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Macroeconomic Fragility Effects of Financial Innovation: Behavioral and Decentralized Finance and Artificial Intelligence

by

Dimitri B. Papadimitriou
Levy Economics Institute

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Levy Economics Institute
P.O. Box 5000
Annandale-on-Hudson, NY 12504-5000
http://www.levyinstitute.org

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ABSTRACT

There seems to be a building consensus of global uncertainty and instability. This can be observed not only from surveys, the media, and country reports, but in the recent speeches by members of the Federal Reserve Board of Governors. The Fed speeches focus on financial stability, not the usual price stability, but that of the financial system. Not surprising, given the unstable conditions of the US economy emanating from the geopolitical conflicts in the Middle East and elsewhere, is the excessive volatility and overvaluation of the equity markets and the public sector's erratic fiscal and trade policy stance. Reports show that equity funds loaded with AI investments—what we may call "emotional investments"—are now looking to unload them in the financial market, adding more fuel to market volatility that may cause a financial crisis, reminiscent of previous crises. The solution may lie in the implementation of a totally new economic regime in answer to recurring macroeconomic fragility.

This paper considers the current conditions of macroeconomic fragility. It explores the challenges and risks to financial system stability that emerge from innovation-developed and increasingly decentralized finance—including the effects of cryptoassets, tokenization of digital assets, and artificial intelligence.

KEYWORDS: Minsky's instability; decentralized finance; behavioral finance; financial system stability; cryptocurrencies; Artificial Intelligence

JEL CODES: E42; E58; G41; G23

1. INTRODUCTION

There seems to be a building consensus of global uncertainty given the geopolitical conflicts especially in the Middle East and Eastern Europe. Even though it is difficult to measure uncertainty precisely, since we would need to specify its impacts on individuals, businesses, markets, national and international economies, certain surveys, commentaries, country reports and official publications (Ahir, Bloom, and Furceri 2025) focus on uncertainty. As Hyman Minsky taught us, uncertainty affects private investment, employment, and consumption—all drivers of economic growth. Moreover, observing the volatility and overvaluation of equities should be convincing of the existence of a highly uncertain boom—similar to the Dot.com boom, although many would disagree, citing the high accumulation of company cash balances and a lower Case-Shiller index than in 1999. Using the Economic Policy Uncertainty Index (EPU) (Baker et al. 2016) which relies on references to uncertainty in the media, shows a much higher level of uncertainty in 2025 than its corresponding surges in 2008 (Global Financial Crisis) and in 2020 (COVID-19 pandemic). Undoubtedly, as Ahir, Bloom and Furceri (2022) indicate, the EPU index may be media biased, but another index developed using the Economist Intelligence Unit's country reports shows the monthly frequency of the term *uncertainty* to follow the same overall trend.

This new World Uncertainty Index (WUI) recording the sentiments of uncertainty across counties is not entirely media-driven. Uncertainty breeds instability which, if left with no policy intervention, can evolve into a crisis. The uncertainty seems to be a concern of the Federal Reserve if one notices the rather frequent use of the word of *stability* in speeches by members of the Federal Reserve Board of Governors (Cook 2026; 2025; Jefferson 2025). They are not referring to the usual price stability—one of the Fed's mandates—but to the financial system's stability. It is not surprising, given the unstable conditions of the US economy emanating from the financial market price volatility swings, the substantial levels of private debt—household debt at over $18 trillion and nonfinancial corporate debt of about $14 trillion—and the public sector's erratic fiscal and trade policy stances. Reports show that equity funds loaded with AI investments—what we may call "emotional investments"—are now looking to unload them in the financial market, adding more fuel to market volatility that may cause a financial crisis

reminiscent of previous ones, in the 70s, 80s, 90s, the Great Recession in the US (2007–9) and other regions in Asia (Asian Financial Crisis, 1997–8) and Europe (European Sovereign Debt Crisis, 2009–19). Once again, the US along with the global economy is facing risks of financial instability. The US central bank has recognized, apparently, that risks are increasing within an uncertain global economic outlook. President Trump's on-and-off tariff impositions cause multiple trade fragmentations which, together with the geopolitical rifts and instability, are most likely forming the elements of a "perfect storm." Solutions implemented in the past may not be appropriate for the present conditions, but may lie, as Minsky used to say, in "a new model of the model" in regards to the implementation of a totally new economic regime in answer to recurring macroeconomic fragility.

