1)	-.591	-.008	.24	1.55	-.605	.006	.23	1.96
	PR(-2)	(.00)	.004	.54	(.45)	(.00)	.003	.48	(.37)
	TRADE(-1)	-.630	-.005	.13	2.38	-.647	.001	.44	.595
	TRADE(-2)	(.00)	-.001	.61	(.30)	(.00)	2E-5	.93	(.74)
	MONEY(-1)	-.618	.001	.01	11.1	-.635	8E-5	.71	.340
	MONEY(-2)	(.00)	.001	.05	(.00)	(.00)	.001	.64	(.84)
DEBT(-1)	-.577	-.003	.42	.693	-.597	-.002	.32	2.00	
DEBT(-2)	(.00)	.001	.74	(.70)	(.00)	.003	.25	(.36)	
FISCAL(-1)	-.606	.006	.72	6.77	-.620	.005	.67	1.04	
FISCAL(-2)	(.00)	-.004	.00	(.03)	(.00)	-.001	.33	(.59)	
C		-9E-5	.97			.008	.79		
AIC		64.3				71.9			
R-Squared		.470				.431			
Economic crisis	ECT		.234	.00			.056	.00	
	PrEcoC(-1)		-.764	.00	33.5		-.661	.00	25.3
	PrEcoC(-2)		-.491	.00	(.00)		-.475	.00	(.00)
	PrFinC(-1)	-.007	.171	.00	17.4	-.023	.224	.00	33.8
	PrFinC(-2)	(.00)	.038	.28	(.00)	(.00)	.080	.02	(.00)
	CPS(-1)	-.145	.003	.61	2.26	-.208	.008	.02	7.83
	CPS(-2)	(.00)	.009	.17	(.32)	(.00)	.006	.08	(.01)
	M2RES(-1)	-.011	.003	.00	7.66	-.142	.002	.05	4.73
	M2RES(-2)	(.00)	.008	.54	(.02)	(.00)	.001	.16	(.09)
	INFL(-1)	.002	6E-5	.00	18.6	-.007	5E-5	.00	12.4
	INFL(-2)	(.91)	3E-5	.00	(.00)	(.81)	3E-5	.02	(.00)
	REER(-1)	-.191	.001	.63	3.37	-.219	-7E-5	.76	.243
	REER(-2)	(.00)	-.006	.06	(.18)	(.00)	-9E-5	.72	(.88)
	PR(-1)	-.057	-.002	.00	15.4	-.224	-.002	.00	14.0
	PR(-2)	(.00)	-.001	.20	(.00)	(.00)	-.001	.11	(.00)
	TRADE(-1)	-.192	.003	.43	2.89	-.222	.003	.17	2.45
	TRADE(-2)	(.00)	-.006	.14	(.23)	(.00)	.001	.49	(.29)
	POPG(-1)	-.194	-.025	.03	4.67	-.222	-.021	.07	4.03
	POPG(-2)	(.00)	-.010	.39	(.09)	(.00)	-.015	.19	(.13)
	GSIZE(-1)	-.197	.003	.30	1.04	-.224	-.002	.91	.683
	GSIZE(-2)	(.00)	.002	.94	(.59)	(.00)	.002	.41	(.71)
	INVEST(-1)	-.413	-.019	.00	40.8	-.482	-.015	.00	29.7
	INVEST(-2)	(.00)	-.012	.00	(.00)	(.00)	-.011	.00	(.00)
	SCHOOL(-1)	-.201	-.008	.40	1.33	-.223	-.003	.56	1.80
	SCHOOL(-2)	(.00)	-.007	.43	(.51)	(.00)	-.006	.22	(.40)
	CACCT(-1)	-.172	.002	.36	1.12	-.173	.001	.51	.536
	CACCT(-2)	(.00)	.001	.46	(.57)	(.00)	.001	.64	(.76)
DCG(-1)	.017	-.242	.00	18.5	.022	-.189	.00	13.4	
DCG(-2)	(.00)	-.134	.00	(.00)	(.00)	-.119	.01	(.00)	
C		.003	.40			.001	.96		
AIC		56.2				64.5			
R-Squared		.291				.246			

(Continued)

Table 12. Continued.

		Bank				Market				
		LTIE	coef	Prob	Wald	LTIE	coef	Prob	Wald	
Financial crisis	ECT		.271	.00			-.008	.11		
	PrFin(-1)		-.410	.00	38.6	PrFin (-1)	-.240	.00	47.3	
	PrFin(-2)		-.279	.00	(.00)	PrFin (-2)	-.117	.00	(.00)	
	PrEcoC(-1)	-.553	-.096	.10	4.51	PrEcoC (-1)	-.405	-.279	.00	145.5
	PrEcoC(-2)	(.00)	.046	.41	(.10)	PrEcoC (-2)	(.00)	-.136	.00	(.00)
	FL(-1)	-.658	-.026	.00	11.1	FL(-1)	-.472	.003	.52	.813
	FL(-2)	(.00)	.013	.12	(.00)	FL(-2)	(.00)	.003	.50	(.66)
	GDPG(-1)	-.548	.002	.83	.191	GDPG(-1)	-.475	-.004	.62	.822
	GDPG(-2)	(.00)	-.003	.80	(.90)	GDPG(-2)	(.00)	-.007	.38	(.66)
	CACCT(-1)	-.569	.001	.46	.586	CACCT(-1)	-.485	.001	.15	2.05
	CACCT(-2)	(.00)	-.003	.87	(.74)	CACCT(-2)	(.00)	.003	.76	(.35)
	TOTC(-1)	.006	.531	.00	96.0	DCG(-1)	-.008	-.029	.01	5.62
	TOTC(-2)	(.00)	.286	.00	(.00)	DCG(-2)	(.48)	-.008	.49	(.06)
	KFLOW(-1)	-.542	.002	.53	.944	TOTC(-1)	-.001	.004	.92	.057
	KFLOW(-2)	(.00)	.003	.38	(.62)	TOTC(-2)	(.43)	-.004	.89	(.97)
	REER(-1)	-.567	.002	.00	48.1	KFLOW (-1)	-.470	.001	.63	.448
	REER(-2)	(.00)	-.005	.13	(.00)	KFLOW (-2)	(.00)	-.001	.69	(.79)
	RIR(-1)	.043	1E-5	.08	4.231	M2RES(-1)	-.492	.007	.10	2.70
	RIR(-2)	(.00)	1E-5	.06	(.12)	M2RES(-2)	(.00)	-.001	.77	(.25)
	PR(-1)	-.597	-.002	.61	1.33	RIR(-1)	-.245	2E-6	.53	4.00
	PR(-2)	(.00)	-.006	.30	(.51)	RIR(-2)	(.00)	-7E-6	.09	(.13)
	TRADE(-1)	-.622	-.002	.66	2.31	PREG(-1)	-.480	.016	.26	3.67
	TRADE(-2)	(.00)	-.008	.15	(.31)	PREG(-2)	(.00)	.025	.10	(.15)
	MONEY(-1)	-.650	-.001	.69	.755	PR(-1)	-.469	.001	.00	14.4
	MONEY(-2)	(.00)	.004	.41	(.68)	PR(-2)	(.00)	-.001	.00	(.00)
	DEBT(-1)	-.579	-.002	.60	.523	MONEY(-1)	-.471	-8E-5	.59	.320
	DEBT(-2)	(.00)	.001	.52	(.76)	MONEY(-2)	(.00)	-3E-5	.84	(.85)
	FISCAL(-1)	-.607	.006	.78	11.4	DEBT(-1)	-.473	.001	.60	1.77
	FISCAL(-2)	(.00)	-.007	.00	(.00)	DEBT(-2)	(.00)	-.002	.19	(.41)
						FISCAL(-1)	-.477	-.002	.83	.348
						FISCAL(-2)	(.00)	-.005	.59	(.84)
		C		.001	.56			-.005	.80	
		AIC		61.1				58.0		
	R-Squared		.488				.282			
Economic crisis	ECT		-.055	.00			-.026	.02		
	PrEcoC(-1)		-.754	.00	32.5	PrEcoC (-1)	-.392	.00	34.5	
	PrEcoC(-2)		-.422	.00	(.00)	PrEcoC (-2)	-.174	.00	(.00)	
	PrFinC(-1))	-.002	.094	.03	6.75	PrFinC (-1))	.012	.359	.00	45.2
	PrFinC(-2)	(.11)	-.013	.72	(.03)	PrFinC (-2)	(.00)	.169	.00	(.00)
	CPS(-1)	-.125	-.001	.07	3.18	FI (-1)	-.197	-.001	.89	.055
	CPS(-2))	(.00)	7E-5	.92	(.20)	FL(-2)	(.00)	-.001	.83	(.97)
	M2RES(-1)	-.159	-.001	.40	.962	CPS(-1)	-.155	.001	.00	48.8
	M2RES(-2)	(.00)	.008	.52	(.61)	CPS(-2)	(.00)	.001	.00	(.00)
	INFL(-1)	-.009	.001	.00	17.1	M2RES(-1)	-.201	-.001	.08	7.14
	INFL(-2)	(.53)	4E-5	.08	(.00)	M2RES(-2)	(.00)	-.001	.06	(.02)
	REER(-1)	-.159	.004	.08	5.02	INFL(-1)	-.006	7E-6	.51	.511
	REER(-2)	(.00)	-.006	.06	(.08)	INFL(-2)	(.04)	5E-6	.65	(.77)
	PR(-1)	-.082	-.002	.00	22.7	REER(-1)	-.130	-.001	.74	1.02
	PR(-2)	(.00)	-.001	.02	(.00)	REER(-2)	(.00)	-.003	.36	(.59)
	TRADE(-1)	-.160	.007	.16	2.19	PR(-1)	-.195	-.001	.88	.245
	TRADE(-2)	(.00)	-.003	.54	(.33)	PR(-2)	(.00)	-.003	.64	(.88)
	POPG(-1)	-.157	-.047	.00	13.6	TRADE(-1)	-.196	-.001	.40	3.00
	POPG(-2)	(.00)	-.015	.25	(.00)	TRADE(-2)	(.00)	.003	.12	(.22)
	GSIZE(-1)	-.160	.007	.01	6.52	POPG(-1)	-.197	-.018	.07	4.41
	GSIZE(-2)	(.00)	.001	.55	(.03)	POPG(-2))	(.00)	-.013	.18	(.10)
	INVEST(-1)	-.308	-.022	.00	47.8	GSIZE(-1)	-.223	-.002	.64	.222
	INVEST(-2)	(.00)	-.012	.00	(.00)	GSIZE(-2)	(.00)	.005	.90	(.89)
	SCHOOL(-1)	-.168	-.007	.43	2.35	NVEST(-1)	-.209	-.011	.00	24.0
	SCHOOL(-2)	(.00)	-.001	.22	(.30)	INVEST(-2)	(.00)	-.006	.00	(.00)
	CACCT(-1)	-.131	.009	.69	.664	SCHOOL (-1)	-.196	.002	.77	.096
	CACCT(-2)	(.00)	-.001	.55	(.71)	SCHOOL (-2)	(.00)	-9E-5	.89	(.95)
	DCG(-1))	.030	-.270	.00	28.7	CACCT(-1)	-.198	-4E-5	.97	6.90
	DCG(-2))	(.00)	-.155	.00	(.00)	CACCT(-2)	(.00)	-.003	.00	(.03)
						DCG(-1)	-.017	-.017	.52	2.56
						DCG(-2)	(.00)	-.032	.11	(.27)
		C		.003	.27			-.003	.03	
		AIC		50.6				62.8		
	R-Squared		.32				.26			

highlights the need for comprehensive policies that address both financial and economic vulnerabilities

The lagged effects of political risk reduction in emergent and bank-based systems, decreasing economic crisis probability in subsequent years, align with research emphasizing the role of governance quality and political stability in economic outcomes (Aisen & Veiga, 2013; Mauro, 1995). This underscores the importance of institutional factors in shaping economic resilience.

