

Beyond Mechanical Markets

ASSET PRICE SWINGS, RISK, AND THE ROLE OF THE STATE

*Roman Frydman
and Michael D. Goldberg*

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*What Went Wrong and
What We Can Do about It*

Quite apart from the fact that we do not know the future, the future is objectively not fixed. The future is open: objectively open.

—Karl R. Popper, *A World of Propensities*

I confess that I prefer true but imperfect knowledge . . . to a pretense of exact knowledge that is likely to be false.

—Friedrich A. Hayek,
“The Pretence of Knowledge,” *Nobel Lecture*

THE FATAL FLAW

Instability is an inherent feature of capitalist economies, perhaps nowhere more markedly so than in modern financial markets. Asset prices and risk tend to fluctuate, and, as recent experience in housing, equity, currency, and commodity markets around the world has shown, upswings in prices sometimes become excessive, eventually ending in abrupt and dramatic reversals.

These boom-and-bust fluctuations in asset values often lead to painful shifts in consumption and investment patterns that

can trigger or prolong economic downturns and sharply increase unemployment. Many observers have pointed to excessive upswings in housing and equity prices as key factors behind the global financial crisis that began in 2007, with devastating consequences for people worldwide. Thus, understanding asset-price swings, their connection to financial risk, and their impact on the broader economy is crucial to assessing the causes of the crisis, as well as to evaluating the various policy proposals aimed at rectifying the system's failures.

The central premise of this book is that the conceptual framework underpinning the debate triggered by the global financial crisis is grossly inadequate for understanding what went wrong with our economies and what should be done to reform them. The reason is simple: contemporary macroeconomic and finance theory attempts to account for risk and swings in asset prices with models that suppose that nonroutine change is irrelevant, as if nothing genuinely new can ever happen.

As Frank Knight (1921, p. 198) put it, "if all changes were to take place in accordance with invariable and universally known laws, [so that] they could be foreseen for an indefinite period in advance of their occurrence, . . . profit or loss would not arise." And yet contemporary models assume that such laws exist. At issue, then, is what motivates economic activity and guides the allocation of resources in capitalist economies. For Knight—and for us—"it is our imperfect knowledge of the future, a consequence of change, not change as such, which is crucial to the understanding" of how profit-seeking market participants make decisions and how prices and risk unfold over time.

ASSUMING AWAY WHAT MATTERS MOST

Of course, economists must always make some assumptions as they build their models. But to assume, as contemporary economic models do, that movements in asset prices and risk can be understood as if the future followed mechanically from the past

is to assume that, except for “shocks,” all change is fully predictable. Were this self-deception confined to the world of academic economics, it would remain a puzzling but harmless intellectual conceit. But economists’ mechanistic accounts of markets wield significant real-world influence over policymakers, financial market participants, and the wider public. Moreover, they have led to seemingly polarized views of financial markets: they are either rational and nearly perfect at allocating society’s capital or irrational casino-like institutions that allocate capital haphazardly.

Both these extreme views share an irreparable flaw, which stems from contemporary economic models’ portrayal of individuals as little more than robots. In one camp, conventional economists presume that rational individuals make decisions as if they adhered strictly and permanently to overarching mechanical rules that economists themselves fully specify in advance. In the other camp, behavioral economists, despite their critique of rational market models as lacking psychological realism, also presume that irrational individuals’ decisions, and their implications for asset prices and risk, can be adequately portrayed with mechanical rules.¹

These theories presuppose that market participants and policy officials never search for genuinely new ways of using their resources and never revise the way they think about the future. Moreover, the social context within which individuals make decisions—including economic policies, institutions, and global economic and political developments—is also supposed to unfold in ways that can be adequately portrayed with prespecified mechanical rules.

Beginning in the last four decades of the twentieth century, nearly all macroeconomists and finance theorists have spent their careers constructing such fully predetermined models. Indeed, these models have become the cornerstone of the contem-

¹For a notable exception, see Akerlof and Shiller (2009). They rely on a narrative mode of analysis, and thus ipso facto avoid mechanical formalizations of behavioral insights, unlike widely used mathematical behavioral finance models. For further discussion, see Chapter 2.

porary approach to economic analysis. Because they presume that change and its consequences can be fully foreseen, such models purport to provide an overarching account of asset prices and risk in the past, present, and future all at once. In contrast, all other types of models have come to be viewed by the academic mainstream as unscientific and thus unworthy of serious consideration.

