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Economic Literacy and Money Illusion

An Experimental Perspective

Helena Chytilova

ROUTLEDGE

Economic Literacy and Money Illusion an Experimental Perspective

The concept of money illusion, a recently resurrected phenomenon of behavioral economics, is a real fact of economic life, the potential role of which should no longer be dismissed. Despite money illusion being utterly suppressed by mainstream economists, small deviations from rationality, together with trends in behavioral economics, alleviate the denial of money illusion induced by the rational expectations revolution. This book argues that money illusion seems to be a ubiquitous phenomenon, affecting various areas such as financial markets, housing markets, labor markets, consumption-saving decisions, and even development at the aggregate level induced by coordination issues. Furthermore, in light of the educational efforts of central banks and other institutions, it is worth considering whether solid economic training would provide guidance for the public regarding their decision-making and thereby alleviate the effects of money illusion. The emerging field of experimental economics provides a unique opportunity for us to verify the presence of money illusion. Specifically, attention is devoted to the experimental investigation of reduction in the direct and indirect effects of money illusion with respect to the level of economic literacy acquired through economic education.

Economic Literacy and Money Illusion will be of interest to the general audience and to those who are interested in behavioral economics, economics education, and experimental economics, as well as to policy makers and institutions. Last but not least, it will help develop students' interest in alternative economic theories.

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Introduction

Since the term "money illusion" was first coined by Irving Fisher in 1928, it has regularly been invoked as a plausible phenomenon and a major influence on the real effects of money on the economy by many economists, including monetarist theories led by Milton Friedman. However, the impact of money illusion was utterly suppressed by the "rational expectations" revolution in 1970s and the consequent development of the neoclassical stream in modern macroeconomics.

Money illusion recaptured its significance again with the arrival of behavioral economics, which allows for psychological biases present in the behavior of individuals. Although it seems that these individual money illusion effects are largely irrelevant at the aggregate level, New Keynesian theories, characterized by strategic complementarity, show that the near-rational behavior of subjects is a second order effect, but the effect on the economy is of the first order, thereby creating space for money illusion at the aggregate level as demonstrated by recent experimental research.

This book suggests that money illusion might be a ubiquitous phenomenon, affecting various areas of economic life. Furthermore, with continuity related to money illusion occurrence, which is generally assumed by economists to be easily wiped out through learning, the question is addressed as to whether a certain level of economic literacy, induced through economic education, might not eventually suppress the aggregate-level effects of money illusion. In this sense, it appears that the experimental method represents a unique tool for investigation of whether a particular level of economic literacy, acquired through economic education, may account for improved decision-making and an alleviation of money illusion effects. We believe that selected phenomena of economic literacy, narrowed to the investigation of money illusion effects, seems to be highly topical considering the recent growing tendency of central banks and other institutions to promote economic and financial literacy by running a variety of education programs.

The book proceeds as follows:

Chapter 1 outlines the term "money illusion," which was first coined by Irving Fisher in 1928. Despite, as it might seem, there being no space in economics for this phenomenon since the revolution of rational expectations, it has been receiving considerable attention in contemporary research. Early theorizing about money illusion from Fisher's point of view shows that this phenomenon is still

highly topical in contemporary real-world situations. Money illusion, as it is contained in the works of John Maynard Keynes, will be put under scrutiny due to its rather implicit presence in Keynes' work, which in and of itself suggests that the money illusion concept should not be neglected.

Chapter 2 presents a critical assessment of money illusion from the point of view of the rational expectations hypothesis, which left no space for money illusion. Friedman's theory of the natural rate of unemployment, which coincides with money illusion in the short run, is linked to Keynes' and Fisher's theories in order to identify common ties within this concept. Alternative theories developed in response to Lucas' rejection of money illusion aimed to account for the non-neutrality of money, including the near-rationality concept. These small deviations from rationality, together with the trend of behavioral economics, might alleviate the denial of money illusion induced by the rational expectations revolution.

Chapter 3 discusses the renewal of interest in money illusion, which emerged with the arrival of behavioral economics. Behavioral concepts are outlined, such as the framing effect, anchoring, loss aversion, mental accounting, fairness, and morale, with regards to the formation of money illusion and its effects. Individual effects of money illusion induced by psychological accounts are regarded as negligible, since they cancel out on average at the aggregate level. However, it proved to be the case that even a small amount of individual money illusion, multiplied in conditions of strategic complementarity by the behavior of sophisticated agents, might have important aggregate-level effects. As a result, the potential role of money illusion in economics may no longer be dismissed.

