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Mediating Role of Financial Development in Association between Economic Policy Uncertainty and Household Financial Vulnerability: Insights from Upper- and Middle-Income Countries

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A B S T R A C T

Purpose—The study examines the impact of economic policy uncertainty (EPU) on Household Financial Vulnerability (HFV) and examines how financial inclusion (FIN), financial efficiency (FE), financial stability (FS), and financial depth (FDP) mediate this relationship.
Study Design/methodology/approach— A composite HFV index is developed using Principal Component Analysis (PCA) to evaluate the differential effect of EPU on HFV. The two-step System Generalized Method of Moments (GMM) estimator estimates the impact of EPU on HFV across a panel of 28 upper- and middle-income countries (UIC and MICs) from 2000 to 2021. Panel Structural Vector Auto-Regressive Model (PSVAR) validates the robustness of the estimation results. The bootstrap test assesses the indirect effects of financial development (FDV).
Findings—The findings reveal that EPU is a key driver of HFV, and the differential analysis reveals that MICs are more vulnerable to EPU. All dimensions of FDV buffers households against EPU while partially mediating EPU's effects on HFV, although the strength of this transmission differs across country groups. The Mediation path is broader in MICs, and FE fully mediates the impact of EPU in MICs. The mediation path is narrow in UICs where FS and FE significantly mediate the impact of EPU on HFV, while FIN and FDP do not confirm a significant mediation path.
Practical Implications—Theoretically, the study provides a comprehensive understanding of existing consumer behavior models under uncertainty, particularly across countries at different levels of economic and financial development. It offers policymakers valuable insights for formulating and evaluating targeted programs to improve household well-being through a resilient financial infrastructure. The study provides practical guidance for households to mitigate risks associated with policy uncertainty and to enhance understanding of household financial management.
Originality/Value— First, the study contributes contextually by examining the differential impact of EPU on HFV across MICs and UICs. Secondly, the study explores the transmission pathways of EPU by considering the mediating effects of different dimensions of FDV on the relationship between EPU and HFV. The heterogeneity analysis increases the credibility of the research by showing that the EPU–HFV nexus structurally depends on the level of economic and financial development rather than being uniform across economies.

Keywords: Economic policy uncertainty; Household Financial Vulnerability; Financial inclusion; Financial efficiency; Financial stability; Financial depth

JEL Classification Codes: C21, D12, D80, E32, G51

1 | INTRODUCTION

Following the impact of the global financial crisis, households have become increasingly vulnerable to financial fragility. Households may face adverse financial consequences, particularly if they earn low wages, resulting in low savings, or continue to finance their increased spending through credit obtained from financial institutions. It is even more complicated to plan for threats, for instance, EPU1, which the household has no control over. The increased vulnerability underscores and addresses the causes and implications of HFV, a topic that has prompted significant engagement in recent years. EPU, driven by the global financial crisis 2007-08, geopolitical tensions, energy crisis, and the global health pandemic COVID-19, has adversely affected the economic environment (Sharif et al., 2020). During high EPU, it becomes progressively harder for lenders to control the credit risks, which hampers credit flow to the household sector. The rising cost of basic economic services impacts individuals and households with limited income (Nguyen et al., 2020).

Considering the empirical literature on the impacts of EPU, several studies find that it undermines the expectations of economic agents, such as consumers and investors (Ghirelli et al., 2019; Nagar et al., 2019). In simpler terms, when people and businesses cannot predict future economic policies, it becomes harder for economic agents to make decisions. While governments make decisions on trade policies, taxation, fiscal stimulus, and central bank actions, uncertainty about these decisions creates challenges for businesses, households, and policymakers alike. The lack of clarity regarding future policies can lead to financial fragility.

In contrast, FDV helps in consumption smoothly by reducing liquidity constraints and reducing the financial vulnerability of households. Specifically, development in digital finance significantly reduces HFV (Hu et al., 2024; Xu et al., 2024). Financial inclusion (FIN) is viewed as the most effective approach to extend financial services, and access to credit cards reduces the risks associated with unemployment, income, and health (Chen et al., 2022). Yet sometimes gains from financial access can be obtained at a risk of financial stability (Barik & Pradhan, 2021; Qiu et al., 2025). Also, changes in household lifestyles and limited financial capacity increase the risk of over-indebtedness (Fernández-López et al., 2023). Similarly, technological shifts toward a cashless economy and easier access to credit have increased the risk of HFV due to over-consumption and over-indebtedness (Seldal & Nyhus, 2022; Verma & Chatterjee, 2025).

With an array of convincing arguments in favor of the positive role of FDV in household well-being, previous empirical investigations on the association between FDV and HFV also report contradictory evidence across different levels and dimensions of FDV. Certainly, the recent literature highlights various factors affecting the direct relationship between HFV and FDV. For instance, Álvarez-Espiño et al. (2026) highlight the levels of economic development, financial literacy, and consumer protection laws as co-factors determining the final output. Additionally, existing research primarily focuses on FIN as a determinant of HFV, while there is insufficient literature linking HFV to the stability, efficiency, and depth of the financial sector.

[1] According to Al-Thaqeb & Algharabali (2022), EPU is a perceived risk in which government policies and regulatory frameworks lack clarity in the foreseeable future.

From a theoretical perspective, Minsky (1975) clearly points towards the inherent financial fragility of capitalist economies, where any economic shock can endanger the financial stability of households. Bringing theoretical insights from the Efficient Market Hypothesis (EMH) (Fama, 1970) into the model suggests that when uncertainty rises, financial markets reprice risk efficiently, and this repricing is transmitted to households through the financial system. Thus, households become vulnerable not because markets fail to process information, but because the consequences of efficiently priced uncertainty are unevenly distributed across households. Those with low income, weak financial literacy, limited savings, or higher indebtedness are less able to absorb such shocks. Bernanke (1983); Bernanke et al. (1994) argue and empirically find that during periods of high uncertainty, economies may face significant amplification of shocks due to high-leveraged financial infrastructure. Consequently, a constrained credit supply and misallocation of financial resources may increase the likelihood that households will fall into a difficult financial situation.

When a question arises: what determines the capability of FDV in reducing the financial well-being of households? The presence of an intricate scientific network of economic theories and contradictory empirical evidence indicates a missing channel through which households may be at potential risk even after having access to finance. One of the channels can be informational asymmetry, in our case, policy uncertainty, which may induce HFV. For instance, during periods of elevated policy uncertainty, interest rates on loans and credit cards may rise as basic financial services become more expensive, putting strain on low-paid individuals and households and potentially forcing them out of the financial system (Phan et al., 2021). Our interest in this topic began with investigating this very important question and exploring the transmission of informational asymmetry through financial institutions and markets through a more consolidated framework.

Despite the growing literature on HFV, important gaps remain in explaining how EPU affects HFV outcomes. Existing research generally adopts a fragmented approach. On the one hand, a few studies examine EPU as a direct determinant of HFV, for example, Zhang and Ling (2024) and Sun and Li (2026). On the other hand, another strand of literature focuses on the role of FDV as an independent driver of HFV (Yan et al., 2025; Zhang & Zhang, 2026). While these studies provide useful insights, they do not explain the integrated transmission process through which policy uncertainty may first affect the financial system and then shape household financial behavior. Particularly, EPU may not influence HFV directly or uniformly; rather, its effect may critically depend on the condition of FDV, through which uncertainty is transmitted to households. However, empirical literature has largely overlooked the mediating role of FDV in the relationship between EPU and HFV. Ideally, such an integrated approach can reveal the transmission of uncertainty in economic policies, leading to deterioration in the financial system and, in turn, household financial behavior. In sum, EPU does not univocally affect HFV; it critically depends on FDV, through which policy uncertainty is transmitted to households. However, the related empirical literature fails to consider the mediating role of FDV in explaining the relationship between EPU and HFV.

A second gap concerns the limited theoretical integration in existing literature. Although theories such as the life-cycle theory, Minsky's financial instability hypothesis, and information asymmetry theory each provide important insights into household financial behavior, they have rarely been combined into a unified analytical framework. As a result, prior studies do not adequately explain how policy uncertainty weakens financial institutions' ability to support households, thereby increasing HFV. In addition, the perspective of

institutional economics suggests that the effectiveness of FDV depends on the quality of institutional infrastructure, yet this insight has not been sufficiently incorporated into a consolidated transmission framework. Therefore, literature lacks a comprehensive conceptual model linking EPU, FDV, institutional conditions, and HFV.

A third gap is related to the contextual heterogeneity across countries. The existing literature is mainly divided between studies conducted in developed economies (Midões & Seré, 2022; O'Connor et al., 2019) and those focusing on developing economies (Singh & Malik, 2022; Yao et al., 2025). However, limited attention has been paid to whether the response of HFV to EPU shocks differs across economies with different levels of economic and financial development. This is an important omission because FDV is fundamentally an institutional process, and its outcomes vary according to the quality of institutions and the stage of economic development. As FDV is an institutional process, a theoretical perspective of institutional economics indicates that the quality of institutional infrastructure matters in shaping the FDV outcomes. Therefore, a contextual differentiation may help in understanding the dynamics of the effects of FDV on HFV across different levels of economic development. Hence, the literature remains incomplete in explaining how the EPU–FDV–HFV relationship may differ across contexts. Addressing this gap can provide a more nuanced understanding of household financial behavior under uncertainty and produce evidence more relevant to cross-country policy design.

This study contributes to the existing literature from theoretical, empirical, and methodological perspectives. Theoretically, a unified framework of theories linking EPU, FDV, and HFV explains how policy uncertainty is transmitted through the financial system to households. Empirically, the mediating roles of financial mediators, namely financial inclusion, financial efficiency (FE), financial stability (FS), and financial depth (FDP) in the EPU–HFV relationship across MICs and UICs add a comparative cross-country dimension to the existing body of knowledge. The study is arranged into five different sections. Section one presents the introduction. Section 2 reviews past studies. Section 3 explains the data and empirical framework. The study's findings are discussed in Section 4. The final section concludes the paper.

2 | LITERATURE REVIEW

2.1 | EPU and HFV

Economic paradigms of the 19th century were based on the assumptions of the perfect market, where economic agents possess full knowledge about all economic implications. It is assumed that the economic environment will remain static in the absence of any human-induced change. Like other laws of nature, economic laws govern laissez-faire philosophy, where all economic agents make choices with the highest payoffs. In the twentieth century, probabilistic risk premiums were referred to as certainty equivalents for the assumption of perfect knowledge.

Knight (1921) distinguished between uncertainty and probabilistic risk, understanding the former as not calculable or insurable, while the latter is both calculable and insurable. Keynes (1937) argued that, knowing the future is uncertain, establishing calculable probability has no scientific ground. His concept of uncertainty implies that the future is unpredictable, so that future outcomes can change due to the decisions taken by

economic agents. Following, Hicks (1977) argued that economic models should represent agents as decision-makers who lack knowledge of future outcomes and are fully aware of this limitation. Davidson later extended this insight within a Post Keynesian framework, interpreting it as a basis for understanding uncertainty in a non-ergodic economic environment (Davidson, 1982). Muth (1961) explained that the expectations depend on the framework of the entire economic system and that the economic system does not waste information. The theory of rational expectation presented by Lucas Jr (1972), where the decision of economic agents based on a subjective probability distribution is considered as an equivalent of an objective probability distribution. The new classical school of thought, based on rational expectations, interpreted the uncertainty as synonymous with the objective probability distribution that ought to rule the future but is known to all individuals at present.

There is no definitive definition of HFV in the available literature. However, different researchers have defined HFV differently. Noerhidajati et al. (2021) associate HFV with the poverty of assets or lower wealth accumulation, leading to the inability to cope with unexpected situations such as unemployment, illness, or housing-related expenses. At the same time, Abd Abd Samad et al. (2020) relate HFV to debt level, household disposable income, household savings, and macroeconomic factors, including inflation, interest rates, unemployment rates, as well as the working-age and retirement age of the population. Although these definitions differ in emphasis, they converge on a central idea: that households become vulnerable when they lack the financial capacity to absorb unexpected disturbances.

