Macroeconomic Policy Evaluation Problem: An Illustration

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Abstract

Macroeconomic policy is often evaluated solely on the basis of empirical evidences, such as the behavior of macroaggregates. This paper argues that this approach is too shortcoming: many unobservable values are often as important as the observable ones, and may not be correlated with the observable ones. Thus the sole exploration of macroaggregates is not sufficient to evaluate the macroeconomic policy—the axiomatic economic theory must be used as well.

1. Introduction

Macroeconomic policy, especially the monetary and fiscal one, is often evaluated solely on the basis of empirical evidence, especially macroaggregates. For example, the desirable rate of inflation is often estimated from its impact on the long run rate of the economy growth (see e. g. Král (2001)). This approach is consistent with the positivist approach to the economic science proposed e. g. by Friedman (1953). But is it really well-based in the common economic theory? This paper argues that *it is not*.

The common economic theory evaluates any change of an agent's well-being on the basis of his or her subjective *utility*. The key question is then: Are the observable variables (e. g. macroaggreages) always well-correlated with agents' utilities? It has never been proved by any theory. This paper argues that it is often not the case.

The paper is organized as follows: Section 2 derives the criterion for the evaluation of a policy, Section 3 describes the reason why macroaggregates and other observable values need not to be correlated with this criterion and than Section 4 presents an illustration.

2. Social Welfare Function

The standard approach to the evaluation of the macroeconomic policy is called *a social welfare function*. The social welfare function is supposed to be a measure of social welfare. We can say an individual is better off if and only if his or her utility increased; it is supposed that the society as a whole is better off if and only its social welfare increased.

There were many attempts to derive this social welfare function from an individual's utilities (e. g. by summing it up), but all these attempts failed; for details see Rothbard (1956). The major reason for this failure is principal: an individual's utility is *ordinal*—i. e. individuals' utilities can be neither

compared one to another nor summed up. We cannot say the society as a whole is better off when someone's utility increased while another's one decreased because we have no criterion to value first person's well-being to be more important than the other's one.

The only well-derived criterion is so called *Pareto efficiency*. The society as a whole can be said to be better off if and only if someone is better off and none is worse off. But this criterion is very strict: it excludes *all* types of economic policies since all of them have some "redistribution" effect and are not Pareto-efficient.[*] For our purpose we will construct another, much weaker criterion. Let us suppose that all agents in a society are absolutely the same, i. e. they have the same preferences, the same production abilities and skills, the same possession etc. Let us call this agent *a representative agent*. Then any macroeconomic policy that benefits one agent benefits *each* agent. Under this condition any policy benefiting the representative agent is Pareto-efficient, and thus good for the society as a whole.

Now, we can study every macroeconomic policy under the assumption that all agents are the same. The redistribution effect is nil. We cannot prove that any policy is good under this criterion (because the criterion is too weak for this reason), but we can say that every macroeconomic policy that makes the representative agent worse off is bad—both under this criterion and under any stronger one. This criterion allows us to exclude all policies that are clearly bad; it allows us to compare the behavior of macroaggregates to the behavior of the representative agent's utility.

Now, we will study whether the observable values, typically macroaggregates, are always correlated with the utility of the representative agent.

3. Utility of Representative Agent

On the macroeconomic level, the macroeconomic policy is usually evaluated based on these variables: the current aggregate product, the current unemployment rate, the current inflation rate, and the current growth rate of the aggregate product. We have to check whether these variables are well correlated with the utility of the representative agent.

The simple microeconomic theory predicts that the utility of any agent is derived form his or her current and all future levels of consumption and his current and all future level of free time (usually called leisure); see Barro (1997). The current level of consumption is measured directly (but its measure—the aggregate consumption—is not always considered). Future levels of consumption are measured only indirectly and even approximately by the expected rate of the economy growth. This estimate is only approximate because the change of the GDP may not always be perfectly correlated with the change of consumption (i. e. the marginal propensity to consume is not constant over time, and it is not the same under all conditions). Current and future levels of leisure (free time) is not observable at all.

