

How not to reward financial innovation: perverse incentives and moral hazard in financial markets

Pietro Monsurrò

Abstract

The last twenty years of financial innovation have produced an impressive amount of new instruments and institutions which have greatly improved the efficiency of national and international financial markets. However, the ongoing economic crisis shows that many of these innovations did not take adequately into account problems like liquidity and credit risk, resulting in an imbalanced and fragile economic structure. This paper investigates the economic drivers of financial innovation and argues that countercyclical economic policies, causing moral hazard, incentivize innovations which contribute to systemic fragility, as markets cannot properly take into account the costs of risk. Innovation is an entrepreneurial process and it can be distorted by economic policies shielding entrepreneurs from the results of their own actions. Attempts to counteract these problems by means of regulations will be probably ineffective, because moral hazard will drive innovators to look for new ways to circumvent them, and inefficient, because fixed rules are no substitute for entrepreneurship.

I. Introduction

This paper is about financial innovation and how it can be distorted by policy activism. I will describe the main effects of moral hazard on investment choices and its impact on the process of financial innovation, and I will analyze the interplay between activist policies creating moral hazard and regulatory constraints set out to reduce their perverse effects. The main conclusion is that moral hazard may foster innovations which do not adequately take into account risks, thus creating systemic instability, and that regulations are of limited avail in counteracting these distortions. Innovation is an entrepreneurial process¹ and it must be based on the individual responsibility of the entrepreneur, who directly faces profits and losses; however, systematic moral hazard created by activist policies hampers this process. The problem is particularly important in financial markets, because in the field of finance losses and bankruptcies are considered evils to be avoided at all costs. This fear has mounted since Bernanke's² explanation of the length and severity of the Great Depression as the result of bank failures, setting the rationale for continual policy interventions in financial markets since the late '80s. There are various channels through which moral hazard³ may affect the behavior of economic agents, and it can be argued that lending standards, financial and operating leverage, maturity mismatch and stock market bubbles⁴ can be affected by policy activism.

One of the problems I will analyze in the following sections is that although it is fairly easy to draw a conceptual distinction between innovations which improve wealth creation and innovations that are the adaptation to wrong data and perverse incentives, the application of this distinction to reality is a daunting task. However, although it may not be possible to estimate a priori the desirability of a specific innovation, it can be safely argued that, if the market is systematically distorted by moral hazard, the final result will

¹ Knight 1921, Kirzner 1973, Mises 1949 and Schumpeter 1947.

² Bernanke 1983, IMF 2008.

³ Kaufman 2000, O'Driscoll 2009, Muller 2001, Tirole 2002 and Corsetti, Pesenti and Roubini 1998.

⁴ Miller, Weller and Zhang 2002.

likely be unstable and inefficient. No one should be entitled to innovate at other people's (tax-payers, savers or money-holders) expenses: only an entrepreneur that is not insured against losses can be induced to properly pay attention to the complexity and risks of the market process.

In history, financial innovation and financial crises have always been strictly knit together. This was already evident in the XVIII century, in which financial systems were already complex and quickly evolving⁵. Another example is the 1907 crisis, which did not hit the banking system, but mainly trust companies⁶, the first instances of the so called "shadow banking system" which recently has been supposed to replace banks in intermediating credit. A parallel can be made between trust companies and modern money market mutual funds⁷. Trust companies held deposits and performed many of the normal functions of commercial banks; they were less regulated than banks, with lower reserve requirements and less constraints in the holding of shares, and they contributed much to the increase in lending and the growth of money supply between the XIX and the XX centuries. Neal 1971 makes an interesting point in noting that the velocity of money grew more or less uniformly before and after the 1907 crisis, whereas this didn't occur after the Great Crash of 1929: for him, this is evidence that trust companies engaged in genuinely productive activities. Neal's reasoning may help distinguishing good and bad innovations, at least a posteriori, although too many things changed in policies after 1929 to make comparisons between the situation before and after the Great Crash significant. The Roaring '20s have been known for rapid technological progress, originating in the automotive and radio industries⁸. However, financial developments which occurred in those years were important, too, and the rapid growth of investment trusts, enhanced by financial leverage⁹, fueled the stock market boom between 1927 and 1929¹⁰. Financial innovation in past crises, however, is dwarfed by what has happened in the last decades: hundreds of acronyms have been created to give a name to new financial instruments and institutions¹¹.