The effects of EPU and HFV can be understood through the Life-Cycle Hypothesis (Ando & Modigliani, 1963), which posits that consumers borrow to finance consumption based on their anticipated future income, increasing their vulnerability over time if high-income expectations are not met. When policy uncertainty increases, those expectations become less reliable, making intertemporal financial planning more fragile.Biju and Tantia (2024) support this view by empirically showing that it often emerges when income and expenditure become difficult to balance, especially among households in MICs. The study finds that in middle-income households, financial difficulties in balancing income and expenditures are the primary source of HFV.

Lawrence (1995) further extends the life-cycle reasoning by illustrating how the potential for default affects consumption quantity, its income sensitivity, and the borrowing constraints that are likely to emerge. Default risk leads to significant deviations from the standard model in life-cycle consumption. First, defaulting while income is low allows individuals to borrow against an uncertain future. The optimal spending and debt levels exceed those predicted by the traditional life cycle model. Secondly, an increase in the probability of default raises the marginal propensity to consume, leading to a concerning rise in HFV. Therefore, even though borrowers may not be subject to any quantity limits, the behavior of extremely high-risk borrowers closely matches that of liquidity-constrained borrowers. Thirdly, non-convex preferences increase the likelihood of "switchovers" between saving and borrowing, and vice versa. However, this tendency may have adverse consequences for their finances, particularly if they earn low wages, resulting in low savings, or continue to finance their increased spending through credit obtained from financial institutions. It is even more complicated to plan for risks, such as EPU, over which the household has no control.

A related argument emerges from real option theory. Myers (1977) and Bernanke (1983) show that uncertainty creates incentives to delay investment and spending decisions because economic agents place

value on waiting when future conditions are unclear. Although this argument was developed mainly for firms, its logic applies to households as well. While EPU rises, businesses may delay or scale back investment decisions due to perceived risks from uncertain policy shifts. The interpretation of real option literature (Bernanke, 1983) is reinforced by Bloom (2014) and Baker et al. (2016), who empirically show that EPU causes labor market contractions and wage uncertainty. Similarly, Gu et al. (2022) identify the investment-employment channel through which EPU impacts household fragility, while Pástor and Veronesi (2013) find that EPU causes financial market volatility and worsens household expectations, thereby influencing portfolio choices for liquid assets.

Recent empirical evidence confirms that EPU worsens household financial conditions. For instance, Zhang and Ling (2024) find that EPU yields income-consumption imbalances, potentially making a household vulnerable through its effects on investment and consumption decisions. In a similar vein, Choudhry and Wohar (2024) add that EPU adversely affects consumer confidence and household consumption. Sun and Li (2026) similarly find that EPU significantly increases HFV by weakening income and employment conditions.

While this literature is persuasive, it remains incomplete. Most existing studies establish that EPU harms households, but they treat this relationship largely as a direct one. As a result, they offer a limited explanation of the institutional and financial pathways through which uncertainty reaches household balance sheets. This is an important omission, because households do not experience policy uncertainty in abstraction; they experience it through credit conditions, financial access, borrowing costs, and changes in the stability of the financial system.

2.2 | FDV and HFV

The second major theme in the literature concerns whether FDV mitigates or amplifies HFV. In principle, stronger financial systems should reduce vulnerability by widening access to formal finance, improving intermediation, lowering borrowing constraints, and enabling households to manage risk more effectively. However, the literature also suggests that the effect of FDV is not uniform across all its dimensions, making a disaggregated analysis necessary.

A vast body of knowledge empirically asserts that FDV plays a positive role in household financial management. The strongest evidence concerns financial inclusion. According to Qian et al. (2025), FIN reduces credit constraints, promotes entrepreneurship, and increases risky asset holdings, thereby decreasing HFV, and Yan et al. (2025) reach a similar conclusion by showing that access to finance allows optimal allocation of household assets, risk transfer through commercial insurance, income structure, and debt management, and enhances the allocative efficiency of household assets, thereby reducing their financial vulnerability. Bruhn and Love (2014) and Azam Khan (2025) also report that better access to formal finance improves household financial outcomes by easing liquidity pressures and expanding economic opportunity. Taken together, these studies suggest that financial inclusion lowers HFV by helping households to smooth consumption and respond more effectively to shocks. Xu et al. (2024) also show that broader financial access helps in reducing household poverty.

Nevertheless, the relationship between FIN and HFV is not uniformly beneficial. Another strand of literature shows that access to finance may result in over-indebtedness. Schicks (2014) finds substantial over-

indebtedness among micro borrowers in Ghana. Yue et al. (2025) and Wang and Chen (2025), for example, show that digital finance broadens credit market participation and household borrowing, but also raises the risk of households falling into a debt trap. Similarly, Sezer et al. (2025) find a nonlinear relationship between FIN and household debt in low- and lower-middle-income countries, reporting that beyond a certain threshold, greater financial inclusion is associated with higher borrowing and possible over-indebtedness. Evidence from microfinance points in the same direction. Zhai et al. (2026) report that access to finance may increase HFV, especially when it increases more than the household's repayment capacity. A critical synthesis of existing literature presents that although FIN is a protective barrier for households, a competing strand of knowledge also suggests it may increase financial stress.

The literature also highlights the role of financial depth. Magwedere and Marozva (2022) and Pasuhuk (2018) find that deeper financial systems reduce poverty and increase households' financial capability. Emara (2025) reports that, with an increase in FDP, domestic savings increase; however, marginal effects indicate that they decline after a certain threshold. A growing literature suggests that deeper financial systems can also increase vulnerability when financial expansion is driven by rapid credit growth, excessive leverage, or weak regulatory oversight. Sahay et al. (2015) argue that a faster pace of financial deepening is associated with a greater risk of crisis and macroeconomic instability, implying that the benefits of deeper finance may be offset when expansion outpaces institutional quality and supervision. In a similar vein, Zabai (2017) shows that financial deepening has a tipping point: once aggregate credit reaches very high levels, its relationship with long-run growth turns negative, while high household debt also raises macroeconomic and financial stability concerns. Abd Samad et al. (2020) and Ekinci and Omay (2020) show that FDP is associated with indebtedness and causes households to experience repayment stress, balance-sheet fragility, and greater sensitivity to shocks.

Following the discussion on FIN and FDP, it is equally important to consider FE and FS in shaping HFV. There is limited literature directly linking FE or FS to HFV; however, mainstream literature focuses on a collective measure of FDV. From an allocative-efficiency perspective, a more efficient financial system should reduce HFV by directing credit toward viable borrowers, lowering misallocation, and improving households' access to appropriately priced financial products. Gao (2024) documents that optimizing asset allocation and financial regulation alleviates HFV. For instance, cross-country evidence by Nguyen et al. (2020) shows that FDV, including the FE dimension, is associated with lower economic vulnerability overall. However, they also document a U-shaped relationship, implying that the benefits weaken and may reverse beyond certain thresholds.

FS measures the ability of the financial system to absorb shocks. When banks face instability, they tighten lending standards, reduce loan supply, increase borrowing costs, constrain household spending and investment (Bernanke et al., 1994). A stable financial system limits disruptions to credit flows, reduces transaction costs, and supports risk-sharing mechanisms that, in theory, cushion households from income shocks (Allen & Gale, 2000). Mian and Sufi (2018) demonstrate how asset price booms in unstable financial environments can mask latent vulnerabilities that later translate into severe declines in consumption and investment. Ernst (2019) shows that prudent regulations stabilize unemployment inflows and expand household insolvency risk. Conversely, Ozili and Arun (2023) finds FS and FIN effective only at certain thresholds. Heightened capital

adequacy ratio puts constraints on the credit available to households, reducing economic growth and employment opportunities for households.

Thus, literature supports the broad expectation that FDV lowers HFV, but it also indicates that the effect depends on the quality and composition of FDV rather than on scale alone.

2.3 | EPU and FDV

A third body of knowledge considers the effect of EPU on financial sector functioning. The expectation is that higher EPU weakens financial development by increasing risk perception, discouraging lending and investment, and impairing the stability and efficiency of financial intermediation. However, the literature also suggests that the effect is not identical across all components of FDV. The impact of policy uncertainty can be explained from the theoretical lens of Diamond and Dybvig (1983), who demonstrate that panicked depositors anticipating a banking failure withdraw their deposits, which may cause a banking crisis. Particularly, when uncertainty increases, there are chances of bankruptcy of both financial institutions and corporate firms. This is truer for small and medium-sized enterprises, as they do not have enough capital and other capabilities to absorb the negative shocks. As a result, banks prefer to refrain from extending loans and other credit facilities to business firms during uncertain times, hindering the process of economic development and growth in the economy (Greenwald & Stiglitz, 1990). Thus, EPU hampers the allocative efficiency of the system by generating financial friction, which is responsible for the misallocation of resources, thus causing a decline in total factor productivity (Wang et al., 2021).

In reaction to high EPU, financial institutions raise interest rates, experience liquidity shortages, and limit credit supply, which may raise interest rates on credit cards and loans by imposing excessive charges for trivial services, in periods of high EPU (Bordo et al., 2016; García-Kuhnert et al., 2015). The rising cost of basic economic services impacts individuals and households with limited income, according to Syed et al. (2024). In addition, these impacts possibly influence the instigations of financial institutions to provide essential financial services to low-end consumer households. Loan availability decreases during periods of higher economic uncertainty as banks limit lending to risky customers (Barraza & Civelli, 2020). Karaömer (2024) and Bilal et al. (2025) report the adverse effect of EPU on stock market returns.

At the banking level, the findings of Ashraf and Shen (2019) suggest that EPU is a financially significant risk factor that banks should consider before setting loan pricing. The banks reprice loans in high EPU by raising the interest rates. Likewise, Ali et al. (2023); Nguyen et al. (2020), argue that EPU restrains credit growth, with the differential impact more unfavorable in developing economies than in their developed counterparts. The destabilizing role of EPU is also evident in broader financial conditions. For instance, according to (Phan et al., 2021), the influence of EPU on FS is greater in economies with weaker regulatory capital and a smaller financial system. In a seminal study, Danisman and Tarazi (2024) argue that EPU increases the volatility of deposit rates and decreases both risk-adjusted capitalization and risk-adjusted profitability.

In contrast, a few studies document that EPU can have positive effects on financial sectors under specific conditions. For instance, Ozili and Arun (2023) report a favorable influence of EPU on FE in some countries, specifically in Asia and America, as these regions report high return on equity during elevated EPU. This

finding can be rational as during periods of increased uncertainty, banks and other financial institutions become more cautious and invest only when there is a higher rate of returns, which positively affects their stability and efficiency, document that EPU.

Although these studies point predominantly toward a negative relationship between EPU and FDV, the evidence is not entirely uniform. Some financial dimensions may respond more strongly than others, and the sign or intensity of the relationship may differ across country groups and institutional settings. This helps explain why literature sometimes reports mixed findings. Rather than treating such variation as a contradiction alone, it is more analytically useful to interpret it as evidence that the EPU–FDV relationship is context-sensitive and dimension-specific. This makes it necessary to examine the separate mediating roles of FIN, FS, FE, and FDP instead of assuming a single, identical transmission channel.

2.4 | The Missing Link: FDV as the Transmission Mechanism between EPU and HFV

The main limitation of the existing literature is that it examines the three relationships discussed above mostly in isolation. One stream studies EPU and HFV, another studies FDV and HFV, and a third considers EPU and FDV. What remains underdeveloped is a unified framework explaining how policy uncertainty is transmitted through financial development to affect HFV. The link between EPU-FDV-HFV (the missing link highlighted by the present study) can be explained by prospect theory (Kahneman & Tversky, 1979) and precautionary savings theory (Leland, 1968). These theories collectively suggest that households are more sensitive to losses than to equivalent gains, prefer liquidity, and may make suboptimal financial decisions under uncertainty. Mian and Sufi (2018) extend this logic by showing that EPU serves as a shock to credit-driven households, where a collapse in credit supply triggers a business cycle bust and amplifies household fragility.

Minsky's financial fragility hypothesis provides a stronger macro-financial explanation of the transmission process. Minsky (1975) disentangles the inherent fragility of highly leveraged economies to suffer greatly from an external threat (EPU, in our case) due to over indebtedness. Households may engage in Ponzi finance due to liquidity constraints and a reduction in the borrower's net worth, as a possible effect of EPU. This interpretation aligns with Bernanke and Gertler (1986), who argue that financial friction creates allocative inefficiency by raising the external finance premium and reducing borrowers' net worth, resulting in high agency costs for borrowers. (Gilchrist et al., 2014) support the argument by asserting that the risk premium effect may reduce firms' expected profitability, thereby increasing their perceived riskiness, adversely affecting borrowers. The efficient market hypothesis also helps in understanding how uncertainty disrupts the normal flow of information and leads to allocative inefficiency in financial markets, further limiting the effectiveness of financial markets in supporting households (Fama, 1970).

