

How can behavioural finance help us in better understanding the recent global financial crisis?

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Abstract

The recent global financial crisis calls for a need to adopt a more interdisciplinary approach to the study of economics and finance by focussing also on the individual and social psychology that drives the actions of market participants. Behavioural finance offers such a perspective by drawing on the fields of psychology and the other social sciences to explain how investors are led to make less than rational investment decisions and how these could aggregate to less than rational market outcomes, like periods of excessive investor euphoria preceding a financial crisis. This paper draws on the existing literature in behavioural finance and particularly on the two models of “information cascade” by Bikchandani et al. (1992) and “limits to arbitrage” by De Long et al. (1990) to provide a better understanding of the underlying reasons behind the recent global financial crisis. The paper concludes with a view to inform policy of the ways it can curb speculative excesses and prevent events like the recent global financial crisis.

Keywords: Investor psychology, information cascade, social contagion, limits to arbitrage, noise trader risk.

1. Introduction

The G-20 summit held on 15th November 2008 at Washington, identified as the root cause of the recent global financial crisis the following: “*weak underwriting standards, unsound risk management practices, increasingly complex and opaque financial products and consequent excessive leverage*”. While it is true that all of these factors played a major part in bringing about the recent financial crisis, these factors by themselves could have been the result of less than rational decision making by managers and investors alike. Behavioural finance could help us better understand the global financial crisis by informing us of the ways in which people make less than rational investment decisions and how these aggregate to less than rational outcomes in the markets leading to asset bubbles and a subsequent crisis.

1.1 From Efficient Market Hypothesis to Behavioural Finance

The efficient market hypothesis has been a key idea that has guided much of finance theory since the 1970's. Fama (1970) defined market efficiency as “A market in which prices always ‘fully reflect’ available information is called ‘efficient’”. He further distinguishes three forms of market efficiency namely weak form, semi-strong form and strong form depending on whether the information set contained historical prices, all publicly available information or all private information respectively. The early tests of market efficiency were tests on whether prices and returns followed a random walk. If prices did follow a random walk it meant they could not be forecast which meant that it was not possible to make risk adjusted economic profits by trading on the basis of an information set thereby validating market efficiency. Fama (1970) finds almost no evidence that dependence in returns could be used to generate profitable trading strategies and also finds that prices on average reflected all available information during major information generating events like earnings announcements and concluded that “...the evidence in support of the efficient market model is extensive, and (somewhat uniquely in economics) contradictory evidence is sparse”.

Over the years however a large number of studies have discovered anomalies that challenge the efficient market hypothesis. Rozeff and Kinney (1976) found average returns on the equally weighted NYSE to be

about 4.5% in January, but only 0.5% for the other months thus demonstrating seasonality in returns. Shiller (1981) shows that stock prices were far too much volatile to be attributable only to new information on expected future dividends. De Bondt and Thaler (1985) show that dramatic fall (rise) in stock prices were predictive of subsequent rise (fall) in earnings and attribute this as evidence of investor overreaction to short term earnings movements. Jegadeesh and Titman (1993) find evidence of profitability in the following 12 months of certain momentum strategies that buy stocks with high returns and sell stocks with low returns over the previous three to twelve months. Jegadeesh and Titman (2001) find their earlier results robust for the 12 month period. Besides these anomalies, further research has also led to new variables being found to predict future returns. Fama and French (1992) find that size, book to market and market to book leverage have significant effect on returns. Fama and French (1993) find that a three factor model with market, size and book to market factors explains well stock returns.

These studies hence validate the claim that the market is less than fully efficient even in the weak sense and call for an alternative explanation to market outcomes that deviate from the efficient market outcome. Behavioural finance which is an approach to study financial decision making and the resulting market outcomes by drawing on the fields of psychology and the other social sciences provides an explanation to the causes of investor's less than rational decisions and the resulting inefficient market outcomes.