Remarkably, this bias persists despite the dismal record of fully predetermined models in explaining how profit-seeking individuals make decisions in financial markets and thus how asset prices and risk unfold over time. The recent crisis is merely a glaring addition to the massive evidence of such models' empirical failures.

In this book, we explore how economists came to believe that they could provide an exact, overarching account of individual decisions and market outcomes. We show how they construct their fully predetermined models and explain why, in their attempts to portray rational individuals' behavior and market outcomes, they must imagine a world in which nonroutine change and imperfect knowledge are unimportant. Indeed, we argue that, by ruling out novelty, contemporary macroeconomic and finance models assume away financial markets' *raison d'être*—namely, to help allocate society's capital in the face of nonroutine change and the imperfect knowledge that it engenders in modern economies.

Our aim, in short, is to persuade readers that extant economic models fail to account for swings in asset prices and risk because they rest on irreparably flawed foundations. Thus, their use by market participants (including investment banks and other financial institutions) to assess prices—whether of mortgage-backed securities or other assets, new or old—has no scientific basis. Indeed, the crisis has painfully demonstrated the gross inadequacy of mechanical finance models' estimates of prices of innovative financial products and the risks entailed by holding and trading them.

Most importantly, we show that contemporary models miss the integral role that swings in asset prices and risk play in the process by which financial markets evaluate prior investments and

foster new companies and projects—the key to modern economies’ dynamism. And yet, owing to the imperfection of knowledge, these swings can sometimes become excessive, implying huge economic and social costs.

What, then, should be the role of the state in asset markets? Contemporary macroeconomic and finance theory, which, by design, disregards imperfect knowledge on the part of policymakers and market participants, has been of little help in thinking about this question. Indeed, despite widespread disillusionment with unfettered markets, the debate on reform and ensuing proposals and measures have largely continued to reflect the precrisis ideological belief that, except for setting and enforcing the rules of the game, the state should stay out of financial markets.²

As a result, the current reforms—the Dodd-Frank Act, Basel 3, and European Union proposals—are largely focused on strengthening the banking and credit system’s resilience to adverse aggregate developments. Macro-prudential measures, such as countercyclical capital buffers, the Volcker rule, and pro-transparency rules, will help limit the buildup of risks in the system. But these reforms offer precious little in the way of attacking one of the main causes of financial crises, namely, excessive upswings in key asset markets—such as those for equity, housing, and currencies—and the sharp and prolonged downturns that time and again follow these upswings.

The framework proposed in this book accounts for the essential role that financial markets play in modern economies,

²Policy economists, notably at the Bank for International Settlements, as well as academic researchers engaged in studying the historical evidence on financial crises, are well aware of the connection between asset-price swings and these crises. See, for example, Borio and Lowe (2002a), Borio (2003), and Reinhart and Rogoff (2009). Borio and Lowe (2002a) stress that viewing wide price swings as bubbles is unhelpful. However, lacking an adequate conceptual framework for understanding such swings in capitalist economies, Cecchetti et al. (2000, 2002) and others interpret them as bubbles and propose using monetary policy to “prick” them—though most economists, arguing on the basis of fully predetermined models, oppose such use of monetary policy. See, for example, Bernanke and Gertler (2001).

while recognizing a role for the state in dampening their excesses. We use this framework to propose refinements of current systemic reforms, particularly of financial markets, which should be accorded much higher priority on the reform agenda. We suggest new ways of thinking about such reforms and consider a panoply of measures aimed at dampening financial market excess without hampering capitalist economies' ability to spur innovation and sustained growth (see Chapter 12).

THE IMPERFECT KNOWLEDGE ALTERNATIVE

Our critique of contemporary economic theory has led us to develop an alternative approach to modeling asset markets, which we call Imperfect Knowledge Economics (IKE) (Frydman and Goldberg, 2007). In contrast to contemporary approaches, Imperfect Knowledge Economics places nonroutine change and imperfect knowledge—the conditions under which financial markets evolved—at the center of economic analysis. We show that doing so implies that swings in asset prices and risk are inherent to the process by which financial markets help society allocate its capital. Thus, Imperfect Knowledge Economics provides an appropriate framework for evaluating and refining current plans and proposals for reform, while suggesting a new policy framework for state regulation and active prudential intervention in financial markets.