More than 60 years ago, Minsky (1964) wrote of the importance of "longer waves in financial relations" in which successive changes of financial conditions and variables affect financial market operations and regulatory structures and cumulatively lead to severe crises and economic contractions. They surface as small, mild recession cycles with noticeable asset (both financial and real) revaluations, higher amounts of debt and as ratios of debt to GDP, stretching liquidity and inadequate income levels to service them. Fast forward to current conditions in the US, which show that financial leverage is notably high instilling high risk vulnerabilities. As the Fed's Financial Stability Report (2025) indicates hedge funds' leverage has reached peak levels from its previous level of 2013 loaded with Treasuries, equities, and interest rate futures while the seemingly resilient banking sector is highly sensitive to interest rates. The banking sector's balance sheet shows an overall low leverage, but still carries substantial fair-value losses and significant exposure to commercial real estate. The leverage levels of businesses vary depending on the industry—being higher in capital intensive industries. The present conditions describe the Minskyan analysis where, before a cycle's downturn, during the expansion period equity and real estate markets become overvalued and together with financial product innovation increase borrowing, leverage, and risk. The government's current policy stance is focused on funding the ever-expanding military complex and the current wars with Iran, Lebanon, and Ukraine at the expense of social programs and support to households that have been severely cut. Consumption spending, however, is still high—in nominal terms—at over $100 billion in February 2026 (BEA) but consumer caution is being observed by the rising energy costs and related products

and services that may affect spending in the months ahead. The recent announcements of job cuts in the tech industry do not bode well in the short run while general job losses resulting from the ever-increasing AI deployment shake labor's confidence in job security and, in turn, affordability for maintaining living standards.

Profits on the other hand, have recently been reported to be at record highs, but many factors can severely affect their steep upward trend continuing in the future (Coy 2026). The most profitable sectors lie in the tech industries with the largest portion coming from the AI boom. Reports, however, indicate that this may not continue since AI will be increasing profits of other sectors, utilizing automation and increasing their productivity and in turn their profits (Coy 2026). Another factor is economic growth continuing in a highly uncertain conditions as discussed. A third factor cited is the continuing market power. Coy cites research findings from the University of Chicago Booth School of Business, indicating that "corporate concentration has been rising for a century." Can this rise continue so as to ensure as it is now that 1 percent of businesses account for 90 percent of corporate profits? Lastly, he mentions the role public policy plays in profitability. Profits, in Kaleckian-Minskyan terms, are a determining factor of investment. Another determining factor of the level of profits, again in Kalecki, is the level of government deficit, but not the currently military-driven deficit.

Minsky was convinced that the fundamental uncertainty in an advanced, complex economy as the US is endogenously generated and rises from a tendency toward a euphoric boom. This, in turn, generates and augments speculation, but each speculative mania has its own characteristics, and the causes that turn a boom to a bust are specific. He focused his analysis of macroeconomic instability on both the existing institutional structure and historical events. To be sure, there are always common causes involved, such as innovations and excessive leverage and most significantly changes in decision-making by households, businesses, banks, and governments that fashioned expectations. Decisions are made in the context of fundamental uncertainty so that cognition and emotion—rationality and irrationality—suggested by Sheila Dow (2011) are very important. The combined psychological attributes of cognition and emotion underpin the margins of safety incorporated in financial arrangements. As Minsky was keenly aware, there are institutional "ceilings and floors" that can contain the push toward economic contraction so as to

ensure “the long-term endogenously induced trend toward closer concatenation of prospective income flows and contracted payments” (Papadimitriou and Wray 2010, 5). The push for deregulation, however, together with the hunger for higher returns and profit-driven innovation can limit the capacity of these institutions to constrain instability that ultimately history has shown lead to a crisis.

As early as in 1964, Minsky wrote how devastating the effects would be for households, businesses, and financial institutions carrying private sector debt, should a significant price drop of real assets occur. His concern was voiced when he studied the then fragile economic landscape and suggested policies that could be implemented by both the central bank—acting as a lender of last resort—and the government, relaxing its fiscal policy stance (Kregel 2010). Minsky couldn’t have imagined how prophetic his writings would be with the crises that followed years later. Economic expansions and contractions although spatial have significant repercussions in exchange rates affecting financing investment and development across the world. Moreover, global imbalances that ensue trigger serious implications in the development of current account deficits as in the case of the US, mirrored by current account surpluses for the economies in Asia—primarily China, which in turn can worsen a developing economic and financial crisis on a global scale (Godley et al. 2006). Notwithstanding Minsky’s assumption of a financial cycle developing and affecting a closed and homogeneous economy, his fragility framework can be extended to an open economy as well. High levels of instability can be the result of financial disturbances both exogenously and endogenously generated from capital flow movements in the world economy which can develop even in the absence of a Minskyan cycle with significant policy implications (Dymski 2010).