Chapter 4 represents an extension of Chapter 3 and shows that money illusion is a ubiquitous phenomenon, affecting various economic areas. Particular attention is paid to the Modigliani–Cohn hypothesis in financial markets, the effects of money illusion on housing markets, money illusion in labor markets with respect to nominal loss aversion and fairness issues, and connection with downward nominal wage rigidity, the incorporation of money illusion in the Phillips curve, the strategic environment and its role in dissemination of money illusion, consumption-saving decisions distorted by money-illusioned individuals, and the introduction of the euro as an illustrative natural experiment or money illusion from the point of view of neuroeconomics. Outlined research shows that experimental economics represent a unique opportunity for the investigation of money illusion effects.

Chapter 5 provides a synthesis of the money illusion concept and economic literacy related to the investigation of the potential effects of economic education. There is a growing tendency among central banks and other institutions across the world to promote economic and financial literacy by running various educational programs. Several factors responsible for this increased attention will be outlined. Measurement issues and the endogeneity problems of economic and financial literacy will be discussed, followed by an evaluation of international evidence and a disaggregated assessment by age, gender, and so on. Empirical findings suggest that there is scope for education programs, the efficacy of which is subject to criticism. The potential effects of economic education are questioned when our

interest is restricted to the narrow field of money illusion, the direct and indirect effects of which might be significantly alleviated.

Chapter 6 presents the experimental method as a unique tool for investigation of whether a particular level of economic literacy, acquired through economic education, may account for improved decision-making and the alleviation of money illusion effects. Methodological considerations of a laboratory experiment and its implications at the aggregate level are discussed, followed by a brief description of experimental design. An hypothesis is outlined in which the distinction related to economic education will allow for two treatments, where the well-educated group is the experimental group, whereas the less-educated one is the control group. Through this mechanism, the effect of economic education under the nominal frame might be verified. In particular, the question is posed whether economic education might not eventually suppress the indirect effects of money illusion, proved in a designed experimental economy, and therefore weaken nominal inertia. In other words, solid economic training should provide sufficient support for individuals to coordinate successfully in a strategic environment and ensure proper adjustment to the equilibrium at the aggregate level through the elimination of money illusion.

The results in Chapter 7 reveal whether the indirect effects of money illusion in conditions of strategic complementarity are still present after the implemented nominal shock, even in the case of a solid economic education. This might have substantial implications for monetary policy in terms of nominal inertia and in the related short-run non-neutrality of money. If the educational effect can't be proven, it is possible that money illusion is a pervasive phenomenon, integrated in one of the New Keynesian models, built on a coordination problem. Notwithstanding, the results suggest that continuing the investigation of the effects of economic education with respect to money illusion is highly desirable.

1 Early theorizing about money illusion

Money is as money does, the dollar is what the dollar buys.
General F. A. Walker, economist (Fisher 1928, p. 18)

"Money illusion" as a concept is frequently referred to and, also, frequently rejected, where a ubiquitous belief in rationality dictates the trend of money illusion as being distant from standard economic thinking. In addition, many economists reacted with hesitation to explanations based on the simplistic concepts of money illusion, since it was in contradiction to the maximizing behavior of individuals and the equilibrium states of economies. In addition, irrational behavior inside a general equilibrium framework might appear to be rational outside that framework, considering the systemic coordination problems that subjects have to cope with.

The position of money illusion in economics is documented by Howitt (1987, pp. 518–519), who considers it as a more equivocal concept. Not only is the absence of money illusion the main presumption in the long run for neutrality of money, but, in contrast, money illusion was considered to be responsible in the short run for the non-neutrality of money such as in the case of Fisher's explanation of business cycles.