Causal logic is therefore stronger when framed as a mediated process rather than as a simple direct association. Policy uncertainty can impair FIN by tightening credit access, reducing FE through mispricing and friction, weakening FS through heightened systemic risk, and altering FDP by constraining the scale and quality of intermediation. These changes then affect households through borrowing costs, credit availability, savings incentives, and asset allocation. FDV is thus not just another determinant of HFV; it is the institutional channel through which macro-level uncertainty is transmitted to household-level outcomes. Importantly, theories of economics and behavioral finance, along with empirical literature, testify to the presence of an

association between HFV-EPU and HFV-EPU. There is also evidence of heterogeneity in HFV behavior across specific thresholds, leading to differential impacts on high- and low-end households. Based on this evidence, we construct the hypothesis in the section below.

The first expectation is that when policy conditions are unstable, households face weaker employment prospects, more uncertain income streams, lower confidence, and more fragile consumption and borrowing decisions. Accordingly, we formulate the following hypothesis.

H1: *EPU increases HFV in the upper and middle-income economies.*

The theory and evidence suggest that EPU is likely to weaken financial inclusion, financial efficiency, financial stability, and financial depth by increasing risk, restraining credit growth, and worsening financial conditions. At the same time, the literature indicates that this effect may vary in magnitude across dimensions and contexts. The hypothesis, therefore, reflects the dominant expected direction while allowing for empirical heterogeneity.

H2: *Economic policy uncertainty negatively impacts financial inclusion, financial efficiency, financial stability, and financial depth across upper- and middle-income economies.*

When the financial system is more inclusive, efficient, stable, and deep, households are better able to access credit, smooth shocks, manage debt, and allocate resources. Therefore:

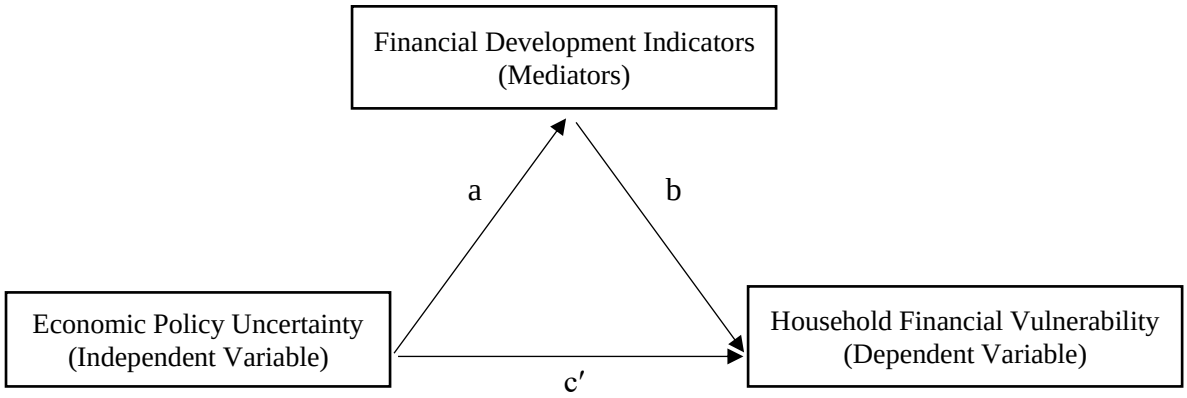
H3: *Financial inclusion, financial efficiency, financial stability, and financial depth negatively affect household financial vulnerability across upper- and middle-income economies.*

Because H_2 links EPU to FDV and H_3 links FDV to HFV, a mediation pathway logically follows. The dimensions of FDV are therefore expected to transmit at least part of the effect of policy uncertainty onto HFV.

H4: *Financial inclusion, financial efficiency, financial stability, and financial depth mediate the relationship between economic policy uncertainty and household financial vulnerability across middle-income and upper-income economies.*

Figure 1

Conceptual Framework of the mediating effect between EPU and HFV



3 | METHODOLOGY & DESIGN

3.1 | Construction of Indices

The study employs a "Two-Stage PCA Methodology" to construct the indices used to estimate the impact of EPU on HFV. The PCA is one of the well-accepted and commonly used data reduction statistical techniques, and it is considered a very effective method for multivariate analysis and to endogenously determine the weight of each indicator included in the construction of an index. It uncovers the latent structure of the underlying data by transforming correlated variables into a set of orthogonal components (not correlated with each other). This technique is based on the eigen decomposition of the covariance matrix. In this method, a new variable is generated algebraically and geometrically without losing any essential information. Pearson (1901) introduced the PCA using simple linear algebra to transform the high-dimensional correlated data into uncorrelated components.

Before proceeding, we perform the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of sphericity to diagnose sampling adequacy and determine whether the correlation matrix is an identity matrix or if there is intercorrelation among the variables (Zhang et al., 2024). Further, we adopt Kaiser's criteria to select components with eigenvalues greater than 1 (Kaiser, 1960). This criterion is one of the popular methods and has been used by several past empirical studies (Bonanno et al., 2025). Secondly, we use (Benzécri, 1979), which suggests the cumulative variance criterion to select the number of components. Specifically, we retain the components that cumulatively explain 70 % of the variation in the underlying. This method is also supported by empirical literature (Pricop & Diaconu, 2025).

A z-score normalization method is used to standardize the variables to facilitate panel data. This widely used standardization method normalizes indicators by subtracting the mean and dividing by the standard deviation, following Inyang et al. (2020). Standardization using z-score normalization is constructed as follows.

$$Z_{it} = \frac{X_{it} - \bar{X}}{\sigma}$$

where,

$Xit - \bar{X}$= The difference between the data point and the mean value

σ = Standard deviation

The following is the empirical equation to construct the HFV index,

$$\mathrm{HFVI_{it}} = \mathrm{W_1 HHDI_{it}} + \mathrm{W_2 HHDL_{it}} + \mathrm{W_3 WAP_{it}} + \mathrm{W_4 DEP_{it}} + \mathrm{W_5 UN_{it}} \quad (1)$$

HHDI denotes the household disposable income, HHDL is household debt and liabilities-to-income, WAP represents the working age population, DEP is the no. of dependents-to-working population, and UN represents the household unemployment level. We invert HHDI and WAP to keep the index in one direction, making it easy to interpret.

Following is the index of FIN,

$$\mathrm{FINI}_{it} = w_1 \mathrm{ATM}_{it} + w_2 \mathrm{DCR}_{it} + w_3 CBB_{it} \quad (2)$$

In Equation (2), ATMit is ATMs per hundred thousand adults, DCRit is the Domestic credit to GDP ratio, and $CBBit$ is Commercial bank branches per hundred thousand adults. The range of the FIN index ranges between 0 and 1. Where 0 indicates complete exclusion, and 1 shows full inclusion. FIN represents access to formal financial services. It is used because access to finance can ease liquidity constraints, improve consumption smoothing, expand risk-sharing, and help households manage shocks. At the same time, the literature recognizes that excessive access can also raise debt stress, which is why this channel is theoretically important.

The following are the components of the FE index.

$$\mathrm{FEI}_{it} = w_1 \mathrm{BNM}_{it} + w_2 \mathrm{BRA}_{it} + w_3 \mathrm{BRE}_{it} + w_4 \mathrm{SMR}_{it} \quad (3)$$

In Equation (3), FEI_{it} is the FE index, BNM_{it} is the bank's net interest margin, BRA_{it} is the bank's return on assets, BRE_{i} is the Bank's return on equity, and SMR is the stock market turnover ratio. FE captures the quality of financial intermediation and the extent to which finance is allocated and priced efficiently. It is included because a more efficient financial system should lower misallocation, reduce financial frictions, and improve households' access to better-priced financial products, thereby influencing vulnerability.

Further, we used the Principal Component Method to calculate the following index,

$$\mathrm{FSI}_{it} = w_1 \mathrm{BZN}_{it} + w_2 \mathrm{BCBD}_{it} + w_3 \mathrm{LADF}_{it} + w_4 \mathrm{BCA}_{it} \quad (4)$$

In the above Equation, FSIit is the FS index, BZN_{it} is the Bank Z-score, BCBD_{it} is the bank's credit to bank's deposit, LADF_{it} is Liquid assets to deposits and short-term funding, and BACPTA_{it} is Bank capital to total assets. FS reflects the resilience of the financial system to shocks. It is used because unstable financial systems tighten lending, increase borrowing costs, and disrupt credit flows, all of which worsen HFV. A stable system, by contrast, supports risk sharing and continuity in credit access.

Finally, we construct an FDP index as follows,

$$\mathrm{FDPI}_{it} = w_1 \mathrm{LL}_{it} + w_2 \mathrm{PRBF}_{it} + w_3 \mathrm{DMBA}_{it} + w_4 \mathrm{SYLI}_{it} \quad (5)$$

In equation (5), LL_{it} represents liquid liabilities, PRBFit is Private credit by deposit money banks and other financial institutions, $DMBA_{it}$= Deposit money banks' assets, and $SYLI_{it}$ shows Syndicated loan issuance volume. FDP represents the scale and penetration of financial intermediation in the economy. It is theoretically relevant because deeper financial systems can improve credit availability and savings opportunities, but excessive deepening may also increase leverage and fragility. This makes depth a meaningful transmission channel between EPU and HFV. The weights are driven from the variance structure of the underlying variables.

3.2 | Data and Sample

The present study considers a balanced panel with annual data from 2000-2021, using a sample of 28 upper- and middle-income economies based on the World Bank classification. Due to the data limitations of the EPU index, the countries include namely, Australia, Canada, China, Chile, Colombia, Croatia, Belgium, Brazil, France, Germany, Greece, Hong Kong, India, Italy, Ireland, Japan, Mexico, the Netherlands, New Zealand, Pakistan, Russia, Singapore, South Korea, Sweden, the United Kingdom, and the United States. Upper-middle-income and lower-middle-income economies are combined into a single MIC category to achieve an appropriate sample size.

This study includes only countries for which consistent EPU data are available. While this ensures comparability of the key explanatory variable across panels, it may reduce external validity and introduce possible sample selection bias, since excluded countries may differ systematically in institutional quality, macroeconomic conditions, and financial sector characteristics. Therefore, the findings should be interpreted within the context of the sampled countries. EPU data is sourced from the website developed by Baker et al. (2016). Data for other indicators are obtained from the International Monetary Fund (IMF), the World Bank (WDI), the Bank of International Settlements (BIS), the European Central Bank (ECB), and the United Nations (UN).

3.3 | Empirical Model

To empirically estimate the impact of EPU on HFV while accounting for the dynamic nature of macroeconomic indicators and including a set of control variables, we can write the following baseline empirical model,

$$\mathrm{HFV_{it}} = \alpha + \theta \mathrm{HFV_{it-1}} + \beta \mathrm{lnEPU_{it}} + \gamma' \mathrm{Z_{it}} + \sigma \mathrm{D2008_t} + \mu_{it} + \nu_{it} + \varepsilon_{it} \qquad (6)$$

where HFV is household financial vulnerability, lnEPU is the natural log of economic policy uncertainty, which captures policy uncertainty that disturbs expectations, borrowing, employment, and household financial planning, Z_{it} is a set of control variables, namely lending interest rate (LIR), consumer price index (CPI), income inequality (IIQ), household savings (HS), and urbanization (URB), following Noerhidajati et al. (2021), Fernández-López et al. (2023), and Liu et al. (2024).

The control variables are consistent with the theoretical framework. Inflation, proxied by CPI, is included because rising prices reduce real purchasing power and weaken households' ability to finance consumption and debt repayment. The LIR is included because, under financial-frictions logic, higher borrowing costs raise debt-servicing burdens and tighten household credit conditions. The HS is included because precautionary saving theory implies that stronger savings buffers improve self-insurance against shocks, while low savings

increase fragility. IIQ is included as a distributional control because unequal income distribution weakens the capacity of lower-income households to accumulate assets and precautionary buffers, thereby increasing vulnerability. Finally, URB is taken as a structural control because more urbanized economies expose households more strongly to formal finance, credit markets, and market-based living costs, making it relevant to the transmission of financial conditions into HFV.