1.2 Behavioural finance

Drawing on the discussion in Barberis and Thaler (2003), the two major "*building blocks*" on which behavioural finance rests are "limits to arbitrage" and "psychology". Limits to arbitrage is based on the notion that in the real world rational arbitrageurs being faced by significant costs and risks to arbitrage will limit arbitrage and thus let deviations from fundamental values persist. Psychology informs us on the deviations from rationality we may observe among investors and their valuation of assets that results in less than efficient asset prices and market outcomes. I present the key research findings on these two building blocks.

1.2.1 Limits to Arbitrage

Proponents of the efficient market hypothesis would argue that in the event of asset prices going very far away from fundamentals rational arbitrageurs would quickly bring these prices in line with fundamental values by taking positions against these price movements. Barberis and Thaler (2003) point out that in reality exploiting such a mispricing away from fundamentals may be risky due to fundamental risk and noise trader risk. Fundamental risk is the risk that the fundamentals of the mispriced asset may worsen and in the event of any close substitute securities be also impossible to hedge against. Noise trader risk is the risk that a mispricing may worsen in the short run as deviations from fundamental values persist due to continued positive or negative sentiment of the irrational investors.

Drawing on De Long et al. (1990) and Shleifer and Vishny (1997) they point out that rational arbitrageurs foreseeing such a scenario of early liquidation in the event of a worsening mispricing tend to be more cautious in taking positions against any such mispricing and may even also trade in the direction of the mispricing. A celebrated example of the risks in arbitrage strategies detailed by Lowenstein (2000) is the fall of Long Term Capital Management, a leading US hedge fund in 1990's which lost millions when its arbitrage position in a dual listed company Royal Dutch Shell hoping that the prices of Royal Dutch and Shell would converge had to be unwounded due to the unforeseen losses it had made on its other trades. I later draw on the model by De Long et al. (1990) to explain why mispricing in real estate may have persisted despite the presence of rational investors who may have seen a bubble in the housing markets.

1.2.2 Psychology

The broad research in psychology relevant to the financial markets is dealt in Shiller (2001). I follow the discussion in Shiller and outline the most important literature in understanding the various deviations from rationality. Kahneman and Travesky (1979) show through experimental evidence that people value losses more than gains i.e. their value function is concave for gains and convex for losses around a reference point. They also show that people distort probabilities in their minds and underweight events that are highly probable vis-a-vis events that are extremely probable. This is also known as the "certainty effect." Shefrin and Statman (1985) show the "disposition effect" among investors to sell winning stocks too early and continue holding on to losing stocks and attribute this to regret avoidance in making a bad investment.

Goetzmann and Peles (1993) attribute “cognitive dissonance” (which is a tendency among people to continue with their old beliefs by disregarding new information or developing arguments to justify their beliefs) to the tendency of mutual fund investors in losing funds to bias upwards their perceptions about the fund resulting in lower outflow of funds from losing funds than inflow of funds into winning ones. Northcraft and Neale (1987) show the phenomena of anchoring (which is a tendency among people to base too strongly their responses around a reference point or an anchor) among real estate experts when giving their valuations for a house. They show that experts who were provided with a higher “asking price” as an anchor gave significantly higher “appraisal values” than those provided with a lower “asking price.”

Odean (1998) after analyzing 10,000 customer accounts from 1987 through 1993 at a large discount brokerage house show investor’s persistent tendency to sell winner stocks and hold on to losing stocks which may evidence “overconfidence” among investors in their beliefs that the losing stocks would bounce back. Shiller (1987) collect responses from individuals and institutional investors after the stock market crash on October 19th, 1987, (the largest one day percentage decline in the Dow Jones Industrial Average) and find a large number of investors who bought stocks on that day (around 47%) expect the stock market to rebound and often attribute their buy decisions to “intuition” and “gut feeling” demonstrating overconfidence in their intuitive feelings. Shiller attribute the crash to a feedback loop in which investors constantly respond to price changes and to each other and thus generates a feedback loop that feeds further price declines. Such a feedback loop in general could explain speculative behaviour in the financial markets as well. Bikchandani et al. (1992) describe a model of herding by way of an “information cascade”. They describe an information cascade as occurring when individuals reject their own private signals and adopt the actions of those ahead of them. I later draw upon the argument by Shiller (1987) and the model by Bikchandani et al. (1992) to explain why housing prices kept on increasing and why investors thought that these prices would keep on increasing to even higher levels which was the psychology behind the housing bubble that led to the recent financial crisis.