The type of economics that economists practice, and the ideas on which it depends, are of crucial significance to the public. With this in mind, we examine Imperfect Knowledge Economics and contemporary approaches—and their implications for understanding financial markets and state regulation—in nontechnical language. Our hope is to enable nonspecialists to take a more informed and active part in the public debate concerning post-crisis financial reform—the outcome of which is likely to affect vitally everyone's well-being and the health of economies around the world.

FISHERMEN AND FINANCIAL MARKETS

The ability of a society's institutions to allocate savings among alternative investment projects and monitor their progress is among the main determinants of innovation and growth. In principle, no individual can compute these projects' prospects—the stream of future returns. Nevertheless, financial markets allocate society's savings to alternative investment projects every day.

To grasp the importance of nonroutine change and imperfect knowledge for investment decisions, and why ignoring them assumes away financial markets' essential role in modern economies, consider a fisherman who must decide in the morning whether to spend the day fishing for flounder or haddock. On a typical day, he has a fairly good basis for estimating the probable catch and price for each type of fish. If, however, he must decide whether to buy a flounder boat or a haddock boat, he must worry about an enormous number of other possibilities: someone might invent a new technology for fishing, people's tastes might change, sea pollution or other environmental factors might affect flounder and haddock differently, or fishing in general might not, in the long run, be the career that he should pursue.

Economists have developed an approach that purports to account for how our fisherman would make his investment decision: if he is self-interested and rational, he will calculate the consequences of each alternative for his well-being, along with the probabilities of their occurrence, and pick the one that he expects to be best for him. But making a decision solely on the basis of such calculation is not merely complicated; strictly speaking, it is impossible, because certain outcomes are inherently indeterminate. Either their existence or importance for the problem at hand will become apparent only with the passage of time, or the uncertainty surrounding them is so great that the fisherman cannot confidently assign any useful values to the probability that they will occur.

The fisherman's problem is emblematic of many investment decisions in modern economies. In the vast majority of cases, the

prospects of investment projects can be known only imperfectly, which in turn gives rise to financial markets' essential role. These markets translate individuals' myriad bundles of knowledge and intuition about the prospects of projects and companies into prices of equities and other financial claims. As market prices unfold over time, they provide a better assessment of the changing values of alternative investment projects than any estimate of those values that an individual could produce on her own. Thus, they provide a better guide in society's search for new ways of using its savings.

But even though financial markets are the best institution available to help society allocate its savings, the very reasons that they are essential to modern economies—nonroutine change and ever-imperfect knowledge—also make them imperfect assessors of asset values. As a result, they do not allocate capital perfectly, even in the course of their normal functioning. Moreover, the recurrence of excessive fluctuations in asset prices—and the great costs that these swings ultimately inflict on the financial system and the broader economy—is evidence that financial markets sometimes grossly misallocate capital.

THE SURVIVAL OF THE RATIONAL MARKET MYTH

Economic theory based on the presumption that nothing genuinely new ever happens has survived even a crisis that few predicted. Indeed, it continues to shape the debate about fiscal stimulus, financial reform, and, more broadly, the future of capitalism—which means that it remains a danger to us all. Policymakers in central banks and treasuries around the world continue to analyze macroeconomic policy options using these fully predetermined models as if they had reliable scientific underpinnings.³

³The fully predetermined accounts of macroeconomic outcomes that frequently guide policymaking are the Dynamic Stochastic General Equilibrium models. Even in the aftermath of the crisis (May 2010), researchers at the

In fact, by giving rise to two extreme and opposing views of the relative roles of the market and the state, contemporary economic theory has obfuscated policy analysis and public debate. One view, ascendant for almost four decades prior to the crisis, is that markets allocate capital nearly perfectly, because they are populated by rational individuals who can supposedly ascertain the true prospects of projects and companies. According to this view, the state's role should be limited to providing the basic framework for the operation of competitive financial markets.