In the empirical model, EPU, the FDV mediators, CPI, LIR, and HS are treated as endogenous due to potential simultaneity and reverse causality. IIQ and URB are treated as exogenous or weakly exogenous controls because they mainly capture slower-moving structural characteristics. μ_{it} are country fixed effects, (ν_{it}) are time-specific effects, and ε_{it} represents the idiosyncratic disturbance term. Time dummies are incorporated in the empirical specification to control for common period-specific shocks affecting all countries, particularly the 2008 global financial crisis. Their inclusion helps isolate the net effect of the explanatory variables from exogenous year-specific disturbances.

3.2.1. Differential Effect of EPU on HFV

To analyze the differential impact of EPU on HFV across upper-income and middle-income countries, we generate two dummy variables to classify the group of countries and interact with EPU.

$$HFV_{it} = \alpha + \theta HFV_{it-1} + \beta^{UIC} EPU_{it} \times D_{it}^{UIC} + \beta^{MIC} EPU_{it} \times D_{it}^{MIC} + \gamma' Z_{it} + \sigma D2008_t + \mu_{it} + \nu_{it} + \varepsilon_{it} \quad (7)$$

where $D_{it}UIC$ ($D_{it}MIC$) takes the value 1 if the country belongs to the UICs (MICs) group, and 0 otherwise. Time dummies are incorporated in the empirical specification to control for common period-specific shocks affecting all countries, particularly the 2008 global financial crisis. Their inclusion helps isolate the net effect of the explanatory variables from exogenous year-specific disturbances.

3.2.2. Differential Effect of EPU on FDV

The following analytical framework estimates the direct impact of EPU on different dimensions of FDV, following (Danisman et al., 2020).

$$M_{it} = \beta_0 + \beta_1 M_{it-1} + \varphi^{UIC} EPU_{it} \times D_{it}^{UIC} + \varphi^{MIC} EPU_{it} \times D_{it}^{MIC} + \lambda' C\, \mu_{it} + \sigma D2008_t + \mu_{it} + \nu_{it} + \varepsilon_{it} \quad (8)$$

The differential effect of EPU on financial mediators, namely FIN, FE, FS, and FDP, is empirically shown in equation (8)

3.2.3. Differential Effect of FDV on HFV

To empirically investigate the impact of financial mediators on HFV, we introduce the following framework, following (Qian et al., 2025; Yan et al., 2025),

$$HFV_{it} = \alpha + \theta HFV_{it-1} + \omega^{UIC} M_{it} \times D_{it}^{UIC} + \omega^{MIC} M_{it} \times D_{it}^{MIC} + \beta^{UIC} EPU_{it} \times D_{it}^{UIC} + \beta^{MIC} EPU_{it} \times D_{it}^{MIC} + \sigma D2008_t + \gamma' X_{it} + \mu_{it} + \nu_{it} + \varepsilon_{it} \quad (9)$$

In equation (4), $\omega^{UIC}M_{it} \times D_{it}^{UIC}$and $\omega^{MIC}M_{it} \times D_{it}^{MIC}$ represent income dummies to measure the differential impact of financial mediators on HFV. In equation 2, β^{UIC} and β^{MIC} show the direct differential effect of EPU on HFV. The differential effect of EPU on the underlying mediator is $\varphi^{UIC}$and φ^{MIC} in equations (3). $\omega^{UIC}(\omega^{MIC})$ is the effect of mediators on HFV. The mediation effect of the mediator variable is an indirect effect, which is the product of $\omega^{UIC}(\omega^{MIC})$ and φ^{UIC} (φ^{MIC}). For example, the total effect of EPU on HFV in UIC countries is the sum of the direct and the mediator effect, which is defined as $\beta^{UIC} + \omega^{UIC} * \varphi^{UIC}$. The operational definitions of all the variables are given in the Appendix.

3.4 | Estimation Method

3.4.1. Generalized Method of Moments (GMM)

The model in the present research is dynamic, and the cross-sections exceed the number of time periods (N > T). Since there is a chance of reverse causality and endogeneity in the model, the study employs a two-step system Generalized Method of Moments (GMM) estimator, presented by Arellano and Bover (1995) and Blundell and Bond (1998), to estimate dynamic panel data models, specifically to address endogeneity and unobserved individual-specific effects.

The lagged dependent variable, HFV_{it-1}, and M_{it-1} are treated as endogenous and instrumented using their own lagged values. This approach helps mitigate simultaneity bias, reverse causality, and omitted-variable bias. In contrast, control variables deemed strictly exogenous are entered as standard instruments. To preserve the estimator's reliability, the number of instruments is restricted through lag limits and instrument collapsing. The adequacy of the instrument set is verified using the Hansen test of overidentifying restrictions and the Arellano–Bond tests for first- and second-order serial correlation. The two-step system GMM estimator is applied with Windmeijer (2005) finite-sample correction to adjust the standard errors and ensure reliable statistical inference.

3.4.2. Robustness Check: Panel Structural Auto Regressive Model

In this study, we employ the Panel Structural Auto Regressive (PSVAR) model to check the robustness of the estimation technique discussed in the previous section. The PSVAR model is an essential estimation technique that addresses the complexities of data spanning both temporal and cross-sectional dimensions. Importantly, a key benefit of the Panel SVAR is that it can model heterogeneity across cross-sectional units (i.e., variation among entities) as well as common shocks that affect all units in the panel. We use a panel SVAR model with three variables, based on data from 28 upper- and middle–income countries, for the period 2000-2021.

The Structural VAR (SVAR) framework goes beyond the traditional VAR model by incorporating structural identification. Because, in panel SVAR, the correlation between variables determines their relationships. However, these correlations may not reflect genuine causal relationships. The structural approach enables researchers to impose restrictions based on economic theory or prior knowledge, thereby identifying causal relationships rather than merely associating variables. By using instrumental variables or imposing restrictions on coefficients, a Panel SVAR model can disentangle complex interactions in a multidimensional dataset. For Cholesky identification, the PSVAR assumes a recursive contemporaneous structure in which variables ordered earlier can affect those ordered later within the same period, while later

variables do not contemporaneously affect earlier ones. This ordering is justified by economic theory and timing assumptions, allowing the structural shocks to be identified in an economically meaningful way.

Variance decomposition is crucial in cross-sectional analysis because it allows examination of how different shocks, such as EPU or financial shocks, may affect endogenous variables within the Cholesky ordering. However, the results of variance decomposition depend on the order in which the variables are placed. While it's excellent for analysing short-term relationships, this method has limitations when it comes to capturing long-term dynamics in a panel setting. In the PSVAR framework, impulse response functions (IRFs) are used to trace the dynamic effect of a one-standard-deviation structural shock in one variable on the current and future values of the other variables in the system. Based on the Cholesky identification scheme, the IRFs capture the direction, magnitude, and persistence of shock transmission over time. This helps explain how innovations propagate through the system and provides evidence on the short-run and medium-run interrelationships among the variables.

3.4.3. Bootstrap Mediation Analysis

The study further performs mediation analysis by employing bootstrapping. The underlying reason for using bootstrap is that it is a non-parametric test, and the confidence intervals do not assume the assumption of normality, which is usually a problem in small data sets. For bootstrapping, the indirect effect is estimated through resampling for each bootstrap as follows,

$$(a \times b)^* = a^* \times b^*$$

The mediation effect was evaluated using 10,000 bootstrap resamples drawn with replacement from the original sample size, and significance was determined using 95% bootstrap confidence intervals; an indirect effect was considered significant when the confidence interval excluded zero. And if the confidence interval does not include zero, the mediation is considered significant.

4 | RESULTS AND ANALYSIS

Table 1 presents the summary statistics of the empirical model used for the analysis. The PCA uses standardized variables (x- $\bar{x}$/SD), which is why the values of the Index can be negative. However, for descriptive analysis, negative values do not serve well, which is why the indices are transformed using the base formula, where we have changed the base of indices using the minimum value “1” and the maximum value “100”. However, for the rest of the analysis, original indices are used.

Table 1

Summary Statistics of Variables

Variables	Mean	Std. dev	P25	Median	P75
lnEPU	4.733	0.369	4.430	4.701	5.001
IIQ	0.523	0.09	0.453	0.499	0.564
lnHS	24.763	8.304	19.3	23.635	28.77
lnCPI	4.604	0.138	4.486	4.615	4.706
URB	78.429	12.45	74.117	80.525	86.285
LIR	6.849	8.579	2.89	5.03	7.58

HFV	51.372	16.293	44.189	54.570	60.532
FINI	33.023	13.222	27.171	33.023	36.458
FEI	75.646	7.647	73.682	75.646	78.856
FSI	31.834	14.246	21.312	31.834	38.452
FDPI	34.809	17.705	21.003	34.809	47.241

Note: EPU = economic policy uncertainty, IIQ = Income inequality, HS = Household savings, CPI = Consumer price index, URB = Urbanization, LIR = Lending interest rate, HFV = Household financial vulnerability index, FINI = Financial inclusion index, FEI = Financial efficiency index, FSI = Financial stability index, FDPI = Financial Depth index.

4.1 | Construction of HFV Index

The current literature is dominated by studies examining HFV and its drivers using different subjective and objective approaches. (Daud et al., 2019; Fernández-López et al., 2023; Hu et al., 2024; O'Connor et al., 2019; Seldal & Nyhus, 2022; Singh & Malik, 2022) utilizing various econometric techniques, periods, and determinants. We use a macro panel to perform the analysis and construct the HFV index after careful consideration and wisdom from previous empirical research. The present study constructs a composite HFV index by selecting indicators that capture critical dimensions of household economic resilience, including shock-absorption capacity, financial burden, demographic pressure, and labour-market conditions in the light of previous empirical literature (Ho & Mainal, 2016; Noerhidajati et al., 2021; Šubová, 2021).

Specifically, household disposable income (HDI) reflects income capacity and the ability to absorb financial shocks. The household debt-to-income ratio (HHDLS) captures financial liabilities relative to available financial resources. In addition, demographic pressure is captured by the ratio of dependents to the working-age population (DEP), which highlights the strain on income earners within households. The unemployment rate (UN) is taken as a representation of labor market risk. Finally, the working-age population (WAP) represents potential earning capacity and economic participation. HHDI and WAP are inverted to keep the index in the same direction. Together, these indicators provide a comprehensive, theoretically grounded representation of HFV, enabling the construction of a robust composite index via PCA. This is consistent with the life cycle, precautionary saving, and financial fragility perspectives because all three frameworks imply that households become financially vulnerable when they lack the capacity to absorb adverse shocks.

The results of the KMO and Bartlet's tests are reported in the Appendix. The KMO and Bartlett's test statistics indicate that the variables for the PCA are adequately selected and well-suited for further analysis. Table 2 illustrates the PCA outcome for the HFV index. The PCA results show that Component 1 is the dominant dimension, explaining 41.3% of total variance, and is mainly driven by WAP (0.683) and DEP (0.682), indicating that demographic pressure carries the highest weights in the composite structure. Component 2 is largely associated with HHDI (0.717) and HHDL (0.533), which reflect income-debt conditions. Finally, Component 3 is dominated by UN (0.902), which indicates labour market stress.

Table 2

Principal Component Analysis for HFV Index

Component	Eigenvalue	Difference	Proportion	Factors	Comp 1	Comp 2	Comp 3	Cumulative
Comp 1	2.065	0.960	0.413	HHDL	0.237	0.533	-0.206	0.413
Comp 2	1.105	0.141	0.221	HHDI	0.005	0.717	-0.377	0.634
Comp 3	0.964	0.107	0.193	DEP	0.682	0.131	-0.031	0.827
Comp4	0.857	0.849	0.172	UN	0.107	0.412	0.902	0.998
Comp5	0.008	.	0.002	WAP	0.683	0.124	0.036	1.000

Note: HHDI=, HHDL=Household debt-income ratio, HHDI=Household disposable income, DEP=No. of dependents, WAP=Working age population, UN= Unemployment.