In summary, the results from Table 12 contribute to the ongoing discourse on crisis dynamics by providing nuanced insights into the temporal relationships and determinants of financial and economic crises. These findings not only confirm certain patterns observed in earlier works but also introduce new dimensions to our understanding of the complex interactions between economic and financial vulnerabilities. Policymakers and researchers can benefit from these insights in crafting more effective crisis management strategies and policies aimed at fostering long-term economic stability.

Consistent with prior research, our investigation delves into the impact of shocks, whether originating from economic conditions or determinants of financial crises, on the likelihood of crisis occurrence. The impulse response functions divulge noteworthy patterns, shedding light on the endurance and resolution dynamics of financial crises across different economic systems. Echoing insights from earlier studies, our findings suggest that financial crises exhibit resilience and prolonged challenges, particularly in emergent and bank-based systems. Existing research, such as that by Reinhart and Rogoff (2009), has highlighted the prolonged impact of financial crises on economies. In stark contrast, developed and market-based systems tend to experience a more transient duration, with the crisis lasting an average of three years. This underscores the notion that global financial crises manifest persistent characteristics and display negative sensitivity to innovations in the real economic sector. The observed transitory reaction in less regulated environments, where market rules function more effectively, aligns with the regulatory environment's impact on crisis resolution, as highlighted by Babecký et al. (2014).

Economic volatility emerges as a significant factor influencing financial crisis dynamics. In developed and market-based economies, heightened economic volatility acts as a stabilizing force, reducing both short-term and long-term financial crisis probability. This aligns with the idea that increased volatility prompts a more cautious approach among economic agents, fostering stability. This resonates with literature emphasizing the impact of uncertainty on economic agents' behavior. The findings align with studies, such as those by Aisen and Veiga (2013), which underscore the influence of political stability and reduced uncertainty on investment decisions. However, in emerging countries, this stabilizing effect appears transitory, lasting no more than two years. Similarly, the bank-based system, characterized by a highly regulated financial environment, exhibits limited susceptibility to the impact of economic volatility. This is consistent with research highlighting the challenges these economies face in managing and adapting to heightened volatility (Hou & Chen, 2014).

Our analysis reveals that financial crisis vulnerability responds persistently to exchange shocks in the full sample and specifically in emergent and bank-based countries, where these shocks yield positive and statistically significant effects over the long run. This result echoes discussions in the literature on the significance of external factors in shaping financial stability (Frankel & Saravelos, 2012). Moreover, terms of trade volatility in these countries amplify the inclination toward risk-taking, thereby increasing the probability of financial crises. This finding aligns with research emphasizing the role of global economic conditions in shaping crisis dynamics (Hume & Sentance, 2009). In contrast, developed and market-based systems demonstrate a fundamental dependence on liquidity risk, where increased liquidity risk positively influences financial crises. This observation reflects insights from studies that highlight the importance of liquidity conditions in financial stability (Babecký et al., 2014).

The observed differences in crisis dynamics across diverse economic systems have implications for policymakers. Insights from our study suggest that regulatory frameworks and the level of market development play a crucial role in shaping crisis resolution dynamics. Policymakers may draw from these findings to tailor interventions and regulations based on the specific characteristics of their economic system. In conclusion, our study not only aligns with the existing literature on financial and economic crises but also extends our understanding by providing nuanced insights into the varied responses of different economic systems to shocks. The interplay between economic volatility, external shocks, and regulatory environments underscores the complexity of crisis dynamics. These insights are valuable for

policymakers, economists, and researchers seeking to refine strategies for crisis prevention and resolution in diverse economic contexts.

Figure 3 illustrates noteworthy dynamics in the relationship between economic and financial crises, shedding light on their temporal patterns and mutual influences across different economic systems. Several key observations emerge from the analysis, aligning with and expanding upon insights from prior research. It is evident that, during the initial years, the probability of an economic crisis responds positively to its own deviation. Notably, this effect remains persistent in the long run across all examined samples. The impact of a shock on the probability of an economic crisis is both positive and enduring, albeit diminishing over time. This resonates with literature highlighting the self-reinforcing nature of economic crises (Reinhart & Rogoff, 2009). This finding underscores that, once initiated, economic crises tend to perpetuate themselves over time, impacting the stability of various economic systems. Particularly in developed and market-based systems, a positive shock to the likelihood of a financial crisis immediately heightens the probability of an economic crisis in a sustained manner, whereas this effect is less pronounced in emergent and bank-based systems. This immediate and enduring effect is a notable observation; particularly pronounced in developed and market-based systems, aligning with studies that emphasize the intricate interplay between financial and real sectors in these economies (Babecký et al., 2014). The less significant impact in emergent and bank-based systems suggests varying sensitivities to financial shocks across different economic contexts. Therefore, a shock influencing the volume of credit to the private sector increases the likelihood of an economic crisis over the long term in the overall sample, as well as in developed, emergent, and market-based economies. Similarly, in bank-based countries, an exchange shock significantly amplifies the probability of an economic crisis. Conversely, a positive shock to investment diminishes the likelihood of an economic crisis in most countries. Thus, the findings suggest a sensitivity of the economic situation to financial shocks, highlighting a greater likelihood of a financial crisis preceding an economic crisis. This underscores the interconnectedness of financial and economic variables in line with research emphasizing the role of credit dynamics in shaping economic outcomes (Fielding & Rewilak, 2015). Additionally, the significance of an exchange shock in increasing economic crisis probability in bank-based countries highlights the vulnerability of these economies to external factors, consistent with discussions on global economic linkages (Frankel & Saravelos, 2012).

Furthermore, the study reveals that over the long term, an escalation in the probability of an economic crisis does not exert a substantial impact on the likelihood of a financial crisis. This observation can be elucidated by the informed nature of agents operating in the financial domain, continuously updating their expectations. However, it is crucial to note that the results indicate a detrimental and statistically significant effect of a financial crisis on the real sphere across all samples. This implies that the repercussions of a financial crisis endure and contribute to the socialization of losses, adversely affecting the employment and purchasing power of the most vulnerable agents. This underscores the enduring socio-economic consequences of financial downturns and aligns with broader discussions on the far-reaching implications of financial crises on employment and purchasing power, particularly affecting disadvantaged segments of the population (Reinhart & Rogoff, 2009). In summary, the outcomes underscore the likelihood of a financial crisis preceding an economic crisis and emphasize the enduring negative consequences of financial crises on the real economy. The asymmetry observed, where an increase in the likelihood of an economic crisis does not significantly affect the likelihood of a financial crisis in the long run, suggests a nuanced dynamic between the two spheres. This observation is consistent with the notion that financial markets are more informed and adaptive, potentially reflecting efficient responses to economic conditions (Fernández et al., 2001).

Thus, the findings from Figure 4 contribute to our understanding of the intricate interactions between economic and financial crises, highlighting their persistence, mutual influence, and the lasting impact of financial turmoil on the real economy. These insights have implications for policymakers and stakeholders seeking to develop strategies that address the interconnected challenges posed by crises in diverse economic environments.

In emergent and bank-based economies, particularly over the long term, financial volatility is predominantly influenced by currency volatility, with the latter accounting for more than half of the variance in the probability of a financial crisis, as illustrated in Table 13. This substantial dependence underscores the

Table 13. Continued.

period	PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOO	CACCT	DCG
1	100.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	88.2	5.35	1.91	.863	.075	.138	.677	.000	.065	.284	2.23	.040	.010	.115
3	79.9	6.97	4.43	1.74	.136	.641	.926	.015	.119	.518	3.76	.038	.049	.723
4	74.8	6.97	5.56	1.96	.331	2.46	.988	.014	.119	.702	4.84	.034	.081	1.09
5	70.8	6.69	6.00	2.12	.457	4.86	1.01	.033	.109	.856	5.42	.039	.151	1.34
6	67.3	6.41	6.28	2.28	.505	7.39	1.04	.066	.100	.983	5.78	.057	.241	1.53
7	63.9	6.16	6.49	2.42	.527	9.98	1.06	.100	.096	1.08	5.98	.088	.340	1.70
8	60.8	5.92	6.64	2.53	.544	12.5	1.07	.133	.096	1.14	6.08	.132	.438	1.83
9	57.9	5.68	6.73	2.61	.558	15.1	1.08	.166	.099	1.19	6.11	.188	.534	1.95
10	55.3	5.47	6.77	2.67	.569	17.5	1.08	.197	.107	1.23	6.09	.254	.624	2.04

Financial crisis probability															
period	PrEcoc	PrFinc	FL	GDPG	CACCT	DCG	TOTC	KFLOW	M2RES	RIR	PREG	PR	MONEY	DEBT	FISCAL
1	100.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	88.7	9.93	.021	.005	.036	.067	.264	.002	.086	.013	.514	.282	.002	.020	.017
3	83.9	13.3	.021	.136	.234	.068	.251	.030	.558	.013	.920	.318	.002	.087	.020
4	81.7	14.4	.069	.182	.464	.095	.285	.037	1.03	.022	1.11	.309	.005	.125	.092
5	80.2	14.9	.173	.188	.555	.194	.306	.039	1.38	.022	1.24	.309	.011	.150	.184
6	79.3	15.1	.281	.187	.570	.283	.312	.041	1.68	.022	1.35	.311	.015	.167	.249
7	78.7	15.2	.376	.185	.567	.325	.317	.043	1.95	.022	1.45	.312	.017	.178	.293
8	78.2	15.2	.454	.185	.566	.345	.320	.046	2.19	.022	1.53	.312	.018	.184	.324
9	77.8	15.2	.517	.184	.575	.357	.320	.051	2.41	.022	1.61	.311	.019	.188	.348
10	77.5	15.1	.566	.184	.597	.364	.320	0.05	2.61	.022	1.68	.309	.020	.190	.366

Economic crisis probability														
period	PrEcoc	PrFinc	FI	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOO	DCG
1	100.0	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	88.5	4.78	.116	5.49	.168	.002	.040	.022	.021	.059	.007	.314	.046	.392
3	82.9	6.60	.203	8.43	.483	.175	.035	.021	.018	.059	.115	.292	.040	.521
4	79.4	7.60	.307	10.0	.732	.372	.057	.065	.037	.058	.298	.261	.036	.605
5	76.4	8.36	.423	11.3	.965	.478	.088	.148	.069	.071	.522	.258	.036	.672
6	73.9	8.83	.539	12.4	1.21	.540	.112	.238	.109	.098	.786	.296	.039	.712
7	71.8	9.08	.647	13.3	1.48	.577	.128	.322	.153	.135	1.07	.381	.049	.731
8	70.0	9.17	.744	14.0	1.76	.600	.138	.391	.198	.177	1.36	.509	.065	.738
9	68.4	9.17	.827	14.6	2.04	.613	.143	.443	.242	.219	1.64	.678	.085	.738
10	67.0	9.10	.897	15.0	2.33	.619	.146	.475	.283	.256	1.91	.882	.109	.733