Unfortunately, many officials worldwide came to embrace this belief, resulting in the massive wave of deregulation that emerged in the 1980s and accelerated in the late 1990s and early 2000s. Official faith in this view also encouraged governments to turn a blind eye to the dramatic upswings in housing, equity, and other asset prices that occurred in the run-up to the crisis, which made the crisis that began in 2007 more likely, if not inevitable.

In the wake of the crisis, however, the rationality of the market began to be widely referred to as a “myth.” The weight of professional and nonacademic opinion swung from faith in unfettered markets' magical power to set prices according to the “true” prospects of projects and companies to the other extreme. Markets now were deemed grossly inefficient in allocating capital, as supposedly proved by the occurrence of market distortions, such as informational asymmetries, and large and prolonged asset-price swings, characterized as bubbles.

To be sure, woefully insufficient transparency and distorted incentives for key participants in the financial system contributed significantly to the unfolding crisis. Many observers have emphasized the opacity of structured assets, the close relationship

European Central Bank referred to the bank's general equilibrium model as “designed for use in the Macroeconomic Projection Exercises *regularly* undertaken by ECB/Eurosystem staff and for policy analysis” (Christoffel et al., 2010, p. 5, emphasis added). For an example of how the staff macroeconomic projections are used in communicating the policies of the European Central Bank to the public, see Trichet (2010).

between investment banks and credit-rating agencies, and the dizzying rise of financial institutions' leverage ratios.

But as damaging as such market distortions are, they alone cannot account for the asset-price swings that played a central role in triggering the crisis. Treating these swings as bubbles that are largely unrelated to fundamental factors—such as economic policy, overall growth, industrial trends, and the prospects of projects and companies—was supposed to provide a dose of behavioral realism to economic analysis of individual decisionmaking and market outcomes.

Bubbles are thought to arise because, instead of trading rationally on the basis of movements in fundamental factors, many market participants succumb to waves of market psychology, indulge in irrationalities of various kinds, or engage in technical trading based on charts of asset-price movements. According to bubble models, markets behave like casinos, often allocating society's capital haphazardly. Thus, rather than recognizing that asset-price swings are inherent to how financial markets allocate society's capital, bubble models suggest that such fluctuations are socially pernicious and should be extinguished as soon as they arise.

It is difficult to imagine two views of markets that could be farther apart. On the one hand, markets are rational, allocate capital nearly perfectly, and require only a narrowly delimited role for the state. On the other hand, markets are grossly inefficient, prone to bubbles, and compel an extremely powerful role for the state.

Given such profound differences, it is striking that these extreme positions share the same fatal flaw: the core belief that nonroutine change and imperfect knowledge are unimportant for understanding market prices and risk. As a result, both strands of contemporary macroeconomic and finance theory attempt to account for market outcomes with fully predetermined models that presume that the future will unfold mechanically from the past.

Paradoxically, market-failure and bubble models, which were supposed to expose the rational market as a myth, ended up reinforcing its mythic significance. If only informational distur-

tions and deficiencies of market competition were minimized, psychology eliminated from individual decisionmaking, and irrational speculators banned from influencing outcomes, the rational participants would supposedly regain the upper hand, and the “rational market” would again set prices at nearly “true” fundamental values.

The rational market, in fact, is a myth in the strict sense of the word: it is, as the *Oxford English Dictionary* puts it, a “widely held but false belief.” It cannot be turned into reality by any means, including regulatory policy, no matter how wise or efficacious. The reason, again, is simple: the underlying values of assets unfold over time in ways that no one can fully foresee. In principle, there can be no true values of assets that competition among rational participants could possibly establish.

OPENING ECONOMICS TO NONROUTINE CHANGE AND IMPERFECT KNOWLEDGE

By presuming that fully predetermined accounts of market prices and risk are within reach of economic analysis, contemporary economists have abandoned the profound insights of John Maynard Keynes (1921, 1936), Frank Knight (1921), Friedrich Hayek (1948), and other early modern economic thinkers. Whatever their differences, these theorists all placed nonroutine change and imperfect knowledge at the center of their accounts of economic outcomes—and of their thinking about the rationale and scope of public policy.