This paper’s main focus is to explore the effects of financial innovation on the stability of the financial system, generated and applied to both indirect and decentralized finance, paying particular attention to crypto assets and the recent developments and diffusion of artificial intelligence (AI). Writing on financial innovation and AI, it would be helpful to consider aspects of behavioral finance and to what extent human cognition could be substituted by algorithmic decision-making. Following the introduction, we begin by examining the structure of a financial system characterized by various types of financial institutions and their role in driving financial

innovation. Minsky was suspicious of the connection between finance and innovation and how this relation affected macroeconomic stability. In this regard, he was very much influenced by Schumpeter's ideas on innovation. Minsky knew that formal theory could not explain innovation developed by individuals in financial institutions in an environment of free and unregulated markets. He, however, was forceful on insisting that they be designed and regulated to ensure economic and financial stability. Since financial innovation has its roots in the banker's imagination, we next analyze the Minskyan banker aiming at explaining banker's rationality and evolving nature including the development of the non-bank banker. Even though behavioral finance was not as extensively developed in Minsky's time, there are a number of authors (Dow 2010; Shefrin 2016; Shefrin and Statman 2012) who insist on the epistemological synthesis of psychology and Minsky's FIH and thus, explore the connection of behavioral finance with Minsky's macroeconomic instability. We next take up the task in attempting to determine the effects of financial innovation on macroeconomic fragility, paying particular attention to crypto currencies and artificial intelligence. The last section concludes, offering Minsky's ideas and suggestions on the reconstitution of the financial system that will help lower the degree of macroeconomic fragility.

2. MINSKY AFTER SCHUMPETER

In his writings for over four decades, starting with his PhD dissertation until his death in 1996, Minsky parted ways from the wisdom of neoclassical economics and attempted, with clarity, to link economics and finance. Followers of Minsky would undoubtedly agree, he was much influenced by Schumpeter and Keynes, especially with Keynes' concern of investment volatility and the related uncertainty of cash flows that could lead to serious repercussions on firms' balance sheets and ultimately their survival. The importance of cash flows—absent in the neoclassical paradigm—was crucial so as to answer the following: (a) was the investment undertaken grounded on sound decision-making; (b) would the funds required by the firm to meet payments of debt servicing be available when due; and (c) would the decision-making process be relevant for future investment financial conditions (Minsky 1982, xvii). Analyzing the firm's cash flows documents, both its performance and ability to make payments on its debts.

This, in the aggregate for all firms, determines the economic and financial system's sustainability which in turn denotes the economy's conditions of employment, output and profits (xvii).

To begin with the beginning, Schumpeter was Minsky's original PhD thesis advisor, and his influence is reflected deeply therein (Minsky and Papadimitriou 2004) and on Minsky's research program for almost four decades. In Minsky's view, Schumpeter linked financial business behavior and financial evolution into his writings on economic development. It follows that in Schumpeter's economic system's structure the existence of commercial banks was an absolute necessity and that the banker was prominently characterized as the "ephor" of capitalism. Schumpeter wrote a number of significant works and Schumpeterian scholars (Burlamaqui 2025; McCraw 2006; Rosenberg 1994; Minsky 1990) have, in general, praised his contributions to our understanding of the operating system of capitalism. There are some among them, however, who criticize him of inconsistencies in his writings. Burlamaqui (2025), for example, suggests that the assumption of general equilibrium condition prominently pronounced in Schumpeter's *Theory of Economic Development and Business Cycles* is totally absent in *Capitalism, Socialism and Democracy*. While the former two books, "remained trapped in equilibrium reasoning and yielded incoherent accounts of capitalist evolution," in the latter book "equilibrium disappears, cycles recede, and competition through innovation—creative destruction—emerge as the central dynamic of capitalism" (2). Where does Minsky fit in all these? In Burlamaqui's view, both Keynes's "expectations and liquidity preference and Minsky's theory of financial instability" are rooted in Schumpeter's "neglected 'secondary wave.'" A concept included in Schumpeter's *Business Cycles* (Vol I, Ch. 4, Section C) which outlines the financial instability resulting from creative destruction. Minsky's concern of financial innovation—absent substantial regulation—drives credit expansion that evolves into systemic over-indebtedness, fragility and, if continued, to debt deflation. Thus, Minsky's economics of turbulent capitalism draws from Schumpeter's works that anticipated modern day's strife-ridden, innovation-driven, unstable and financially fragile economic system.

On the other hand, we can represent the Schumpeterian system as one involving an economy in which purchases of produced goods and services take place from the results of employed labor while purchases of output without sales or vice versa play no part (Papadimitriou and Wray

2010). In this regard, such a circular flow system continues unchanging as “the circulation of the blood” (Schumpeter 1934 [1949], 61). The use of money serves the purely limited function of coordinating and facilitating exchange. Schumpeter, however, forcefully advocated a dynamic economy where continued changes disturb the existing circular flow and move the economy from one equilibrium to a new one, but reaching it was not achieved “by infinitesimal steps” (Schumpeter 1934 [1949], 64). Schumpeter concentrated on the changes emanating from within the economic system that caused the displacement of the initial equilibrium. To him, this is how economic development was achieved, the outcome of innovation accompanied by new combinations of resources and forces or means of production.

Schumpeter assumed that in a circular flow economy within which all resources are utilized fully for innovation to take place it would be necessary to extract and move employed resources to a completely new activity (Schumpeter 1934 [1949], 68). But how would these resources be obtained? A purchasing capacity would be needed and could only be provided from credit creation. Innovation, therefore, needs a system that avails credit and so the banker is the “capitalist par excellence,” as the producer of “the commodity ‘purchasing power’” that enables the new combination of resources related to innovation materialize (Schumpeter 1934 [1949], 74).

