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End of previous Forum article

Moritz Schularick and Kaspar Zimmermann

Towards a New Paradigm: Stabilising Financial Markets

The global financial crisis and its aftermath dealt a blow to the reigning belief in efficient and self-stabilising financial markets. A new, post-crisis paradigm is being shaped by

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important work in behavioural finance, empirical macroeconomics and financial history. The new paradigm acknowledges the potential of financial markets to periodically misprice fundamental risks, and it builds in stronger buffers to make the financial system resilient to asset price fluctuations. It also ends the “the more, the merrier” view on financial deepening and takes the negative externalities of high private debt and the exposure of the financial system to market risk seriously. Furthermore, it recognises that boom and bust cycles in private, not pub-

lic, debt tend to be the main driver of financial instability. Finally, it embraces prudential regulation based on simple and transparent rules.

Until recently, economics was in love with finance. The profession enthusiastically embraced a narrative that stressed the potential of unfettered financial markets to enhance economic prosperity. Financial markets were believed to come closest to the “ideal” market in economic textbooks: competitive, efficient and virtually complete. This love affair has taken a few punches in the past decade. The crisis has put financial instability at the top of the agenda of economists, policymakers and taxpayers. Research on asset price bubbles, banking crises and household debt has surged in recent years.

Ten years after the crisis, we examine this research and argue that a new paradigm to stabilise financial markets is emerging. This paradigm takes a less axiomatic perspective on market efficiency and acknowledges the potential of unfettered financial markets to misprice assets and endogenously create financial instability. It also acknowledges that not all activities of the financial sector are growth-enhancing, and many may carry potential negative externalities for the real economy. The avoidance of costly credit-cum-asset price bubbles is set to become a cornerstone of future economic policy, with regulation shifting from micro to macro approaches and central banks returning to their roots by focusing on financial stability.

To begin with, there is no doubt that well-functioning financial markets are crucial for economic development. The financial sector mobilises and allocates capital to its most productive uses. It produces information by evaluating firms, households and market conditions before investment decisions. It monitors firms, diversifies individual risks, pools savings for larger projects and operates our system of payments.¹

However, finance also has a tendency to produce boom-bust cycles in credit markets that throw economies into deep and prolonged recessions with substantial economic and political costs. The pre-crisis paradigm focused exclusively on the positive role of finance. The new paradigm takes the other side of finance seriously and arrives at distinctly different trade-offs and regulatory approaches. In some aspects, the new paradigm draws on older

1 R. Levine: Finance and growth: theory and evidence, *Handbook of Economic Growth*, Vol. 1, 2005, pp. 865-934; R.C. Merton, Z. Bodie: A conceptual framework for analyzing the financial system, in: D.B. Crane, K.A. Froot, S.P. Mason, A. Perold, R.C. Merton, Z. Bodie, E.R. Sirri, P. Tufano (eds.): *The global financial system: A functional perspective*, Boston 1995, Harvard Business School Press, pp. 3-31.

views, such as Minsky’s financial instability hypothesis,² but it also builds on lessons learned since the global financial crisis using state-of-the-art empirical and theoretical research.

The old paradigm: in love with finance

The dominant pre-crisis paradigm rested on four main pillars. We will discuss them briefly, starting with the efficient market hypothesis and then moving on to the size of finance, the sources of financial instability and the philosophy behind financial regulation. Needless to say, most of these ideas are heavily stylised, but they nonetheless provide the background against which the new paradigm is set.

Efficient financial markets

The belief in efficient financial markets has deep roots in the economics profession. Fama summarised the concept in the efficient market hypothesis (EMH).³ The EMH states that prices fully and rationally reflect all available information. Price movements mirror new rather than old information, and irrational deviations of prices from their fundamental values could, if at all, be only transitory: irrationalities of investors would cancel each other out in the aggregate, or rational arbitrageurs could make money by betting against irrational investment behaviour.

It is important to note that the EMH is closely linked to market depth and liquidity. Prices can only reflect all available information if an asset is traded frequently enough. Thus, according to the EMH, higher liquidity generates more information about firms and investment opportunities and improves capital allocation in the economy. Individuals can only buy and sell assets instantaneously without fearing large negative price effects if markets are deep and liquid. This, in turn, makes asset markets more attractive to investors and increases investment. Higher liquidity and larger trading volumes benefit the economy by improving the allocation and incentivising the accumulation of capital.

There are two important implications of the EMH. First, individual investors cannot on average “beat the market” based on available information and trading rules. Individual trading strategies or portfolios with a risk structure similar to the market should not be able to consistently outperform the market. Any outperformance is either the result of luck or is driven by higher risks. Second, rational expectations and the efficient market hypothesis imply that financial instabil-

2 H.P. Minsky: *Stabilizing an Unstable Economy*, London 1986, Yale University Press.

3 E.F. Fama: Efficient capital markets: A review of theory and empirical work, in: *The Journal of Finance*, Vol. 25, No. 2, 1970, pp. 383-417.

ity results from truly exogenous and unanticipated shocks to the economy or unanticipated government policies.

The growth of finance: the more, the merrier

Market economies need a reasonably sophisticated and dynamic financial system to allocate funds and provide insurance against risks. Under the old paradigm, financial deepening, i.e. an increase in the size of financial intermediation activities such as borrowing and lending, was generally welcomed as an equilibrium outcome and efficiency gain. The dominant paradigm was “the more, the merrier”.

The pre-crisis optimists advocated financial innovation, domestic market liberalisation and international financial integration. Financial globalisation promised to deliver capital flows from savings-abundant industrialised economies to capital-scarce emerging market economies, as well as supporting stock market and banking system development.⁴ However, interventions and restrictions on the activities of intermediaries would reduce the capability of the financial system to exert its beneficial function for the real economy. Imperfect capital allocation, lower productivity growth and less capital would be the consequences.