2. The Global Financial Crisis

I present below a brief account of the recent global financial crisis along with an account of the real estate bubble in the US housing markets which was the single most important event that led to the crisis. The recent global financial crisis has been the severest financial crisis we have seen since the Great Depression of the 1930s. In its unwinding we witnessed the collapse of major investment banks Lehman Brothers and Bear Stearns, the bailout of American International Group (AIG), America’s largest insurance company and that of Freddie Mac and Fannie Mac, America’s largest mortgage finance companies. The crisis quickly spread to major financial institutions across the world with the British Bank Northern Rock witnessing a run and banks like BNP Paribas, UBS, Citigroup, Merrill Lynch, Royal Bank of Scotland among others with investments in sub-prime mortgage securities running losses into billions. The after effects of the crisis have been a global credit crunch and a period of slower economic growth in the economies across the world.

The primary event behind the financial crisis was the bursting of a speculative bubble in the housing markets in the US. A speculative bubble is formed when the current market value of an asset is far greater than the present value of its discounted payoffs into the future. A study of the housing bubble is presented in Shiller (2008). Shiller constructs a price index of real home prices dating from 1890 and showed that real home prices in the United States had increased 85% between 1997 and its peak in 2006. He found no corresponding changes in building costs, population and interest rates to account for this sharp increase in home prices. His studies show that home prices were clearly out of line with fundamentals and that there was a resulting bubble. The price increases were also found to be the highest in the lowest price tier homes which were in line with the growing expansion of subprime loans to lower income buyers to finance purchase of low priced homes. This bubble in the housing market was fuelled further by access to easy credit by the banks to anyone who wanted to buy a house with very little effort to assess the borrower’s ability to repay their loans. Shiller brings out that the lending standards were so lax that the mortgage lenders often failed to even verify the borrower’s incomes with the Internal Revenue Service in spite of them having signed authorisation forms which gave them the right to.

These mortgages after they had been made did not remain on the books of the banks but were bundled into tradable securities known as Collateral Debt Obligations (CDO's) often backed by high credit ratings from a ratings agency and sold to investors through a Special Purpose Vehicle (SPV). Such a model of banking is known as the "originate and distribute model" of banking and the process of selling mortgage backed securities known as securitisation. Keys et al. (2008) empirically show that portfolios that are more likely to be securitised (by way of having a score higher than an ad-hoc credit score) defaults by 10%-25% more than a portfolio of a similar risk profile but with a lower probability of securitisation and conclude that the securitisation practises did adversely effect the screening incentives of lenders. All of the above factors together with ineffective regulation to deal with the declining standards in lending and the proliferation of complex mortgage backed securities that allowed banks to transfer the risk of holding these mortgages off their balance sheet further fuelled the speculative fervour in the housing markets.

3. The Psychology of the Real Estate Bubble

Shiller (2007) argue that the boom in the housing markets from 2000 onwards was largely driven by extravagant expectations of further price increases. Using data from questionnaires surveys for two major US cities he finds that in times and places of high price changes, expectations of future price increases were higher. Moreover he shows that as the rate of price increases changes, the expectations of future prices increases are also altered in the direction of the change.

Further, he argues that the declining standards in lending and the proliferation of complex mortgage backed securities were a result of the institutional changes that resulted during the boom and concludes that there is a "coordination problem with psychological expectations" during periods of boom in that people find it hard to alter their expectations of future price increases since they find it difficult to coordinate on a time to alter their expectations inferring from the expectations of other investors.