Credit enables purchases of resources without the necessity of sales of previously produced output that can engender inflationary pressures from the outbidding of resources necessary for innovation. Established firms will have fewer resources that would cause a decrease in their output. Aggregate demand will most likely be maintained, however, from the purchases of the innovators, despite the possibility of aggregate supply declines, resulting in what Schumpeter calls temporary credit inflation. In a period of time, the new products emanating from innovation will be introduced in the market and their sales will enable firms to pay back the credit initially advanced that made innovation possible. Retiring credit reduces deposits (money supply) and this, in turn, contracts spending, pushing prices back toward their initial levels (Schumpeter 1944, 9). In Schumpeter (1934 [1949], 111), the credit inflation is temporary, and the innovation created can even cause a deflationary trend in the long term due to reduced production costs. Schumpeter distinguishes two particular periods he calls “waves”. First, there is the “primary

wave," or the initial period during the expansion where the economy moves away from the circular flow and subsequently contracts, moving toward the initial equilibrium of the circular flow without expectational errors. Firms reacting to changes occurring in the initial credit expansion increasing "purchasing power" can give rise to a boom caused by "mass psychology" and agents' herding. In contrast, the "second wave" occurs in the contraction period which can deteriorate, leading to recession as the economy surpasses the circular flow on the way down, increasing the instability inherently generated in the capitalist economy—frequently emphasized by Minsky.

The tranquility of the circular flow can generate innovation; it occurs endogenously when confident entrepreneurs responding to economic data adjust their conduct and engage in experimentation-encouraging innovation (Bellofiore 1992). Schumpeter's idea of creative destruction describes progress as "breaking things. New technologies and firms replace outdated ones, clearing the way for innovation" (Shiller 2025, 16fn). Innovation raises prospects of economic expansion, altering conventional and established habits of behavior. Prediction of outcomes is neither easy nor accurate, affecting entrepreneurial frame of mind that may become distressed as Schumpeter argues that innovation "changes social and economic situations for good" by altering the system's data and moving away from equilibrium restricting the entrepreneur's ability to predict the outcome of actions (Schumpeter 1951, 217; Bellofiore 1992). These behavioral relationships—causes and effects—are very much Minskyan and can be found in his work, i.e., financial innovation and the role stability plays in generating them. Much of his work emphasizes that *stability is destabilizing*. Minsky, echoing Schumpeter, wrote about the strong connection of financial innovation with debt which can increase faster than the ability to service and pay, causing booms and busts. The shifting of income to rentiers characterized by a lower propensity to spend decreases the level of aggregate demand necessary to generate the required income for debt servicing. Schumpeter's influence on Minsky's approach is evident: importance of finance; endogenous generation of innovation and instability; and cyclical behavior responding to incomes have their roots in Schumpeter's many theoretical arguments (Papadimitriou and Wray 2010, 9).

As mentioned above, Minsky paid particular attention to commercial banking and especially to the commercial banker whose importance has been changed dramatically with the appearance of a new form of capitalism: that of money manager which has helped increase indirect finance.

3. THE DISAPPEARANCE OF THE MINSKYAN BANKER

In a capitalist economy, Minsky always argued, it is important to understand the role of banking. Investment financing (other than using retained earnings) is an activity involving money contracts arranged mostly by financial organizations (banks). Engagement in investment financing, however, is not only restricted to chartered banks, but also includes other depository institutions and a variety of managers of money (Minsky 1986 [2008], 249). Minsky defined money-manager capitalism as an economic system in which the proximate owners of a vast proportion of financial instruments are mutual funds and pension funds. The total return on the portfolio is the only criterion used for judging the performance of the manager (Minsky 1996). In advanced and sophisticated economies, imperfect and asymmetric information is an observable phenomenon and a very meaningful one. Despite the perceived knowledge and particular expertise of economic agents (i.e., business people and bankers) and their supposedly information advantage, asymmetry still prevails. To be sure, both borrowers and lenders have calculated their respective risk in undertaking and financing a project, but as Minsky (1986, 177) has painstakingly argued "each participant…has private information as well as its own market power that can be emphasized in a convincing manner so that bankers would never be given a pro forma statement of return they didn't like, since the borrower's incentive is to overestimate the expected return of the investment project." Bank lending officers are supposedly knowledgeable, but as Minsky urged, it is their duty "to be skeptic[s]" and be able to detect "the shaky or heroic assumptions and also the unwarranted inferences made" (Minsky 1992, 23). Protecting the lender's interests, skeptic bankers would impose restrictive covenants, collateral (as margins of safety) and increased interest rates (Minsky 1986 [2008], 187–93). Thus, asymmetric information needs to be considered as meaningful and inherent in a market economy. Minsky was conscious of the asymmetry and argued in favor of instituting appropriate underwriting processes and standards, but recognized that "although some risks faced by lenders

are expressed in observable increases in interest rates, as leverage increases and the confidence in future cash flows decreases, this observed rise in interest rate is not the full picture of the rise in financing costs" (Minsky 1986 [2008], 123).