4.2 | Construction of FDV Indices

The study measures different dimensions of FDV using PCA. Tables 3,4,5 and 6 show the PCA estimates of FIN, FE, FS, and FDP indices, respectively. To choose indicators to construct FDV indices, we follow the standard empirical literature, including Isiaka et al. (2021),Demirgüç-Kunt and Klapper (2012), and Ozili and Arun (2023).

Table 3

PCA of FIN Index

Component	Eigenvalue	Difference	Proportion	Factors	Comp 1	Comp 2	Cumulative
Comp 1	1.384	0.382	0.461	ATM	0.708	-0.014	0.461
Comp 2	1.002	0.389	0.334	CBB	0.694	0.196	0.795
Comp 3	0.612	.	0.2042	DCR	-0.128	0.980	1.000

Note: ATM = Automated teller machines (ATMs), DCR = Domestic credit to private sector % GDP, CBB = Commercial bank branches.

In Table 3, Component 1 is the main dimension, explaining 46.1% of the variance and loading most strongly on ATM (0.708) and CBB (0.694). DCR (0.980) mainly defines Component 2, showing it reflects a distinct aspect of the index.

Table 4

PCA of FE Index

Component	Eigenvalue	Difference	Proportion	Factors	Comp 1	Comp 2	Cumulative
Comp 1	2.028	1.062	0.507	BRA	0.660	0.131	0.507
Comp 2	0.966	0.119	0.241	BRE	0.379	-0.046	0.749
Comp 3	0.847	0.690	0.211	BNM	0.622	0.173	0.960
Comp 4	0.156	.	0.039	SMR	-0.181	0.975	1.000

Note: BRA = Bank return on assets, BNM = Bank net interest margin, BRE = Bank return on equity, SMR = Stock market turnover ratio.

Table 4 shows the PCA output for the FE index. Component 1 is the dominant dimension, explaining 50.7% of the variance and loading most strongly on BRA (0.660) and BNM (0.622), with BRE (0.379) contributing more moderately. SMR (0.975) mainly defines Component 2, indicating a separate dimension.

Table 5

PCA of FS Index

Component	Eigenvalue	Difference	Proportion	Factors	Comp 1	Comp 2	Cumulative
Comp 1	2.176	1.156	0.544	BCAPTA	-0.072	0.968	0.544
Comp 2	1.020	0.397	0.255	BCBD	0.631	-0.073	0.799
Comp 3	0.623	0.443	0.155	BNZ	0.484	0.236	0.955
Comp 4	0.179	.	0.049	LADF	0.600	0.002	1.000

Note: BCAPTA = Bank capital to total assets, BCBD = Bank credit to bank deposits, BNZ = Bank Z-score, LADF = Liquid assets to deposits and short-term funding.

Table 5 reports PCA output for the FS index. Component 1 is the main dimension, explaining 54.4% of the variance and loading most strongly on BCBD (0.631) and LADF (0.600), with BNZ (0.484) also contributing. BCAPTA (0.968) mainly defines Component 2, suggesting it captures a separate aspect of the index.

Table 6

PCA of FDP Index

Component	Eigenvalue	Difference	Proportion	Factors	Comp 1	Comp 2	Cumulative
Comp 1	2.004	1.992	0.678	LL	0.498	-0.352	0.678
Comp 2	1.40	0.322	0.180	PRBF	0.546	-0.038	0.859
Comp 3	0.588	0.234	0.100	SYLI	0.386	0.895	0.959
Comp 4	0.166	.	0.041	DMBA	0.552	-0.271	1.000

Note: LL = Liquid liabilities, PRBF = Private credit by deposit money banks and other financial institutions, DMBA = Deposit money banks' assets, SYLI = Syndicated loan issuance volume.

Component 1 is the dominant dimension, explaining 67.8% of the variance and loading most strongly on DMBA (0.552), PRBF (0.546), and LL (0.498). SYLI (0.895) mainly defines Component 2, indicating a distinct underlying aspect of the index.

4.3 | The Impact of EPU on HFV

In Table 7, Model 1 reports the effect of EPU on HFV, while Model 2 captures differential effects across country groups. Panel B of the table presents the statistics of the Arellano-Bond test for AR (1) in first differences, which is significant, as expected, while the AR (2) test is insignificant, indicating no second-order serial correlation and confirming model validity. The diagnostic tests support the validity of the dynamic panel specification. Similarly, the Hansen J-statistics show that the instruments used in the estimation are valid and not overidentified. These diagnostics validate the GMM model and the robustness of the findings. The one-period lagged dependent variable HFV carries a highly significant, positive coefficient across both model specifications (0.872 and 0.898, both significant at the 1% level), indicating strong persistence in HFV. This

implies that households experiencing financial distress in the previous period are highly likely to remain vulnerable in the current period. Such persistence is consistent with prior empirical findings (Islam & Chowdhury, 2025), suggesting that financial fragility is a path-dependent process influenced by past conditions, including borrowing behavior, income shocks, and wealth depletion.

EPU has a positive and statistically significant coefficient (0.238, appeared significant at the 1% level), indicating that EPU considerably exacerbates. This result is consistent with the theoretical paradigm of Bernanke (1983) and the empirical evidence put forward by Zhang and Ling (2024), Baker et al. (2016), and Bloom (2014). According to these researchers, EPU yields income-consumption imbalances, making a household potentially vulnerable due to its effects on investment and consumption decisions.

Table 7

The Impact of EPU on HFV

Variables	Model 1	Model 2
HFV_{it}	0.872***	0.898***
	(0.031)	(0.033)
$lnEPU_{it}$	0.238***	
	(0.062)	
$lnEPU_{it} \times D_{it}^{MIC}$		0.195***
		(0.021)
$lnEPU_{it} \times D_{it}^{UIC}$		0.101***
		(0.024)
LIR_{it}	-0.026*	-0.011
	(0.014)	(0.010)
$lnCPI_{it}$	0.029***	-0.032***
	(0.009)	(0.006)
IIQ_{it}	1.730***	1.588***
	(0.429)	(0.310)
HS_{it}	-0.011***	-0.015***
	(0.004)	(0.003)
$lnURB_{it}$	-0.391***	-0.261
	(0.099)	(0.174)
$D2008_t$	-0.093***	-0.046**
	(0.027)	(0.019)
Constant	1.971**	-0.827
	(0.799)	(0.657)
Panel B		
No of obs.	508	521
No of groups	28	28
No of instruments	20	22
AR-1	-3.757	-3.788
p-value	0.000	0.000
AR-2	-0.915	0.640
p-value	0.360	0.522
J-statistic	13.08	23.86
p-value	0.288	0.047

Note: EPU = economic policy uncertainty, IIQ = Income inequality, HS = Household savings, CPI = Consumer price index, URB = Urbanization, LIR = Lending interest rate, HFV = Household financial vulnerability index, D2008, D2020=Time dummies for years 2008 and 2020.
Source (s): Author's own work
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Households are less inclined to invest or spend when future policy directions like taxes, interest rates, or social spending become uncertain. Instead, due to liquidity constraints, they frequently turn to cautious measures that nonetheless heighten their vulnerability. A negative sign of the EPU coefficient may have been expected on the basis that uncertainty may induce precautionary saving or deleveraging; the present result implies that, in this sample, the adverse income-risk and debt-burden channels dominate any stabilizing precautionary response. This interpretation is in line with recent evidence of Zhang et al. (2024) showing that EPU heightens HFV, worsens income–expenditure imbalances, reduces spending, and increases income risk and credit frictions.

Model 2 shows that the transmission of uncertainty is heterogeneous across income groups. The coefficient on EPU×MIC is positive and highly significant (0.195, $p<0.01$), while the coefficient on EPU×UIC is also positive but smaller in magnitude (0.101, $p<0.01$). This means that the vulnerability effect of EPU is materially stronger in MICs; in coefficient size, the MIC effect is about 1.93 times the UIC effect. Given their increased reliance on labor income, consumer credit, and restricted access to financial hedging tools, MICs are particularly vulnerable to macroeconomic shocks, because uncertainty harms asset prices and investment returns; even higher-income countries are not immune. The heterogeneous effect of EPU can be explained through the lens of institutional economics North (1991). Institutions reduce uncertainty by providing credible rules, enforcement mechanisms, and stable incentive structures. In MICs, where institutional quality and policy credibility are often less developed than in UICs, EPU is more strongly transmitted into HFV (Gu et al., 2022).

The empirical findings regarding the other macro-level control factors provide evidence that financial vulnerability and interest rates are negatively related. This might be a sign of discipline, in which higher interest rates discourage excessive borrowing, or it could be a sign of improved savings returns, which would lessen vulnerability. This result is consistent with the outcome proposed by Martín-Legendre and Sánchez-Santos (2024). Conversely, inflation erodes real earnings and reduces consumers' financial capacity, directly affecting their ability to invest, save, and manage risk. These findings are consistent with those of Hintermaier and Koeniger (2024), who examined the impact of inflation on household financial behavior.

Higher inequality increases financial vulnerability, most likely because of unequal income distributions and restricted access to economic possibilities for disadvantaged groups (Kumhof et al., 2015). The buffer-stock model of consumption, which holds that households with higher savings are better able to withstand shocks, is supported by the finding that higher savings considerably reduce vulnerability (Deaton, 1989). A positive coefficient for URB suggests that metropolitan areas are more financially vulnerable, which aligns with research across several developing nations, where rapid urbanization causes housing stress and higher living costs.

4.4 | The Impact of EPU on Financial Mediators

Table 8 presents the empirical results of the impact of EPU on financial mediators. The significant positive coefficients of lagged dependent variables support the fact that FIN (0.299), FE (0.587), FDP (0.743), and FS (0.841) often follow a path-dependent process. The magnitudes of the lagged dependent variables imply that FDP and FS are highly path dependent. A clear pattern emerges from the results that EPU positively

and significantly affects all four dimensions of financial development; however, the differential effect is pronounced in MICs, as indicated by the magnitude of the interaction terms. The results align with the theory of financial frictions, suggesting that EPU causes agency costs, collateral constraints, and credit constraints that affect the level of FDV. Also, in the presence of informational asymmetry and adverse selection, the financial intermediaries may face allocative inefficiency.

Table 8

Differential Impact of EPU on Financial Mediators

Variables	FINI	FEI	FSI	FDPI
$FINI_{i,t-1}$	0.197**			
	(0.081)			
$FEI_{i,t-1}$		0.471***		
		(0.018)		
$FSI_{i,t-1}$			0.758***	
			(0.040)	
$FDPI_{i,t-1}$				0.849***
				(0.065)
$lnEPU_{it} \times D_{it}^{MIC}$	-0.105**	-0.456***	-0.243***	-0.529***
	(0.046)	(0.092)	(0.046)	(0.203)
$lnEPU_{it} \times D_{it}^{UIC}$	-0.065***	-0.104***	-0.184**	-0.219***
	(0.023)	(0.040)	(0.089)	(0.075)
$LIR_{i,t}$	-0.064**	0.227***	0.065***	-0.178**
	(0.026)	(0.049)	(0.023)	(0.087)
$lnCPI_{i,t}$	-0.220***	-0.522***	-0.333***	-0.225***
	(0.079)	(0.186)	(0.066)	(0.063)
$IIQ_{i,t}$	1.521***	5.527***	4.502**	-2.994*
	(0.519)	(1.353)	(2.019)	(1.604)
$HS_{i,t}$	0.033***	0.049***	0.020***	0.134***
	(0.012)	(0.013)	(0.005)	(0.018)
$lnURB_{i,t}$	-1.338**	-1.735**	-0.504***	-5.217**
	(0.589)	(0.712)	(0.194)	(2.301)
$D2008_t$	-1.259***	-3.441***	0.474**	-0.567**
	(0.234)	(0.744)	(0.240)	(0.234)
Constant	6.969***	3.430	1.702	26.656***
	(2.687)	(3.529)	(1.596)	(9.484)
Panel B				
No of Observations	522	510	510	531
No of Groups	28	28	28	28
No of Instruments	24	28	26	25
AR-1	-3.466	-2.921	-3.561	-3.042
p-value	0.000	0.003	0.000	0.002
AR-2	1.424	-0.383	-0.947	-1.355
p-value	0.154	0.702	0.344	0.175
J-statistic	25.39	18.53	18.69	21.84
p-value	0.115	0.421	0.411	0.112

Note: EPU = economic policy uncertainty, IIQ = Income inequality, HS = Household savings, CPI = Consumer price index, URB = Urbanization, LIR = Lending interest rate, FINI = Financial inclusion index, FEI = Financial efficiency index, FSI = Financial stability index, FDPI = Financial Depth

Source: Author's own work

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The outcome is consistent with recent research highlighting EPU's detrimental effects on financial markets, such as Karaömer (2024). Furthermore, capital inflows into UICs are deeper (Gulen & Ion, 2016), making them less vulnerable to EPU than MICs. The results suggest that MICs face deeper structural constraints by absorbing uncertainty shocks, particularly in dimensions linked to market functioning and financial intermediation. The especially large gap in the FEI model implies that FE is the dimension most severely disrupted by uncertainty in MICs, likely because institutions, credit allocation mechanisms, and market coordination processes are less robust in these economies. Similarly, the stronger adverse effect on financial depth indicates that policy uncertainty discourages balance sheet expansion, long-term credit intermediation, and broader financial deepening more strongly in MICs.