The money illusion refers to the tendency of individuals to think more in nominal monetary values than in real ones. There are many definitions, differing slightly, used by authors. Leontief (1936) defines money illusion as a violation of the "homogeneity postulate." According to him, demand and supply functions are homogeneous of degree zero in all nominal prices, where they depend on relative and not absolute prices. Patinkin (1965, p. 22), states that "An individual will be said to be suffering from such an illusion if his excess-demand functions for commodities do not depend solely on relative prices and real wealth." Shafir, Diamond, and Tversky (1997, p. 348) interpret money illusion as "a bias in the assessment of the real value of economic transactions, induced by a nominal evaluation." However, as Fehr and Tyran (2001) emphasize, the basic problem is how people perceive the veil of money, that is, whether they are able to recognize purely nominal changes that should not affect their decision.

There are many other recent studies, such as Brunnermeier and Julliard (2008), Vaona (2013), Cannon and Cipriani (2006), Agell and Lundborg (2003), and so

on, showing that money illusion is still a topical issue that is receiving increased interest in contemporary research.

This chapter describes the early theorizing of economists about money illusion, its roots and origins. Attention will be devoted to Irving Fisher, who first coined the term "money illusion" and devoted his whole book to it. The second part deals with money illusion as contained in the works of John Maynard Keynes, which is scrutinized due to its rather implicit presence in Keynes' work.

Irving Fisher's *Money Illusion*

In 1928, Irving Fisher wrote a whole book entitled *The Money Illusion*, which was based on lectures given in the summer of 1927 at the Geneva School of International Studies. This book introduced the term "money illusion" to economic science, however, the term had already been coined in his article "Stabilizing the Dollar" in 1919. Fisher (1928, p. 4) defined money illusion in his book as a "failure to perceive that the dollar, or any other unit of money, expands or shrinks in value." *The Money Illusion* was written in the 1920s, prior to the 1929 Crash, and the main point was primarily to highlight the existence of a money illusion linked to the human fallacy of thinking about the dollar as something fixed. The instability of buying power of all monetary units, including the dollar, is demonstrated on various illustrative examples based on the author's empirical observation. This is followed by the identification of hidden causes, for example, inflation and deflation, generating this instability, with resulting harm, which is often attributed to other causes. Consequently, the author proposes various remedies, emphasizing specifically the role of the government and monetary authorities in weakening negative consequences of harm.

Fisher is widely believed to have coined the term money illusion, but the concept had already been mentioned in the theories of classical economists, although not explicitly. Ricardo (1811), cited by Hahn (1947), states that when new money is introduced, prosperity spreads like magic, since the judgment of market participants is overly optimistic. Prices rise faster than costs, creating illusory high profits and making a stimulus for the creation of new enterprises. This boosts prices even further. The illusion is discovered only later once prices rise and the boom spiral goes in the opposite direction.[1]

As Fisher suggests, people simply take it for granted that a dollar is a dollar and that all money is stable, emphasizing that almost everyone is subject to money illusion with respect to his own currency. This topic attracted his attention because of the trend of increasing prices caused by World War I and the related value of the dollar, which was unstable in its buying power. On the contrary, followers of Fisher, such as Shafir et al. (1997), Modigliani and Cohn (1979), and Akerlof and Shiller (2009), do not assume complete deception by money illusion, but rather a consciousness of nominal values, as will be mentioned later.

Together with another economist (Professor Frederick W. Roman), Fisher studied price changes in Europe and talked with various individuals they met by chance during their travels in Germany in 1922, as well as with Americans—including

his own dentist. He concluded that "all people assumed that their own respective moneys had not fallen in value, but that goods had risen" (Fisher 1928, p. 8), believing various other reasons, such as the blockade or the destruction wrought by the war, were the cause of the high cost of living, but denying that the change in the value of the dollar could be responsible.

A particularly famous example is Fisher's discussion with a very intelligent German shopkeeper in Berlin, when the German mark had depreciated by more than 98 percent (the price level had risen by about fifty-fold, leaving the currency to be a fiftieth of its original value). She sold him a shirt, explaining further that she bought the shirt initially for less and thereby made a profit. Unfortunately, she was deceived by money illusion: she made no profit, since the dollar was not the same value as she had thought, but had fallen. She instead assumed that the marks paid by her for the shirt a year ago were the same marks that she received from Professor Fisher. She has not recognized the hidden cause, "inflation," which had led to the rise in the volume of marks, instead finding many trivial reasons for the high prices. Since her accounts were in a fluctuating currency (instead of translating her accounts into dollars or units of commodities), it looked like a profit, which was only a nominal one and she instead suffered a loss in real terms.