Minsky's approach is based on financial Keynesianism that considers expectations, uncertainty, and ignorance and rejects the axioms considered "fundamental features of neoclassical economics" involving probabilistic risks, rational expectations and a "world oblivious of history […] Instead Minsky's world is one of complex decision-making where fundamental uncertainty in the sense of Keynes, dominates and where decisions once taken, can exhibit over time a strong dose of indeterminacy (Nasica 2010, 102). This is in concert with "subjectively valued" risk and not objectively probabilistic that bankers carry in their lending activities (Minsky 1986 [2008], 239). Minsky's "rational banker" is guided by Keynes' conventional rationality. In such an environment, "expectations are partly formed on the basis of the operation of the economy and partly on the imagination of agents, they are composed both of endogenous and exogenous elements" (Kregel 1995, 218). In general, investment activity is risky and uncertain, but provides opportunities for creativity and ingenuity to flourish. Minsky despite his reservations on speculative excesses, appears, to some extent, supportive. In his own words

> Federal Reserve policy needs to continuously lean against the use of speculation and Ponzi finance. But Ponzi finance is a usual way of debt-financing investment in process in a capitalist society. Consequently, capitalism without financial practices that lead to instability may be less innovative and expansionary, lessening the possibility of disaster might very well take part of the *spark of creativity* out of the capitalism system. (Minsky 1986 [2008], 328, emphasis added)

Bankers modify their decisions in an environment where debtors are unable to fulfill the conditions of their loans—their expectations notwithstanding—by limiting the number of new loans and amounts extended. On the contrary, in an environment characterized by debt repayment and fulfilment of debtors' obligations, again in deference to their expectations, bankers will be encouraged to increase the availability of credit. The longer their increased confidence lasts, the higher the level of indebtedness will be reflected in their balance sheets and in the economy overall. This trend of pro-cyclical indebtedness engenders what Minsky called macroeconomic fragility that ultimately will lead to a crisis. (The Global Financial Crisis of 2008 being an example.) Banks driven by competition and increased confidence about the economy

increase their own indebtedness in proportion to their equity and other assets rendering their own balance sheets fragile (Minsky 1986 [2008], 223–53). On the other hand, when banker's confidence about the economy weakens the indebtedness in proportion to their equity and other assets decreases. These ratios, therefore, tend to evolve countercyclically.

Minsky's theoretical approach has been subjected to some criticism regarding these ratios and in turn the generation of financial fragility. Friedman and Laibson (1989) and Tobin (1989, 106), commenting on Minsky's *Stabilizing an Unstable Economy* (1986 [2008]) are noted examples. Friedman and Laibson (1989, 169) suggested that the Minskyan banker appears to be myopic in that in general economic agents might foresee an economic downturn coming and act by changing the composition of their portfolios and in a way increasing the likelihood of a crisis, while Tobin (1989, 106) argued that supporters of rational expectations would disagree with the notion that the projected cycle would disappear once lenders and borrowers understood its coming. As Nasica (2010) questions, however, how is it possible to know the timing the financial crisis will actually happen? This unknown variable is crucial, "this means for the individual financial or non-financial firm it is in no way profitable to engage in 'hedge' finance during an economic boom" (Nasica 2010, 104). The conclusion that can be drawn from the above is that, given the existence of asymmetric information in the economic environment, the Minskyan banker is conventionally rational and not myopic. Financial fragility is endogenously generated in a capitalistic system when economic expansion is underway and debt-financed investment appears rational.

4. MINSKY AND BEHAVIORAL FINANCE

As mentioned earlier, references to ideas developed in behavioral finance are absent in Minsky's writings. Behavioral finance *per se* hadn't been developed as an economic area of study in Keynes's and Minsky's eras. Keynes, however, as Skidelsky (2009) suggests, anticipated the work of behavioral psychologists. He stressed the importance of agents expectations based "of others' behavior" (94). Some authors (Dow 2011; Shefrin and Statman 2012; Shefrin 2016) have suggested that when Minsky's fundamental uncertainty epistemology and method are