We must recognize that the utility of the representative agent is not derived only from directly observable consumption, but also from its future level and from unobservable current and future leisure. That means that the *distribution* of benefits among consumption and leisure matters, and

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[*] Rothbard (1956) argues that only the outcomes of the market process are Pareto-efficient. Therefore the only desirable economic policy is to protect the free market.

the *timing* of consumption and leisure matters too. There are possible trade-offs between the current level of consumption and leisure, the current and future consumption etc. Neither one of these possible trade-offs is covered in the observable macroaggregates.

The standard microeconomic theory predicts that an agent choses such composition of his or her consumption and leisure in the time that maximizes his or her utility. The macroeconomic policy can affect his or her optimizing behavior in the only way: it can change the agent's opportunity set. We will define the opportunity set as a set of all opportunities the agent can freely choose.

The government can change the agent's opportunity set in many ways: 1) it can lower it (e. g. by some monopoly right given to someone), or 2) it can enlarge it (e. g. some public services make private firms more productive, and this way make the representative agent richer), or 3) it can exclude some items from the opportunity set and include another ones (e. g. some public services paid with taxes leave less sources for private consumption). Or 4) the government can cheat the agent pretending the agent's opportunity set has changed when it has not; this latter case is illustrated in the Section 4.

The impact of the macroeconomic policy on the agent's utility then depends on what items were subtracted from his or her opportunity set and what items were added there. If the excluded item was the chosen one, then the agent may suffer a loss. If the added item is better (from his or her point of view) than the formerly chosen one, then he or she may be better off. There is no way how to learn it from the observable values because he or she can substitute (usually imperfectly) the lost benefit with another one—something (maybe unobservable) declined and something (maybe observable) increased. For example, some man chooses to work only modestly preferring leisure. Then the government excludes this possibility—the man starts to work harder (he substitutes the lost leisure with more consumption). His product and his consumption rises—but his utility declines.

The observable variables thus may or may not be correlated with the utility of a representative agent. The only way how to learn whether some policy is good or bad is to use an axiomatic theory that explains *why* the agent does what he does—and how his or her utility is changed.

4. An Illustration

Let us illustrate the problem briefly on the monetary business cycle. It is known that the monetary policy can affect both the price level and the aggregate product, but the mechanism is not known very well yet. There are at least four hypotheses consistent with the observable data: 1) the hypothesis of sticky prices, 2) the monetary misperception hypothesis, 3) the Austrian business cycle hypothesis, and 4) the real business cycle hypothesis.

Usually it is supposed that the monetary expansion increases the aggregate product first (which is supposed to be good), and then it increases inflation while the product declines back to its natural level (which is supposed to be bad). If the first effect is good and the second one bad, this "timing" can be used for the macroeconomic policy.

We will see that this interpretation might be misleading—whether the macroaggregates are correlated with the utility of the representative agent depends on which of the above mentioned hypotheses is right. Some of them—the monetary misperception hypothesis and the Austrian hypothesis—imply that the utility of representative agent *is negatively* correlated with the

macroaggregates in the business cycle. Another (the real business cycle) predicts there is no connection between the real variables and the monetary policy at all. And the fourth hypothesis (the sticky prices) predicts that the monetary policy affects the agents' utilities in the same way as the real variables. Each hypothesis implies a different impact on the representative agent's utility.

For our purpose we will use a simplified version of the monetary misperception hypothesis. Let us suppose that there are firms and households in the economy. Each firm produces the same homogeneous product (called "aggregate product"). The firm's production function can be written as $f(l,k)$, where l is the amount of hired labor, and k the amount of hired physical capital (both measured in hours per some period). In the short run the level of capital k is constant, i. e. we can write the production function as $f(l)$. The marginal product of labor is positive but decreasing, i. e. $\partial f(l)/\partial l > 0$, and $\partial^2 f(l)/\partial l^2 < 0$.