This example may be well generalized by the statement of Lord D'Abernon, British Ambassador to Germany, who said: "Professor Fisher, you will find that very few Germans think of the mark as having fallen" (Fisher 1928, p. 5). Additionally, Fisher (1928) claims that after World War I, people in America were aware of the fall of the German mark, as opposed to very few Germans who knew about it. However, Americans were not different in terms of their inability to perceive the value of their own currency. They generally thought of the dollar as fixed, despite the fact its buying power was changing. Based on these empirical observations, Fisher concluded that people tend to perceive the value of other currencies as better than the value of their own currency.

The gold standard present that time in the United States intensified this notion even further. Actually, the dollar was fixed in terms of grains of gold, but it was not fixed in terms of goods and benefits it could buy. In the United States, pure gold was sold at about $20.67 an ounce, and had remained unchanged since 1837 when the dollar was fixed at 23.22 grains of pure gold. These two figures "mutually imply each other" (Fisher 1928, p. 15), with no evidence that gold is constant in its buying power. An ounce of gold would always buy $20.67, given by the fixation of the dollar at 23.22 grains of pure gold. As a result, it means that gold is constant in terms of gold but not in its buying power over other commodities. As gold fluctuated, the dollar fluctuated as well, keeping the ratio between those two unchanged and leading to the false notion that the dollar is stable in terms of its buying power.

In other words, Fisher (1928) claims that the dollar could be used accurately for measuring the weight of sugar, but not for measuring the value. This may be further illustrated with the help of an example that he provides:

> Our fixed-weight dollar is a poor substitute for a really stable dollar as would be a fixed weight of copper, a fixed yardage of carpet, or a fixed number of

> eggs. If we were to define a dollar as a dozen eggs, thenceforth the price of eggs would necessarily and always be a dollar a dozen. Nevertheless, the supply and demand of eggs would keep on working. For instance, if the hens failed to lay, the price of eggs would not rise [in dollars] but the price of almost everything else would fall. One egg would buy more than before [because they are more rare]. Yet, because of the Money Illusion, we would not even suspect the hens of causing low prices and hard times.
>
> (Fisher 1928, p. 17)

In other words, people affected by money illusion tend to confuse the fixed weight of the dollar with a fixed value. The dollar is a unit of weight, which is "masquerading as a stable unit of value, or buying power" (Fisher 1928, p. 16).

Perception of inflation and deflation from viewpoint of money illusion

Based on this fact, Fisher (1928) aims to answer why the currency fluctuates in its buying power and links it, consequently, to the concept of money illusion, responsible for the false perception of the public about the fixed value of the currency.

The concept of relative inflation and deflation is applied, that is, inflation and deflation relative to the volume of trade in a given period. Fisher (1928) argues that if the circulation of money and the circulation of goods, each of the same number of dollars in value, should keep going at the same rate year after year, there is no reason for deflation or inflation. In other words, the flow of money is adjusting the pace with respect to the growth or shrinkage of the business. However, if these two circulations do not develop at the same pace, then the situation is different. If for instance the circulation of money rises, despite the constant rate of circulation of goods, the price level has to rise necessarily. Inversely, if the circulation of goods rises, keeping the flow of money fixed, the price level will decline. To sum up, if the flow of money is rising relatively to the flow of goods, the price level will rise. If the flow of money is falling with respect to the flow of goods and services, the contrary will happen with the price level. The former case is named "relative inflation," the latter "relative deflation."

Fisher emphasizes that the real income is of crucial importance for every economy. Man's real income is given by its buying power multiplied by the nominal number of dollars he gets. This real income per capita expands or contracts in proportion to the circulations, the flow of goods and services per capita, and the flow of money per capita. As a result, possible causes of general price level changes are expressed in per capita terms:

- Per capita increase of money circulated.
- Per capita decrease of money circulated.
- Per capita increase of goods circulated.
- Per capita decrease of goods circulated.

If we assume the flow of goods per capita to be unaltered, any change in the price level may be solely attributed to a change in the money flow. If, however, the flow of money per capita is the same, any change in the price level may be attributed only to a change in the flow of goods per capita. Change in the flow of money per capita is called absolute inflation and absolute deflation respectively, whereas the change in goods per capita is known as relative inflation and relative deflation.