To be sure, the crisis thrust to the foreground Keynes’s theory concerning the key role of fiscal stimulus in averting depressions. But even though the effects of fiscal (and monetary) policies were built into the fully predetermined models used by central banks and treasuries to analyze policy options, Keynes’s emphasis on the centrality of imperfect knowledge for understanding financial markets simply did not fit the contemporary conception of economic science. To be sure, many observers have

cited the instability of these markets as one of the proximate causes of the crisis. But, with few notable exceptions (Soros, 2008; Phelps, 2009; Skidelsky, 2009; Kaletsky, 2010; Volcker, 2010), the nexus between imperfect knowledge and movements in asset prices and risk has not featured prominently in the formulation of proposed reforms or in the analysis of their consequences. Some have even suggested that Keynes's ideas in this regard are largely irrelevant for understanding the causes of the crisis (Stiglitz, 2010).

In jettisoning fully predetermined accounts of outcomes, Imperfect Knowledge Economics builds on and incorporates into mathematical models the early modern economists' key premise: given the inescapability of imperfect knowledge—for market participants, policymakers, and economists themselves—individual behavior cannot be adequately captured with overarching mechanical rules. As with any scientific theory, Imperfect Knowledge Economics must presume that purposeful behavior exhibits regularities, even if they are context dependent and become or cease to be relevant at times that cannot be fully specified in advance. Nonetheless, Imperfect Knowledge Economics explores the possibility that these contingent regularities—the ways in which market participants make and alter their decisions—may be formalized with qualitative conditions.

By establishing this alternative framework for analysis, Imperfect Knowledge Economics offers economists and practitioners a rigorous way to account for individual behavior, and thus asset prices and risk, without presuming that anyone can fully predetermine how the future will unfold. Because it aims for only qualitative predictions of market outcomes, its mathematical models remain open to nonroutine change and imperfect knowledge.

IMPERFECT KNOWLEDGE ECONOMICS AND ITS IMPLICATIONS

To model individual behavior, Imperfect Knowledge Economics draws on behavioral economists' empirical findings about

how individuals actually behave. However, in contrast to behavioral finance models, which formalize these findings with mechanical rules, Imperfect Knowledge Economics formalizes them as qualitative and contingent regularities. And, whereas behavioral economists have interpreted the importance of psychology in individual decisionmaking as a symptom of irrationality, an emphasis on imperfect knowledge enables an economist to incorporate psychological factors in ways that are compatible with market participants' rationality.

Indeed, given that nonroutine change and ever-imperfect knowledge are key features of real-world financial markets, self-interested, profit-seeking market participants (however extraordinary their analytical abilities) cannot afford to base their assessments of the future, and thus their trading decisions, only on calculation and fundamental considerations, let alone on overarching mechanical rules. As Keynes pointed out in his much-neglected discussion of rational decisionmaking in modern economies,

We are merely reminding ourselves that human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist; and that . . . our *rational selves* [are] choosing between alternatives as best as we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance. [Keynes, 1936, pp. 162–63, emphasis added]

In contrast to behavioral economists, who interpret individuals' reliance on psychological factors in decisionmaking as a symptom of irrationality, Keynes's description makes clear that rational individuals in the real world use knowledge of facts ("calculating where we can"), but that, because knowledge is imperfect, they must supplement their computations with auxiliary psychological considerations. Even though such considerations play a role in individual decisionmaking, Keynes (1936, p. 162) stressed that "we should *not* conclude from this that everything depends

on *waves* of irrational psychology.” If fundamentals pointed the other way, “waves of irrational psychology” could not by themselves sustain the long swings in asset prices that we observe.

In fact, fundamental factors underpin changes in confidence and other market sentiments, which implies that they mediate the influence of psychological factors on asset prices and risk over time. New empirical evidence that we present in this book, based on Bloomberg’s daily market wrap reports, shows that in virtually no cases do psychological considerations or technical trading alone move the market. Although psychological factors matter in nonroutine ways (as Imperfect Knowledge Economics predicts), this and other, more formal, empirical evidence points unambiguously to the importance of economic fundamentals, such as company earnings and interest rates, in sustaining swings in asset prices and risk.

