Chapter 2
The First Class: Subjective Value and Time Preference

Civil Engineers often claim to work for the public good. Their work between two environments, the physical and the economic, has been described in the following way: "[t]he function of engineering is to create utility in the economic environment by altering elements in the physical environment." (Thuesen and Fabrycky 2001)

In the physical environment, we know that this altering can only be achieved at a physical efficiency less than unity. However, for an activity in the economic environment to proceed successfully, the economic efficiency must exceed unity (i.e., must "make money"). Our question in this section is how to decide whether the economic efficiency of a proposed course of action is expected to exceed a numerical value of one.

The first class in my "Economy and Risk" course has been used to introduce students to the new concept of purposeful action in this economic environment. In later sections of this narrative, we will discuss a variety of decision models to achieve successful actions. For now, we must prepare an understanding of fundamental terminology and some basic tools to help make the decision whether to accept a proposed course of action.

2.1 The Meaning of Words

At this point, the instructor should instill in students the mandate that words have (or, should have) meaning. We will try to define our terms carefully and consistently. For example, at a very basic level, we must distinguish between "price" and "cost" as numerical descriptions of the value placed on some item. By "price" we intend to mean an exchange ratio. For example, the price of a pencil can be stated as, let us say, one-fourth of a "dollar." In an exchange ratio sense, we could equally correctly state that the price of a dollar is four pencils. The idea of a "pencil economy" will be developed in later classes by referring to the classic article "I, Pencil" by Read (1992).

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The "cost" (or, opportunity cost) of an item is a different matter. For example, Thoreau (1965) wrote that "…the cost of a thing is the amount of what I will call life which is required to be exchanged for it, immediately, or in the long run." This means that only the actor can know the cost of anything. Cost is the most-valued thing foregone (Mises 1996). Thus, every student in a class may have faced the same price to attend college but no two of them may have faced the same cost; and, none of the students can know the cost to any other student. This is a fundamental situation that should be explained to each class.

Apparently, R.W. Emerson said that money often costs too much. This concept ("money") is often called a medium of exchange. At a later point, we will consider just what money is, what it is not, and how the "money function" evolved (Mises 1996; Menger 1994). For now, let it suffice to say that something called "money" can be used to determine whether an action is economically efficient and desirable. This will involve a process of "economic calculation."

2.2 Economic Calculation and Action

Economic calculation can be forward looking (prospective; ex ante) or backward looking (retrospective, ex post); but, as Mises demonstrated in the "economic calculation debate" of the early twentieth century, without "money" economic calculation would be impossible (Rothbard 2004). It would therefore be impossible to determine the economically efficient action to take and impossible to determine after the fact whether an action taken had been economically successful. For engineers, who are often involved with so-called public projects, the determination of economic success should be a crucial concern. We will argue that sound money is a prerequisite for this determination.

An "economic action" would tend to bring supply and demand into agreement. Without properly functioning money, there would be no prices and no possibility of economic calculation, hence, no "economics" at all. Supply and demand would not be in agreement. This means that both "suppliers" and "demanders" would be disappointed. The evidence of the Soviet Union could be invoked as proof.

This might also be an appropriate place in the class to introduce the difference between "limited resources" and "free goods." For example, oil was a nuisance-free good before it became a critical, limited natural resource. We should also consider resources as "limited" in two senses, physically and economically. This situation can be explained in terms of supply and demand.

2.3 An Economy Study Process

The following four "steps" in an engineering economy study are given by Thuesen and Fabrycky (2001), namely (1) creative, (2) definition, (3) conversion, and (4) decision. After the possible procedures and all of their respective inputs and outputs have been identified in terms of physical quantities, the "conversion step" calls for these to be put into a common denominator, "money" terms. We should also develop a project "time line" indicating when various events are expected to occur.

The example that I often use at this point in the class is construction of a dam/reservoir system. Some of the possibly conflicting capabilities used to justify the project might include water supply, hydropower, low flow augmentation, flood control, or recreation. The students are urged to look for "double counting" of so-called benefits when such competing uses are encountered. Also, the anticipated project "costs" (mobilization, clearing, construction) are noted to occur at different times during project development. Thus, the idea of time value is introduced as an important factor in the justification of the project.

Since the ultimate purpose of a proposed project is to satisfy future wants (an uncertain process), it will be imperative that we consider the time value of the money amounts. This time value will require the introduction of a so-called interest rate and an estimate of its numerical value.

So, what do we mean by "time value of money"? At the most fundamental level, money has time value because people prefer current goods over future goods. This means that current money should be more valuable than future money—we discount the future. The Austrian economists called this basic rate an originary rate of interest. Of course, an actual (market) interest rate would have to take into account additional factors such as risk and inflation that we will consider later in this narrative (Chap 4). Because the numerical value of the interest (discount) rate will influence the result of a decision rule, the selection of its value must be done with some deliberation. This effect will be demonstrated later (Chap. 8).

2.4 The Uncertainty of Predictions

We want to be clear that even though our numerical calculations from interest formulas seem precise, we cannot predict future conditions. We must contradict the positivist approach to economic analysis that attempts to mimic the predictions of mathematical physics. The application of the model of physics to economics has led economics astray because people do not behave like billiard balls (Rothbard 1979). Economic action is undertaken by purposeful individuals.

And so, we can play mathematical games (such as "sensitivity") by varying the numerical values in our cash flow equations. But, while we can visualize the changes in numerical results, we must not think that we are somehow predicting values in some absolute sense.

This attempt at prediction of the future is not a risk problem—it is uncertain as described by Mises (1996) because every situation in reality is unique; there can be no statistical summaries created from which probabilities for risk calculations can be derived. And, as developed by O'Driscoll and Rizzo (1996), information can be expected to evolve as a "project" proceeds; this is the effect of operating under a condition of uncertainty in "real time." And this is the degree of understanding that engineering students need to develop.

I often end the first class by asking the students to derive an interest rate by taking a poll. Ask: “How much would you want in return a year from now to lend another student $100 today?” There will be a range of “bids”; the instructor can summarize the results if the class is large enough. Pick the center value and demonstrate how that value might draw in some marginal borrowers and drive out some marginal lenders. More detail can come later, after the concept of operating at the margin has been explained.

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