The most important outcome of these considerations is that money illusion hides the money side of the market, as people consider wholly or chiefly the goods market. The thinking is that the change in price level is due to a scarcity or a superabundance of the individual goods in the market. As a result, they consider the relative inflation/deflation to play a role. However, according to the empirical observation of various economists (Professor Cassel of Sweden, Professor Keynes of England, and Professor Holbrook working in California) named by Fisher, including his own findings, the money stream is varying greatly, in contrast with the goods stream which is varying little. Based on that, it can be derived that people should instead put greater emphasis on absolute inflation; however, they suffer from money illusion.

This implies the necessity to distinguish between the individual movements of prices (caused by individual supply and demand) and the general movements of prices (caused by money demand and supply). Most people ascribe an important role to the supply and demand of a commodity, which will equalize the price of everything, and neglect the forces of money demand and supply in changing the price level. The result of this money illusion is direct and indirect harm to the economy.

The direct harm caused by the money illusion

It seems at first sight that if price movements are solely governed by the movements in the value of money (and not determined by the scarcity of goods), the harm is dubious. For instance, if prices double because people use twice as many dollars to buy things, the monetary yardstick changes, but the thing measured does not change. However, as Fisher (1928) argues, everybody's income is not adjusted to the price changes and therefore the change in the monetary yardstick is serious. The monetary yardstick not only affects all sales as the universal monetary unit in exchange, but it is also applied in the case of long-term contracts.

Standard contracts to pay present dollars for future dollars and their outcome are affected by inflation and deflation, which either expands or shrinks the dollar value. As a result, the effects of the monetary yardstick are tremendous in terms of the redistribution of buying power and consequently affecting bond markets, insurance policies, saving bank deposits, pensions, leases or wage contracts, and so on. On the contrary, the effect of a change in the physical yardstick is not considered that serious, since it merely affects the sale of goods measured in yards (e.g., ribbon market), but its changes do not affect the sale of most goods (e.g., the wheat, sugar, cola, or steal markets), measured in units like bushels, ponds, tons, or days' work. Additionally, a change in the physical yardstick is discovered

at once. On the contrary, the change in the monetary yardstick is more harmful, since money illusion comes into play and the source remains unrecognized (Fisher 1928).

Based on the disastrous effects of a change in the monetary yardstick, it is worth stressing the illusory nature of nominal wage gains.

Laborers are, according to Fisher (1928), victims of deflation resulting in unemployment, but also victims of the high cost of living in the case of inflation. In the case of rising prices, the laborer is able to get and keep a job easily, but his wage is considerably lagging behind the rising cost of living. Although wage contracts and salaries run for shorter periods with a possibility of readjustment, they are rarely adjusted promptly. This is well documented in the period of the great inflation in Germany, which began in 1922. In January 1923, the wages of skilled labor had risen to more than 500 times the level of 1913, however the cost of living had increased more than 1,100 times. As a result, the workman's weekly wage of 18,000 marks in 1923 was less than half of the purchasing power of his weekly wage of 35 marks in 1913. At that time, the wages for both skilled and unskilled labor were lagging behind prices. A striking absurdity might be mentioned in the case of a German metal worker, whose average weekly wage in December 1923 was about 850 billion times the 1913 wage. Notwithstanding, the cost of living was 1,250 billion times as high. As a result, his buying power was only about 70 percent as much as it had been in 1913.

The trend of rising prices with money wages lagging behind them, such as the German example, might be illustrated well by "counterfeit wages," a term first coined by Filene (1923). These wages refer to any wages, however large in nominal value, that have too little value. They are unable to serve their purposes—to purchase the basic necessities of life, provide motivation to make working more desirable, or ensure appropriate provision for sickness or retirement. Filene (1923) agrees with Fisher (1928) that it is a question of what people can buy with what they earn. As a result, the concept of counterfeit wages has important ties with the concept of money illusion.

In Fisher's sense, money illusion again plays a crucial role during the period when counterfeit wages were passing for real wages. The workman was the victim of this illusion, not realizing that his real buying power had decreased. Even when he is able to see through the veil of nominal values and make a distinction between nominal and real wages, he is still not aware of the fact that the dollar or mark is responsible for his situation. Instead he puts the fault on his employer. In the case of falling price levels, those who keep their jobs benefit from a reduced cost of living. However, high unemployment causes the laborer to lose on average in the long run due to falling prices.