Market

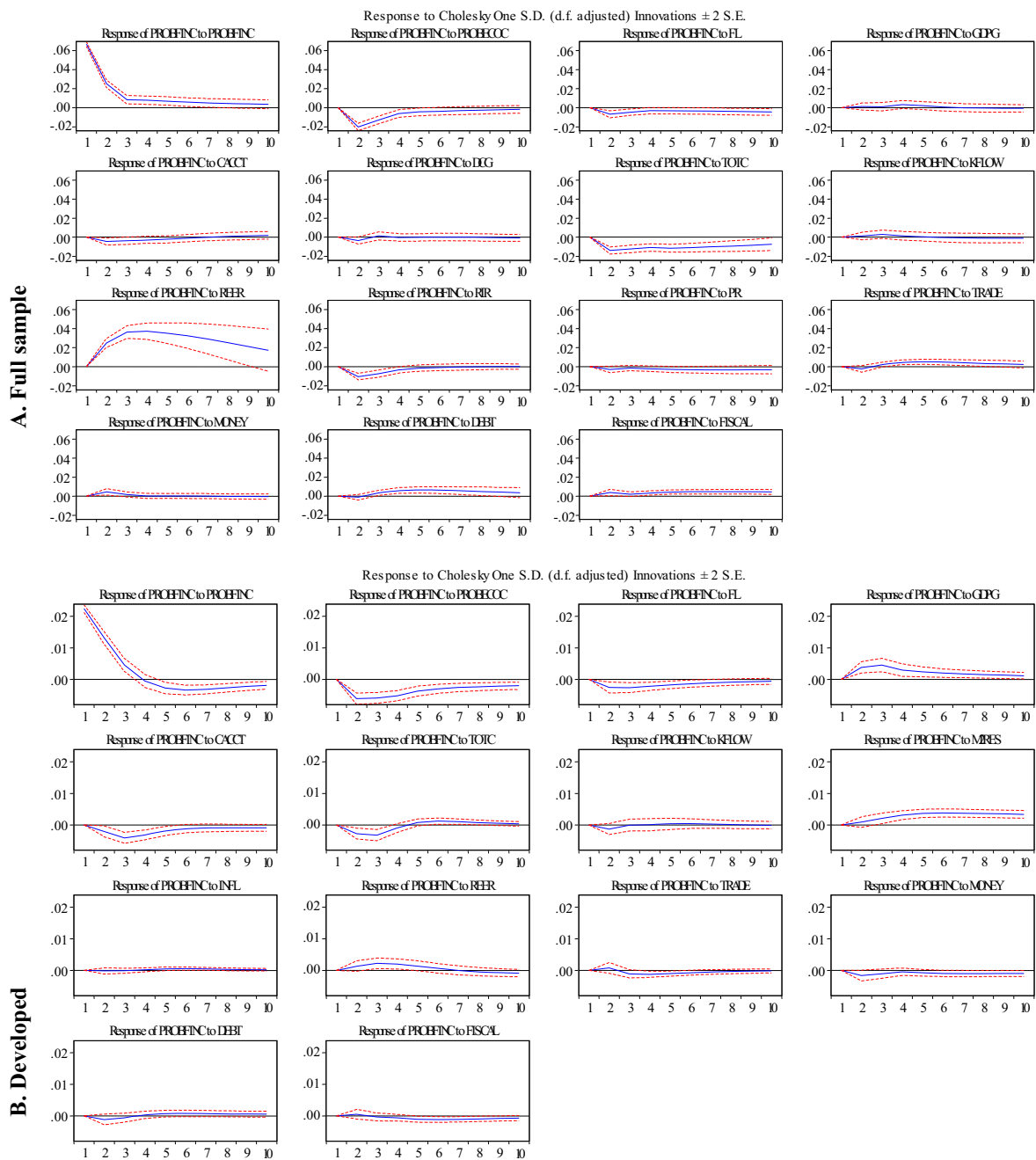


Figure 3. Impulse response functions: financial crisis probability.

prominence of currency-related factors in influencing financial stability consistent with prior research highlighting the pivotal role of currency dynamics in shaping financial conditions, especially in economies characterized by emerging markets and bank-oriented financial systems (Lestano et al., 2003; Babecký et al., 2014). Moreover, the noteworthy contribution of currency volatility, explaining more than half of the variance in the probability of financial crisis, aligns with studies emphasizing the sensitivity of these economies to external shocks, particularly those related to exchange rate fluctuations (Frankel & Saravelos, 2012; Dawood et al., 2017). The exchange rate, as a crucial determinant, becomes a key factor shaping financial vulnerability in these contexts. Following closely is the variance of terms of trade, explaining over 14% of the variation in financial vulnerability within this category of countries. Conversely, in developed and market-based economies, financial volatility is primarily contingent on economic probability and liquidity volatility. For these economies, the reliance of financial volatility on economic probability and liquidity volatility reflects the different dynamics at play in more mature and market-oriented

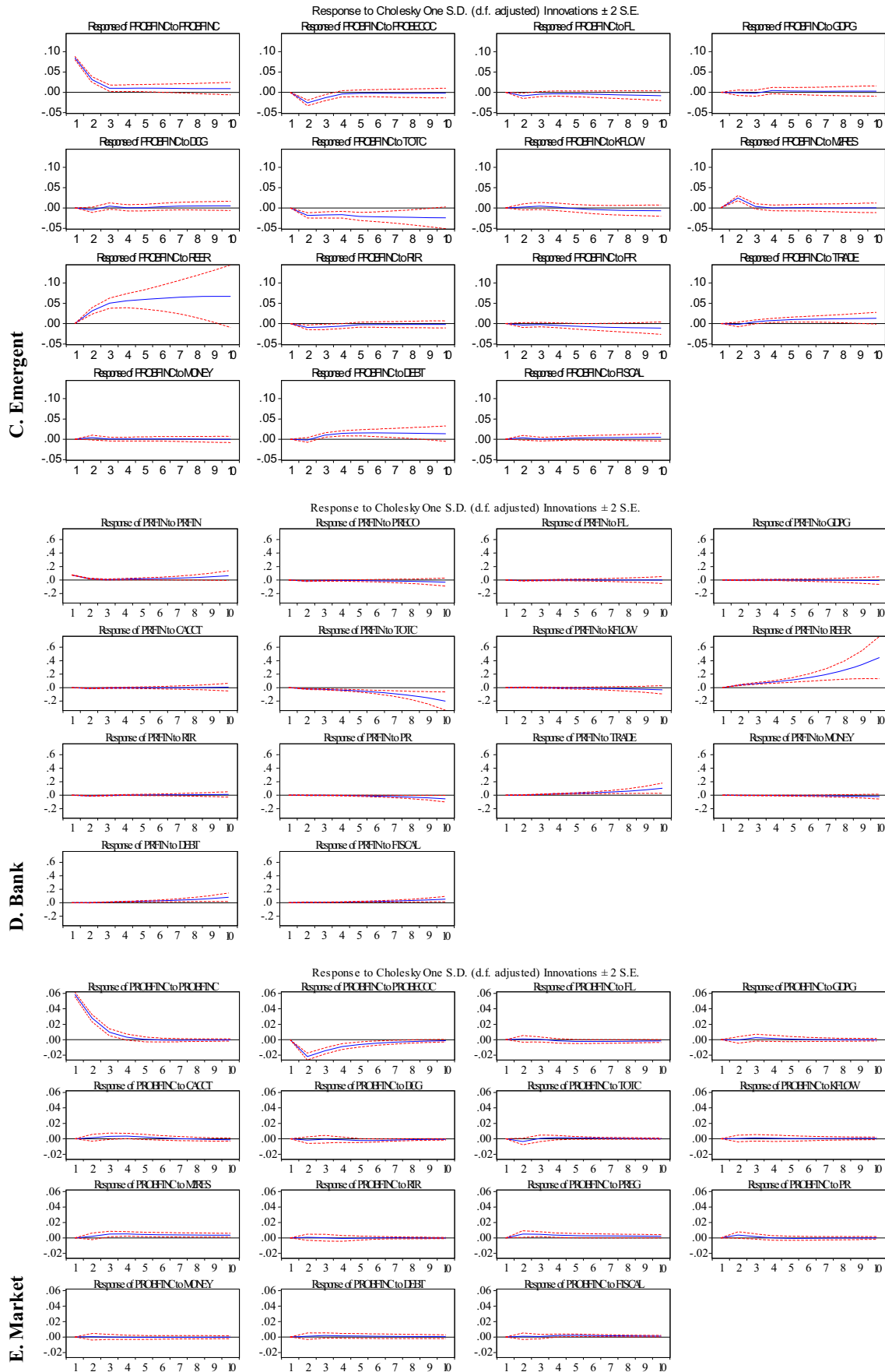


Figure 3. Continued.

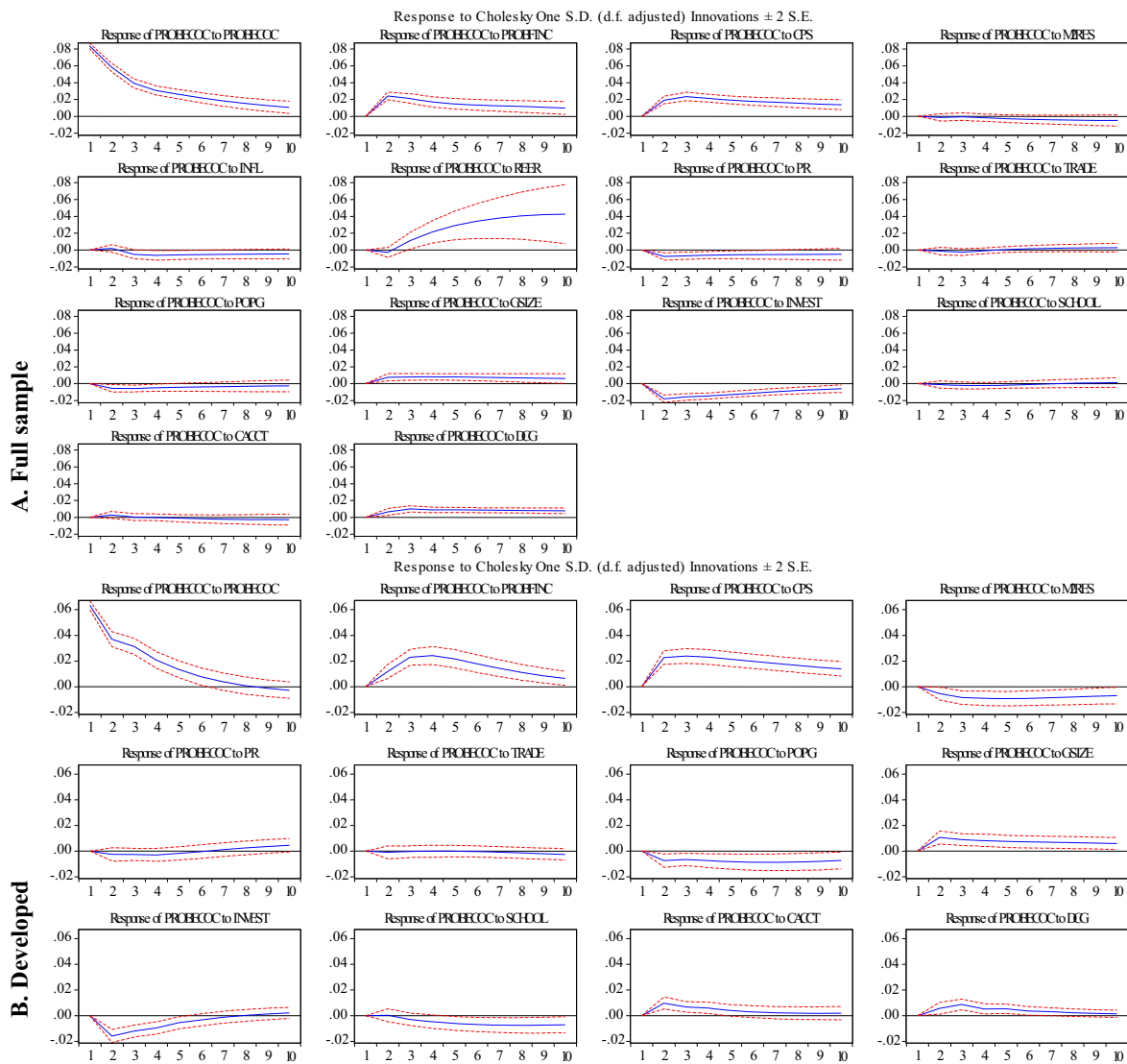


Figure 4. Impulse response functions: economic crisis probability.

financial systems. Economic fundamentals and liquidity considerations take precedence in influencing financial market dynamics in these settings (Fernández et al., 2001; Sala-I-Martin et al., 2004).

Examining the volatility of the real sector, we observe that in emergent and bank-based systems, it is primarily attributed to fluctuations in the exchange rate. In contrast, in developed and market-based systems, the volatility of the real sector is associated with variations in credit to the private sector, with less significance attributed to changes in investment and the volatility of the probability of financial crisis across all categories of countries. This reflects the significance of domestic credit dynamics in influencing real sector conditions (Levine & Zervos, 1998; Beck et al., 1999). This observation leads us to posit that both types of crises are largely shaped by their own preceding developments, especially in the short term, and that this memory effect diminishes over time, allowing other indicators such as the exchange rate to assume greater significance.

