"Summary of article by Howard and Elizabeth Odum: Energy and Money" in Frontier Issues in Economic Thought, Volume 1: A Survey of Ecological Economics. Island Press: Washington DC, 1995. pp. 204-206

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To understand the economic system as a whole, it is important to understand the relationship between money, which flows in circles within the system, and energy, which flows through it. The effects of energy flows and the circulation of money on both economic growth and on inflation will be considered.

THE MONEY CYCLE

In economic process, flows of money and of energy are closely intertwined. For example, in the production process on a farm, high-grade potential energy flows in and low-grade dispersed heat flows out. Money flows in from the townspeople to pay for farm produce, and then flows back to the town when farmers buy machinery and fertilizer. Some of the energy that flows into the system is used to support the work involving these transactions with money. The money paid to the farmer by the townspeople pays only for the work of the farmer, but not that of the rain, soil, wind, etc. To capture the contribution of nature, energy, and not money, must be the measure of value.

The circulation of money is dependent on the inflow of energy; money will not circulate unless materials and energy are flowing as well. In turn, money facilitates the flow of material, and the receipt and processing of energy, and money must therefore be seen as affecting energy flows as well.

In the US in 1973 there were approximately 25,000 calories[1] used for every dollar in circulation. This means that if a person earned and spent $10,000 in 1973, 250,000,000 calories were used to support that person. Since only 1,000,000 of these calories were needed to support the individual as represented by the food energy requirements, the difference represents work done by farm machines, power plants, industry and nature.

Increases or decreases in the level of money supply are thought to influence the level of production in the economy. However, this is true only if the "externals" to the economy - i.e., sources of energy from outside of the money circle - are constant. When the availability of energy changes, the economy changes in ways not correctable by manipulations of the money supply.

INFLATION

The buying power of money is the amount of real goods and services that it can buy. If the amount a dollar can buy diminishes, this is called inflation. Inflation can be caused by increasing the amount of money circulating without increasing the amount of energy flowing and doing work, e.g., when more money is printed. It can also occur when the money supply is constant but less work is done, e.g., because energy becomes scarce. As long as there is unused fuel energy to be tapped, increasing the money supply can increase the flow of energy through the system, causing growth as well as some inflation.

During wartime, even when the money supply is not increased inflation occurs, because energy is diverted away from normal production into military activities. This reduces the energy available per dollar in the main economy, causing inflation.

DEPRESSION AND RECESSION

The depression of 1929 was caused by a shortage of circulating money, a shortage of institutions to process money, and a lack of spending. At that time, the government undertook massive efforts to increase the circulation of money and the flow of energy. Energy was abundant, so stimulating the flow of money increased the inflow of energy. The recession of the 1970s, however, was caused by a shortage of energy. Increasing the money supply did not help in this case, as there was no increase in the inflow of energy. Thus, if the economy is in a period of low growth, increasing the money supply will increase the amount of work in the economy only if there are untapped fuel reserves available. If not, increasing the money supply will only increase inflation.

Notes

1. To compare energies of different kinds, it is necessary to express them each in units of one kind of energy required. In this paragraph the numbers are in kilocalories of coal energy required. A new word, "eMergy," spelled with an "m," was coined for energies of several kinds expressed as one kind. Thus these numbers are in units of coal eMergy.