The so-called finance and growth literature provided empirical evidence that stressed the beneficial effects of financial development. Levine found a general consensus among economists that a deeper financial system (higher credit-to-GDP ratio) and higher stock turnover (trading volume-to-market capitalisation) are positively associated with faster GDP growth.⁵ Other authors concurred. Rajan and Zingales showed that more financially dependent industries tended to grow faster in more financially developed countries,⁶ while Levine and Zervos stressed the beneficial complementarity of banking and capital markets for economic growth.⁷ Ranciere et al. even argued that the finance-growth nexus is strong enough to trump the negative effects of financial crises.⁸

Financial stability

At the same time, the old paradigm argued that increased financial depth and more complete markets would also

benefit financial stability. Improved risk management capacities in liquid markets were supposed to make the financial system more resilient to economic shocks and enable agents to insure against (probabilistic) risks. Debt securities and derivatives would allow financial market participants to price risk adequately through the market. Such risks could then either be matched with inversely correlated risks, diversified or placed in hands best able to absorb a loss. Global finance and market integration increased the scope for international diversification. Local risks were believed to wash out in the global aggregate. In short, the old paradigm was built on the premise that more finance would not only lead to more growth, but would also lead to more stable economies.

Over time, 20 years of “Great Moderation” seemed to vindicate these policies, at least in the advanced economies. Financial crises were assumed to be a thing of the past or something that only affected developing countries with weak institutions and emerging financial markets. At the peak of the Great Moderation, Robert Lucas’s presidential address to the American Economic Association in 2003 said that “the central problem of depression prevention [has] been solved, for all practical purposes”.⁹

Philosophy of non-regulation

Under the old paradigm, the room for financial regulation was limited. Efficient financial markets and enhanced stability due to market integration and innovative risk management left little room for regulation and supervision. Regulators and economists trusted in the market as the main disciplining device,¹⁰ and the empirical evidence supported policies that enhance transparency and improve monitoring incentives.¹¹

Actual regulation intended to fill in where the market might not efficiently discipline itself or self-stabilisation was impeded. For instance, in the presence of deposit insurance, short-term debtors no longer had an incentive to monitor the risk-taking of banks; consequently, regulators forced minimum capital ratios upon the banks during the Basel process. Capital regulations in the Basel 1 and Basel 2 framework were supposed to prevent individual banks from taking excessive risks in the presence of public guarantees for deposits and ensure a safety buffer for

4 F.S. Mishkin: The next great globalization: how disadvantaged nations can harness their financial systems to get rich, Princeton 2006, Princeton University Press.

5 R. Levine, op. cit.

6 R.G. Rajan, L. Zingales: Financial Dependence and Growth, in: The American Economic Review, Vol. 88, No. 3, 1998, pp. 559-586.

7 R. Levine, S. Zervos: Stock markets, banks, and economic growth, in: American Economic Review, Vol. 88, No. 3, 1998, pp. 537-558.

8 R. Ranciere, A. Tornell, F. Westermann: Systemic crises and growth, in: The Quarterly Journal of Economics, Vol. 123, No. 1, 2008, pp. 359-406.

9 R.E. Lucas, Jr.: Macroeconomic Priorities, in: American Economic Review, Vol. 93, No. 1, 2003, pp. 1-14.

10 A. Greenspan: Corporate governance, remarks at the 2003 Conference on Bank Structure and Competition, Chicago, Illinois, 8 May 2003, available at <https://www.federalreserve.gov/BoardDocs/speeches/2003/20030508/default.htm>.

11 J.R. Barth, G. Caprio Jr, R. Levine: Bank regulation and supervision: what works best?, in: Journal of Financial Intermediation, Vol. 13, 2004, pp. 205-248.

loss absorption. Yet Basel 2 in particular gave considerable discretion to banks to “risk adjust” their capital according to their assets.

Solving such incentive problems required detailed regulation at the level of the individual bank, giving regulation a pronounced micro flavour. Regulators would monitor individual banks at the micro level, often at arm’s length. The core assumption was that the regulation of individual institutions would implicitly guarantee the stability of the system as a whole.

Cracks in the edifice

Cracks appeared in the old paradigm over the years, culminating in the 2008 meltdown of global finance. These cracks had emerged long before the global financial crisis, but were by and large ignored. The crisis at the heart of global capitalism now made it impossible to continue to look away.

The crisis (i) revealed large asset mispricings in the US real estate market, (ii) disclosed the exposure of the banking sector to systematic (undiversifiable) housing market risk, (iii) underscored the costs of private debt cycles and their aftermath, and (iv) exposed gaps in the micro-regulation approach.

These failures have not only revived scepticism about the information efficiency and self-stabilising nature of financial markets. They have also led to a fundamental rethink of the role of finance in the economy. A substantial body of new research led to a revision of the “the more, the merrier” view of finance, and in doing so also forced a reconsideration of the guiding principles of financial regulation.

Market inefficiency, excess volatility and bubbles

The economics discipline has been slow to reach the conclusion that the EMH needed some intellectual adjustments. Important evidence from economic history was largely ignored. Waves of irrational exuberance are as old as the financial system itself. The recent US housing bubble was the last on a long list of fundamentally unwarranted asset price booms, including the dot-com bubble and the Japanese real estate bubble of the 1990s, and the Chinese stock market boom in the aughts. Clearly, bubbles and busts are too frequent to be disregarded.

How can such frequent bubbles be squared with the EMH? On one level, it is important to distinguish between the ability of financial markets to get relative prices right and their ability to value the fundamental outlook cor-

rectly. Macroeconomists typically accept that markets do a fairly good job when it comes to relative prices. Larry Summers once described the market’s ability to get relative prices right as ketchup finance:

Two quart bottles of ketchup invariably sell for twice as much as one quart bottles of ketchup except for deviations traceable to transactions costs, and that one cannot get a bargain on ketchup by buying and combining ingredients once one takes account of transactions costs.¹²

Yet the fact that no money can be made from arbitrage between ketchup bottles of different sizes does not mean that the fundamental price is warranted. We can still be in a ketchup bubble.