analyzed using the perspective of psychology, then, his financial instability hypothesis can be better understood. There is plenty of psychological content in his *Financial Instability Hypothesis*, since it is aggregate entrepreneurial behavior that leads up to financial disaster and market responses to it. A careful examination of behavioral finance reveals an existing lacuna relating to motivation for action under fundamental uncertainty that plays on center stage in Minsky's and Keynes' treatment of financial behavior. Shefrin and Statman (2012) use "Keynes' view that psychology… (sentiment) reflecting unrealistic optimism or pessimism, leads to booms and busts" while Minsky's view incorporating psychology makes crises inevitable in capitalistic systems (119). Keynes (1921; 1936), under conditions of fundamental uncertainty, considered economic behavior dependent on psychology, unlike the neoclassical thinking which limits it strictly on rationality. It is also well-known that Keynes developed the psychological concepts of animal spirits, the spontaneous and the emotional desires to act, the psychological laws to consume and save—propensities to consume and save—liquidity preference, conventional wisdom, along with other human behavior heuristics that create uncertainty which in turn can engender instability. Exploring the effects of uncertainty, emotion, aspiration, and culture at the level of social structures and institutions as they are recognized in the Minskyan structural approach is of crucial importance. It can be argued that interconnecting cognition and sentiment rather than analyzing them separately is unnecessarily limiting (Dow 2011, 235–6). Clearly, Minsky's structural theory of financial instability assumes certain behavioral biases, i.e., availability, representativeness, and anchoring, which lead to overreaction creating undue confidence that fashions entrepreneurial motivation for action and thus incorporates aspects of psychology into the theoretical foundations.

The integration of psychology in Keynes' thinking, and by extension in Minsky's, is controversial. The assumed linkage has sparked, in substantive ways, a plethora of differences of opinion on how it relates to Keynes and Minsky. Excepting the authors already mentioned above, others too have supported the perspective that behavioral macroeconomics was very much present in Keynes' *General Theory* (Akerlof and Shiller 2009; Pech and Milan 2009). Akerlof and Shiller (2009), quoting Keynes, argued that he reasoned lower employment to be due to animal spirits. "If people are uncertain, how are decisions made? They 'can only be taken as a result of animal spirits.' They are the result of 'spontaneous urge to action.' They are not as

rational economic theory would dictate" (3). Minsky (1982) argued of the significance of animal spirits underpinning the psychology of speculative bubbles. Many have, however, criticized the linkage between Keynes and psychology (King 2010; Barens 2011; Kurz, Nishizawa, and Tribe 2011) arguing that it constitutes a misunderstanding and misinterpretation of Keynes' view on expectations, rationality, and business decision-making. King (2010) argues that "Keynes' use of psychology is unsystematic and confusing and should be avoided." While Barens (2011) agrees with King and disagrees strongly with Akerlof and Shiller's (2009) attributing strong significance of the phrase "animal spirits" in playing a key role in Keynes' *General Theory of Employment, Interest and Money*. Instead, Barens (2011) argues the use of "animal spirits" is an "eloquent" expression describing the "state of confidence" and with the phrase "changes in animal spirits" signaling surges of optimism or pessimism (15).

The intention of this section of the paper is not to provide a Solomonic judgment on the issue centering on the role, if any, behavioral finance plays in Keynes and Minsky. As mentioned, behavioral finance was not well detailed during their respective times. Instead, what is attempted here is to explain aggregate behavior and how it relates to financial instability which in turn establishes a fragile economic system. If, however, psychology relates to forming expectations underpinning uncertainty that generate Minsky's financing profiles of hedge, speculative or Ponzi linked to tranquility or instability in an economy, then, Dow's (2013) view is very fitting:

> A major source of uncertainty is changes in conventional judgment, especially as to confidence in expectations, as well as to the exercise of agency under animal spirits. . . . Neither deductive logic nor inductive logic can predict such things with certainty. Therefore, Keynes's theory incorporates socio-psychological variables which cannot be explained, and yet are not random; they can only be observed, and signs picked up of impending changes using alternative methods. (124)

What can these alternative methods be? Invoking Keynes, Barnett (2015) argues it will involve a better understanding of the "physiology of industry" (Keynes 1936 [1973] 365) and of the "sio-psychological variables" that are essential in Keynes' theory of expectations that can be explained not only by conventional economic theory (330).

5. MACROECONOMIC FRAGILITY, CRYPTOS, AND ARTIFICIAL INTELLIGENCE

Minsky, as was noted above, was troubled by the increasing financial innovations leading to the introduction of new financial instruments that were inadequately regulated and supervised, if at all, endangering the stability of the financial system. Had Minsky been alive in January 2009, when the first cryptocurrency (Bitcoin) was introduced, he would have been highly concerned. Cryptocurrencies are financial transaction instruments representing unbacked money that appeared as the first bloc—genesis block—in the blockchain of Satoshi Nakamoto's (an unknown individual or a group of individuals) as a decentralized peer-to-peer digital currency.