Table 14 employing Granger's causality test, establishes noteworthy causal relationships, both unidirectional and bidirectional, among various indicators and the intensity of financial or economic crises. The findings underscore a statistically significant two-way relationship between the probability of financial and economic crises across all types of economies. This implies a robust interaction and a cause-and-effect dynamic between the financial and real spheres in the short term, highlighting the interconnectedness of these domains. For brevity, specific causalities are not exhaustively detailed here, but it's noteworthy that the identified relationships provide insights into the intricate dynamics shaping crises. For instance, in the full sample, the causality

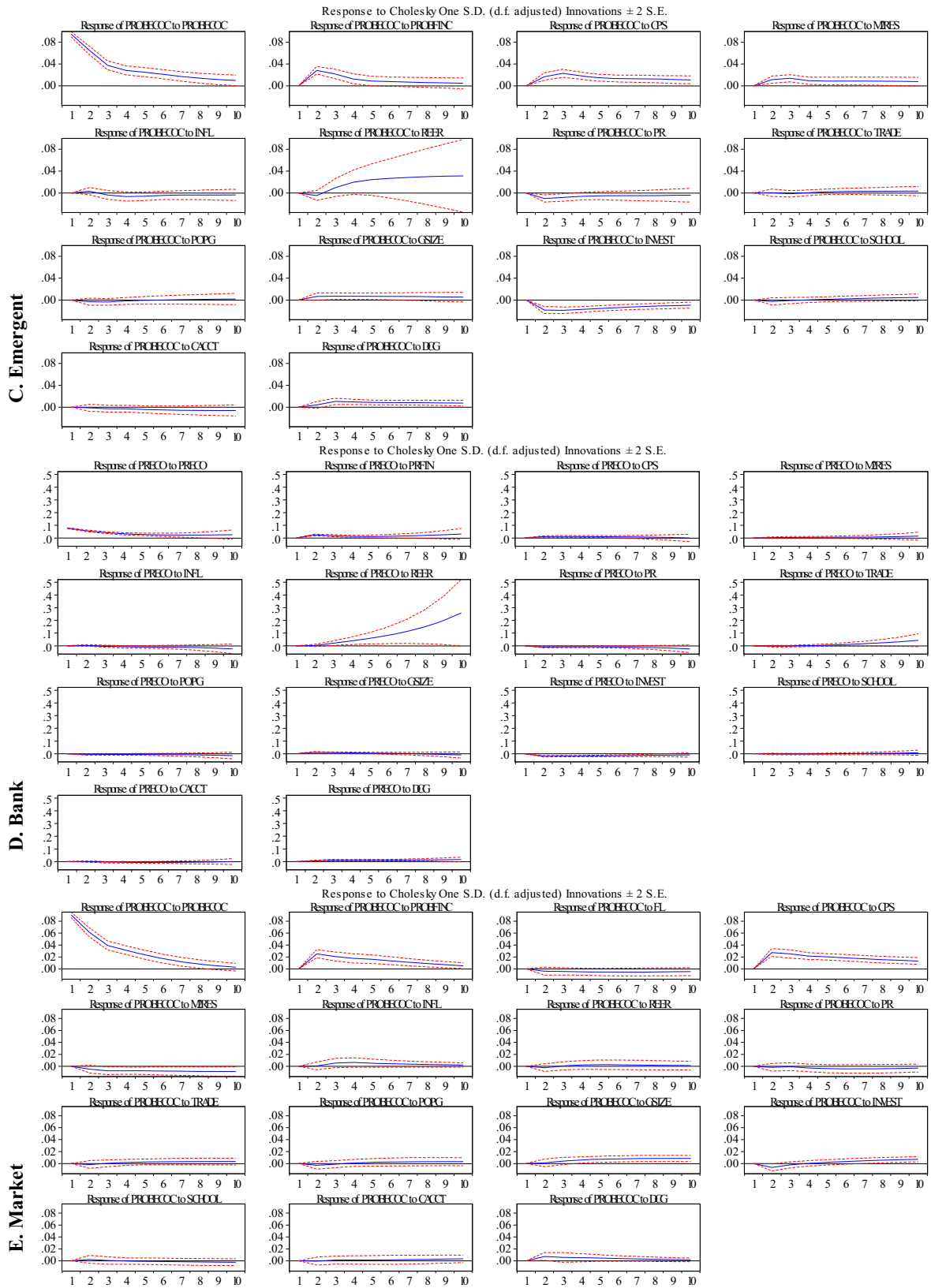


Figure 4. Continued.

Table 14. Granger causality test¹³.

		Financial crisis														
Variables	PrFinc	PrEcoc	FL	GDPG	CACCT	DCG	TOTC	KFLOW	REER	RIR	PR	TRADE	MONEY	DEBT	FISCAL	
Full sample	PfFinc	(2E-23)	(.577)	(2E-5)	(3E-14)	(9E-7)	(4E-8)	(.006)	(.002)	(4E-13)	(.000)	(.174)	(.058)	(.287)	(.002)	
	PrEcoc	(.017)	(.042)	(3E-15)	(.000)	(.000)	(1E-6)	(.236)	(.009)	(.020)	(.005)	(.076)	(2E-7)	(.004)	(.177)	
	FL	(2E-44)	(.068)	(.002)	(.000)	(.149)	(.049)	(7E-05)	(.158)	(.064)	(4E-7)	(.171)	(.383)	(1E-6)	(.018)	
	GDPG	(.095)	(.079)	(1E-15)	(7E-9)	(5E-8)	(3E-7)	(.207)	(.005)	(.911)	(6E-7)	(4E-9)	(4E-5)	(.088)	(.008)	
	CACCT	(3E-34)	(.185)	(.028)	(.872)	(.872)	(3E-9)	(4E-5)	(.401)	(.763)	(.008)	(.000)	(.768)	(1E-5)	(.653)	
	DCG	(.003)	(.056)	(1E-21)	(.567)	(.039)	(.671)	(.385)	(.996)	(.401)	(6E-11)	(.336)	(.884)	(.000)	(.006)	
	TOTC	(.371)	(.757)	(.006)	(2E-8)	(.889)	(.743)	(.907)	(.878)	(.762)	(.190)	(.664)	(.453)	(.248)	(.007)	(.456)
	KFLOW	(1E-28)	(.416)	(.006)	(.002)	(.002)	(3E-5)	(.907)	(.878)	(.762)	(.190)	(.369)	(.150)	(.008)	(.056)	(.335)
	REER	(8E-5)	(.785)	(.006)	(.002)	(.002)	(.042)	(.937)	(.008)	(.703)	(.801)	(.976)	(.150)	(.000)	(1E-6)	(.142)
	RIR	(.110)	(.000)	(.150)	(.333)	(4E-7)	(.254)	(.937)	(.008)	(.703)	(.801)	(.266)	(.150)	(.000)	(.000)	(.845)
	PR	(7E-5)	(.237)	(.128)	(2E-9)	(.245)	(.686)	(7E-22)	(8E-5)	(.321)	(.251)	(.029)	(.029)	(.399)	(.234)	(.005)
	TRADE	(2E-06)	(.975)	(.012)	(.012)	(.006)	(.622)	(6E-10)	(6E-10)	(.112)	(.265)	(.018)	(.018)	(.834)	(.000)	(.462)
	MONEY	(6E-11)	(.003)	(.136)	(6E-6)	(1E-05)	(.008)	(.071)	(6E-10)	(.112)	(.265)	(.018)	(.018)	(.834)	(.000)	(.070)
	DEBT	(1E-8)	(.055)	(.001)	(2E-7)	(.009)	(2E-5)	(.002)	(342)	(.134)	(.030)	(.081)	(.081)	(.001)	(.000)	(.000)
	FISCAL	PrFinc	(2E-10)	(.009)	(2E-11)	(5E-6)	(2E-9)	(.034)	(.953)	(.133)	(.760)	(.020)	(4E-5)	(2E-9)	(.000)	(.000)
Developed	PfFinc	(3E-22)	(.416)	(.000)	(.013)	(.005)	(.415)	(.342)	(9E-6)	(.792)	(.000)	(.000)	(.011)	(1E-6)	(.000)	
	PrEcoc	(.004)	(.453)	(.000)	(.560)	(.501)	(.278)	(.291)	(2E-59)	(.848)	(.026)	(.058)	(.556)	(.449)	(.000)	
	FL	(2E-33)	(.422)	(.032)	(2E-11)	(2E-7)	(.053)	(.112)	(4E-10)	(.041)	(4E-8)	(.000)	(3E-10)	(5E-6)	(.000)	
	GDPG	(8E-11)	(.199)	(.036)	(.065)	(.007)	(.838)	(.022)	(6E-6)	(.971)	(.004)	(.331)	(.042)	(.835)	(.001)	
	CACCT	(7E-13)	(.901)	(.029)	(.708)	(.481)	(.615)	(.520)	(5E-8)	(.934)	(.015)	(.561)	(.784)	(.167)	(.000)	
	TOTC	(5E-9)	(.442)	(.032)	(.087)	(.220)	(.553)	(.883)	(.000)	(.869)	(.043)	(6E-6)	(3E-5)	(.398)	(.158)	
	KFLOW	(.834)	(.059)	(.168)	(.000)	(.220)	(.553)	(.883)	(.000)	(.869)	(.043)	(6E-6)	(3E-5)	(.398)	(.158)	
	M2res	(.127)	(.300)	(.022)	(.752)	(.007)	(.838)	(.022)	(6E-6)	(.971)	(.004)	(.331)	(.042)	(.835)	(.001)	
	INFL	(.026)	(.659)	(.001)	(.053)	(.344)	(.183)	(.008)	(.011)	(4E-13)	(.364)	(.062)	(.660)	(.000)	(.000)	
	REER	(.668)	(.077)	(.759)	(.129)	(.209)	(.630)	(.413)	(.000)	(.014)	(.055)	(.472)	(.660)	(.000)	(.239)	
	MONEY	(.181)	(.808)	(.306)	(.003)	(5E-5)	(.021)	(.092)	(2E-5)	(.257)	(.035)	(.027)	(.961)	(.000)	(.007)	
	DEBT	(8E-13)	(.000)	(.000)	(.003)	(5E-5)	(.021)	(.092)	(2E-5)	(.257)	(.035)	(.027)	(.961)	(.000)	(.007)	
	FISCAL	PrFinc	(4E-17)	(.965)	(.000)	(4E-7)	(4E-5)	(.033)	(.006)	(.006)	(6E-8)	(.004)	(.486)	(.020)	(.138)	(.057)
	Emergent	PfFinc	(6E-12)	(.233)	(5E-10)	(.002)	(5E-6)	(.446)	(.052)	(.014)	(.055)	(.472)	(.660)	(.000)	(2E-5)	(.239)
		PrEcoc	(.063)	(.344)	(.497)	(.138)	(.034)	(2E-6)	(.081)	(.229)	(.257)	(.035)	(.027)	(.961)	(.000)	(.007)
FL		(1E-21)	(.240)	(.079)	(6E-7)	(.000)	(.802)	(.341)	(.001)	(.815)	(5E-5)	(8E-5)	(.005)	(.327)	(.299)	
GDPG		(2E-14)	(.135)	(.079)	(.020)	(.471)	(.725)	(.000)	(.457)	(4E-11)	(.329)	(.934)	(1E-7)	(.162)	(.007)	
DCG		(.000)	(.240)	(5E-16)	(.020)	(.471)	(.957)	(.957)	(.002)	(.068)	(.592)	(.628)	(1E-7)	(.162)	(.007)	
TOTC		(7E-19)	(.146)	(.254)	(.993)	(.806)	(.125)	(.321)	(.784)	(.799)	(.153)	(.686)	(.002)	(8E-5)	(.984)	
KFLOW		(.103)	(.050)	(.6E-6)	(.005)	(.241)	(.125)	(.321)	(.784)	(.799)	(.153)	(.686)	(.002)	(8E-5)	(.984)	
M2res		(6E-21)	(.471)	(4E-5)	(.011)	(.001)	(.960)	(.198)	(.249)	(4E-22)	(.182)	(.934)	(.001)	(.002)	(.261)	
REER		(8E-18)	(.865)	(.289)	(.011)	(.001)	(.960)	(.198)	(.249)	(4E-22)	(.182)	(.934)	(.001)	(.002)	(.261)	
RIR		(.016)	(.120)	(.032)	(.018)	(.438)	(.000)	(.043)	(.051)	(.282)	(.611)	(.053)	(.217)	(6E-5)	(.069)	
PR		(.623)	(.047)	(.536)	(.465)	(.863)	(1E-23)	(.079)	(.005)	(.781)	(.746)	(.188)	(.210)	(.007)	(.695)	
TRADE		(.000)	(.939)	(.004)	(.167)	(.913)	(2E-11)	(.826)	(.014)	(1E-13)	(.807)	(.178)	(.754)	(.008)	(.065)	
MONEY		(8E-7)	(.044)	(.037)	(.011)	(.001)	(.057)	(.014)	(.360)	(.133)	(.072)	(.317)	(.033)	(.250)	(.136)	
DEBT		(1E-8)	(.172)	(.001)	(.011)	(.005)	(.021)	(.187)	(.360)	(.228)	(.096)	(.010)	(.289)	(.048)	(.411)	
FISCAL		(2E-5)	(.000)	(.000)	(.011)	(.005)	(.021)	(.187)	(.360)	(.228)	(.096)	(.010)	(.289)	(.048)	(.411)	

(Continued)

Table 14. Continued.

