Symmetry, Efficient Markets and Monetary Neutrality

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Abstract

We study the relationship between symmetry, efficient markets and monetary neutrality. We find that information symmetry can lead markets to reach efficient outcomes and will produce the prices which fluctuate randomly. However, information symmetry is almost impossible to achieve without considering the time factor! In addition, efficient markets can lead to monetary neutrality.

Keywords: information symmetry; communism; efficient markets; value neutrality; monetary neutrality

JEL Classification: A13; D3; D8; E44; E5; G14

1. Introduction

For many of us, the rise and fall of stock prices symbolizes economic development.

Fama coined the terms “market efficiency” and “efficient markets”. They first appear in “Random Walks in Stock Market Prices,” paper number 16 in the series of Selected Papers of the Graduate School of Business, University of Chicago, reprinted in the Financial Analysts Journal (Fama 1965).

Fama showed that it is very difficult to predict asset-price movements in the short run, because markets incorporate any new price-relevant information very quickly. This finding came to be known as the efficient-market hypothesis.

Fama analyzed historical stock-price movements and came to the conclusion that stock prices follow a “random walk” and is therefore essentially unpredictable.

In this paper, we study the relationship between symmetry, efficient markets and monetary neutrality. We find that information symmetry can lead markets to reach efficient outcomes and will produce the prices which fluctuate randomly. However, information symmetry is almost impossible to achieve without considering the time factor! In addition, efficient markets can lead

to monetary neutrality.

2. Information Symmetry, Efficient Markets and Randomly Fluctuated Prices

Information symmetry, which means by definition “A condition in which all relevant information is known to all parties involved”, will make markets incorporate any new price-relevant information very quickly. This means that information symmetry can lead markets to reach efficient outcomes.

The information set of properly anticipated prices is a subset of the whole set of information shared between market participants. Therefore, information symmetry, in which all relevant information is known to all parties involved, will produce the properly anticipated prices. According to the paper "Proof that properly anticipated prices fluctuate randomly" (Samuelson 1965), we can find that information symmetry will produce the prices which fluctuate randomly.

How to understand information symmetry? Some people think that information symmetry is the ideal that can never be realized.

In the following, we point out that information symmetry is almost impossible to achieve without considering the time factor!

We can assume that the information resources are completely distributed in a straight line, the total information resource is B and the total population is N.

Real numbers can be thought of as points on an infinitely long line called the number line or real line.

In basic mathematics, a number line is a picture of a graduated straight line that serves as abstraction for real numbers. Every point of a number line is assumed to correspond to a real number, and every real number to a point.

In advanced mathematics, the expressions of real number line, or real line are typically used to indicate the above-mentioned concept that every point on a straight line corresponds to a single real number, and vice versa.

The real numbers include all the rational numbers, such as the integer −5 and the fraction 4/3, and all the irrational numbers, such as √2 (1.41421356…, the square root of 2) and π (3.14159265…), the ratio of the circumference of any circle to its diameter.

In mathematics, a rational number is any number that can be expressed as the quotient or fraction p/q of two integers, a numerator p and a non-zero denominator q. Since q may be equal to 1, every integer is a rational number.

The decimal expansion of a rational number always either terminates after a finite number of

digits or begins to repeat the same finite sequence of digits over and over. Moreover, any repeating or terminating decimal represents a rational number. These statements hold true not just for base 10, but also for any other integer base (e.g. binary, hexadecimal).

Any number that cannot be expressed as a ratio of two integers is said to be irrational. Their decimal representation neither terminates nor infinitely repeats but extends forever without regular repetition.

Any real number can be approximated to any desired degree of accuracy by rational numbers with finite decimal representations.

As a consequence of Cantor's proof that the real numbers are uncountable and the rational numbers are countable, it follows that almost all real numbers are irrational (Cantor 1955 [1915]).

Therefore, the measure of the set of rational numbers is 0.

Because of the infinite state involved, repeating decimals and irrational numbers do not have practical separability without considering the time factor.

At this time, information symmetry necessarily requires B/N to be a terminating decimal, for only in this way can there be practical separability!

It is shown that B/N as a terminating decimal is an event with zero probability.

Therefore, without considering the time factor, information symmetry is almost impossible to achieve.

However, from the perspective of modern mathematics, since terminating decimals with practical separability do exist, theoretically information symmetry has its existence!

3. Efficient Markets and Monetary Neutrality

In my earlier work, I study the relationship between communism and value neutrality and monetary neutrality. We find that the symmetry of communism is bound to lead to value neutrality. In the case of value neutrality, the economic man will certainly accept monetary neutrality. However, without considering the time factor, communism is a kind of symmetry that is almost impossible to achieve. While considering the time factor, the symmetry of communism can be achieved in theory (Luo 2017)!

In the above analysis, we can find that information symmetry can lead markets to reach efficient outcomes. Whats is the relationship between market efficiency and monetary neutrality?

Monetary neutrality refers that money only affects the price of economic output without

affecting economic output.

We have

$Y=M/P$

where Y is economic output, M is money, P is the price of economic output.

Monetary neutrality requires

$Y'_M=(P-M*P'_M)/P^2=0$

As a result, we have

$dM/M=dP/P$

According to the efficient-market hypothesis, markets incorporate any new price-relevant information very quickly when markets are efficient, therefore, markets incorporate any new monetary information very quickly. This will make dM/M=dP/P which means that money is neutral.

4. Conclusion

In this paper, we study the relationship between symmetry, efficient markets and monetary neutrality. We find that information symmetry can lead markets to reach efficient outcomes and will produce the prices which fluctuate randomly. However, information symmetry is almost impossible to achieve without considering the time factor! In addition, efficient markets can lead to monetary neutrality.

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