While the EMH remained the dominant paradigm and centrepiece around which finance operated, financial economists had begun to study its empirical validity long before the financial crisis. In 1981, Robert Shiller published his first paper on excess volatility in stock markets and challenged the standard asset pricing model with constant discount rates and rational expectations of future dividends.¹³ Shiller’s main finding was that stock markets are a lot more volatile than corporate fundamentals would justify. Building on this early work, Campbell and Shiller show that high prices relative to company dividends or earnings predict low subsequent returns, while low prices predict high returns.¹⁴

These two key results laid the foundations for the still flourishing literature on return predictability and behavioural finance. The predictability of the aggregate market has been confirmed for various asset classes¹⁵ and over the long-run using up to 400 years of data.¹⁶ So far, no single causal driver of aggregate return predictability is universally accepted. Rational models need to vary risk or the price of risk over time to account for the observed patterns using habit formation,¹⁷ long-run risk¹⁸ or rare dis-

12 L.H. Summers: On economics and finance, in: *The Journal of Finance*, Vol. 40, No. 3, 1985, pp. 633-635.

13 R.J. Shiller: The use of volatility measures in assessing market efficiency, in: *The Journal of Finance*, Vol. 36, No. 2, 1981, pp. 291-304.

14 J.Y. Campbell, R.J. Shiller: The dividend-price ratio and expectations of future dividends and discount factors, in: *The Review of Financial Studies*, Vol. 1, No. 3, 1988, pp. 195-228.

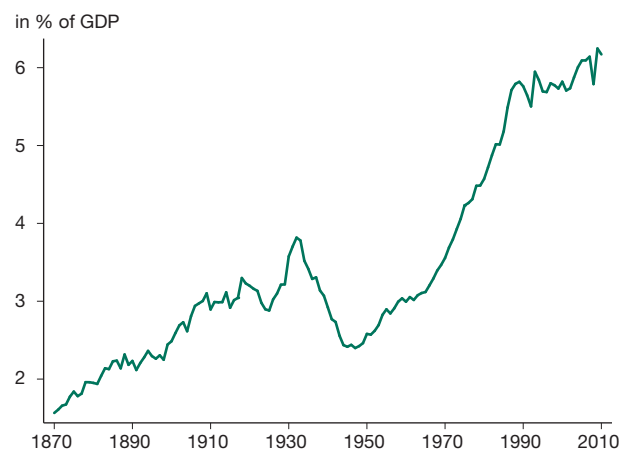
15 A. Ilmanen: *Expected returns: an investor’s guide to harvesting market rewards*, Chichester 2011, John Wiley & Sons.

16 B. Golez, P. Koudijs: Four centuries of return predictability, in: *Journal of Financial Economics*, Vol. 127, No. 2, 2018, pp. 248-263.

17 J.Y. Campbell, J.H. Cochrane: By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior, in: *The Journal of Political Economy*, Vol. 107, No. 2, 1999, pp. 205-251.

18 R. Bansal, A. Yaron: Risks for the long run: A potential resolution of asset pricing puzzles, in: *The Journal of Finance*, Vol. 59, No. 4, 2004, pp. 1481-1509.

Figure 1
Financial sector's share of GDP in advanced economies, 1870-2010



Note: Value added share of finance averaged across 17 countries: Australia, Belgium, Canada, Denmark, France, Finland, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA.

Source: Macrohistory Lab Bonn, unpublished.

asters.¹⁹ However, recent work challenges all three main rational explanations: Muir investigates economic fundamentals and risk premia and finds that none of these three models can explain the data.²⁰

The most prominent behavioural models assume that irrational investors extrapolate past returns into the future and constrain the arbitrage possibilities of rational investors.²¹ High current returns generate expectations of high future returns and thus also higher prices. Some rational agents might decide to “ride” the bubble if they are sufficiently confident that the bubble will continue to grow.²²

Too much finance?

Has the financial sector grown too big – possibly past the point of serving the real economy in a growth-enhancing way? We now turn our attention to challenges to the old

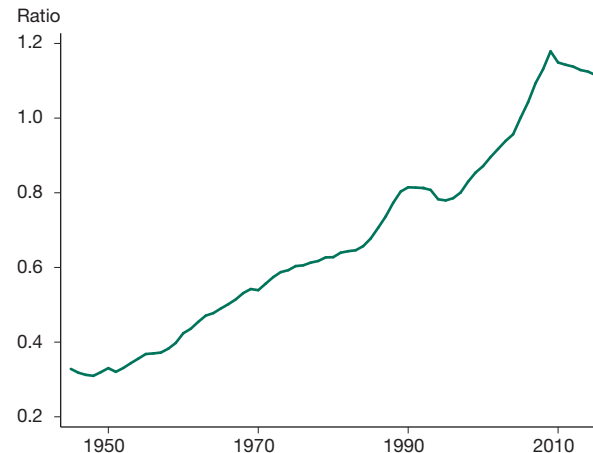
19 X. Gabaix: Variable rare disasters: An exactly solved framework for ten puzzles in macro-finance, in: *The Quarterly Journal of Economics*, Vol. 127, No. 2, 2012, pp. 645-700.

20 T. Muir: Financial crises and risk premia, in: *The Quarterly Journal of Economics*, Vol. 132, No. 2, 2017, pp. 765-809.

21 N. Barberis, R. Greenwood, L. Jin, A. Shleifer: X-CAPM: An extrapolative capital asset pricing model, in: *Journal of Financial Economics*, Vol. 115, No. 1, 2015, pp. 1-24; N. Barberis, R. Greenwood, L. Jin, A. Shleifer: Extrapolation and bubbles, NBER Working Paper No. 21944, 2016.

22 D. Dilip, M.K. Brunnermeier: Bubbles and crashes, in: *Econometrica*, Vol. 71, Nr. 1, 2003, pp. 173-204; P. Temin, H.-J. Voth: Riding the south sea bubble, in: *The American Economic Review*, Vol. 94, No. 5, 2004, pp. 1654-1668.

Figure 2
Credit-to-GDP ratios of advanced economies, 1945-2015



Note: Total private debt-to-GDP ratio averaged across 17 countries: Australia, Belgium, Canada, Denmark, France, Finland, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA.

Source: Ò. Jordà, M. Schularick, A.M. Taylor: Macrofinancial history and the new business cycle facts, in: *NBER Macroeconomics Annual*, Vol. 31, No. 1, 2017, pp. 213-263.

paradigm that have emerged with respect to the assumption that finance provides a positive growth contribution.

In recent decades, the financial sector has grown considerably faster than the real economy.²³ The GDP share of the financial sector in advanced economies – the sum of all wages and profits of the sector – has almost tripled since 1950 (see Figure 1). It is even higher in countries such as the United Kingdom, Australia or Switzerland, where it approaches ten per cent of GDP.