Financial crisis															
Bank	Variables	PrFinc	PrEcoc	FL	GDPG	CACCT	TOTC	KFLOW	REER	RIR	PR	TRADE	MONEY	DEBT	FISCAL
	PrFin		(6E-13)	(.116)	(4E-7)	(3E-12)	(2E-11)	(.138)	(6E-6)	(.060)	(.576)	(.668)	(.027)	(.327)	
	PrEcoc	(3E-6)	(.000)	(.043)	(1E-6)	(.014)	(.004)	(.598)	(.016)	(.017)	(.339)	(.003)	(.037)	(.5477)	
	FL	(.000)	(.054)		(7E-5)	(.001)	(.125)	(.063)	(.063)	(.525)	(.049)	(.498)	(2E-5)	(.226)	
	GDPG	(.789)	(2E-25)	(.028)		(1E-7)	(3E-6)	(.640)	(.005)	(.458)	(.001)	(.125)	(.907)	(.123)	
	CACCT	(2E-12)	(.001)	(.103)	(4E-10)	(2E-5)	(1E-7)	(.092)	(.000)	(.534)	(.009)	(.397)	(2E-5)	(.583)	
	TOTC	(2E-21)	(.001)	(.095)	(3E-14)	(.179)	(.915)	(.960)	(.004)	(3E-5)	(.672)	(.941)	(.103)	(.611)	
	KFLOW	(.845)	(.175)	(.713)	(.001)	(.179)	(.915)	(.726)	(.769)	(.864)	(.760)	(.587)	(.001)	(.916)	
	REER	(3E-25)	(.072)	(.116)	(6E-5)	(.473)	(.015)	(.002)	(.020)	(.934)	(.138)	(.606)	(2E-6)	(.481)	
	RIR	(.001)	(1E-5)	(.950)	(.007)	(.077)	(.000)	(.959)	(1E-7)	(.762)	(.625)	(.284)	(1E-7)	(.110)	
	PR	(.640)	(.001)	(.041)	(.061)	(.066)	(.312)	(.002)	(.020)	(.238)	(.238)	(.198)	(.004)	(.574)	
	TRADE	(.012)	(.656)	(.012)	(.572)	(.091)	(.763)	(6E-10)	(7E-8)	(.136)	(.053)	(.074)	(.111)	(.483)	
	MONEY	(.005)	(.023)	(.472)	(.344)	(.063)	(.784)	(.566)	(.566)	(.492)	(.843)	(.131)	(.006)	(.452)	
	DEBT	(.002)	(8E-8)	(.005)	(.385)	(.039)	(.181)	(1E-9)	(1E-9)	(.853)	(.072)	(.074)	(.036)	(.478)	
	FISCAL	(1E-11)	(2E-10)	(.006)	(.000)	(.001)	(2E-5)	(.043)	(.186)	(.459)	(.072)	(.131)	(.006)	(.452)	
Market	PrFin		PrEcoc	FL	GDPG	CACCT	TOTC	KFLOW	REER	RIR	PR	TRADE	MONEY	DEBT	FISCAL
	PrFin		(8E-12)	(1E-6)	(.070)	(.792)	(.537)	(.117)	(.136)	(.000)	(.014)	(.034)	(.008)	(.137)	
	PrEcoc	(2E-23)	(.401)	(.123)	(.350)	(.049)	(.113)	(.564)	(.369)	(.609)	(.291)	(.061)	(.385)	(.626)	
	FL	(.248)	(.170)	(.991)	(.381)	(.021)	(.128)	(.049)	(.003)	(.478)	(.221)	(.287)	(.265)	(.510)	
	GDPG	(.747)	(.087)	(.991)	(4E-5)	(.049)	(.000)	(.054)	(.450)	(.829)	(.724)	(.185)	(.036)	(.010)	
	CACCT	(.602)	(3E-6)	(.463)	(.349)	(.049)	(.000)	(.021)	(.021)	(.456)	(.556)	(.219)	(.744)	(.032)	
	DCG	(.258)	(.358)	(.199)	(1E-7)	(.875)	(.976)	(.508)	(.458)	(.610)	(.451)	(.933)	(.205)	(.998)	
	KFLOW	(.717)	(.285)	(.966)	(.415)	(.000)	(.053)	(.506)	(.799)	(.428)	(.106)	(.857)	(.240)	(.787)	
	M2RES	(.014)	(.692)	(.958)	(.013)	(.939)	(.077)	(.631)	(.000)	(.249)	(.388)	(.310)	(.078)	(.462)	
	RIR	(.486)	(.919)	(.831)	(.891)	(.813)	(5E-6)	(.011)	(.959)	(.308)	(.099)	(.491)	1(201)	(.001)	
	PR	(.024)	(.406)	(.751)	(.373)	(.009)	(.443)	(.318)	(.835)	(.219)	(.974)	(.851)	(.077)	(.453)	
	MONEY	(.115)	(.391)	(.076)	(.757)	(.208)	(.042)	(.319)	(.031)	(.619)	(.976)	(.508)	(.085)	(.964)	
	DEBT	(.716)	(.576)	(.105)	(.457)	(.301)	(.008)	(.618)	(3E-8)	(.674)	(.071)	(.508)	(.062)	(.242)	
	FISCAL	(.537)	(.131)	(.550)	(.341)	(.008)	(.011)	(.004)	(.332)	(.939)	(.579)	(.474)	(.062)	(.242)	
		(.533)	(.085)	(.544)	(.476)	(.010)	(.480)	(.004)	(.047)	(.364)	(.607)	(.166)	1(035)	(.041)	

Economic crisis probability.															
Economic crisis															
Full	Variables	PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DCG
	Precoc	(2E-23)	(9E-23)	(3E-8)	(.742)	(.067)	(.009)	(.005)	(.076)	(.049)	(.138)	(3E-8)	(.841)	(.000)	(.000)
	PrFinc	(1E-22)	(2E-8)	(1E-7)	(.038)	(2E-17)	(.002)	(.005)	(.174)	(.108)	(.039)	(7E-15)	(.861)	(3E-14)	(9E-7)
	cps	(.361)	(2E-10)	(.214)	(.257)	(4E-9)	(.810)	(.033)	(.828)	(.401)	(.050)	(.090)	(.413)	(.000)	(2E-5)
	M2RES	(.000)	(.098)	(5E-5)	(.282)	(.005)	(.371)	(.144)	(.476)	(.010)	(.014)	(.076)	(.820)	(.984)	(.028)
	INFL	(.005)	(1E-28)	(.004)	(.148)	(.002)	(.057)	(.666)	(.173)	(.997)	(.397)	(.257)	(.530)	(.226)	(5E-6)
	REER	(.005)	(1E-28)	(.004)	(.148)	(.002)	(.009)	(.369)	(.001)	(.007)	(.002)	(.061)	(.293)	(.002)	(.002)
	PR	(.007)	(.110)	(2E-6)	(.010)	(.003)	(.009)	(.266)	(.266)	(.055)	(.000)	(.042)	(.193)	(.019)	(.013)
	TRADE	(.351)	(7E-5)	(.114)	(.297)	(.070)	(8E-5)	(.251)	(.001)	(7E-5)	(.080)	(.108)	(.419)	(2E-9)	(.245)
	POPG	(.038)	(.464)	(.112)	(.786)	(.113)	(.081)	(3E-5)	(3E-5)	(.013)	(.014)	(.366)	(.410)	(.873)	(.584)
	GSIZE	(8E-07)	(.534)	(.095)	(.456)	(.052)	(.158)	(.000)	(2E-5)	(.005)	(.063)	(2E-5)	(.010)	(.566)	(.234)
	INVEST	(4E-20)	(2E-17)	(1E-5)	(.751)	(.867)	(.198)	(.214)	(.625)	(.083)	(.008)	(.095)	(.203)	(2E-8)	(.004)
	SCHOOL	(.177)	(.291)	(.031)	(.005)	(.549)	(.858)	(3E-7)	(.001)	(.277)	(.611)	(.095)	(.203)	(.210)	(.407)
	CACCT	(.095)	(3E-24)	(.203)	(.617)	(.003)	(2E-5)	(.008)	(.001)	(.674)	(.000)	(.006)	(.289)	(.567)	(.872)
	DCG	(3E-34)	(3E-05)	(.022)	(.206)	(.003)	(.401)	(.336)	(.884)	(.674)	(.000)	(.006)	(.289)	(.567)	(.872)
			PrFinc	CPS	M2RES	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DCG		
			(3E-05)	(.022)	(.206)	(.003)	(.401)	(.336)	(.884)	(.674)	(.000)	(.006)	(.289)	(.567)	(.872)

(Continued)

Table 14. Continued.