This paper is organized as follows: Section II introduces entrepreneurship and innovation, with emphasis on financial innovation. The core argument of the paper is to be found in Section III, which introduces the distinction between good and bad innovation, and in Section IV, which analyzes the impact of policy activism on the process of financial innovation. Conclusions are drawn in Section V.

II. Innovation and financial innovation

Innovation can take many forms, and in the field of finance it usually consists in creating new instruments, finding new ways for intermediating funds and providing means of payments in transactions¹². A complete taxonomy of innovation cannot be achieved because, by its very nature, innovation can be described in terms of its past achievements, but not of its future potentialities. However, financial innovation may imply

⁵ Hoppit 1986.

⁶ Moen and Tallman 1992, White 1990, Livermore 1930, Friedman and Schwartz 1963 and Neal 1971.

⁷ White 1990.

⁸ White 1990.

⁹ Rothbard 1963, Livermore 1930.

¹⁰ Phillips, McManus and Nelson 1937, Rothbard 1963.

¹¹ Gorton 2008.

¹² Dufey and Giddy 1981 and Miller 1986.

risk transformation, which occurs when risks are unbundled from the underlying asset and transferred to third parties (like with credit default swaps – CDSs) and reduced through pooling; or maturity transformation, when long term assets are backed by short term liabilities. Another service rendered by financial markets is that of providing liquidity, reducing the transaction costs involved in trading. Innovation may also impact trading techniques employed by arbitrageurs in financial markets, such as the trading schemes of hedge funds, which use shorting and other techniques involving a variety of instruments that financial innovation constantly creates.

It has been argued¹³ that deregulation may reduce the rate of financial innovation as the latter is mainly due to regulatory arbitrage, thus being useful only in heavily regulated economies. Although it may appear that the surge of financial innovation in the last two decades may disprove this theory, regulatory constraints keep on playing a fundamental role in the process of innovation. An example of regulatory constraints affecting innovation are capital requirements, such as those of the Basel I agreement, forcing banks to keep a minimum amount of capital to back their loans. Banks have responded to this constraint by creating special purpose vehicles (SPVs), sometimes called off-balance sheet vehicles, to remove risky loans from their balances and expand credit. SPVs would probably be of much less use without these constraints. I will describe in the following how regulations constraining financial institutions may coexist with policies incentivizing the very behavior that regulations are supposed to avoid, and what are the likely consequences of this tug of war.

III. The market process, entrepreneurial errors, and innovation

The market system can be seen both as an incentive system and as a knowledge conveying system. It may be argued that modern economics is imbued in the former framework while neglecting the latter, which on the contrary has been emphasized by the Austrian School¹⁴. The market process seen as an incentive system can be depicted as a system of sticks and carrots whose aim is to cajole recalcitrant economic agents into behaving in a certain way. The latter paradigm sees the market as a way to spread information about the state of the economic system: a single price summarizes a huge amount of information which in the absence of prices no single human mind would be capable of collecting and elaborating: the market system makes a system-wide “division of intellectual labor¹⁵” possible. Profit opportunities act both as incentives and as signals, luring entrepreneurs into exploiting them; besides, the entrepreneur, competing on the market, modifies the incentives and the information of the other agents: firms observing the shrinkage of their profit margins need to reconsider their plans. In the Austrian theory of economic cycles¹⁶, monetary policies create a wedge between the price system and the underlying economic reality, so that the new constellation of prices creates perverse incentives and spreads false knowledge.

When the knowledge problem is assumed away, all that remains is a complex problem of optimization, which a computer endowed with sufficient computational power and data may solve, judging the optimality of choices, allocations and plans, and in which a single mind may substitute entrepreneurs in their role as link of the market system. One of the consequences of the knowledge problem¹⁷, however, is that both entrepreneurs and economists lack a perfect grasp of the underlying economic reality and so they

¹³ Miller 1986.

¹⁴ Mises 1949, Kirzner 1973.

¹⁵ Mises 1920.

¹⁶ Mises 1949 and Rothbard 1963.

can't faultlessly distinguish error-induced changes from changes in the fundamental underlying data. An error may influence many markets by changing the incentive and informational content of prices: if the source of the error is persistent, the subsequent disruptions in the economic process can be profound, long lasting and pervasive. This point plays an important role in the following argument, as the difficulties in distinguishing good and bad innovations depend on the knowledge problem.