We develop an IKE account in which fundamental considerations play the key role in driving such swings (see Chapters 7–9). However, our account also incorporates behavioral economists’ psychological findings to model how market participants might revise their thinking about the importance of movements of fundamentals for forecasting outcomes. We show that such revisions are crucial to understanding sustained reversals of an upswing or downswing (see Chapter 10).

A NEW UNDERSTANDING OF ASSET-PRICE SWINGS, RISK, AND THE ROLE OF THE STATE

Recognizing that asset-price swings are driven to a large extent by trends in fundamental factors suggests that they lie at the heart of financial markets’ ability to monitor the results of prior investments and select new projects and companies for financing. Thus, policies aimed at extinguishing price swings as soon as policy officials believe that they have detected them would undermine the very process by which financial markets allocate capital.

The imperfection of knowledge, however, implies that price swings can sometimes become excessive. This possibility is enhanced by what George Soros (1987) has called “reflexive” relationships, or channels through which, for a time, asset-price swings and fundamental trends reinforce each other.

As the housing- and equity-price booms of the 2000s show, markets eventually correct excessive swings on their own. However, the self-correction came too late, and neither the banking sector nor financial markets were sufficiently prepared for it. As a result, the reversal had a severe impact on the financial system and on broader economic activity, with investment spending dropping to historically low levels and unemployment rates soaring to highs not seen for a quarter-century or more.

By early 2000, market participants understood that housing and equity prices had already reached historically high levels. Yet as fundamental factors continued to trend in bullish directions, they continued to bid up prices. Their concern was with profits, and so, in their trading, they did not internalize the economic and social costs associated with such excess. This externality, then, rationalizes a role for the state in asset markets beyond setting the rules of the game. Society has an interest in instituting a policy framework that dampens excessive swings in financial markets and regulates financial institutions’ risk exposure to them before they reach crisis levels. Our IKE account of swings in asset prices and risk provides a new way of addressing both these objectives.

Because standard models relate financial risk to the volatility of asset prices over a month or a quarter, they obscure its inherent connection to long swings in asset prices—to how far prices have moved in one direction or another. In contrast, our IKE model relates risk to participants’ perceptions of the gap between an asset price and its range of historical benchmark levels: as asset prices rise well above or fall well below most participants’ perceptions of these levels, those who are betting on further movement away from the benchmark perceive an increased

risk in doing so. We extend this insight, which can be traced to Keynes, and formalize it as a qualitative regularity.

Our IKE account of risk in financial markets suggests that excessive overall price swings in equity and housing markets, as well as in the key sectors to which bank loan portfolios or trading books are heavily exposed, provide complementary indicators of risk both for individual banks and for the system as a whole. Dynamically relating bank capital buffers to these indicators provides regulators with an additional tool for managing systemic risk. However, we argue that regulation best protects banks—and the broader economy—from the consequences of sharp reversals in asset prices by targeting excessive asset-price swings directly.

The policy framework suggested by Imperfect Knowledge Economics aims to weaken market participants' incentives to prolong price swings beyond levels that are consistent with their *own* assessments of the longer-term prospects of projects and companies. However, the inherent connection between asset-price swings and the process by which financial markets allocate capital suggests that prudential intervention in markets should not aim to minimize their instability. Cutting off price swings early is likely to impede innovation, thereby reducing society's dynamism and growth potential.

In our proposed scheme, so long as asset-price fluctuations remain within reasonable bounds, the state's involvement is limited to setting the rules of the game: ensuring transparency and adequate competition, and eliminating other market distortions (such as those that the recent crisis exposed). But officials should also devise guidance ranges for asset prices. In doing so, they should not rely solely on historically based valuations, which, because they ignore nonroutine change, are unreliable as a guide to likely thresholds of excess during asset-price swings. Once prices move beyond such a nonroutine guidance range, Imperfect Knowledge Economics suggests that policy officials should cautiously and gradually implement dampening measures, as well as requiring banks to prepare for the eventual reversal by increasing their loan-loss provisions.

Our proposed regulatory framework recognizes that policy officials, like everyone else, must cope with ever-imperfect knowledge. Imperfect Knowledge Economics nonetheless provides a rationale for active prudential intervention, which we hope may also help restore much-needed balance to the public debate concerning what should be left to the market and what only the state and collective action can accomplish.