		Economic crisis													
Developed	Variables	PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DCG
	PrEcoc	(2E-10)	(3E-22)	(.017)	(.342)	(.059)	(.000)	(.042)	(2E-17)	(.018)	(.693)	(.013)	(.222)		
	PrFinc	(2E-20)	(.018)	(.000)	(.953)	(.000)	(3.91)	(1E-5)	(1E-8)	(8E-15)	(.326)	(5E-6)	(.103)		
	CPS	(2E-20)	(.018)	(.000)	(.122)	(.980)	(.309)	(.260)	(.017)	(.278)	(.320)	(.022)	(9E-6)		
	M2RES	(.253)	(5E-9)	(.008)	(.005)	(.204)	(.043)	(.005)	(.276)	(.480)	(.749)	(.087)	(.011)		
	PR	(.114)	(.529)	(.003)	(.515)	(.183)	(.814)	(.131)	(.002)	(.541)	(.808)	(.536)	(.115)		
	TRADE	(.632)	(.026)	(.018)	(.010)	(.183)	(.001)	(.399)	(.811)	(.231)	(.308)	(.053)	(.328)		
	POPG	(.001)	(.116)	(.058)	(.604)	(.013)	(.037)	(.268)	(.747)	(.530)	(.949)	(.123)	(.433)		
	GSIZE	(3E-10)	(.026)	(.042)	(.328)	(.037)	(.818)	(.001)	(1E-10)	(7E-5)	(.004)	(.003)	(.368)		
	INVEST	(.000)	(5E-18)	(.000)	(.328)	(.054)	(.001)	(.001)	(.592)	(.605)	(.043)	(.003)	(.308)		
	SCHOOL	(.407)	(.428)	(.062)	(.168)	(.107)	(.131)	(.849)	(.009)	(2E-7)	(.010)	(.336)	(.575)		
	CACCT	(.087)	(8E-11)	(.491)	(.253)	(.014)	(.000)	(.056)	(.037)	(.293)	(.624)	(.001)	(.308)		
	DCG	(4E-27)	(.025)	(.064)	(.574)	(.860)	(.844)	(.644)	(.037)	(.010)	(.010)	(.336)	(.575)		
	PrEcoc	PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DCG
Emergent	PrFin	(4E-17)	(6E-12)	(4E-9)	(.052)	(.159)	(.014)	(.472)	(.66)	(.429)	(.941)	(5E-6)	SCHOOL	CACCT	DCG
	M2RES	(5E-7)	(1E-6)	(7E-8)	(.006)	(2E-10)	(.006)	(.004)	(.486)	(.716)	(.384)	(2E-9)	(.657)	(8E-10)	(4E-7)
	INFL	(.001)	(.379)	(1E-5)	(.325)	(5E-10)	(.809)	(.197)	(.596)	(.586)	(.811)	(.301)	(.297)	(.000)	(.026)
	REER	(.098)	(8E-18)	(.041)	(.198)	(.421)	(.249)	(.182)	(.934)	(.878)	(.015)	(.009)	(.194)	(.080)	(.005)
	TRADE	(.291)	(.000)	(.145)	(.079)	(.920)	(.176)	(.611)	(.053)	(.010)	(.034)	(.379)	(.487)	(.382)	(5E-6)
	GSIZE	(.027)	(.210)	(.470)	(.063)	(.794)	(.005)	(.019)	(.188)	(.258)	(.061)	(.204)	(.416)	(.130)	(.011)
	INVEST	(2E-13)	(.288)	(.000)	(.982)	(.421)	(.004)	(.070)	(.000)	(.011)	(.006)	(.204)	(.416)	(.130)	(.011)
	SCHOOL	(.197)	(.749)	(.644)	(.189)	(.920)	(.790)	(.869)	(.310)	(.993)	(.514)	(.254)	(.482)	(.2E-7)	(.004)
	CACCT	(.022)	(8E-14)	(.181)	(.353)	(.038)	(.000)	(.046)	(.008)	(.492)	(.824)	(.3E-7)	(.349)	(.385)	(.681)
	DCG	(2E-14)	(.000)	(2E-7)	(.000)	(.000)	(.457)	(.329)	(.934)	(.285)	(.004)	(.001)	(.524)	(.385)	(.775)
Bank	PrEcoc	PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DCG
	PrFinc	(6E-13)	(3E-6)	(6E-6)	(.389)	(.774)	(.016)	(.030)	(.339)	(.417)	(.921)	(5E-7)	(.117)	(.014)	(.002)
	CPS	(2E-6)	(.002)	(8E-5)	(.510)	(6E-8)	(6E-6)	(.060)	(.576)	(.763)	(.287)	(3E-7)	(.708)	(3E-12)	(7E-0)
	M2RES	(.277)	(.011)	(.228)	(.680)	(.135)	(.560)	(.013)	(.254)	(.436)	(.708)	(.394)	(.001)	(.003)	(.001)
	INFL	(3E-7)	(.035)	(6E-6)	(.682)	(.645)	(.095)	(.024)	(.880)	(.768)	(.078)	(.226)	(.752)	(.240)	(.298)
	REER	(.072)	(3E-25)	(.000)	(.648)	(.884)	(2E-7)	(.817)	(.379)	(.989)	(.177)	(.397)	(.789)	(.017)	(7E-0)
	PR	(.001)	(.640)	(.003)	(.238)	(.411)	(.020)	(.481)	(.238)	(.002)	(.036)	(.024)	(.423)	(.473)	(.003)
	TRADE	(.656)	(.012)	(.000)	(.651)	(.180)	(7E-8)	(.136)	(.084)	(.886)	(.865)	(.024)	(.462)	(.066)	(.066)
	POPG	(.301)	(.239)	(.481)	(.089)	(.549)	(.067)	(.000)	(.008)	(.534)	(.002)	(.750)	(.317)	(.091)	(.052)
	GSIZE	(.000)	(.172)	(.157)	(.250)	(.008)	(.177)	(.017)	(.008)	(.646)	(.998)	(.006)	(.450)	(.855)	(.466)
	INVEST	(7E-17)	(.000)	(1E-6)	(.426)	(.397)	(.174)	(.260)	(.658)	(.301)	(.004)	(.006)	(.592)	(.837)	(.061)
	SCHOOL	(.272)	(.760)	(.785)	(.045)	(.569)	(.995)	(.000)	(.715)	(.780)	(.634)	(.220)	(.716)	(.664)	(.005)
	CACCT	(.001)	(2E-12)	(.083)	(.625)	(.773)	(.000)	(.110)	(.009)	(.938)	(.004)	(1E-13)	(.003)	(.664)	(.908)
	DCG	(1E-12)	(.542)	(.012)	(.765)	(.699)	(.759)	(.409)	(.901)	(.938)	(.418)	(.004)	(.003)	(.676)	(.642)

(Continued)

Table 14. Continued.

Market	Variables	Economic crisis														
		PrEcoc	PrFinc	CPS	M2RES	INFL	REER	PR	TRADE	POPG	GSIZE	INVEST	SCHOOL	CACCT	DGG	
	PrEcoc															
	PrFinc	(8E-12)	PrFinc (2E-23)	FI (1E-6)	CPS (4E-5)	M2RES (609)	INFL (980)	REER (000)	PR (061)	TRADE (141)	POPG (093)	GSIZE (003)	INVEST (013)	SCHOOL (844)	CACCT (049)	DGG (113)
	FI	(401)	(248)	(1E-6)	(8E-5)	(000)	(378)	(043)	(034)	(407)	(094)	(000)	(8E-10)	(801)	(792)	(537)
	CPS	(9E-16)	(1E-10)	(031)	(014)	(011)	(004)	(292)	(287)	(688)	(717)	(314)	(871)	(128)	(021)	(128)
	M2RES	(692)	(014)	(958)	(224)	(038)	(092)	(068)	(005)	(021)	(505)	(023)	(187)	(326)	(450)	(077)
	INFL	(373)	(728)	(006)	(514)	(425)	(126)	(906)	(491)	(831)	(245)	(510)	(152)	(002)	(939)	(077)
	REER	(636)	(776)	(815)	(044)	(640)	(5E-6)	(795)	(608)	(707)	(866)	(445)	(345)	(976)	(726)	(009)
	PR	(391)	(115)	(076)	(003)	(019)	(001)	(033)	(809)	(432)	(960)	(000)	(764)	(364)	(006)	(342)
	TRADE	(390)	(142)	(061)	(893)	(738)	(277)	(103)	(732)	(828)	(899)	(756)	(347)	(016)	(208)	(042)
	POPG	(039)	(955)	(257)	(260)	(694)	(584)	(897)	(086)	(250)	(899)	(976)	(197)	(857)	(2E-5)	(505)
	GSIZE	(000)	(953)	(037)	(266)	(699)	(278)	(912)	(046)	(132)	(000)	(2E-5)	(000)	(002)	(680)	(160)
	INVEST	(4E-6)	(2E-18)	(918)	(025)	(702)	(395)	(004)	(112)	(351)	(005)	(630)	(734)	(583)	(325)	(471)
	SCHOOL	(638)	(391)	(007)	(089)	(095)	(509)	(084)	(000)	(209)	(354)	(630)	(000)	(002)	(680)	(160)
	CACCT	(087)	(112)	(463)	(088)	(698)	(007)	(111)	(219)	(814)	(182)	(521)	(527)	(945)	(313)	(492)
	DGG	(3E-6)	(602)	(199)	(207)	(610)	(001)	(298)	(933)	(893)	(984)	(881)	(812)	(236)	(875)	(976)

Notes: Numbers presented in this table correspond to p-values.

analysis suggests that financial liberalization may lead to a financial crisis, while the reverse relationship is not observed—indicating that financial liberalization does not result from the occurrence of a financial crisis. This finding resonates with literature that has explored the consequences of financial market liberalization. Scholars such as Kaminsky and Reinhart (1999) and Bussiere (2013) have previously discussed the potential risks associated with financial liberalization, highlighting its role in increasing the vulnerability of economies to financial crises. Similarly, the volume of credit to the private sector is identified as a potential cause of economic crises, and economic crises may, in turn, lead to a decline in credit to the private sector⁹. This aligns with studies emphasizing the importance of credit dynamics in economic downturns (Easterly & Rebelo, 1993; Levine & Zervos, 1998; Beck et al., 1999).

The overarching conclusion drawn from this analysis is that a range of economic factors can contribute to the onset of a financial crisis. Economic recession, current account deficits, rapid growth in domestic credit to the private sector, deteriorating terms of trade, exchange rate depreciation, increased real interest rates, higher levels of commercial openness, reduced liquidity, rising central government debt, and increased government spending are identified as potential triggers for financial crises. This aligns with and extends previous research that has explored the multifaceted determinants of financial instability (Kaminsky & Reinhart, 1999; Alessi & Detken, 2011; Rose & Spiegel, 2011; Frankel & Saravelos, 2012; Dawood et al., 2017). Furthermore, the results highlight that while capital account liberalization may contribute to financial crises in various economic contexts, it is not necessarily the predominant factor triggering such crises. This nuanced understanding provides valuable insights into the relative importance of different factors in precipitating financial instability, offering policymakers a more refined perspective for crisis prevention and management strategies.

By grounding the findings in the context of existing research, the study not only contributes to the empirical understanding of the relationships between economic and financial variables but also enriches the ongoing scholarly dialogue on crisis prediction and management. Policymakers and researchers can leverage these insights to develop more targeted and effective strategies for crisis prevention and mitigation, taking into account the multifaceted nature of the relationships between the real and financial spheres.

3.3.3 Robustness tests

In the initial phase of our analysis, we considered a comprehensive list of variables, guided by existing literature, and addressed multicollinearity concerns by excluding variables with high correlation coefficients exceeding 0.5 and variance inflation factors (VIFs) less than 2. Subsequently, through Bayesian Model Averaging (BMA), we refined the list, eliminating variables deemed less influential in explaining the probability of a financial crisis. Further refinement involved revisiting the correlation matrix and, based on considerations of correlation coefficients and VIFs, selectively excluding variables such as 'Fiscal' and 'FL' to construct a more focused model. This rigorous variable selection process resulted in a final set of 11 candidate variables instead of 15. Our methodological choices and analytical approaches align with and build upon insights from previous works in the field of financial and economic crisis literature. The variable selection process, influenced by correlation coefficients and VIF considerations, mirrors established practices in econometric modeling (Hocking, 1976). By applying Bayesian Model Averaging (BMA) for further refinement, our study aligns with the work of Fernández et al. (2001), Crespo-Cuaresma and Slacik (2009), and other scholars who advocate for model averaging as a strategy to address challenges in identifying determinants of events.

FMOLS and DOLS results: Moving beyond traditional methodologies susceptible to endogeneity issues, such as fixed effects (FE) and generalized method of moments (GMM), our study leveraged dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS) to estimate long-term relationships between economic growth and financial crises. Some problems have arisen in these techniques, leading to biased estimates such as regression on panel data with fixed effects not taking into account potential simultaneity, and the GMM technique suffers from the problem of proliferation of instruments as the time dimension increases (De Dominicis et al., 2008). In addition, these techniques are dedicated to the estimation of short-term relationships, which is not our only object of this work, but we are also seeking to find long-term relationships. Recognizing the endogeneity inherent in the relationship between financial and economic conditions, we adopted FMOLS and DOLS as techniques capable of addressing this challenge, as highlighted by Al Mamun et al. (2018) and Risso et al.

Table 15. FMOLS and DOLS results for the full sample.