Its initial value was one-tenth of a cent in US dollar terms. Seventeen years later, with many booms and bust cycles of its value, its transaction value at the time of writing is over $73,000. And it is not the only cryptocurrency in circulation! There have been many crypto assets developed since, tied to various blockchains. The decentralized finance—part of shadow finance—facilitates many services (i.e., trading, lending, and borrowing) replacing traditional financial institutions. The early users of Bitcoin have surely gained significant wealth while others have incurred substantial losses (Cornelli et al. 2023). To be sure, amassing wealth and big losses from cryptocurrencies are the result of combined extreme price volatility and encouraged speculation. Their volatility notwithstanding, the overall trend has been upward. Clearly, there are challenges confronting central bankers from the ever-growing use of these financial innovations. The current structure for regulating these products, in the US, involves the SEC, CFTC and the IRS for taxing capital gains—if they are reported. These government agencies, however, have only indirect responsibility for ensuring financial macroeconomic stability. Central Banks have direct responsibility for the financial system's stability. Aquilina et al. (2025), in a recent BIS paper, noted that the initial reactions of central bankers and international organizations "were a mix of curiosity, skepticism and cautious willingness to explore the underlying characteristics of these new assets" (4). However, the amazing growth and broader use of cryptocurrencies over the years, has increasingly connected them with activities affecting traditional finance, i.e., payments, interest rates, and inflation. In addition, stablecoins—a form of cryptocurrencies—backed by US Treasuries have been considered a

serious factor creating links with financial system stability. Even though the BIS recognizes the need for strong prudential regulation to establish oversight of the linkage of decentralized finance with traditional finance (22), such measures have yet to be taken.

In all of Minsky's writings, he called for a regulatory structure that would enable proactive interventions to safeguard financial stability. Proponents of decentralized finance see advantages in leveraging blockchain technology to carry out traditional financial services, create new services and instruments and improve the efficiency of financial markets. Undoubtedly, tokenization of digital assets has the potential to offer benefits such as lower-cost and faster transactions, reduced settlement time risk, data privacy and protection from fraud (Johnson et al. 2025). In addition, decentralized finance can, to some extent, solve information asymmetries with required disclosure, but cannot successfully address exogenous shocks. Policy makers around the world need to concentrate their efforts on protecting citizens and the international financial system since it is well-known that new technological advances entail both benefits and risks that are not known (op. cit., 13). As Minsky urged in many of his papers, public intervention is necessary when private interests are not in concert with public interests. These interventions should include (i) the prudential regulation and supervision of financial institutions with knowledgeable and qualified examiners; (ii) careful risk analysis and management; (iii) deposit insurance; and (iv) central banks acting as lenders of last resort at crisis times, being the "big banks." This, however, has not happened despite excessive financialization which has allowed many economies to become fragile. Moreover, to raise the level of Minskyan concerns about stability even higher, issues connected with the relative recent, but prominent use of artificial intelligence in finance could be alarming. To these we turn next.

Many have warned of the multi-faceted reverberations of Artificial Intelligence (AI) across banking and finance in general. They range from imaginative creation to sheer destruction. Gary Gensler is quoted by Kearns (2023) as having said "AI may heighten financial fragility, as it could promote herding—with individual actors making similar decisions because they are getting the same signal from a base model or data aggregator" which means that financial stability risks from AI require "new thinking on systemwide or macroprudential policy interventions." Yet two years later, the US Central Bank has not implemented new regulations regarding the use of AI,

but applies the existing guidelines and risk management instead of instituting AI-specific rules, guidelines or laws. The Fed knows that the use of AI in trading and other financial services may entail risks. Fed Governor Lisa Cook (2025) in one of her speeches indicated that AI trading "can autonomously display trading strategies that could be opaque and used without careful testing and human oversight, generative AI may create risks that are difficult to monitor or mitigate" and she continued, saying that "[O]n the other hand, generative AI may improve algorithmic trading and may adjust the current models in a way that stabilize rather than destabilize prices." In other words, we don't really know whether economic and financial stability can be assured since the use of "generative AI in financial markets trading….could both increase and decrease financial stability." Priority in Minsky's agenda was the reconstituting of the financial structure so as to have the capacity to regulate and supervise financial innovation that may engender economic fragility. In his later years, he was worried about the excessive financialization in the US and other advanced economies with their economic systems having been converted to "money manager capitalism." He warned that money manager capitalism threatened economic stability and increased the fragility of the economic system. Innovations such as cryptos and generative AI reinforce the financial system's dynamics that could result in institutional changes. Economic agents, i.e., households, businesses, and financial institutions seeking to maximize profits embrace speculative behavior acquiring new financial instruments produced from financial innovation with asymmetric information absent the required regulation results in underpricing risk. The new financial products and the institutions that emerge together with old instruments and institutions are used in new ways that promote economic fragility (Minsky 1986 [2008], 77–78). Experiences inform us that financial innovation with inadequate regulation brings about broader economic implications as witnessed in the 2007–8 global financial crisis—the result of innovating with mortgage securitization—that necessitated multi-faceted and very costly government and central bank interventions.