This finding can be interpreted through the lens of the EMH, which holds that financial markets allocate resources more efficiently when prices rapidly and accurately incorporate available information. When EPU rises, information becomes noisier, expectations become less anchored, and asset pricing and credit allocation become less efficient. These distortions are likely to be stronger in MICs, where institutions, disclosure quality, regulatory credibility, and market coordination mechanisms are generally less robust. As a result, uncertainty impairs the efficiency of financial intermediation more severely in MICs than in UICs

The 2008 crisis dummy is negative and significant for FINI, FEI, and FDPI, indicating that the global financial crisis weakened access, efficiency, and financial deepening. For FSI, however, the coefficient on D2008 is positive and significant, which may reflect post-crisis regulatory tightening, liquidity support, and prudential interventions that strengthened measured financial stability after the initial shock.

Control variables in the model, such as inflation and interest rates, also have a major detrimental impact on financial indicators. Interestingly, in this situation, all financial indicators seem to be significantly and negatively correlated with income inequality. Although income inequality is an integral part of human civilization, it serves as a bug to the economic and financial system by eroding public confidence in institutions (Kuzmenko et al., 2022).

Moreover, HS significantly improves all financial indicators. While those living in cities usually have greater access to financial infrastructure and services, larger households may benefit from resource pooling and mutual assistance systems. These results are consistent with those of Demirgüç-Kunt and Klapper (2012), who emphasize the importance of household access to financial services in determining FIN outcomes. Furthermore, Sarma and Pais (2011) provided evidence that urbanization is essential for promoting financial access and efficiency through improved infrastructure, greater information availability, and stronger institutional presence.

4.5 | The Differential Impact of Financial Mediators on HFV

Table 9 reports the estimation output of the impact of financial mediators of HFV. Notably, there are constantly negative and significant associations between financial mediators and HFV across both income categories. The estimated coefficients indicate that the impact of uncertainty is higher in MICs than in UICs across all models. Across the four specifications, the EPU coefficient for MICs is 0.227, 0.131, 0.181, and 0.223, whereas the corresponding UIC coefficients are 0.198, 0.068, 0.101, and 0.120. This pattern shows that uncertainty shocks translate into larger volatility responses in MICs, where financial systems are typically less

diversified and more exposed to policy credibility problems, capital flow reversals, and refinancing constraints. Thus, the stronger MIC coefficients are consistent with Minsky's view.

Table 9

Impact of Financial Mediators on HFV

Variables	HFV			
$HFV_{i,t-1}$	0.844***	0.846***	0.849***	0.833***
	(0.027)	(0.029)	(0.015)	(0.017)
$EPU_{it} \times D_{it}^{MIC}$	0.227***	0.131***	0.181***	0.223***
	(0.047)	(0.019)	(0.028)	(0.022)
$EPU_{it} \times D_{it}^{UIC}$	0.198***	0.068***	0.101**	0.120***
	(0.029)	(0.021)	(0.039)	(0.035)
$FINI_{it} \times D_{it}^{MIC}$	-0.025**			
	(0.012)			
$FINI \times D_{it}^{UIC}$	-0.052**			
	(0.024)			
$FEI_{it} \times D_{it}^{MIC}$		-0.010**		
		(0.004)		
$FEI \times D_{it}^{UIC}$		-0.023**		
		(0.010)		
$FSI_{it} \times D_{it}^{MIC}$			-0.038**	
			(0.015)	
$FSI \times D_{it}^{UIC}$			-0.018**	
			(0.008)	
$FDPI \times D_{it}^{MIC}$				-0.050***
				(0.019)
$FDPI \times D_{it}^{UIC}$				-0.026**
				(0.010)
$LIR_{i,t}$	-0.021**	-0.014*	-0.014*	-0.046***
	(0.009)	(0.008)	(0.008)	(0.011)
$INF_{i,t}$	0.048***	0.052**	0.029***	0.017***
	(0.014)	(0.011)	(0.008)	(0.006)
$IIQ_{i,t}$	0.279*	1.105***	0.224*	2.044***
	(0.120)	(0.227)	(0.194)	(0.381)
$HS_{i,t}$	-0.012***	-0.006***	-0.013***	-0.009***
	(0.004)	(0.002)	(0.002)	(0.003)
$URB_{i,t}$	-0.084	0.334***	0.260*	0.479***
	(0.080)	(0.075)	(0.139)	(0.140)
$D2008_t$	0.066**	0.236***	0.050*	0.108**
	(0.030)	(0.057)	(0.026)	(0.048)
Constant	-0.123	-0.970***	-0.869	-1.217*
	(0.446)	(0.270)	(0.551)	(0.683)
Panel B				
No of obs.	544	542	515	542
No of groups	28	28	28	28
No of instruments	26	27	25	28
AR-1	-3.795	-4.292	-4.216	-4.110
p-value	0.000	0.000	0.000	3.95e-05
AR-2	1.671	-0.398	1.344	0.846
p-value	0.0947	0.691	0.179	0.397
J-statistic	17.52	12.93	16.65	10.36
p-value	0.420	0.741	0.548	0.847

Note: *EPU* = economic policy uncertainty, IIQ = Income inequality, HS = Household savings, CPI = Consumer price index, URB = Urbanization, LIR = Lending interest rate, FINI = Financial inclusion index, FEI = Financial efficiency

index, FSI = Financial stability index, FDPI = Financial Depth Index.
Source: Author's own work
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

that fragility accumulates endogenously and becomes visible when policy regimes become less predictable. Higher levels of inclusion help reduce the negative impacts of policy uncertainty, as seen in the interaction between FIN and MIC. The argument is consistent with the broader body of research emphasizing FIN as a crucial safeguard against economic shocks, enabling households to access credit, diversify their risks, and manage their spending (Demirgüç-Kunt & Klapper, 2012; Fernández-López et al., 2023), and financial exclusion increases the chances of financial vulnerability in households (Daud et al., 2019). However, FIN reduces HFV in both groups, with coefficients of -0.025 for MICs and -0.052 for UICs. This implies that broader access to formal financial services dampens volatility and that the stabilizing effect is stronger in UICs.

Likewise, through their corresponding negative coefficients in the interaction terms with MIC and UIC, FDPI, FSI, and FEI also have significant impacts on HFV. Consistent with the findings by Zhai et al. (2026). Notably, a very significant coefficient indicates that a well-developed financial sector greatly cushions households against uncertainty in UICs, suggesting that markets do not process uncertainty in a frictionless way. Rather, incomplete information, segmentation, and institutional weakness likely slow adjustment and magnify price responses.

Moreover, the estimates are more consistent with the interpretation of EMH as a useful benchmark rather than a literal description of market behavior. EPU interaction terms are positive and statistically significant in every model across MIC and UIC. These significant, positive coefficients indicate that policy uncertainty triggers HFV, especially in MICs. The findings align with the theory that uncertainty increases market volatility and prompts households to become more cautious, potentially reducing their financial resilience (Tudu et al., 2025). Last but not least, the D2008 coefficient confirms that the global financial crisis period was associated with a structural upward shift in HFV, further supporting the interpretation that systemic shocks and uncertainty regimes matter for financial volatility.

4.6 | Bias-Corrected Bootstrap Path Estimates for the Mediation Models for MICs

In this section, we present the bootstrap mediation analysis for UICs and MICs. The indirect effect is estimated using 10000 bootstrap resampling. The mediation analysis offers a more robust and detailed view, considering all paths. The mediation results show that EPU affects HFV both directly and indirectly through the FDV dimensions, but the strength of this mediation differs sharply between MICs and UICs. The bootstrap output is consistent with recent evidence showing that policy uncertainty raises systemic financial risk, weakens bank stability, and worsens financial system efficiency, with the impact being shaped by the resilience of financial structures and institutions (Aman et al., 2024).

In MICs, all financial mediators are partially and broadly mediating the effects of EPU on HFV. Importantly, the direct path becomes insignificant, clearly supporting FE as the dominant indirect channel across all models. The FE model for MICs is especially important. EPU significantly reduces efficiency (β = -0.257), and FE significantly reduces HFV (β = -0.122), while the direct effect of EPU on HFV becomes statistically insignificant (β = 0.002), indicating full mediation of FE. The results support the broader economic

theory that greater FE enables households to make informed, strategic financial decisions, thereby significantly reducing their exposure to risk and improving their long-term financial security. Our analysis aligns with Gao (2024) empirical conclusion.

Table 10

Bais -Corrected Bootstrap Path Estimates for the Mediation Models for UICs and MICs

Path	β	Bias	SE	95% BC CI	Result
Middle-Income Countries					
Financial inclusion					
EPU → FIN	-0.071	0.000	0.019	[-0.106, -0.033]	Significant
FIN → HFV	-0.380	-0.003	0.094	[-0.582, -0.210]	Significant
EPU → HFV	0.060	-0.000	0.026	[0.010, 0.112]	Significant
Financial efficiency					
EPU → FE	-0.257	-0.000	0.034	[-0.325, -0.192]	Significant
FE → HFV	-0.122	-0.001	0.056	[-0.231, -0.010]	Significant
EPU → HFV	0.002	-0.000	0.031	[-0.062, 0.058]	Not significant
Financial stability					
EPU → FS	-0.149	-0.000	0.035	[-0.218, -0.082]	Significant
FS → HFV	-0.100	-0.004	0.052	[-0.150, -0.050]	Significant
EPU → HFV	0.052	-0.000	0.030	[0.032, 0.085]	Significant
Financial depth					
EPU → FDP	-0.638	-0.000	0.042	[-0.718, -0.554]	Significant
FDP → HFV	-0.337	-0.001	0.040	[-0.417, -0.259]	Significant
EPU → HFV	0.249	-0.001	0.032	[0.187, 0.314]	Significant
Upper-Income Countries					
Financial inclusion					
EPU → FIN	-0.026	0.000	0.007	[-0.041, -0.013]	Significant
FIN → HFV	-0.001	-0.000	0.078	[-0.153, 0.158]	Not significant
EPU → HFV	0.083	-0.000	0.025	[0.034, 0.132]	Significant
Financial efficiency					
EPU → FE	-0.132	-0.000	0.030	[-0.196, -0.078]	Significant
FE → HFV	-0.055	-0.003	0.016	[-0.093, -0.031]	Significant
EPU → HFV	0.075	-0.000	0.025	[0.027, 0.125]	Significant
Financial stability					
EPU → FS	-0.052	0.000	0.014	[-0.079, -0.024]	Significant
FS → HFV	-0.125	0.000	0.028	[-0.179, -0.070]	Significant
EPU → HFV	0.089	-0.000	0.025	[0.041, 0.138]	Significant
Financial depth					
EPU → FDP	-0.162	0.000	0.024	[-0.209, -0.116]	Significant
FDP → HFV	-0.010	0.000	0.029	[-0.070, 0.045]	Not significant
EPU → HFV	0.084	0.000	0.025	[0.036, 0.133]	Significant

Note. BC CI = bias-corrected confidence interval; Significant effects are identified when the 95% bias-corrected confidence interval excludes zero.

The critical mediation finding is consistent with the theoretical perspective of the EMH of Fama (1970) and Bernanke et al. (1999), which states that efficient markets reduce informational asymmetry and help

households to mitigate financial challenges. EPU may cause informational asymmetry and deteriorate FE, suggesting that uncertainty harms MIC financial systems primarily by disrupting the quality of intermediation, pricing, and allocation efficiency.