The laborer loses in either case. The real wage of the laborer is either reduced due to nominal wages lagging behind prices, or during deflation, when workers are unemployed and have no wage at all. It appears again that stabilization of the monetary unit is crucial for workers in the case of inflation or deflation as emphasized by Fisher (1928), since it affects their buying power. This is documented by the appearance of a working man in front of the Dawes

Commission,[2] who emphasized that labor needs "a more stable currency" to avoid counterfeit wages.

Also, the illusory nature of a nominal interest rate deserves attention. Fisher (1928) comments on the works of Smith (1928) and Van Strum (1925). These authors independently showed that bondholders are not safe in terms of investment as measured in buying power, as long as the inflationary environment affects the value of the dollar. Actually, bondholders occasionally experience a loss in terms of purchasing power instead of getting interest rate. Nevertheless, they thought that the interest rate was merely a return of the principal; instead, they were actually losing part of their principal.

Fisher (1928) specifically points out that the evil of an unstable currency is not primarily general impoverishment, but social injustice itself. Giving the example of the disturbance of loan contracts, he shows the inflation to benefit the debtors and harm the creditors. On the first sight, it looks like no harm is done to society, since the debtor gains what the creditor loses. But in the same way it might be argued that the robbery of a bank vault in a person's house keeps the society just as well off since what the person lost, the burglar has gained. This provoking example just shows that the dollar is defrauding people in the same way as a burglary. However, in both cases, the cause of harm is social injustice rather than general impoverishment. Unlike burglary, there is no violation of law in the case of an unstable currency.

As Fisher demonstrates on many other examples, including the Central European hyperinflation, money illusion has hidden the truth from people and has harmed them seriously.

Fisher (1928) illustrates the case of millions of European savings bank depositors (subject to money illusion), who had lost all their life savings because they didn't withdraw their money in the early stages of inflation and reinvest them to profit by the price increases. An example of an American depositor illustrates the case of nominally confused depositors even further. In 1920, our depositor could buy only about three-quarters as much with $300 as he could buy with $100 in 1896. Fisher argues that the depositor should have turned his $100 deposit into some representative commodity and simply keep this commodity until 1920. What's more, this commodity would have appreciated four-fold compared to the deposited money. In the current state, money illusion has hidden the truth from him and instead of having interest, our depositor was punished and lost also part of his principal. He deposited $100 in 1896, but in 1920 each dollar was worth 26⅔ cents of the 1896 buying power. When he withdrew $300 in 1920, it was worth 300 × 26⅔ = $80 of the 1896 buying power. As a result, he lost 20 percent of his original principal and received no such thing as interest. The nominal interest rate again appeared to be illusory.

Similarly, millions of middle-class bondholders were ruined after World War I by the fall of the German mark, the Polish mark, the Russian ruble and the Austrian crown. Fisher's example about a lady who was left a legacy of $50,000 by her father in 1892 is worth attention. During that time the dollar was worth the most. The money inherited was put in trust and invested into so-called "safe"

bonds. In 1920, when the dollar was worth the least, the lady visited the trustee together with Professor Fisher. The trustee claimed that there was only a loss of $2,000 out of $50,000, due to an unwise investment made by the lady's father. He argued therefore that the principal had been left intact, apart from this minor loss, reaching a value $48,000. Fisher, however, argued that the $50,000 dollars invested in bonds was the equivalent of about $190,000 in 1920. The final amount was not $48,000 dollars in real terms, because of depreciation of the dollar. The total loss was almost 75 percent, since $48,000 does not reflect the buying power of $190,000 in 1920. The lady was paid a life annuity of $2,500 or $3,000 a year, which was, however, consumption of the principal rather than income. Fisher recommended that the trustee should have adopted a different investment strategy to fight against the depreciation of the principal. We may apply again the concept of social injustice, since the debtors/stockholders won what the lady in this example lost.

In other words: "Inflation has picked the pockets of bondholders and put the value into the stockholder's pockets, simply through unstable value of the dollar" (Fisher 1928, pp. 79–80).