	Variables	Coefficient	Prob.*		
Financial crisis probability	Dependent variables: Financial crisis probability				
	FMOLS	PrEcoc	.013	.32	
		GDPG	-.006	.00	
		CACCT	-.002	.00	
		DCG	-.050	.00	
		TOTC	.343	.00	
		KFLOW	.004	.01	
		REER	.005	.00	
		RIR	7E-5	.00	
		PR	.001	.15	
		MONEY	-.002	.00	
		DEBT	5E-5	.35	
		DOLS	PrEcoc	-.013	.33
			GDPG	-.008	.00
			CACCT	-.002	.00
			DCG	-.047	.00
			TOTC	.333	.00
			KFLOW	.007	.00
			REER	.006	.00
			RIR	6E-5	.00
			PR	.002	.04
			MONEY	-.0002	.00
			DEBT	.001	.09
	Economic crisis probability	Dependent variables: Economic crisis probability			
		FMOLS	PrFinc	.252	.00
		CPS	.0001	.30	
		M2RES	-.001	.00	
		INFL	.0001	.00	
		REER	.001	.00	
		PR	.002	.00	
		TRADE	-.0002	.00	
		POPG	.049	.00	
		GSIZE	.016	.00	
		INVEST	-.005	.00	
		CACCT	.012	.00	
		DCG	-.340	.00	
		DOLS	D(PrFinc)	.150	.04
			D(CPS)	7.E-5	.61
			D(M2RES)	-.001	.00
			D(INFL)	.0001	.00
			D(REER)	.001	.00
			D(PR)	.002	.00
			D(TRADE)	-.0002	.00
			D(POPG)	.049	.00
			D(GSIZE)	.018	.00
			D(INVEST)	-.005	.00
			D(CACCT)	.014	.00
			D(DCG)	-.332	.00

(2013). The long-term estimates presented in Table 15 for a panel of 49 developed and emerging countries offer insights into the enduring impacts of financial crises on the real economy.

One noteworthy finding is that, in the long run, an increase in the likelihood of an economic crisis does not significantly impact the likelihood of a financial crisis. This result is rationalized by the notion that agents in the financial sphere are well-informed and continuously update their expectations. However, the study underscores the persistent and detrimental effects of financial crises on the real economy, with statistically significant consequences evident through both FMOLS and DOLS methodologies. This signifies a sustained negative impact on employment and purchasing power, particularly affecting the most vulnerable segments of society. Our findings regarding the persistent and detrimental effects of financial crises on the real economy echo and extend conclusions drawn by various researchers, including those exploring the socialization of losses and the negative repercussions on employment and purchasing power (Reinhart & Rogoff, 2009).

While FMOLS and DOLS provide valuable insights into long-term relationships, the analysis proceeds to employ the Autoregressive Distributed Lag (ARDL) technique to disentangle the total effect into short- and long-term components, offering a more nuanced understanding of the dynamics between economic growth and financial crises. This strategic methodological choice enhances the robustness and depth of

our investigation. The transition from traditional methodologies like fixed effects (FE) and generalized method of moments (GMM) to more advanced techniques such as ARDL demonstrates an awareness of the limitations of earlier approaches. This evolution in methodology is in line with the broader trend in the literature to employ more sophisticated techniques that capture both short-term and long-term dynamics. The utilization of ARDL provides a nuanced understanding of the temporal aspects of the relationship between economic growth and financial crises.

In summary, our methodological choices and analytical strategies are anchored in the existing literature, reflecting a commitment to building upon established practices and contributing to the refinement and advancement of methodologies in the study of financial and economic crises.

3.3.4. Pooled Mean Group (PMG) estimates

3.3.4.1. Financial crisis. In the short run, the likelihood of a financial crisis is influenced by various factors, with a decrease in probability associated with the experience of an economic crisis, positive economic growth, an improvement in the current account balance, and, to a lesser extent, the growth in private sector credit provision (Table 16). The notion of a learning effect resonates with research emphasizing the adaptive behavior of economic agents. Scholars such as Reinhart and Rogoff (2008) have explored the persistence of financial crises and the potential for economies to adapt and mitigate risks over time. The findings align with the idea that a past economic crisis imparts lessons, influencing short-term financial risk perceptions. Conversely, potential triggers for financial crises in the short term include deteriorating terms of trade, substantial capital flows, exchange rate depreciation, and an increase in central government debt. This finds corroboration in studies investigating specific crisis episodes. For instance, studies on currency crises (Krugman, 1979) and sovereign debt crises (Eichengreen et al., 1996) provide insights into the role of these factors in precipitating financial instability. In the long term, the probability of a financial crisis is significantly reduced by experiences of economic crises, economic growth stimulation, current account balance equilibrium, and promoting investment through expanded private sector credit growth. On the other hand, long-term financial crisis likelihood is heightened by deteriorating terms of trade, massive capital inflows, exchange rate depreciation, and an escalation in public debt. This segregation of short-term and long-term effects aligns with the VECM results, reinforcing the presence of a learning effect through economic crisis experiences.

3.3.4.2. Economic crisis. Contrary to earlier findings, an elevated probability of a financial crisis may, in the short run, reduce the likelihood of an economic crisis, a trend that is reversed in the long run. This observation, supported by VECM, FMOLS, and DOLS analyses, indicates that an increase in the likelihood of a financial crisis eventually leads to a higher probability of an economic crisis. This echoes discussions on the intertwined nature of these crises. Claessens et al. (2009) and other scholars have investigated the bidirectional relationships between financial and economic crises, recognizing the potential for a feedback loop where one crisis type exacerbates the other over time. Furthermore, various variables emerge as critical determinants of economic crises, both in the short and long term. Notably, factors such as ensuring market liquidity, fostering increased exchange of goods and services, and promoting higher levels of investment significantly diminish the probability of an economic crisis, as revealed by the empirical analyses. The use of dynamic OLS (DOLS) and fully modified OLS (FMOLS) methods to address endogeneity aligns with the methodological advancements advocated by scholars like Al Mamun et al. (2018) and Risso et al. (2013). These techniques contribute to robust estimates of long-term relationships, offering insights into the enduring consequences of financial crises on the real economy.

Table 17 provides a comprehensive overview of the intricate relationships between the financial and economic situations across various models and time horizons. The utilization of discrete measures to delineate crisis situations and distinguish between short- and long-term effects reveals several noteworthy patterns, adding valuable insights to the existing body of literature. The results highlight a robust and immediate impact of experiencing an economic crisis on reducing the probability of a financial crisis, as indicated by the impulse functions. This aligns with behavioral explanations, suggesting that economic downturns diminish speculative incentives, thereby decreasing the likelihood of financial crises (Kindleberger, 1978). The findings underscore a reciprocal influence between financial and economic spheres, shedding light on the bidirectional causality. An economic shock, according to the Impulse Response functions, swiftly and significantly reduces the likelihood of a financial crisis, possibly reflecting a prudent response by economic agents. Conversely, a financial crisis reinforces caution among economic

Table 16. ARDL results.

		Variables	Coef	Prob.*
Pooled Mean Group (PMG) estimates	Dependent variables: Financial crisis probability	Long Run coefficients		
		PrEcoc	-.040	.00
		GDPG	-.006	.01
		CACCT	-.008	.00
		DCG	-.030	.00
		TOTC	.414	.00
		KFLOW	.008	.00
		REER	.003	.00
		RIR	-8E-5	.42
		PR	5E-5	.15
		MONEY	-8E-6	.70
		DEBT	.002	.00
		Err. Corr. Coef.	-.256	.00
		Short Run coefficients		
		D(PrFinc (-1))	-.044	.29
		D(PrFinc (-2))	-.079	.02
		D(PrFinc(-3))	-.010	.62
		D(PrEcoc)	-.062	.03
		D(GDPG)	-.006	.00
		D(CACCT)	-.001	.07
		D(DCG)	-.031	.04
		D(TOTC)	.117	.00
		D(KFLOW)	.002	.07
		D(REER)	.005	.01
		D(RIR)	2E-5	.95
		D(PR)	.003	.37
		D(MONEY)	.004	.48
	D(DEBT)	.004	.05	
Pooled Mean Group (PMG) estimates	Dependent variables: Economic crisis probability	Long run coefficients		
		PrFinc	3.90	.00
		CPS	.004	.00
		M2RES	-.005	.00
		INFL	-.002	.02
		REER	.001	.02
		PR	.001	.34
		TRADE	-.001	.01
		POPG	.235	.00
		GSIZE	.005	.91
		INVEST	-.010	.00
		CACCT	.028	.00
		DCG	1.98	.00
		Err. Corr. Coef.	-.002	.96
		Short run coefficients		
		D(PrEcoc (-1))	-.038	.03
		D(PrEcoc (-2))	-.012	.30
		D(PrFinc)	-.136	.02
		D(CPS)	-5E-5	.94
		D(M2RES)	-.005	.00
		D(INFL)	.001	.62
		D(REER)	-.001	.36
		D(PR)	-.001	.00
		D(TRADE)	-.001	.00
		D(POPG)	-.007	.66
		D(GSIZE)	.005	.00
		D(INVEST)	-.022	.00
	D(CACCT)	.011	.00	
	D(DCG)	-.298	.00	

agents, contributing to a decline in triggering an economic recession, as evidenced by the P-VECM results. The identified bidirectional causality between the financial and economic spheres corroborates findings from studies exploring the feedback loops between these domains (Minsky, 1982). The quick adaptation of economic agents in response to shocks, as reflected in the Impulse Response functions, echoes the notion of a dynamic interplay between financial and real sectors, contributing to the understanding of short-term dynamics (Bernanke & Gertler, 1989).

When transitioning to a continuous measure of crisis likelihood and accounting for endogeneity, the results diverge. It is observed that the likelihood of an economic crisis significantly increases in countries experiencing a financial crisis, emphasizing the interconnectedness of these crises. Moreover, the enduring impact of a financial shock on economic volatility is notable, suggesting a prolonged influence on economic conditions. This aligns with the recognition in the literature of the multifaceted nature of crisis

Table 17. Time varying relationship between various financial crises.

	Discrete analysis						Continuous analysis						
	SE	BMA	P-VECM	Impulse	SE	BMA	P-VECM	Impulse	ARDL	FMOLS	DOLS		
Fcrisis	+ Y	- N	- Y	+Y -y	Fcrisis Ecrcrisis	- Y	Fcrisis Ecrcrisis	+ Y	Fcrisis Ecrcrisis	-Y +Y	Fcrisis Ecrcrisis	+ Y	Fcrisis Ecrcrisis
Ecrcrisis	- N	- Y	+ Y	-y+N	Fcrisis Ecrcrisis	- Y	Fcrisis Ecrcrisis	+Y +Y	Fcrisis Ecrcrisis	-Y -Y	Fcrisis Ecrcrisis	+ Y	Fcrisis Ecrcrisis

SE: Simultaneous equation; Y(N) implies that the effect is (is not) statistically significant at the threshold level.

dynamics (Borio et al., 2001). The consideration of endogeneity in the FMOLS and DOLS models is consistent with recent advancements emphasizing the importance of robust econometric methods to account for potential biases in estimating causal relationships (Stock & Watson, 2018). While some models propose a learning effect for financial officers in countries that have undergone economic crises, the FMOLS and DOLS models, which explicitly consider endogeneity, do not confirm the notion that experiencing an economic crisis reduces the likelihood of a financial crisis in the long run. This nuanced finding highlights the complexity of the relationship and the need for rigorous methodologies that account for endogenous interactions. The nuanced findings regarding the long-term impact highlight the importance of distinguishing between short- and long-term effects, an approach supported by studies emphasizing the persistence of financial and economic shocks (Reinhart & Rogoff, 2009).

The results are in harmony with theoretical literature, notably emphasizing the critical role of the financial system in influencing economic cycles. Insights from scholars like Fisher (1933) and Bernanke (1983) are invoked, emphasizing the two-fold impact of the financial accelerator on the real economy (First, since the borrower's equity is likely procyclical, an additional and persistent source of fluctuation is introduced to a standard real business cycle. Second, exogenous shocks to the borrower's equity can trigger economic fluctuations). The asymmetry of the financial accelerator's effect during economic downturns is particularly emphasized, aligning with the observed sensitivity of the real sphere to financial sector volatility. The invocation of theoretical underpinnings, including the financial accelerator effect, draws on a rich tradition of economic thought (Fisher, 1933; Bernanke, 1983). The emphasis on asymmetry in the financial accelerator effect aligns with research highlighting the varying impact of financial conditions during different phases of the economic cycle (Kiyotaki & Moore, 1997).