In line with previous arguments Shiller (2008) attribute the boom in the housing market to a "*social contagion of boom thinking*" and "*new era stories*" in the belief that home prices would continue to rise forever, this belief being further strengthened by the media with its overly optimistic stories around the price increases. He calls this a "*price-story-price*" feedback loop that takes place repeatedly during a speculative bubble. Taking a cue from Shiller, I will draw on a model of "information cascades" by Bikchandani et al. (1992) to provide a understanding of how such a feedback loop could be formed.

4. The Models

In line with the arguments of behavioural finance, I draw on two models to elucidate further "limits to arbitrage" and "investor psychology" in relation to how they can explain the underlying reasons for the housing bubble and the financial crisis that followed. I will now draw on two models, one by De Long et al. (1990) which shows arbitrage is risky and hence of limited use in bringing prices in line with fundamental values and then a model of herding by Bikchandani et al. (1992) which shows how investor's paying little attention to their own private signals and basing their actions on the observed actions of those before them can create a bubble. The two models together I feel can explain well how a bubble in the housing market was formed and what allowed it to persist before its subsequent bursting leading to the recent financial crisis.

While accounts of the crisis as discussed earlier place the cause of the crisis on declining lending standards practised by the banks, proliferation of complex mortgage backed securities, improper assessment of the risks of these securities by the credit rating agencies, incentive issues with the mortgage originators and the ratings agencies and ineffective regulation to address all of these, I would like to take the view of Shiller (2007) and think that these were not the driving forces behind the bubble but a result of the ensuing circumstances that may have prevailed in a period of euphoria and confidence among investors in the housing market founded in the optimism that the prices would always rise.

4.1.1 A model of herding by Bikchandani et al. (1992)

Bikchandani et al. (1992) describe a model of herding by way of an "information cascade". They describe an information cascade as occurring when individuals reject their own private signals and adopt the actions

of those ahead of them. Thus in the absence of any external disturbances all individuals adopt the same action leading to conformity of behaviour among individuals. Bikchandani et al. (1992) however also point out that the resulting conformity of behaviour can be “fragile and idiosyncratic” resulting in a shift in action in the event people’s expectations shift. Without going into the formal details, Bikchandani et al. (1992) thus essentially show that cascades prevents the useful aggregation of individual actions to inform decisions of later individuals, as when a cascade starts individuals disregard their own private signals and act on the actions of those before leaving behind no useful information available.

4.1.2 Application to the Financial Crisis

The model on information cascades can be applied to explain the real estate bubble. Consider an investor with a private signal H (High) on the housing markets who adopts the signal at a cost equal to the investment cost which maybe assumed to be the same for all investors. Considering a scenario of an optimistic outlook towards real estate investments with the conviction that real estate prices would always rise, it is plausible to assume that investors following would in the event of an H signal invest and in the event of an L (Low) signal still choose to invest leading to a rush for investments in the housing market. This created a scenario for banks to relax their lending standards and provide easy credit in the form of subprime loans which further fuelled this rush for investments. Such a scenario of investors rushing to take up mortgages could be seen as an UP cascade in which investors simply based their investment decisions on the decisions of those before them ignoring their own private signal. Such a scenario also seems to agree well with the argument presented earlier by Shiller (2007) on “coordination problem with psychological expectations” during periods of boom in that people find it hard to alter their expectations of future price increases. Moreover investors with a low private signal could have been led to ignore their signals due to banks extending easy credit making these investors less risk averse than they would have been. One could also attribute the disregard of a low private signal to “regret avoidance” in missing a good investment. The model could also be extended to explain the behaviour of banks and institutional investors who invested in the SIVs and the CDOs. The high credit ratings given by the rating agencies to most of these SIVs and CDOs could also have an effect in the decision of the banks and institutional investors to ignore their private signals and invest in these securities which may have led to an UP cascade in subprime investments. Danielsson (2008) argue that the ratings produced by the credit rating agencies on the CDO’s and other Structures Investment Vehicles (SIVs) were incorrect assessments of their risks due to their underestimation of default correlations which resulted in the risk of defaults being highly correlated in the event of a downturn.