It can be objected that information considered unreliable is automatically "discounted" by economic agents, who choose between accepting information as true and acting accordingly or rejecting information as false and neglecting it. Too low a price for risk, thus, can either induce more risk taking or being rejected as a fundamentally unsound vagary: in the latter case the true market price of risk remains unknown. However, it is unlikely that millions of actual or potential entrepreneurs do not exploit a profit opportunity because each of them perfectly realizes its unsoundness. Such a constellation of incentives would form an unstable equilibrium: the first mover would have a competitive hedge and thus incentives may be irresistible, as in a tragedy of the commons¹⁸. Furthermore, the incentive to exploit even unsound profit opportunities can increase if there is a nonnegligible probability of being able to transfer the risk to third parties. A policy capable of shifting the costs of bad decision-making will thus incentivize the exploitation of profit opportunities also by those who are aware of their unsoundness: it will be argued in the following that such policies exist, and they have been at work both in the last two decades and in the 20s.

Bad incentives and false information may spur the wrong kind of innovation. Whereas good innovations open new opportunities to better allocate resources and satisfy consumer wants, bad innovation is driven by errors and contributes to spreading them: it is the market adjustment to perverse incentives. Every financial innovation may be good or bad depending on circumstances; in order to distinguish between the two it would be necessary to know the "real" underlying market conditions, which could only be known through the price system: the alternative to bad information is not good information, but no information at all. Huerta de Soto 1998 argues that although innovation in production is almost always positive, innovation in finance should be considered with suspect, at least if it goes against the traditional legal principles at the foundation of markets. However, financial innovation regards many other things¹⁹ – such as the efficiency of resource allocation, the insurance of risk and the coordination of consumption and investment – which are as necessary to economic growth as technological progress. My point is that activist monetary policies foster the wrong kind of innovation, and that the systematic distortion of the price system which they engender makes it impossible to distinguish between good and bad innovation. This distinction, thus, has a central "epistemological" problem: although it appears to be economically relevant, because of its potential effect on the dynamics of the market system, it has little operational content, as no criterion is provided to apply it. Like the notion of the "natural rate of interest" at the core of Austrian business cycle theory, the "badness" of innovation is unobservable.

It may appear that common sense may help: a moderate level of maturity mismatch, for instance, may be sound, whereas beyond a certain threshold its unsoundness may be evident. The problem is that this threshold is both unobservable and variable in time, as financial innovation may increase the optimal amount of maturity mismatch. The difficult problem of distinguishing good and bad innovation is turned

¹⁷ Mises 1920, Hayek 1948.

¹⁸ Carilli and Dempster 2001.

¹⁹ Levine 1997.

into the equally difficult problem of setting sensible limits to financial positions. This is particularly difficult when innovation occurs, as it breaks routines and habits, making rules of thumbs antiquated and old standards inapplicable: in the presence of innovation, the difficulty of distinguishing the normal from the abnormal is magnified. There is no other situation in which incentivizing unsound activities can have such a pervasive impact on the market process.

IV. Policy activism and financial innovation

Moral hazard occurs when an economic agent does not bear the full cost of risk taking and thus has incentives to take on too much risk²⁰. One example of moral hazard is that caused by activist monetary policies: if the central bank actively pursues a policy of reducing large losses in financial markets, costs become collective: every economic agent pays a price in terms of financial instability, every money-holder bears part of the costs in terms of reduced purchasing power, and every saver pays a price in terms of lower returns. The effect of systematic moral hazard in financial markets spreads throughout the economic system. Two classes of effects will now be considered: first of all, moral hazard will incentivize excessive risk taking; second, as long as there is any attempt to reduce the impact of moral hazard by regulations, financial institutions subject to moral hazard will be incentivized to circumvent them.

A. Direct effects of policy activism

In this subsection I will assume that activist monetary policies are pursued, that these policies are credible and that they have been at work for a long period of time. This was surely the case in the 20s, as countercyclical monetary policies were pursued in 1921, 1924 and 1927²¹; and it is an adequate description of economic policy in the last two decades, as the Federal Reserve has contributed to smoothing economic cycles and saving financial institutions in 1987, 1990, 1998, 2000 and 2007.

This kind of policy may impact maturity mismatch: as short rates, which are directly controlled by the central bank, are kept at low and stable levels and the related markets are kept liquid, financial intermediaries will find it profitable to rely on short term debts to fund long term investments. As a consequence, short term distortions of the interest rate will diffuse toward term maturities thanks to arbitrage. This factor has been recently magnified by financial innovation: usually, the common form of maturity mismatch in financial markets was the asset/liability structure of commercial banks; however, also structured investment vehicles (SIVs) have in the last years funded residential mortgages, with maturities higher than a decade, by issuing short term debt in the bond market or commercial paper in the money market, often with maturities of a couple of months. Maturity mismatch and the financial instruments which rely on it arise naturally in financial markets, but activist policies can incentivize agents to indulge in these strategies, affecting systemic stability. It is difficult to distinguish the result of monetary policy from the “natural” behavior of an unhampered market, as estimates of the “optimal” level of maturity mismatch are unlikely available. The long term consequences of systematic moral hazard may be described as “just-in-time finance”: money markets are used to fund not only short term financial needs of firms, but also fixed investments such as housing. In the very moment in which money markets become illiquid or short-term rates have a spike, the whole edifice crumbles.