Looking at the driving forces of this process, Figure 2 shows the average credit-to-GDP ratio of 17 advanced economies between 1945 and today. Credit increased from less than 40% of GDP in the 1950s to 60% in the 1970s to around 120% on the eve of the financial crisis. To be sure, there is ample variation across countries, but they all follow a similar trend. Today, we are living in a world that is more “financialised” than ever before.

The growth of finance raises questions about whether or not the additional services provided by the financial sector add value to the overall economy. Without positive growth effects, a larger financial sector means that less income goes to the real economy and more goes to

23 T. Philippon: Has the US finance industry become less efficient? On the theory and measurement of financial intermediation, in: *The American Economic Review*, Vol. 105, No. 4, 2015, pp. 1408-1438.

owners and employees of financial firms. Philippon and Reshef find a large and increasing premium for working in the financial sector relative to other industries in the United States that cannot be explained by typical worker characteristics.²⁴ Interestingly, the U.S. finance wage premium is correlated with the strictness of financial regulation. It was high in the beginning of the 20th century, low in the 1950s and is high again today. Philippon shows that the unit cost of financial intermediation – the average cost that the real economy pays for one unit of intermediated financial assets – has remained stable at around two per cent over the last 130 years.²⁵ Financial innovation and the growth of computing power have not had a major effect on the cost of financial intermediation.

In the last few years, a number of studies have directly challenged the prevailing consensus that the relationship between finance and growth is positive. In particular, studies have argued that financial deepening can be beneficial at low levels of financial development, but there might be such a thing as “too much finance”, and financial deepening is negatively associated with economic growth above a certain threshold.²⁶

Why has the positive relationship between finance and growth disappeared? A potential explanation is the shifting nature of financial activity away from financing firms and investment and towards real estate. The credit boom of the past several decades was driven by mortgage credit to households, while non-mortgage lending remained stable relative to GDP. As a consequence, the share of mortgage credit increased from one-third of total credit in 1950 to two-thirds today.²⁷ Yet household credit does not necessarily have the same effect on economic growth as business credit. For instance, Beck et al. do not find a positive correlation between household credit and growth,²⁸ and Mian et al. show that an expansion in household credit is actually followed by lower subsequent

24 T. Philippon, A. Reshef: Wages and human capital in the US finance industry: 1909-2006, in: *The Quarterly Journal of Economics*, Vol. 127, No. 4, 2012, pp. 1551-1609.

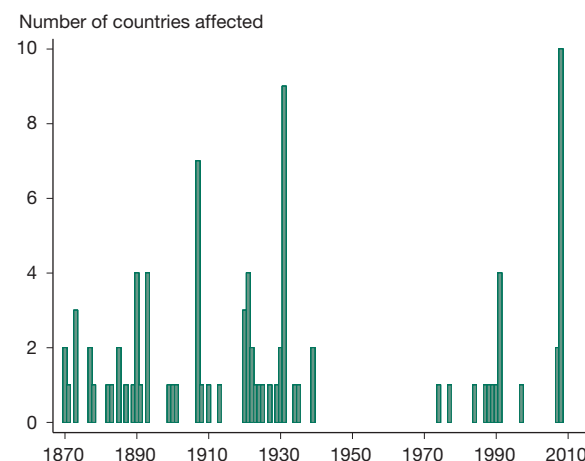
25 T. Philippon, *op. cit.*

26 J.L. Arcand, E. Berkes, U. Panizza: Too much Finance?, in: *Journal of Economic Growth*, Vol. 20, No. 2, 2015, pp. 105-148; L. Gambacorta, J. Yang, K. Tsatsaronis: Financial structure and growth, in: *BIS Quarterly Review*, March 2014; S.H. Law, N. Singh: Does too much finance harm economic growth?, in: *Journal of Banking & Finance*, Vol. 41, 2014, pp. 36-44.

27 Ö. Jordà, M. Schularick, A.M. Taylor: The great mortgaging: housing finance, crises and business cycles, in: *Economic Policy*, Vol. 31, No. 85, 2016, pp. 107-152.

28 T. Beck, B. Büyükkarabacak, F.K. Rioja, N.T. Valev: Who Gets the Credit? And Does It Matter? Household vs. Firm Lending Across Countries, in: *The B.E. Journal of Macroeconomics*, Vol. 12, No. 1, 2012, pp. 1-44.

Figure 3
Financial crises in advanced economies, 1870-2015



Note: Number of countries experiencing a systemic banking crisis in a given year. The 17 countries included are Australia, Belgium, Canada, Denmark, France, Finland, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK and USA.

Source: Ö. Jordà, M. Schularick, A.M. Taylor: *Macrofinancial history and the new business cycle facts*, in: *NBER Macroeconomics Annual*, Vol. 31, No. 1, 2017, pp. 213-263.

GDP growth.²⁹ Another important implication of the rising share of real estate loans on bank balance sheets is that the health of the financial sector has become highly dependent on non-diversifiable macro risks.

In short, credit today is not primarily used to finance new investment. Instead, it often finances the purchase of already existing assets, real estate in particular. The expansion in household mortgage credit has not generated additional income, but rather fuelled the surge of house prices and generated a new source of financial crisis risks instead.³⁰ House prices have indeed risen sharply in the second half of the 20th century. This increase was driven by rising residential land prices, while construction costs remained relatively stable.³¹

Financial instability

Evidence shows that larger and more complete financial markets have not led to a reduction in the incidence of financial crises. On the contrary, systemic risk is back. Figure 3 shows the frequency of financial crises in 17 ad-

29 A. Mian, A. Sufi, E. Verner: Household debt and business cycles worldwide, in: *The Quarterly Journal of Economics*, Vol. 132, No. 4, 2017, pp. 1755-1817.

30 A. Turner: *Between debt and the devil: Money, credit, and fixing global finance*, Princeton 2015, Princeton University Press.

31 K. Knoll, M. Schularick, T. Steger: No price like home: global house prices, 1870-2012, in: *The American Economic Review*, Vol. 107, No. 2, 2017, pp. 331-353.

vanced economies between 1870 and today. While relatively common between 1870 and 1930, financial crises were not a regular concern for the post-World War II generation, when finance was kept on a short leash. As financial markets were progressively liberalised in the 1970s, financial stability concerns made a comeback.