The overall conclusion supports a nuanced interdependence and causality between the real and financial spheres. This underscores the interconnected nature of financial and economic spheres, resonating with the literature on systemic risk (Acharya et al., 2010). The sensitivity of the real sphere to financial sector volatility is accentuated, highlighting the adaptability and learning capabilities of financial agents in response to economic crises.

4. Conclusions

The intricate relationship between financial and economic spheres has been a subject of intense scrutiny, especially in the aftermath of the 2008 financial crisis. The study at hand extends the analysis to 49 emerging and developed countries, covering the period 1984–2016, employing various indicators and estimation techniques to unravel the dynamics between financial and economic crises. The findings, summarized below, bear significant policy implications:

The empirical evidence supports a robust causal relationship between financial and economic spheres. However, the nature of this relationship exhibits temporal nuances, with the sign of the relationship varying between short and long terms. This underscores the importance of considering time dynamics when formulating policies aimed at addressing financial and economic challenges.

The study identifies the exchange rate and terms of trade as primary drivers of volatility in financial markets. Understanding these key determinants can guide policymakers in implementing measures to enhance financial market stability. Policies addressing exchange rate fluctuations and terms of trade shocks may prove effective in mitigating financial volatility.

Volatility in the real sector is primarily explained by the exchange rate, private sector credit levels, and financial sphere volatility. Policymakers should consider these factors when designing strategies to stabilize the real economy. Managing exchange rate risks and ensuring a balanced approach to private sector credit may contribute to greater economic resilience.

The study reveals that economic crises tend to be more enduring than financial crises. Policymakers need to factor in this temporal asymmetry when devising crisis management strategies. Measures addressing the prolonged impact of economic crises may require sustained policy interventions and support mechanisms for affected sectors.

One notable finding is the rapid transmission of financial sector difficulties to the real economy, whereas economic problems are swiftly detected by financial market operators. Policymakers should be

attuned to this asymmetry, emphasizing the need for prompt and targeted responses to financial sector challenges to prevent their adverse spillover effects on the broader economy.

Given the observed trade-off between crisis onset and financial sector development, policies should focus on redistributing the benefits of economic development across all segments of society. Inclusive economic policies can help mitigate the adverse social impacts of crises.

Policymakers should ensure that the gains from financial development are accompanied by an effective regulatory framework. This is crucial for preventing financial crises and their subsequent impact on the real economy. Striking a balance between financial development and regulatory oversight is imperative.

The study emphasizes the global dimension of prudential regulation. Policymakers should strengthen international coordination in financial regulation to harness the benefits of globally integrated markets while mitigating the risks that could adversely affect the real economy.

The study highlights the importance of learning from the subprime crisis. Policymakers need to carefully implement financial reforms, incorporating lessons from past crises to avoid similar pitfalls. Coordination between macroeconomic and financial policies is paramount for effective crisis mitigation.

Acknowledging the limitations related to the use of annual data, future research could explore more granular data to enhance precision. Additionally, considering the evolving nature of the global economic landscape, periodic updates and expansions of the dataset may provide valuable insights into changing dynamics.

In conclusion, the study's findings offer valuable insights for policymakers navigating the complex terrain of financial and economic interdependence. Crafting policies that address the identified drivers of crises, recognizing temporal dynamics, and fostering global cooperation can contribute to building resilient and sustainable economies in the face of evolving challenges.

Notes

1. The premium is linked to the additional costs incurred by the creditors to control and verify the results obtained and declared by the borrower.
2. The result of information asymmetry is moral hazard, a situation in which the gain to lenders from a project depends on actions taken by borrowers after the project is initiated and where there is a conflict of interest between lenders and borrowers.
3. For more details on this method see Babecký et al. (2014).
4. Babecký et al. (2014) highlight limits of applying VAR model with dummy variables which explains our choice to go to continuous analysis.
5. The significance of each regressor is weak, positive, or decisive if the PIP lies between 0.5 and 0.75; 0.75 and 0.95; 0.95 and 0.99 or 0.99 and 1, respectively.
6. We implicitly assumed that the financial crisis indicators are the same for developed and emerging countries since the probabilities are calculated using the results of the regression of the overall sample.
7. Similarly, for economic crisis model.
8. Before running regression we test for unit root and cointegration. Our results show that all the series are I (1) and not I (2) which permit performing a cointegration test to establish a potential long run relationship. As made previously we confirm possible cointegration of our series.
9. We supported this type of conclusion based on impulses responses functions (the nature of reaction) that are not presented here.
10. Guidelines for this test: H_0 : panels contain unit Root; H_a : panels are stationary. If p -value is small than 5%, we can reject H_0 meaning that we accept alternative hypothesis such as panels are stationary.
11. LTIE: Long Term Individual Effect.
12. Although this variable is significant in explaining financial crisis, we cannot introduce it into our analysis given that it is binary and we cannot affirm its stationarity of order 1.
13. Null Hypothesis: variable in the line does not Granger Cause variable in the column.
14. Peru (1990).
15. Venezuela (2016).
16. Russia (1992).
17. Argentina (1989).
18. Government Stability (12); Socioeconomic Conditions (12); Investment Profile (12); Internal Conflict (12); External Conflict (12); Corruption (6); Military in Politics (6); Religious Tensions (6); Law and Order (6); Ethnic Tensions (6); Democratic Accountability (6); Bureaucracy Quality (4).

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Appendix A

Table A1. Financial system structure and crises dating (1984–2016).

Country		Banking	Currency	Sovereign	Country		Banking	Currency	Sovereign
		Developed					Emerging		
	Financial structure					Financial structure			
Australia	Market				Argentina	Bank	2001	1987, 2002, 2013	2014
Austria	Bank	2008			Brazil	Market	1990, 1994	1987, 1992, 1999, 2015	
Belgium	Bank	2008			Chile	Market			
Canada	Market				China	Bank	1998		
Denmark	Market	2008			Colombia	Bank	1998	1985	
Finland	Bank	1991	1993		Czech Republic	Bank	1996		
France	Bank	2008			Egypt	Market		1990, 2016	1984
Germany	Bank	2008			Hong Kong	Market			
Greece	Market	2008		2012	Hungary	Bank	1991, 2008		
Ireland	Market	2008			India	Bank	1993		
Israel	Bank		1985		Indonesia	Bank	1997	1979, 1998	1999
Italy	Bank	2008			Korea	Market	1997	1998	
Japan	Bank	1997			Malaysia	Bank	1997	1998	
Netherlands	Market	2008			Mexico	Market	1994	1995	
New Zealand	Bank		1984		Morocco	Bank			
Norway	Market	1991			Pakistan	Bank			
Portugal	Bank	2008			Peru	Market		1988	
Spain	Market	2008			Philippines	Market	1997	1998	
Sweden	Market	1991, 2008	1993		Poland	Market	1992		
Switzerland	Bank	2008			Russia	Market	1998, 2008	1998, 2014	1998
United Kingdom	Market	2007			Singapore	Market			
United States	Market	1988, 2007			South Africa	Market		1984, 2015	1985
					Sri Lanka	Bank	1989		
					Thailand	Market	1997	1998	
					Tunisia	Bank	1991		
					Turkey	Market	2000	1984, 1991, 1996, 2001	
					Venezuela	Bank	1994	1984, 1989, 1994, 2002, 2010	2015

Source: Authors' development based on Laeven and Valencia (2020).

Table A2. Data description.

Variables	obs	Mean	Std. Dev	Min	Max	Descriptions	Sources
Dependent variables							
Economic crisis	1617	.505	.5001	0	1	A binary variable taking the value 1 in the year of economic recession and 0 otherwise. To construct this variable we used the Hodrick-Prescott filter to separate cyclical component from tendency and considered as recession when the difference between tendency and actual GDP is negative.	Authors (WDI)
Precoc	1617	.505	.154	.028	.952	Probability of economic crisis computed based on estimated parameters by logit model	Authors
Financial crisis	1617	.0507	.219	0	1	A binary variable taking the value 1 when there is banking, currency of debt crisis and 0 otherwise	Laeven and Valencia (2020)
PrFinc	1617	.050	.0844	.0004	.999	Probability of financial crisis based on logit estimations of models parameters	Authors
Independent variables							
Determinant of financial crisis							
FL	1617	.782	1.576	-1.91	2.35	It refers to capital account openness based as a measure of external financial liberalization	Chinn & Ito, 2008, 2014 updated in 2018
GDPG	1617	3.22	3.77	-14.5	25.1	GDP growth (annual%)	WDI
CACCT	1617	.164	5.15	-14.4	25.9	Current Account Balance (%GDP)	WDI
DCG	1617	.026	.155	-6.70	2.87	Growth rate of domestic credit to the private sector	WDI
CPSB	1617	70.3	43.3	6.884	214.2	CPS: credit to the private sector by banks (% of GDP)	WDI
TOTC	1617	.004	.096	-4.35	1.14	Terms of trade change	WDI
KFLOW	1617	6.21	12.5	-34.9	156.9	Capital flow measured by foreign direct investment net inflows and outflows(%GDP)	WDI
M2RES	1617	13.3	18.5	.849	106.4	Broad money to total reserves ratio	WDI
INF	1617	27.3	226.8	-8.71	6261.2 ¹⁴	Inflation, GDP deflator (annual %)	WDI
REER	1617	99.9	30.47	20.2	740.6 ¹⁵	Real effective exchange rate index (2010 = 100)	Darvas (2012) and WDI
RIR	1617	26.7	502.2	-1322.3 ¹⁶	14178.1 ¹⁷	Real lending Interest rate (%)	WDI and IFS
PREG	1617	.760	.426	0	1	Political regime quality it corresponds to a Dummy variable taking the value 0 if the country is autocratic and 1 if it is democratic	Anckar and Fredriksson
GDPC	1617	22447.3	19510.4	470.9	91617.2	GDP per capita (constant 2010 US\$)	WDI

(Continued)

Table A2. Continued.

Variables	obs	Mean	Std. Dev	Min	Max	Descriptions	Sources
DINS	1617	.720	.448		1	A dummy variable equals one if the country adopt an explicit deposit insurance and zero otherwise	Demirgüç-Kunt et al. (2014)
PR ¹⁸	1617	70.9	15.9	0	97	A synthetic index measuring country's political risk as a proxy for governance quality. It contains 12 subcomponents and ranges between 0 and 100 where the higher score points equates to Very Low Risk (high quality of governance and a score of 0 points to Very High Risk (or bad governance quality).	International Country Risk Guide
TRADE	1617	75.6	62.9	12.2	442.6	The sum of imports of goods and services and exports of goods and services (% of GDP)	WDI
Money	1617	74.8	51.6	1.82	376.5	Broad money (% of GDP)	WDI
Debt	1617	53.2	34.3	1.84	425.7	Central government debt, total (% of GDP)	WDI
FISCAL	1617	74.8	8.04	45.2	95.3	Fiscal balance corresponding to final consumption expenditure containing private and public spending (% of GDP)	WDI
Determinants of economic crisis							
FL	–	–	–	–	–	–	–
CPS	1617	75.080	47.446	8.333	233.2	Domestic credit to private sector (% of GDP)	WDI
M2RES	–	–	–	–	–	–	–
INF	–	–	–	–	–	–	–
REER	–	–	–	–	–	–	–
PREG	–	–	–	–	–	–	–
PR	–	–	–	–	–	–	–
TRADE	–	–	–	–	–	–	–
POPG	1617	1.02	.829	–1.85	6.01	Population growth (annual %)	WDI
GSIZE	1617	16.2	5.00	2.97	34.3	General government final consumption expenditure (% of GDP)	WDI
INVEST	1617	24.0	5.52	9.88	47.8	Share of private investment to GDP [Gross capital formation (% of GDP)]	WDI
SCHOOL	1617	90.3	25.3	18.7	163.9	School enrollment, secondary (% net)	WDI
CACCT	–	–	–	–	–	–	–
DCG	–	–	–	–	–	–	–