Currency carry trade, the strategy of lending in a currency and borrowing in another, can be facilitated by innovative financial instruments such as currency ETFs (created at the top of the subprime boom, in 2005)

²⁰ Pauly 1968.

²¹ Friedman and Schwartz 1963.

and currency swaps, which may reduce the cost of entering the Forex market. It has been argued²² that fixed exchange rates, removing the risk of adverse movements, incentivize international borrowing; however, the cost of maintaining exchange rate parity will be borne by the whole economy when the central bank will step in to defend the value of the currency, thus causing moral hazard. In that paper it is argued that avoiding moral hazard is difficult because governments cannot credibly commit to *laissez-faire*²³. This is an instance of time inconsistency²⁴: the same may be said of the policy of avoiding disruptions in financial markets which has informed monetary policy in the last decades.

Policy interventionism can also impact leverage²⁵. Financial leverage is the ratio between debts and equity, and operating leverage is the ratio of fixed to variable costs. To the extent that monetary policy causes a boom in the stock market²⁶, financial leverage, *ceteris paribus*, will decrease, as firms will be able to issue more stocks on the primary market, and the understatement of leverage may incentivize the undertaking of more debt. On the other hand that fixed costs, and thus operating leverage, increase during the boom is a natural consequence of Austrian business cycle theory, as excessive investments in fixed capital are undertaken²⁷.

Interventionism, by assuring market liquidity, will also incentivize illiquid investments, as difficult to liquidate investments may not be seen as risky if liquidation is a rare event. The building up of illiquid investments will be the natural outcome of a long period of countercyclical policies characterized by brief and moderate recessions. Financial innovation can play a fundamental role in this process, as the essence of securitization is to increase the liquidity and marketability of intrinsically illiquid investments²⁸.

Moral hazard can also incentivize lax screening. The “originate to distribute” (OTD) business model, an instance of financial innovation, has been blamed for the present financial crisis²⁹. In the previous “originate to hold” business model financial firms made loans and kept them till maturity: the same financial institution provided credit and gained interests in return. With OTD, lenders and borrowers may be separated by more than one layer of intermediation, originated loans can be packaged and loaned to third parties, and their risks may be transformed and sold separately: inherently illiquid investments can be undertaken as the underlying risks are pooled and spread among investors. However, what need be explained is why these investments were liquid: a rational investor which has reasons to fear will ask for a large discount³⁰; if this does not occur, some additional assumption must be made, for instance that activist monetary policies reduce the private cost of risk taking. That OTD has played a role in the crisis is likely: by

²² Corsetti, Pesenti and Roubini 1998.

²³ Problems of commitment are also central in Tirole 2002 and Kaufman 2000.

²⁴ Kydland and Prescott 1977.

²⁵ Regarding the relations between maturity mismatch, financial leverage and structured finance, see BIS 2009.

²⁶ Miller, Weller and Zhang 2002.

²⁷ Mises 1949.

²⁸ Gorton 2008.

²⁹ Purnanandam 2009.

³⁰ In the presence of asymmetric information, a market may not even exist. See Akerlof 1970.

increasing the number of layers of intermediation between borrowers and lenders, it increases the scope of market transactions and thus enhances the effect of distortions in market prices. However, the central questions are whether OTD finance improves economic efficiency or not, and to what extent the observed characteristics of OTD finance are inherent in it or are the effect of perverse incentives.

B. Policy activism and regulatory constraints

It will now be analyzed how regulatory constraints and moral hazard interact. Let's consider an activist monetary policy fostering moral hazard together with a series of constraints set to reduce the negative effects of moral hazard on the behavior of economic agents. The likely result is that the former policies will incentivize economic agents to look for new ways to overcome the constraints created by the latter: new financial instruments, financial institutions and market strategies will be devised.