Not only have crises made a comeback, research has also been able to demonstrate their large economic costs to the economy, the political system and the fiscal health of countries. The output costs are large,³² and governments typically face sizable fiscal costs. Crises also take a toll on political stability. The share of votes going to far right populist parties increases on average by 30% after a systemic banking crisis.³³

What have we learned about the sources of instability in financial markets? Before the global financial crisis, economists routinely warned about the risk of excessive public borrowing. A discussion of the pros and cons of private borrowing was largely absent. Private credit growth was seen as a benign equilibrium result of financial development. The financial crisis and new research have led to a revision of these priors.

Empirical work in macroeconomics has successfully identified the key characteristics of crises. Financial stability risk typically originates in the private sector. If we want to understand the driving forces behind financial instability, we must shift the focus away from public debt and towards private debt.³⁴ Schularick and Taylor show that an acceleration of credit growth is the single best predictor of future financial instability.³⁵ Other researchers have come to similar results with shorter time horizons by examining developed economies and emerging markets

over the last few decades.³⁶ Even though alternative fragility measures matter, they remain of second order importance relative to credit. External imbalances, the loan-to-deposit ratio and the share of non-deposit funding do signal financial fragility, but they are trumped by the importance of credit growth.³⁷

The build-up of imbalances and systemic risk is best described by a self-reinforcing cycle of asset prices and private credit – a leverage cycle.³⁸ Adrian and Shin show a strong pro-cyclicality of financial intermediary leverage.³⁹ Intermediaries respond to rising asset prices by expanding credit and short-term debt finance. Increased credit supply fuels the boom and produces a further increase of asset prices, investor sentiment and wealth.

Regulatory failure

The old guiding principles of financial regulation that look to the market for a disciplining device have failed. The crisis of 2007-08 demonstrated the ineffectiveness of the reigning regulatory framework: “[T]hose of us who have looked to the self-interest of lending institutions to protect shareholders’ equity, myself especially, are in a state of shocked disbelief.”⁴⁰ Mutual monitoring and micro-regulation did not work as a check against the financial boom-bust cycle.

Baron and Xiong show that equity markets typically fail at disciplining banks during lending booms.⁴¹ Bank equity holders ignore crash risks and are caught in the same heuristic bubble as the rest of the economy. Otherwise, they would demand higher returns as compensation for the increased systemic risk during credit expansions. Yet the excess stock return in credit expansions is negative

32 V. Cerra, S.C. Saxena: Growth dynamics: the myth of economic recovery, in: *The American Economic Review*, Vol. 98, No. 1, 2008, pp. 439-457; G. Hoggarth, R. Reis, V. Saporta: Costs of banking system instability: some empirical evidence, in: *Journal of Banking & Finance*, Vol. 26, No. 5, 2002, pp. 825-855; Ò. Jordà, M. Schularick, A.M. Taylor: When credit bites back, in: *Journal of Money, Credit and Banking*, Vol. 45, No. 2, 2013, pp. 3-28; C.M. Reinhart, K.S. Rogoff: *This Time is Different: Eight Centuries of Financial Folly*, Princeton 2009, Princeton University Press.

33 M. Funke, M. Schularick, C. Trebesch: Going to extremes: Politics after financial crises, 1870-2014, in: *European Economic Review*, Vol. 88, 2016, pp. 227-260.

34 Ò. Jordà, M. Schularick, A.M. Taylor: Sovereigns versus banks: credit, crises, and consequences, in: *Journal of the European Economic Association*, Vol. 14, No. 1, 2016, pp. 45-79; M. Schularick: Public and Private Debt: The Historical Record (1870-2010), in: *German Economic Review*, Vol. 15, No. 1, 2014, pp. 191-207.

35 M. Schularick, A.M. Taylor: Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870-2008, in: *The American Economic Review*, Vol. 102, No. 2, 2012, pp. 1029-1061.

36 P.-O. Gourinchas, M. Obstfeld: Stories of the twentieth century for the twenty-first, in: *American Economic Journal: Macroeconomics*, Vol. 4, No. 1, 2012, pp. 226-265; E.G. Mendoza, M.E. Terrones: An anatomy of credit booms and their demise, NBER Working Paper No. 18379, 2012.

37 Ò. Jordà, M. Schularick, A.M. Taylor: Financial crises, credit booms, and external imbalances: 140 years of lessons, in: *IMF Economic Review*, Vol. 59, No. 2, 2011, pp. 340-378; Ò. Jordà, B. Richter, M. Schularick, A.M. Taylor: Bank Capital Redux: Solvency, Liquidity, and Crisis, NBER Working Paper No. 23287, 2017.

38 J. Geanakoplos: The leverage cycle, in: *NBER Macroeconomics Annual*, Vol. 24, No. 1, 2010, pp. 1-66.

39 T. Adrian, H.S. Shin: Liquidity and leverage, in: *Journal of Financial Intermediation*, Vol. 19, No. 3, 2010, pp. 418-437.

40 A. Greenspan: The Financial Crisis and the Role of Federal Regulators, statement of Alan Greenspan, Hearing before the Committee on Oversight and Government Reform, 23 October 2008, available at <https://www.gpo.gov/fdsys/pkg/CHRG-110hhrg55764/html/CHRG-110hhrg55764.htm>.

41 M. Baron, W. Xiong: Credit expansion and neglected crash risk, in: *The Quarterly Journal of Economics*, Vol. 132, No. 2, 2017, pp. 713-764.

most of the time. Fahlenbrach et al. find similar effects across banks. Investors fail to account for the risks of high loan growth.⁴²

These findings challenge policy proposals that focus on monitoring incentives as the main instrument for crisis prevention. Monitoring does not work if market participants ignore crash risks, are overly optimistic and do not “see the crisis coming”.

Towards a new paradigm

The history of financial crises shows that caution should prevail when markets get excited and investors rationalise the exuberance with appealing new narratives about the economy. Not every credit and asset price boom is an equilibrium phenomenon justified by economic fundamentals. Acknowledging the inherent tendency of financial markets to live through boom-bust cycles must drive future thinking about financial stability.