Finally, in MICs, FIN partially mediates the relationship between EPU and HFV, implying that EPU hinders access to financial institutions, especially for marginalized or vulnerable segments, by increasing the magnitude of nonperforming loans, placing financial institutions in difficult business conditions, and reducing households' access to financial services. This may indicate constricted credit, diminished access to financial services, or households withdrawing from formal systems due to distrust or instability (Syed et al., 2024). The households in MICs face limitations, including limited access to credit and affordability, underdeveloped financial markets, and weak institutional infrastructure. The same goes for FS, which partially mediates the impact of EPU on HFV. While FS enhances households' resilience and helps them fall into financial vulnerability, EPU destabilizes the financial system and reduces its ability to absorb shocks, as Karaömer (2024) reported.

The FDP results for MICs are the strongest in magnitude. EPU sharply reduces financial depth (β = -0.638), and financial depth strongly reduces HFV (β = -0.337), while the direct effect of EPU on HFV remains positive and significant (β = 0.249). This implies partial mediation with a large indirect component. In substantive terms, policy uncertainty appears to raise HFV in MICs partly by shrinking or weakening FDP, thereby reducing its ability to absorb shocks, mobilize liquidity, and spread risk efficiently. This is in line with evidence of Danisman and Tarazi (2024), emphasizing that stronger, better-functioning financial sectors are central to resilience and prosperity in emerging and developing economies, and with recent work linking FDV to lower volatility in macroeconomic outcomes. In sum, in MICs, FE appears to fully transmit the EPU effect, while FIN, FS, and FDP each partially transmit it.

The differential mediation analysis reveals that the FIN and FDP do not significantly mediate the pathway to HFV through EPU in UICs. Empirical evidence provides insight from several aspects, for instance, in UICs, the size and access of financial infrastructure are large enough that the impact of further expansion in accessibility does not necessarily reduce HFV. Additionally, UICs already possess relatively broad access and substantial market depth, so marginal variation in those dimensions is less influential than variation in efficiency and stability. Whereby, in MICs, FIN and FDP still contribute to reducing HFV, the marginal change in FDV benefits the lower-income percentile of the economy (Aman et al., 2024). FE and FS remain significant partial mediators in UICs, implying that the stability and efficiency of the financial system matter due to developed financial markets, so that an increase in the size of the financial system does not significantly reduce HFV. The bootstrap results are more selective in UICs, where FE and FS partially mediate the effect of EPU on HFV.

4.7 | Panel Structural Vector Auto-Regressive Analysis

To economize on space, improve the readability of the study, and focus more on differential responses, we do not present or discuss IRFs and FEVD for the full sample. Both IRFs and FEVDs are estimated for 10 horizons, with a Cholesky ordering identification strategy. Robust regression analysis indicates that uncertainty has significant, economically meaningful impacts on the underlying dependent variables.

Therefore, the empirical analysis based on IRFs and FEVD is an additional step and a robustness check to confirm the findings presented in sections 4.1, 4.2, and 4.3.

4.8 | The Impulse Response and Variance Decomposition of HFV to EPU Shocks: Case of MICs

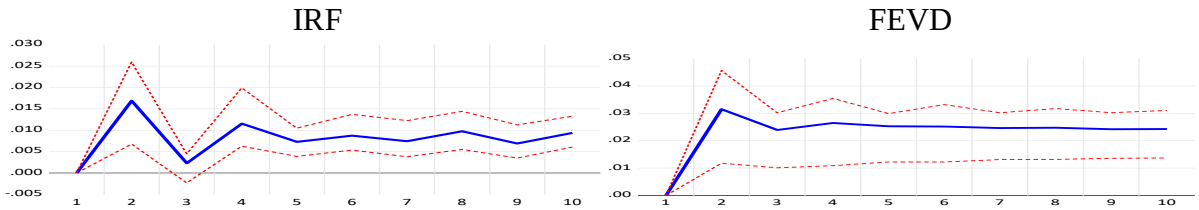
The estimated IRFs and FEVD values from the panel SVARs without the mediator variable are plotted in Figure 2 for the MICs. For example, in year 1, the estimated IRF is about 5%, which increases to about 17% at year 2. Afterwards, at year 5%, it becomes again 15% in MICs. Nevertheless, it is worth noting that in year 10, once again, the repose is very significant, reaching about 9%. The magnitude of the shock is smaller in UICs, as shown in Panel B of the figure. These observations suggest that the responses of the HFV exhibit dynamic structure at different time horizons.

The figure also provides strong evidence for the role of EPU shocks in forecasting errors for the HFV index. For instance, at the one-year horizon, about 3% of the forecast error for a household's financial vulnerability is attributed to shocks in uncertainty about the government's economic policies, across both income groups. The plotted values of FEVD indicate that this percentage is even higher in the long run. This finding implies that uncertainty shocks are very significant in determining and explaining the behavior of the HFV index in the examined countries.

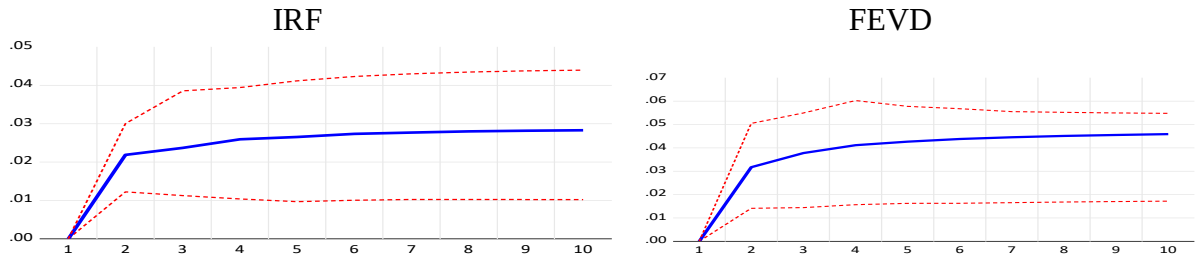
Figure 2

The Impulse Response and Variance Decomposition of HFV to EPU Shocks

Panel A: Case of MICs



Panel B: Case of UICs



4.8.1. Mediating Effect of FIN

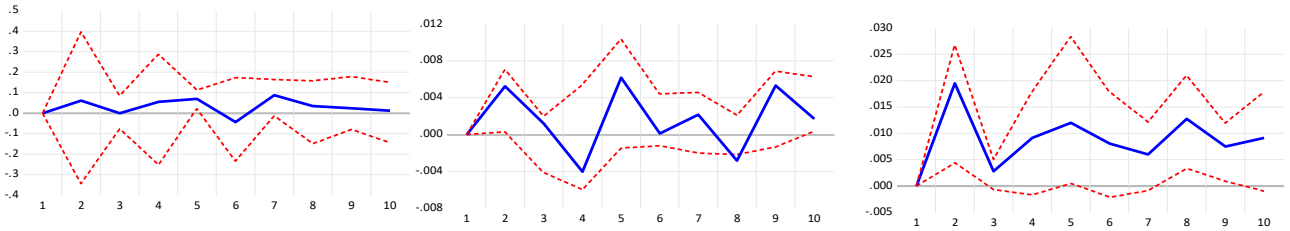
To scrutinize the role of mediator variables in transmitting the effects of uncertainty shocks, IRFs and FEDV analyses are performed using panel SVARs that include the mediator variable in the specification. The results are plotted in Figure 3. The estimated IRFs, with FIN included in the specification as a mediator variable, show that the response of FIN to uncertainty shocks fluctuates between positive and negative values in the long run across MICs. Conversely, a different finding is observed for the HFV's impulse responses to

shocks in FIN in UICs. The IRF of HFV is insignificant in FIN in UICS, confirming the bootstrap mediation pathway. In UICs, HFV shows a significant response to FIN and EPU, whereas FIN shows a modest response to EPU shock. Finally, from a higher forecast error, it can be concluded that FIN plays a significant role in transmitting the effects of uncertainty shocks on HFV in the UICs, as the impact of EPU is greater in a mediating PSVAR setup.

Figure 3

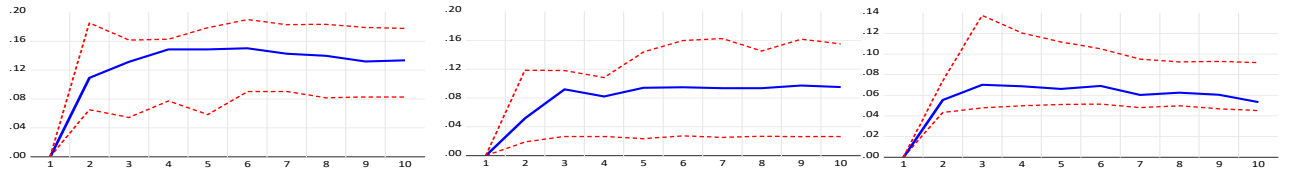
Mediating Effect of FIN

Panel A: IRF of MICs



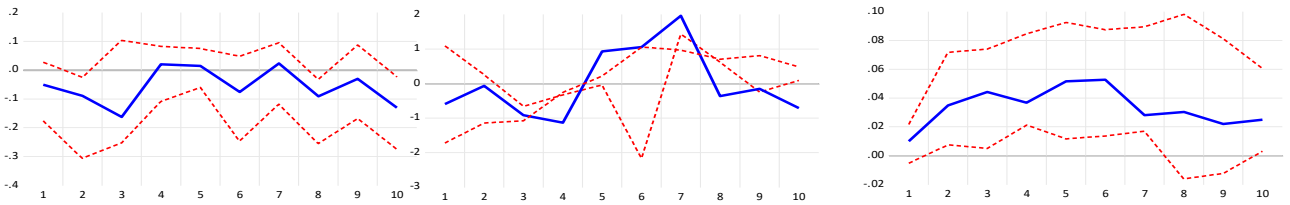
(a) FIN←EPU (b) HFV←FIN (c) HFV←EPU

Panel B: FEVD OF MICs



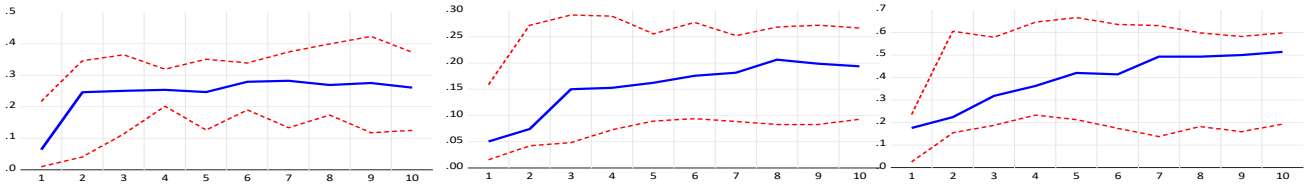
(a) FIN←EPU (b) HFV←FIN (c) HFV←EPU

Panel B: IRF of UICs



(a) FIN←EPU (b) HFV←FIN (c) HFV←EPU

Panel B: FEVD of UICs



(a) FIN←EPU (b) HFV←FIN (c) HFV←EPU

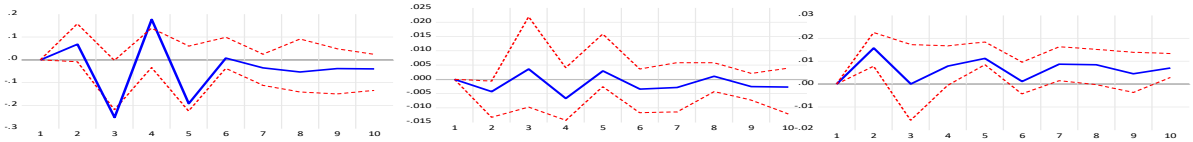
4.8.2. Mediating Effect of FE

The estimated IRFs also show that increases in the level of FE significantly and persistently reduce HFV at all horizons examined in MICs. The shock in FE initially reduces HFV, followed by fluctuations in the long run. Also, the direct effect of EPU is smaller in magnitude, referring to a mediating effect transmitted through FE, in MICs. The response of FE to EPU shock is negative and persistent in UICs, whereas MICs exhibit a fluctuating response.