A distinction can be drawn between (self-enforcing) constraints whose enforcement is in the interest of the subject and constraints whose enforcement comes at a cost to him. Profits and losses create self-enforcing incentives, for instance if excessive maturity mismatch causes bankruptcy. However, maturity mismatch consists is constrained by a regulation forcing financial institutions to leave profit opportunities unexploited, enforcement may become costly and inefficient. Moral hazard will make the self-enforcing constraints less binding, thus fostering regulatory arbitrage: when regulations make it illegal what monetary policy incentivizes, the benefits of circumventing these constraints are magnified by the insurance implicit in policy activism. This may result in a cat-and-mouse game between economic agents and regulatory agencies, as the latter try, with varying degrees of success, to impose by coercion what can't be imposed by self-interest.

Furthermore, strict regulations combined with activist policies will move agents from regulated to unregulated markets, as taking advantage of profit opportunities is easier in the latter. The combined policy of causing moral hazard and regulating it will cause a flourishing of new more or less unregulated markets in which profits opportunities are exploited; these opportunities, however, may be the result of perverse incentives, causing the economic system to be more fragile. On the other hand, unregulated markets may be relatively less subject to moral hazard than regulated ones, to the extent that government has more stakes in the latter: for instance, heavily regulated government sponsored enterprises (GSEs) such as Fannie Mae and Freddie Mac may be relatively more prone to excessive risk taking than private firms operating in the same markets. The two forces may balance and it cannot be said a priori which markets will be more prone to instability: in the present crisis, relatively free financial institutions such as hedge funds have fared better than heavily regulated institutions such as the GSEs in the US³¹, Landesbanken in Germany and Caixas in Spain; conversely, the panic of 2007 began in the subprime market, in which, on one hand, GSEs operated but on the other hand relatively lightly regulated SPVs, CDOs and SIVs played a large role.

V. Conclusion

Innovation is an entrepreneurial process and financial innovation plays a key role in economic development. Entrepreneurs react to incentives and information carried by the price system and thus every entrepreneurial process, financial innovation included, can be affected by policies which distort the price system. These distortions are particularly dangerous in the process of innovation as it is easier to mistake a policy distortion for a genuine economic improvement when old rules of thumb lose significance.

³¹ Hedge funds may have fared even better without limitations on short selling introduced in late 2008.

This problem can be analyzed in terms of the distinction between bad and good innovation, the first being the response of the market system to systematic distortions. This distinction, however, cannot be easily put in practice because it lacks operational content: if it were possible to distinguish bad and good innovation, the former would probably never occur. As the market process is coordinated through the price system, distortions in the latter make judgment of the outcomes of the former impossible: entrepreneurs cannot judge risks if no one has incentives to find the right price for them because of moral hazard, and distortions in the price system tend to spread throughout the markets in complex and unpredictable ways.

Where entrepreneurs fail, it is unlikely that bureaucrats will succeed: the distortion of the market process destroys the very possibility of efficient coordination between economic agents. As a consequence, solving the problems of economic fragility by means of regulations, in a context of systematic moral hazard, is whimsical, as moral hazard will incentivize economic agents to circumvent them; on the other hand driving markets by means of regulations is no less impossible than managing a complex economy through central planning³². In other words, the combined policies of fostering moral hazard through countercyclical interventions and limiting it through regulation worsen the trade-off between efficiency and stability, as regulations reduce the former and moral hazard hampers the latter: it is likely that eliminating the policies which cause moral hazard would relax the trade-off as less regulatory constraints would be required. To the extent that these distortions are the main source of financial instability, this will also reduce the severity of economic crises; in any case, it will enable the market system to price and allocate resources better, turning entrepreneurial resources away from regulatory arbitrage and toward real economic progress. Order in the market system cannot be achieved if prices are systematically distorted, as this affects the entrepreneurial process, so that policy activism enhances financial instability and reduces efficiency. Re-establishing entrepreneurship by eliminating countercyclical policies fostering moral hazard is the only sensible way to address this problem, whereas the policy of systematically bailing out the financial system has no time-consistent solution but system-wide fragility.

Acknowledgments

Although responsibility for what I wrote is and can only be my own, I have to thank several people for their help: Leonardo Baggiani, Marco Botta, Arianna Capuani, Prof. Enrico Colombatto, John Christian Falkenberg, and Prof. Nicola Iannello.

References

Akerlof, G. A.; "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism"; *Quarterly Journal of Economics*; V. 84 N. 3, 1970, pp. 488—500.

Bank for International Settlements; "The role of valuation and leverage in procyclicality"; *Committee on the global financial system papers*; 2009.