Fisher (1928) asserts that due to uncertainty in the purchasing power of the dollar, the public and businessmen act like unconscious gamblers. They are running the risk and they will either benefit or lose. Those losers, who were subject to money illusion, blame the lucky winners of the lottery, who won the money from their neighbors' pockets without any intent to defraud. The fault is not the winners, who are unconscious gamblers just like the rest of general public. They only played the game, which should be stopped.

Fisher claimed that the effects of price levels on the economy result from changes in the real interest rates, which are given by an incomplete perception of changing price levels, and by the wrong price expectations held during the time the loan or nominal contract was signed. He mentions the so-called "peculiar behavior of the real interest rate," which is largely responsible for the crises and depressions through price movements (Fisher 1913, p. 56, cited in Dimand 1993). Money illusion is again the factor that is responsible for this peculiar behavior, since the nominal interest rate is of illusory nature for confused individuals.

Fisher gives an example of the borrower and debtor, whose relationship should be kept the same during rising prices as before and after. Not only will lenders require higher interest rates, but borrowers are capable of paying higher interest rates. This, however, requires higher nominal interest rates than the stationary prices require. Unfortunately, individuals tend to consider the dollar as a stable thing, regardless of the time and the fact that the process of adjustment is slow and imperfect. This is yet strengthened by law and custom, keeping the interest rate down (Fisher 1913, pp. 57–58).

According to Fisher (1913, pp.60, 69), when prices are rising, "the rate of interest rises, but not sufficiently," when prices are falling, "the rate of interest falls, but not sufficiently." The insufficient adjustment of a nominal interest rate was attributed to confusion between nominal and real variables: "If there were a better

appreciation of the meaning of changes in the price level and an endeavor to balance these changes by adjustment in the rate of interest, the oscillations might be very greatly mitigated. It is the lagging behind of the rate of interest, which allows the oscillations to reach so great proportions" (Fisher 1913, pp. 71–72). Marshall (1907, p. 594) says on this point: "The cause of alternating periods of inflation and depression of commercial activity … is intimately connected with those variations in the real rate of interest which are caused by changes in purchasing power of money."

If the public would correctly perceive and anticipate price changes, it would not affect real interest rate and consequently economic activity. According to Dimand (1993), Fisher did not suppose that borrowers dispose more precise information, only that they perceive an increase in money receipts, inducing them to borrow even more, before they find out that the purchasing power had changed. The same holds for lenders who observe a rise in demand for loans and only later realize that the price level has changed. These arguments markedly resemble the theory of imperfect information developed by Lucas, as we shall see in Chapter 2, and some economists like Dimand (1993) emphasize this similarity.

As a result, the famous Fisher equation relating the nominal interest rate to the real interest rate was then a rather imperfect description of the real world. It could only work in a world with "foresight," which is very close to rational expectations, as emphasized by Thaler (1997). Fisher's extensive empirical research (1930) proved a very slow adjustment of the nominal interest rate to changes in inflation and with very long lags.[3] He analyzed interest rates in five markets (London, New York, Berlin, Calcutta, and Tokyo) and concluded that the real interest rate in terms of commodities is from seven to thirteen times as variable as the nominal interest rate in terms of money. This suggested the inability of people to adjust promptly the nominal interest rate to changed price level.

This finding might be closed by a poignant statement: "Erratic behavior of real interest is evidently a trick played on the money market by the money illusion" (Fisher 1930, p. 415).

It is interesting to add that, for instance, Rutledge (1977) claimed that Fisher did not interpret the lag between inflation and the full adjustment of nominal interest rates in terms of inflation expectations. He neglected Fisher's book, *The Money Illusion* (1928), showing that Fisher believed real interest rates to depend on past inflation during the period of transition. But as Dimand (1993) points out, this view is consistent with changes in real interest rates due to the slow perception and adjustment of inflation expectations (the nominal interest rate lagging behind the inflation) in Fisher's sense.

Fisher formulates explicitly implications of the movement of real interest rates on the economy. He gives an example during the period of 1896 to 1920, when the real rate of interest was wiped out, whereas in 1921 in a period of deflation, the nominal interest rate adjusted incompletely and the real interest rate rose as high as 60 percent. A period of deflation followed by a resulting rise in real interest rate was formulated explicitly by Fisher to affect aggregate production and employment and thereby strengthen the severity of the Great Depression.