One of the key results of their model “that as the number of individuals increases, the probability of not being in a cascade falls exponentially” could explain how the scale of investments in subprime mortgages built up to the levels that were sufficient to trigger a global financial crisis. As more and more individuals took up mortgages and more and more institutions invested in mortgage backed securities the probability of another individual or institution making the same decision could have become more and more likely. These arguments also fall in line with the arguments of Shiller (2008) that attribute the boom in the housing market to a “*social contagion of boom thinking*” in the belief that home prices would continue to rise forever and a “*price-story-price*” feedback loop that takes place repeatedly during a speculative bubble.

The characteristics of “fragility” and shifts in equilibrium in the event of changing expectations could serve as an explanation to the sudden change in investor sentiment which led to the bursting of the housing bubble followed by a period of a DOWN cascade during the ensuing financial crisis. Hence the model by Bikchandani et al. (1992) on information cascades agrees well with the notions of “social contagion” and “price-story-price” feedback loops founded in social/investor psychology and offers a plausible explanation to formation and the bursting of the real estate bubble that preceded the crisis.

Danielsson (2009) highlight the problem of endogenous risk that financial markets are susceptible to. Endogenous risk is defined as the risk arising from the actions of market participants in response to an exogenous event. An exogenous shock may increase the risk aversion of market participants who may chose to sell their holdings leading to decline in asset prices and further increase in risk aversion among other investors resulting in further sales and price declines and thus result in a systemic crisis of the nature we witnessed during the recent financial crisis.

4.2.1 A model on the limits to arbitrage by De Long et al. (1990)

I next draw on the theory of limits to arbitrage to understand why such a bubble persisted and why if prices were going out of line with fundamentals were they not brought in line by rational arbitrageurs. I draw on a model by De Long et al. (1990).

De Long et al. (1990) model the behaviour of two investor classes namely “noise traders”, who have false beliefs that they know the future price of a risky asset and sophisticated investors who seek the take advantage of the erroneous beliefs of the noise traders by following investment strategies that drive prices towards fundamentals. Without going into the formal details, De Long et al. (1990) thus essentially show that arbitrage to bring prices in line with fundamentals is limited due to presence of “noise trader risk”, in that any arbitrage would come with the risk of the noise traders misperceptions being more extreme (and in directions uncertain) thus driving prices further out of line with fundamentals tomorrow than today.

4.2.2 Application to the Financial Crisis

As detailed earlier, the precursor to the global financial crisis was a rapid boom in home prices in the US which resulted in a bubble in a housing market and the resulting proliferation of easy credit, lax lending standards and the use by banks of derivative products to transmit their credit risk to other financial institutions and investors thereby exposing the entire financial system to a systemic risk in the event of a downturn in home prices.

If however home prices were driven out of line with fundamentals why were these not brought in line with fundamental values as efficient market theory would have us believe? Why did mispricing persist to the lengths that led to a bubble and a major financial crisis? An answer to this may lie as argued earlier with reference to De Long et al. (1990) in the limited ability of arbitrageurs to bring a mispricing in line with fundamental values. Although the model of De Long et al. (1990) applied primarily to the stock markets, the same limitations of a mispricing worsening or being too unpredictable to take a position against, I think applied to the housing market as well. I detail other factors that may have limited arbitrage in the housing markets.

Farlow (2003) argue that arbitrage maybe limited by fundamental risk (which may also result due to an inability to define a fundamental value leading to uncertainty in an arbitrage strategy and the resulting gains) by citing the housing market as an example where there is imperfect information of the value of the fundamental asset and also no close substitute to hedge thereby limiting arbitrage. Farlow also point to “noise trader risk” in the housing market due to uncertainty in the length of the mispricing and argues that a bank choosing not to lend (and thereby taking a position against the mispricing) in an upturn faces the risk of profits eroding by way of losing market share to other banks which are lending. Farlow point out to “horizon risk” faced by individual investors who may not be incentivised to put off a purchase or to sell out of a housing investment due to uncertainty in the fundamental price and the length of the mispricing before it corrects.