The pertinent question is whether AI could decrease judgment errors by improving the models and algorithms so that outcomes are optimal, ensuring stability in a dynamic markets environment (Daianu 2024). The affirmative answer would imply that AI can crowd out human intelligence in terms of adaptability, contextual quality, and abundance and emotional depth while the negative response will ignore AI's precision, focused attention, task-specific and

limitless memory (Zhang 2024). It seems there is symbiotic intelligence combining human and AI. Since AI does not alter human cognition, it follows that it cannot prevent animal spirits leading to business cycles, competition, overinvestment and economic instability. In spite of AI's admirable capacity to extract, gather, and classify all sorts of data, it can make financial systems more fragile (Daianu 2024, 2). AI causes a disruption of the status quo and in the world of finance, it means that the regulatory structure must be proactive and evolving in step with financial innovation so as to reduce risks for market participants and simultaneously ensure the financial system's stability.

6. CONCLUSION

The structure of the modern US financial system plays a dominant role on the financial fragility of the economy. As Minsky insisted, a regulation and supervision-deficient financial structure will have an impact on contagion by which financial fragility will generate economic instability (Kregel 2019, 79). In this paper, we first analyzed the relevance of Minsky's financial instability hypothesis within the context of past financial crises and then moved to current conditions as they have been formed by significant financial innovation especially cryptocurrencies, tokenization of digital assets, and artificial intelligence. In this regard, we examined Schumpeter's influence on Minky's financial Keynesianism and the role financial innovation plays on the financial structure of the US financial system. As is well-known, Minsky characterized the US modern economic system as being, at best, "conditionally coherent" (Minsky 1986 [2008], 117). Minsky rejected the equilibrium-guided mainstream methodology as inappropriate in analyzing today's capitalist economy with complex innovation-driven and overvalued capital assets. He replaced equilibrium with "periods of tranquility" (197) in which the financial system was robust with few innovations. Tranquility, however, encourages risk-taking and innovation, purporting to increase income even if it causes disruption in the conditions that generate coherence and tranquility. The process has many effects on market forces operating in a stable system now being pushed toward instability which triggers behavioral responses, quickly moving the system away from tranquility. This led Minsky to coin the phrase "stability is destabilizing" and that for our economy tending toward speculative

excesses there is an inherent and fundamental instability. This is rooted in Keynes' argument developed in chapter 12 of his *General Theory* that, in an unstable economy, "speculation dominates enterprise." Even though Minsky did not explore behavioral finance for the reasons outlined in Section 4, he was concerned with the imagination, biases, and behavior of economic agents during the euphoric periods. He did not attribute instability being the result of shocks, irrational exuberance or foolish policy (Akerlof and Shiller 2009; Shiller 2000), but argued in favor of the endogenous processes generating the economic system's financial fragility (Papadimitriou and Wray 2008, xii).

As mentioned in the beginning of this paper, Fed governors have recently discussed the financial system's stability (Cook 2026; 2025; Jefferson 2025). They discuss the financial system's resilience characterized by strong condition balance sheets among all sectors: households and businesses along with high capital levels across the banking system. Governor Cook (2025), in her speech, indicated that "[d]efault rates are low, but they are a backward-looking measure and could also reflect increased usage of payment in kind arrangements, loan amendments, distressed exchanges." She also noted that there is tendency "away from traditional bank loans toward private credit arrangements. Growth of private credit over the past five years, has roughly doubled from non-bank entities" (2). This, in Minskyan terms, supports his warnings of the decline of traditional banking and movement to unregulated decentralized (shadow) finance endangering the system's stability. In his later years, Minsky coined the latest form of capitalism as "money manager" capitalism as the most unstable economic system. In this economic system, uncertainty is high because of the dominant influence of mutual funds, high leverage, unbacked financial instruments, i.e., cryptocurrencies, tokenized digital assets and AI-guided finance which systematically underprice risk (Papadimitriou 2012).

Given the ever-increasing market share of decentralized finance and the relatively lax regulation and supervision of financial institutions, Minsky's concern about another financial crisis is warranted. It seems that, in the aftermath of the Global Financial Crisis, the legislative agenda has moved once more toward deregulation as witnessed with the Silicon Valley Bank run. To be sure, it didn't develop into a crisis, but indicated that the financial system is fragile. Kregel (1993 [2019]), many years back, raised the question whether "the current financial system is more or

less fragile" (88). It seems the same question is still appropriate to ask about today's financial system. Clearly, from the Fed's perspective the automatic answer would be "No!" We, however, would disagree and suggest that the financial structure is more fragile and more unstable, placing responsibilities for its reconstitution on the financial authorities, especially the central bank. We would argue along Minskyan insights that, to lessen macroeconomic fragility, there is an urgent need for creating new rules and regulation and strengthening supervision. Both are important and necessary because there is a recognition that innovation-driven financial instruments and practices are complex to understand, supervise, and risk-estimate. Regulation would include restrictions on some financial institutions to use financial instruments and practices along with much closer supervision, since it will be difficult to write rules and regulations to cover innovation-driven instruments and AI uses that are yet to be developed. Minsky's (1982) financial instability hypothesis teaches us that regulation and supervision of financial institutions and markets are required to prevent a crisis for "'It' to happen again."

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