In his famous 1953 essay, Isaiah Berlin divides thinkers into two categories: hedgehogs, who view the world through a unified framework, and foxes, who use a variety of models and accept loose ends to understand the world around them.⁴³ Our thinking about managing financial markets has to become more foxy. This foxy turn in thinking about financial markets builds on more and better empirical research and a willingness to take the insights from macroeconomics and economic history seriously.

The new paradigm also rests on a precautionary refusal to embrace an encompassing theory. Research and policy have to be clearer about model uncertainties. We are far away from a theory that incorporates all the frictions, behavioural biases and political economy feedbacks that would be needed for a true “general equilibrium” perspective. In a world with high model uncertainty, macroeconomists have to be humble in their aims and foxy in their research and policy advice. We will have to accept that there are a lot of things that we do not yet understand.

Economics is slowly embracing this new approach. There is a much greater emphasis on empirical research and a larger variety of models and approaches than before. Philosophically, this is not only the right way forward for the field, but also for thinking about financial stability. We propose four guiding principles to inform new thinking about stabilising financial markets.

42 R. Fahlenbrach, R. Prilmeier, R.M. Stulz: Why does fast loan growth predict poor performance for banks?, NBER Working Paper No. 22089, 2016.

43 I. Berlin: The Hedgehog and the Fox: An Essay on Tolstoy's View of History, London 1953, Weidenfeld & Nicolson.

Tackling excess volatility

Time and again, markets have experienced large asset price reversals, frequently without new fundamental information that could have warranted such swings. A pivotal challenge for the future is to construct a financial system that is resilient to large asset mispricing and bubbles.

There is clearly no better system than the market for price discovery. But an equally fundamental empirical insight from financial history is that financial markets are not free of mistakes either. Regulators need to build in a healthy dose of scepticism vis-à-vis the price signals coming from financial markets.

This requires a rethinking of the principles of regulation and risk management. Before the financial crisis, financial regulation and risk management turned to the market as the ultimate source of information and prices. Market-based measures are hard to game, and they quickly incorporate new information. It is important to take market signals of financial sector instability seriously.⁴⁴ However, if market prices are periodically off their fundamental levels, market-based measures can be misleading.⁴⁵ Mark-to-market based accounting and regulation can strengthen the feedback effect between asset prices and credit, both in the boom and the bust, and make financial intermediaries' balance sheets more pro-cyclical.⁴⁶

A simple but powerful idea is for financial sector regulation to return to a “principle of prudence”.⁴⁷ The “principle of prudence” was historically a central idea in German accounting standards. It required companies to price their assets and liabilities at their least favourable valuation. In practice, financial intermediaries would have to compare the book and the market value of their assets according to different valuation methods and always use the lowest for regulatory filings. A related idea is to maintain or extend prudential filters in the calculation of regulatory ratios. For example, Basel III allows countries to exclude unrealised

44 N. Sarin, L.H. Summers: Understanding Bank Risk through Market Measures, Brookings Papers on Economic Activity, No. 2, 2016, pp. 57-127.

45 J.L. Yellen: Financial Stability a Decade after the Onset of the Crisis, speech at the symposium “Fostering a Dynamic Global Recovery”, Federal Reserve Bank of Kansas City, Jackson Hole, WY, 25 August 2017, available at <https://www.federalreserve.gov/newsevents/speech/yellen20170825a.htm>.

46 M. Hellwig: Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis, in: De Economist, Vol. 157, No. 2, 2009, pp. 129-207; G. Plantin, H. Sapra, H.S. Shin: Fair value accounting and financial stability, in: Financial Stability Review, No. 12, 2008, pp. 85-94.

47 H.-W. Sinn: Kasino-Kapitalismus: Wie es zur Finanzkrise kam, und was jetzt zu tun ist, Berlin 2009, Econ Verlag.

capital gains from the calculation of bank capital to reduce its pro-cyclicality.

However, using a more stringent definition of capital and changing regulatory accounting standards alone is not a sufficient barrier to protect financial intermediaries from the effects of asset price bubbles. Large and persistent asset price reversals, such as the bursting of the housing bubble, require that the banking system has sufficient loss absorption capacity. The precautionary case for higher capital ratios remains strong, as they reduce the cost of crises – although there is no empirical evidence that higher capital ratios reduce crisis probabilities *ex ante*.⁴⁸

Another prominent policy idea is a tax on financial transactions. Proponents of a financial transaction tax argue that it throws sand in the gears of financial markets and reduces excessive volatility. A small tax on each transaction would make low-margin/high-volume activities unprofitable and drive short-term speculators from the market.⁴⁹ Opponents point to the risks of higher costs of capital, lower liquidity and the flexibility of the market to circumvent taxation. They argue that a financial transaction tax would neither have prevented the financial crisis nor significantly reduced aggregate asset mispricing.⁵⁰ Nevertheless, a financial transaction tax could be a powerful policy tool to channel financial sector activity and reduce trading in undesirable markets.

Tackling the externalities of debt

An important pillar of the new paradigm is that policymakers and economists will have to re-evaluate the role of debt in the economy and tackle its negative externalities. Debt is a powerful, but sometimes dangerous, financial instrument.⁵¹ It allows the lender to focus exclusively on default risks and ignore all other information that might be crucial for equity holders. If debt is particularly secure, lenders might even be lulled into ignoring credit risks alto-

gether.⁵² Even though both debt and equity can fulfil very similar roles in theory, they are very different in reality.

Excess leverage can have dire consequences for the economy. Yet households and firms generally do not take these consequences into account when making individual financial decisions. They might evaluate their own deleveraging risks, but they do not fully account for the effects of their actions on the aggregate economy.⁵³ In other words, debt can create negative externalities not dissimilar to air pollution.

Similar externalities can also exist for financial intermediaries that do not internalise the negative effects of their own pro-cyclical leverage for financial stability.⁵⁴ Increasing the private cost of borrowing to the level of the social cost would be the best way to efficiently deal with these externalities. Pigouvian taxes on debt can correct for the externalities of debt finance.⁵⁵ These taxes could be linked to the economic cycle – high during the boom and low in the bust, as Jeanne and Korinek argue.⁵⁶ Their calibrated model generates an optimal tax rate on leveraged collateralised borrowing during the boom of around 0.5% of total debt outstanding.