Each firm maximizes its profit, i. e. it hires an amount of labor to equate the market value of the marginal product of labor to the nominal wage, i. e. $P \cdot MPL = W$, where W is nominal wage rate, and the P is the price level. Each firm's demand for labor is then a function decreasing with the real wage rate, i. e. $L^d = L^d(\underset{(-)}{W/P}, \ldots)$.

A household's utility is derived from its consumption and its leisure. Each household has some limited amount of time per period. It can either addict it to work, or to leisure. If it works an hour, it makes nominal wage W. It allows it to buy the amount W/P of physical products. If household works l hours per period, it can buy $l \cdot W/P$ units of product, but looses l hours of leisure.

The household maximizes its utility. It chooses to work the number of hours to equate its marginal rate of substitutions $MRTS$ between consumption and leisure to the real wage rate W/P. We suppose that the household's preferences are normal, i. e. its indifference curves are convex. Now the increase of the real wage rate W/P motivates the household to work more—to equate its marginal rate of substitution to the new level of the wage rate. Therefore each household's supply of labor is a function increasing with the real wage rate, i. e. $L^s = L^s(\underset{(+)}{W/P}, \ldots)$.

The intersection of the labor supply and demand determines the real wage rate W/P and the number of work-hours L hired by firms. This way the product of firms (and the aggregate product) is determined as well.

Let us suppose that the price level P was constant over a long period, and than it increases to $P' > P$ because the central bank has expanded the money stock. Let us suppose further that firms have better information than the employees: The firms notice this price-level jump, and the households do not. Now the firms offer a higher nominal wage W' to the workers to keep the real wage rate constant ($W'/P' = W/P$).

The households have not recognized the price-level jump. They still suppose the price level is P. In such a case they misinterpret the higher nominal wage rate W' as a higher *real* wage rate ($W'/P > W'/P' = W/P$). The households increase their labor supply in such a case, which lowers the nominal wage rate slightly to W'' ($W < W'' < W'$), because the marginal product of labor is diminishing ($\partial^2 f(l)/\partial l^2 < 0$). Both the employment and the aggregate product rises.

We have seen that a monetary expansion which rises the price level rises (under the monetary misperception hypothesis) both the employment and the aggregate product. But does it rise the

utility of a representative agent as well? Not at all. To explore this we have to recall that the marginal rate of substitution is the number of consumption units a household is willing to change for one unit of leisure without any change of its utility (Varian, 1993). Each household expanded its labor supply because it supposed it gets *more* units of consumption per one hour (i. e. consumption became cheaper relative to leisure). The household expected to get W''/P units of consumption goods per one hour, but it really got only W''/P'! That is much less than it wanted. From the definition of the marginal rate of substitution it is clear that the utility of the family *decreased*—it gave one hour of its leisure for less consumption than it was willing. The reason is the family made a mistake—it misperceived the price-level jump. This outcome is rather expectable: it is hard to expect that an error can systematically increase anyone's utility.

Later the household lowers its labor supply: both the employment and the aggregate product declines to its former level. But the decline is *not negative*—it is just a correction of the former mistake.

We can extend the theory a lot. In a more realistic case we can treat the price level explicitly to see the timing of the price level jump. We can also suppose that the firms misperceived the price jump in the same way as households, but the outcome is always the same: under this hypothesis, the macroaggregates are *negatively correlated* with the utility of the representative agent—the utility decreases while the macroaggregates increase, and vice versa. Thus we have to explore not only the data (macroaggregates), but the relevant theory as well. Unless we know what theory is the right one we cannot interpret what any change in macroaggregates means.

5. Conclusion

In this paper we have seen that the macroeconomic policy has to be evaluated on the basis of agents' utilities rather than on the basis of some observable values. The utility of the representative agent was chosen as a weak criterion to exclude those policies that do not benefit even the "average" agent.

The paper also shows that such cases exist when the macroaggregates (or other observable variables) are not correlated with the utility of the representative agent. Therefore we cannot evaluate the macroeconomic policy solely on the basis of the behavior of the macroaggregates. A theory explaining *why* the macroaggregates increased or decreased is necessary to be used in the evaluation process as well. A purely empirical evaluation of the macroeconomic policy is not possible.

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