The model of De Long et al. (1990) and the arguments by Farlow (2003) hence show that arbitrage against mispricing is costly and hence limited due to fundamental and noise trader risks which may explain why banks kept on lending and other financial institutions kept on investing substantially in housing related securities during the boom thereby feeding the subsequent bubble. The recent bubble in the housing markets may thus be seen as such an example of the inability of arbitrageurs to correct a mispricing and the mispricing persisting for a significant length of time to allow the formation of a bubble.

5. Conclusion and Policy Implications

The recent global financial crisis has been the worst financial crisis we have witnessed since the Great Depression of the 1930's. In its aftermath we have witnessed a global credit crunch and a prolonged period of slow growth in economies across the world, the effects of which we are still under. While numerous accounts of the crisis place the blame of the crisis (to cite a few) on the easy lending standards adopted by the banks, the proliferation of complex mortgage securities underwritten by these banks and their improper

assessment by the credit rating agencies, the problems with the incentive structure of the mortgage originators and the ratings agencies and the improper regulation of these practices by the regulators together with an expansionary monetary policy followed by the major central banks in the US and UK among other economies, these accounts by themselves only provide a partial and limited explanation to the crisis. Behavioural finance could provide a more holistic understanding of the underlying factors that led to such a scenario of events in the first place by focussing on the individual and social psychology that underlies any period of excessive investor optimism or panic. A behavioural finance framework to explain the current crisis must then focus on the underlying investor psychology that drove the real estate bubble and the limitations faced by rational arbitrageurs to correct this bubble. Drawing on Shiller (2007) what seems to have been the underlying cause of the bubble was a psychology of extravagant expectations of price increases leading to a “coordination problem with psychological expectations” which limited people’s ability to correct their overly optimistic expectations resulting in a “social contagion of boom thinking”. What may have followed was an “information cascade” of the nature shown by Bikchandani et al. (1992) resulting in investors copying the actions of others before leading to a huge rush of investments in the housing markets and a “price-story-price” feedback loop that fed the resulting bubble. Further any attempts to correct any mispricing may also have been limited as argued by Farlow (2003) due to inability to define a fundamental value for housing and there being no close substitutes to hedge against and the risks to arbitrage due to mispricing from fundamentals worsening as shown by De Long et al. (1990).

Policy Implications

Adopting a behavioural finance view taking into account individual and social psychology and the limitations to arbitrage can help us design policy more in line with the underlying psychological forces that drive the behaviour of market participants.

Such policies could begin by having in place a monetary policy that takes a more proactive role in curbing speculation. Shiller (2005) describe a novel way to do this by having “symbolic” increases in interest rates accompanying a statement cautioning against speculation whenever markets are perceived to be overpriced. Authorities could also help safeguard individual investors against excessive risk taking by way of educating investors on effective hedging and diversification and cautioning them against “expert advice” rampant in the finance news media. Effective regulation can also focus more on dealing with the endogenous nature of market risk and its systemic effects. Lastly, financial technology and innovation can expand into other new markets and products that incentivise analysts to concentrate on forecasting fundamentals rather than simply forecasting the price levels. One such market proposed by Brennan (1998) called “S&P 500 Strips” is a market for future annual total dividends of aggregate S&P 500 firms.

To conclude behavioural finance with its application of the insights on individual and social psychology to finance can help increase our understanding of less than rational behaviour among investors and the less than rational market outcomes in the form of speculative bubbles. This is however not to say that behavioural finance is an alternative to the efficient market hypothesis which has its own merits, rather it is a step towards a more integrated approach to finance by placing at the centre not a financial model in abstraction but an individual and collective psychology that is the ultimate driver of all economic activity. Such an integrated approach could inform policymakers and regulators to design policies and regulations that check speculative excesses while not curbing financial innovation and market expansion that have the potential to quickly and effectively correct excessive “irrational exuberance” and in doing so prevent events like the financial crisis.

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