Bernanke, B.; "Nonmonetary effects of the financial crisis in the propagation of the Great Depression"; *American economic review*; V. 73, N. 3, Jun 1983, pp. 257—276.

Carilli, A. M., Dempster, G. M.; "Expectations in Austrian business cycle theory: an application of the prisoner's dilemma"; *The review of Austrian economics*; V. 14, N. 4, 2001, pp. 319—330.

Corsetti, G., Pesenti, P., Roubini, N.; "Paper tigers? A model of the Asian crisis"; *New York University working paper*, 1998.

³² Mises 1920.

- Dufey, G., Giddy, I. H.; "Innovation in the international financial markets"; *Journal of international business studies*; V. 12, N. 2, Autumn 1981, pp. 35—51.
- Friedman, M., Schwartz, A. J.; "A monetary history of the United States, 1869-1960"; Princeton university press; 1963.
- Gorton, G.; "The panic of 2007"; NBER working paper, 2008.
- Hayek, F. A.; "Individualism and economic order"; University of Chicago press; 1948.
- Hoppit, J.; "Financial crises in eighteenth-century England"; *Economic history review*; V. 39, N. 1, Feb. 1986, pp. 39-58.
- Huerta de Soto, J.; "Dinero, Crédito Bancario y Ciclos Económicos" [Money, bank credit and economic cycles], Unión Editorial, 1998.
- International Monetary Fund; "Financial stress and economic downturns"; *World economic outlook*, 2008, ch. 4.
- Kaufman, G. G., "Banking and currency crises and systemic risk: lessons from recent events", Federal reserve bank of Chicago, 2000.
- Kirzner I., "Competition and entrepreneurship"; University of Chicago press; 1973.
- Knight, F. H.; "Risk, uncertainty and profit"; University of Chicago press; 1921.
- Kydland, F. E., Prescott, E. C.; "Rules rather than discretion: the inconsistency of optimal plans"; *Journal of political economy*; V. 85, N. 3, Jun. 1977, pp. 473--491.
- Levine, R.; "Financial development and economic growth: views and agenda"; *Journal of economic literature*; V. 35, N. 2, Jun. 1997, pp. 688—726.
- Livermore, S.; "Investment trusts in 1930"; *Journal of business of the University of Chicago*; V. 3, N. 4, Oct. 1930, pp. 432—444.
- Miller, H. M.; "Financial innovation: the last twenty years and the next; *The journal of financial and quantitative analysis*"; V. 21, N. 4, Dec. 1986, pp 459—471.
- Miller, M., Weller, P., Zhang, L.; "Moral hazard and the US stock market: analyzing the 'Greenspan put'"; *The economic journal*; V. 112, N. 378, Mar. 2002, pp. C171—C186.
- Mises, L.; "Human action"; Yale university press; 1949.
- Mises, L.; "Die Wirtschaftsrechnung im Sozialistischen Gemeinwesen" [Economic calculation in the socialist commonwealth]; *Archiv für Sozialwissenschaft und Sozialpolitik*; 1920.
- Moen, J., Tallman, E. W.; "The bank panic of 1907: the role of trust companies"; *The journal of economic history*, V 52, N 3, September 1992, pp 611—630.
- Muller, A. P.; "Financial cycles, business activity and the stock market"; *The quarterly journal of Austrian economics*; V. 4, N. 1, Spring 2001, pp. 3—21.

Neal, L.; "Trust companies and financial innovation, 1897-1914"; *The business history review*, V 45, N 1, Spring 1971, pp 35—51.

O' Driscoll G.; "Money and the present crisis"; *Cato Journal*; V. 29, N. 1, Winter 2009, pp. 167—186.

Pauly, M. V.; "The economics of moral hazard: comment"; *American economic review*; V. 58, N. 3, Jun. 1968, pp. 531—537.

Phillips, C. A., McManus T. F., Nelson, R. W.; "Banking and the business cycle"; The MacMillan Company, 1937.

Purnanandam, A.; "Originate-to-distribute model and the subprime mortgage crisis"; SSRN working paper; 2009.

Rothbard, M. N.; "America's Great Depression"; Ludwig von Mises Institute, 1963.

Schumpeter, J. A.; "The creative response in economic history"; *The journal of economic history*; V. 7, N. 2, Nov. 1947, pp. 149—159.

Tirole, J.; "Financial crisis, liquidity and the international monetary system"; Princeton university press; 2002.

White, E. N.; "The stock market boom and crash of 1929 revisited"; *The journal of economic perspectives*; V. 5 N. 2, Spring 1990, pp 67—83.