The aggregate level of indebtedness is equally important. While beneficial at low levels and at low stages of financial development, the idea that there can be too much debt, and that not all debt is equally desirable, must be taken seriously.⁵⁷

Most countries have large implicit subsidies that favour debt relative to equity finance. In particular, interest payments are often tax deductible. This differential treatment of debt relative to equity finance generates a funding hierarchy that dominates the global financial system. Almost all countries allow companies to deduct interest

48 Ò. Jordà et al.: Bank Capital Redux..., op. cit.

49 J.E. Stiglitz: Using tax policy to curb speculative short-term trading, in: Journal of Financial Services Research, Vol. 3, No. 2-3, 1989, pp. 101-115; L.H. Summers, V.P. Summers: When financial markets work too well: a cautious case for a securities transactions tax, in: Journal of Financial Services Research, Vol. 3, No. 2-3, 1989, pp. 261-286; J. Tobin: A proposal for international monetary reform, in: Eastern Economic Journal, Vol. 4, No. 3/4, 1978, pp. 153-159.

50 T. Matheson: Security transaction taxes: issues and evidence, in: International Tax and Public Finance, Vol. 19, No. 6, 2012, pp. 884-912; G.W. Schwert, P.J. Seguin: Securities transaction taxes: an overview of costs, benefits and unresolved questions, in: Financial Analysts Journal, Vol. 49, No. 5, 1993, pp. 27-35.

51 A. Turner, op. cit.

52 P. Bordo, N. Gennaioli, A. Shleifer: Diagnostic expectations and credit cycles, NBER Working Paper No. 22266, 2016; P. Bordo, N. Gennaioli, A. Shleifer: By force of habit: A consumption-based explanation of aggregate stock market behaviour, in: Journal of Political Economy, Vol. 107, No. 2, 2016, pp. 205-251; R.M. Greenwood, S.G. Hanson: Issuer quality and corporate bond returns, in: The Review of Financial Studies, Vol. 26, No. 6, 2013, pp. 1483-1525; R.M. Greenwood, S.G. Hanson, L.J. Jin: A model of credit market sentiment, Harvard Business School Working Paper No. 17-015, 2016.

53 A. Korinek, A. Simsek: Liquidity trap and excessive leverage, in: The American Economic Review, Vol. 106, No. 3, 2016, pp. 699-738.

54 H.S. Shin: It is time for a reappraisal of the basic principles of financial regulation, in: J. Danielsson (ed.): Post-Crisis Banking Regulation: Evolution of economic thinking as it happened on Vox, London 2015, CEPR Press, pp. 15-21.

55 Ibid.

56 O. Jeanne, A. Korinek: Managing credit booms and busts: A Pigouvian taxation approach, NBER Working Paper No. 16377, 2010.

57 A. Turner, op. cit.

payments in tax returns and many also incentivise mortgage financing of real estate by making it possible for households and investors to deduct mortgage interest payments in their income tax returns.

Existing policy proposals target the tax shield of debt finance by treating debt and equity equally in the tax code.⁵⁸ As the majority of the increase in private debt levels was driven by an expansion of private mortgage debt, limiting deductions for mortgage credit could be a novel but politically challenging approach.

Leaning against the wind

The main regulatory response to the financial crisis has been to (modestly) increase capital ratios. More capital clearly improves the loss absorption capacity of the banking system and increases the “skin in the game” of shareholders.

However, we should not fool ourselves that increasing capital ratios by a few percentage points has made the financial system much safer. Jordà et al. show that higher capital ratios are not associated with lower crisis risk *ex ante*.⁵⁹ Foxy empirics teach us that bank capital should not be our sole focus when it comes to crisis prevention. Increasing the “skin in the game” of bank shareholders will not be sufficient to maintain financial stability.

If we are to mitigate system-wide crisis risks and limit the fallout of financial crises, the regulatory focus must shift from a micro to a macro perspective. Such a “macroprudential” approach directly challenges Alan Greenspan’s old view that central banks should not deliberately pop bubbles and should avoid leaning against excess credit booms.

Yet for macroprudential policies to be welfare improving, we have to learn how to differentiate good booms from bad booms. Clearly, not all credit booms end badly.⁶⁰ Some credit booms might well be justified by fundamentals and help the economy to grow and prosper. If policymakers “lean against the wind” in a good boom, they could impose a substantial cost on the economy. Profit-

58 R.A. De Mooij: Tax biases to debt finance: Assessing the problem, finding solutions, in: *Fiscal Studies*, Vol. 33, No. 4, 2012, pp. 489-512; R.A. De Mooij, M.P. Devereux: An applied analysis of ACE and CBIT reforms in the EU, in: *International Tax and Public Finance*, Vol. 18, No. 1, 2011, pp. 93-120; S. Fatica, T. Hemmelgarn, G. Nicodème: The debt-equity tax bias: consequences and solutions, in: *Reflets et perspectives de la vie économique*, Vol. 52, No. 1, 2016, pp. 5-18.

59 Ö. Jordà et al.: *Bank Capital Redux...*, op. cit.

60 G. Gorton, G. Ordoñez: Good booms, bad booms, NBER Working Paper No. 22008, 2016.

able investments might lose access to funding and economic growth would slow down.

Consequently, the detection of booms and bubbles before their bursting is a major challenge for policy proposals that aim to deflate bubbles and reduce the amplitude of the financial cycle. But it can be done: Richter et al. show that central bankers might indeed be able to distinguish good and bad credit expansions.⁶¹ Rising asset prices and loan-to-deposit ratios are strong signals for excessive credit booms with subsequent financial distress.

The basic idea of macroprudential policy has already gained traction with central bankers, regulators and economists, and has become part of the policy toolkit in Europe. However, there are still a lot of things that we do not know about macroprudential policies and their effectiveness. Also, using standard monetary policy to reduce the amplitude of the financial cycle remains subject to debate.⁶²

The optimal design of macroprudential policies is still an open question. Macroprudential policies can be implemented by discretion – based on the judgement of the policymaker – or follow pre-specified rules. Economists generally tend to prefer rule-based over discretionary policies, as they reduce policy uncertainty and limit the room for policy errors. Rule-based policies are less likely to fall into the trap of the “this time it’s different” syndrome⁶³ and can act as a commitment device. Insulating the macroprudential policy authority from political pressures will be important for the success of these new policies.