Figure 4

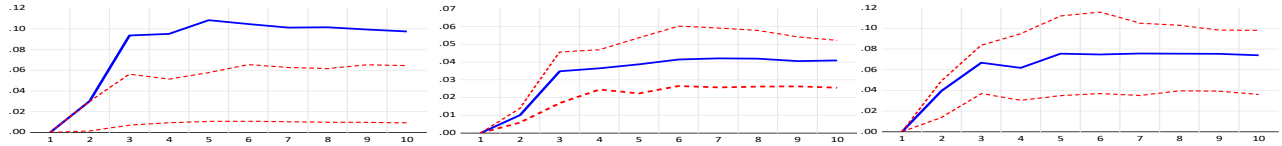
Mediating Effect of FE

Panel A: IRF of MICs



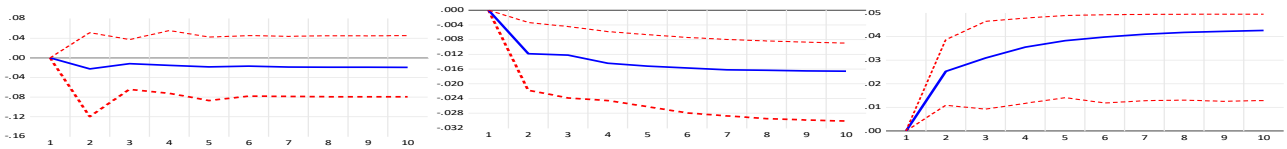
(a) FE←EPU (b) HFV←FE (c) HFV←EPU

Panel B: FEVD of MICs



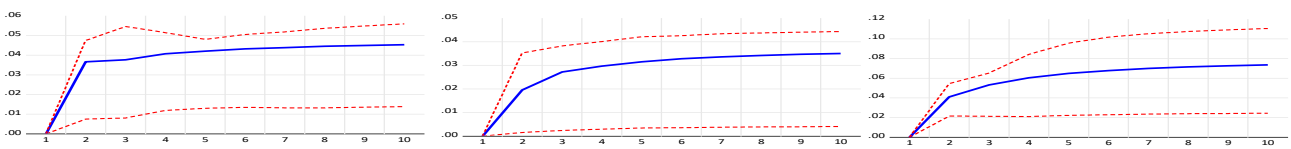
(a) FE←EPU (b) HFV←FE (c) HFV←EPU

Panel B: IRF of UICs



(a) FE←EPU (b) HFV←FE (c) HFV←EPU

Panel B: FEVD of UICs



(a) FE←EPU (b) HFV←FE (c) HFV←EPU

4.8.3 Mediating Effect of FS

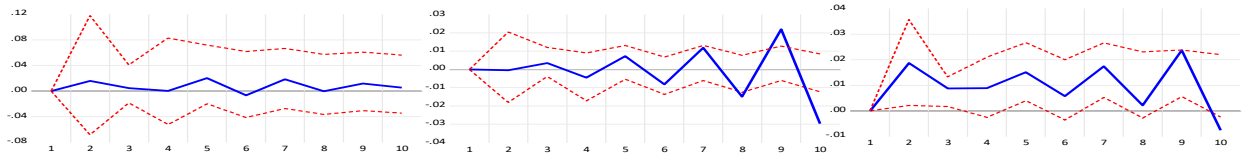
The response of HFV to a shock in FS is significant and persistent in UICs; however, in MICs, it initially reduces HFV, then changes its direction over the horizon, as shown in the bootstrap mediation analysis for MICs. The behavior in UICs can be attributed to the theoretical approach that, in advanced nations, excessive

stability breeds instability. FEDV shows that a significant portion of the forecast error in HFV and FS is attributed to EPU. Finally, the impulse response of HFV is positive and significant to a shock in EPU.

Figure 5

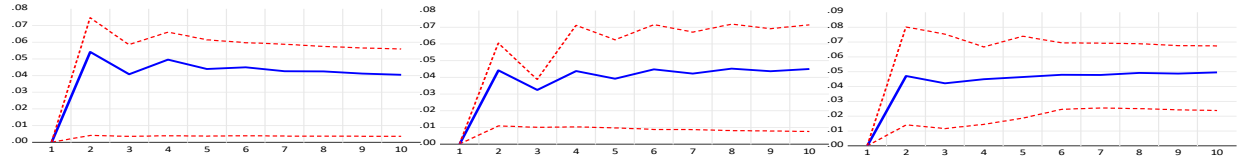
Mediating Effect of FS

Panel A: IRF of MICs



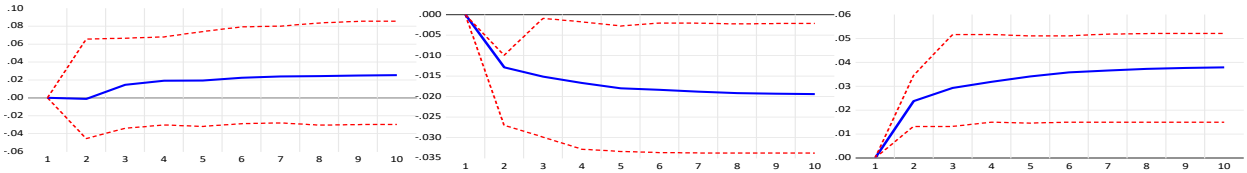
(a) FS←EPU (b) HFV←FS (c) HFV←EPU

Panel B: FEVD of MICs



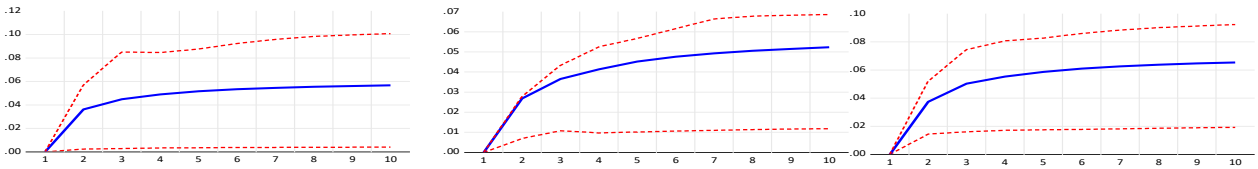
(a) FS←EPU (b) HFV←FS (c) HFV←EPU

Panel A: IRF of UICs



(a) FS←EPU (b) HFV←FS (c) HFV←EPU

Panel B: FEVD of UICs



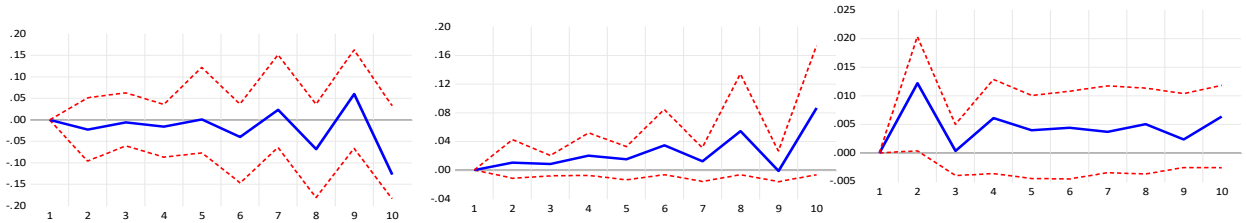
(a) FS←EPU (b) FS←EPU (c) HFV←EPU

4.8.2. Mediating Effect of FDP

The HFV impulse response to a shock in FDP is significant and negative, with a smaller magnitude in UICs across all horizons. Whereas in MICs, it is significant and fluctuates around zero. The shock in EPU causes a significant response in both MICs and UICs. The estimated values of the variance decomposition indicate that during the examined horizons, a modest portion of the forecast error for FDP is attributable to uncertainty shocks. Similarly, a 20% to 30% of the error in the HFV index forecast is attributed to FDP. Finally, modest forecasting errors in HFV and FDP are attributed to shocks in EPU's uncertainty, confirming FDP's mediating effects on the UICs.

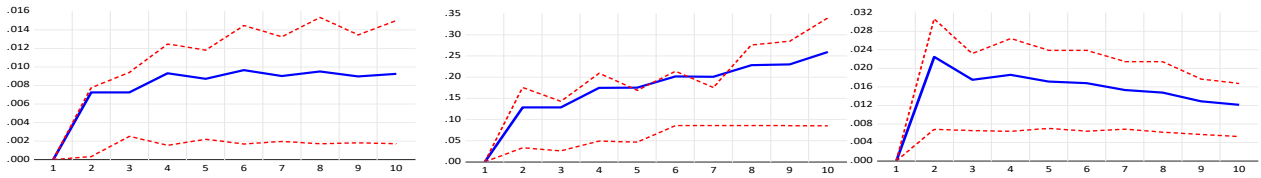
Figure 6
Mediating Effect of FDP

Panel A: IRF of MICs



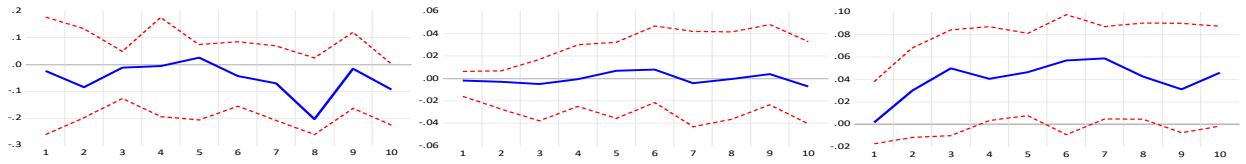
(a) FDP←EPU (b) HFV←FDP (c) HFV←EPU

Panel B: FEVD of MICs



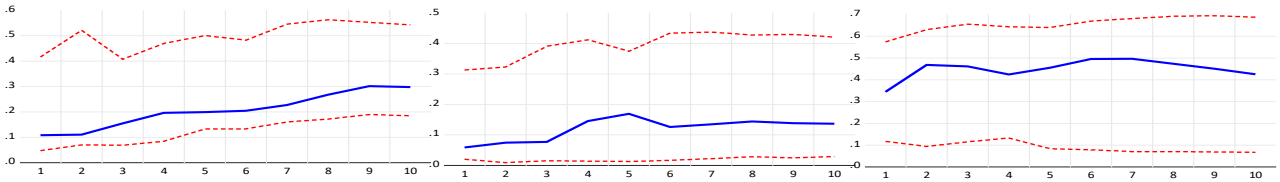
(a) FDP←EPU (b) HFV←FDP (c) HFV←EPU

Panel A: IRF of UICs



(a) FDP←EPU (b) HFV←FDP (c) HFV←EPU

Panel B: FEVD of UICs



(a) FDP←EPU (b) HFV←FDP (c) HFV←EPU

5 | CONCLUSION

The present study empirically estimates the impact of EPU on HFV and investigates the mediating role of different dimensions transforming this relationship. The study highlights the heterogeneity in the behavior of the underlying variable of interest at the level of economic and financial development. The evidence from empirical analysis of the countries under investigation suggests that EPU has a significant impact on HFV, and this impact is magnified in MICs compared to UICs. The mediation analysis confirms the significance of FDV in determining the HFV under policy uncertainty. Notably, the indirect effect of FE is strongest in MICs,

confirming the notion that EPU is inherently conditioned by the efficiency in financial markets. FS and FDP partially mediated the relationship between EPU and HFV, supporting the argument that financial markets are vulnerable to systemic risks, exacerbate policy uncertainty, and impede growth.

The main findings on the effect of EPU on HFV are quite insightful for policy design and management. Governments need more predictable fiscal, monetary, and regulatory decisions, clearer communication, and fewer abrupt policy reversals. For MICs, the priority is to strengthen core resilience through better supervision, stronger capital and liquidity buffers, and more efficient intermediation. The findings underscore the need for policymakers to focus on stabilizing economic policies and fostering financial sector resilience. In UICs, the focus should be on preserving institutional quality, efficient intermediation, and systemic stability. Overall, the findings confirm that the effect of EPU on HFV is conditional on the structure of FDV and is stronger where financial systems are less resilient.

The research study has several limitations; for example, a key limitation of the study is that country-level EPU data are available only for a restricted set of economies, which may affect the generalizability of results. The analysis is conducted at the macro level; however, the use of macro-level proxies may not fully capture HFV at the micro level. Future research may extend this work by using alternative uncertainty measures, nonlinear methods, or micro-level data to capture household and institutional heterogeneity more effectively. Also, global economic integration encourages future research to investigate the dynamic interactions presented here from an international policy uncertainty perspective.

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