Tackling “too complex to work” financial regulation

Policymakers’ reaction to the financial crisis was voluminous. The Dodd-Frank Act – the regulatory response to the Great Recession in the United States – is around 848 pages long. It is even longer if one includes all the extensions and details on its rules that were subsequently added. The final version of the Volcker Rule – a ban on proprietary trading by commercial banks – comprises hundreds of pages explaining guidelines and exemptions. In comparison, the Glass-Steagall Act – the main regulatory re-

61 B. Richter, M. Schularick, P. Wachtel: When to Lean Against the Wind, CEPR Discussion Paper No. 12188, 2017.

62 T. Adrian, N. Liang: Monetary policy, financial conditions, and financial stability, CEPR Discussion Paper No. 11394, 2016; L.E.O. Svensson: Monetary policy and macroprudential policy: different and separate, in: *Canadian Journal of Economics*, forthcoming; L.E.O. Svensson: How Robust Is the Result That the Cost of Leaning Against the Wind Exceeds the Benefit?, Response to Adrian and Liang, CEPR Working Paper No. 11744, 2017.

63 C.M. Reinhart, K.S. Rogoff, op. cit.

sponse to the Great Depression – was only 37 pages long. Clearly, it is not only finance; financial regulation has also become ever more complex.

Before the crisis, complexity and financial innovation were celebrated for their virtues. The Basel II regulatory system actively encouraged the use of sophisticated risk management models. Markets for mortgage-backed securities, credit default swaps and many other innovative products flourished. This changed dramatically in the crisis, when these markets became illiquid and it was hard to get a realistic assessment of valuations and risk.⁶⁴

Finance needs simple regulatory rules, tools and practices. In many cases, it makes sense to bundle the regulation and supervision of financial institutions and markets together. Unspecified or overlapping responsibilities increase the ability for financial intermediaries to play regulatory agencies off each other. Leverage ratios have the potential to become the principle solvency regulation and create a strict upper bound for intermediary leverage. Risk-weighted capital requirements based on complex internal risk models are typically outperformed as a measuring tool by standard leverage ratios.⁶⁵

Liquidity regulation needs to go through a similar simplification. The crisis has shown that wholesale funding exposes the financial system to risks similar to those associated with traditional deposit finance before the introduction of deposit insurance.⁶⁶ Instead of automatically turning to new complex liquidity regulations such as the Liquidity Coverage Ratio and the Net Stable Funding Ratio (NSFR), central banks should consider if simple metrics can do the job. Lallour and Mio show that simple loan-to-deposit ratios typically outperform more complex measures of liquidity mismatch such as the newly introduced NSFR in their ability to predict financial distress.⁶⁷

Implementation: actors and mandates

What is the role of national and international institutions in the implementation of the new paradigm? How can we get from A to B? The path towards a stable financial sys-

tem requires a redefinition of policy mandates and actions on different levels.

First, central banks should be equipped with an extended toolkit and a broader financial stability mandate. The global financial crisis effectively made central banks guardians of financial stability. They need explicit political backing and the necessary policy tools to fulfil this role effectively. This could be done by integrating financial stability explicitly into primary statutory mandates. Central banks also have to become leading supervisory and macroprudential institutions. Mandates for supervision, financial stability and monetary policy are most effective when conducted by a single institution with a clear structure and well-defined responsibilities.⁶⁸ Managing the credit cycle and acting as a responsible lender-of-last-resort require intimate supervisory knowledge. Giving central banks the additional mandate to target and smooth the financial cycle also allows them to manage the interaction effects of macroprudential and monetary policy.

Second, the Basel Committee should aim to replace excessively complex regulatory standards with simple rules. As a first step, leverage ratios could become the principle capital regulation, risk weighting could be reduced in scope (not unlike Basel I) and regulators ought to decrease the number of regulatory capital definitions. At the same time, national regulators have to streamline their domestic institutional structures. They should define a clear hierarchy between different regulatory agencies and try to limit the amount of overlapping supervision by different agencies with conflicting interests and agendas.

Third, national governments need to tackle the bias towards debt-financed real estate investments. To be sure, turning away from a model that actively encourages mortgage finance and adopting a more neutral stance will be politically challenging. However, individual country histories offer useful lessons. Gruber et al. show that a cut in the deductibility of mortgage payments in Denmark in the 1980s did not lead to negative effects on home ownership.⁶⁹ Instead, the main consequence was a reduction in the indebtedness of affected households. Slowly phasing

64 J. Danielsson: Complexity Kills, in: J. Danielsson (ed.): Post-Crisis..., op. cit., pp. 31-34.

65 A. Haldane, V. Madouros: The Dog and the Frisbee, speech given at the Federal Reserve Bank of Kansas City's 36th Economic Policy Symposium: The Changing Policy Landscape, 31 August 2012, available at <http://www.bis.org/review/r120905a.pdf>.

66 G. Gorton, A. Metrick: Securitized banking and the run on repo, in: *Journal of Financial Economics*, Vol. 104, No. 3, 2012, pp. 425-451.

67 A. Lallour, H. Mio: Do we need a stable funding ratio? Banks' funding in the global financial crisis, Bank of England Working Paper No. 602, 2016.

68 S.G. Cecchetti: The Relationship between Prudential Supervision and Monetary Policy, Testimony before the joint hearing of the Subcommittee on Financial Institutions and Consumer Credit and the Subcommittee on Monetary Policy and Trade and the Committee on Financial Services, U.S. House of Representatives, 12 September 2017, available at <https://financialservices.house.gov/calendar/event-single.aspx?EventID=402279>.

69 J. Gruber, A. Jensen, H. Kleven: Do People Respond to the Mortgage Interest Deduction? Quasi-Experimental Evidence from Denmark, NBER Working Paper No. 23600, 2017.

out the deductibility of interest payments and subsidies over time has proven to be a successful strategy in some countries.

Finally, the new paradigm calls for international policy cooperation and coordination. Unilateral policy changes are unlikely to be effective in a globally integrated financial system. For example, reducing the debt bias at the

national level increases incentives for international debt shifting. Only coordination will induce the desired policy effects. Another example is the cooperation of regulators and accountants. Fair value accounting can be misleading if prices are not justified by fundamentals. The Basel Committee and the International Accounting Standards Board need to cooperate and develop solutions that deal with this problem.