“Gone Fishing”: Modeling Diversity in Work Ethics

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Abstract

In his "Anecdote Concerning the Lowering of Productivity", written in 1963, the West-German writer Heinrich Böll humorously contrasts the mindset of an enterprising capitalist, bent on the maximization of profit, with that of a person we might call a profit "satisficer," a maximizer of leisure or happiness, or, less politely, a bum. The anecdote is suggestive, as it leaves the reader wondering whose behavior is in fact rational, or whether we observe here a clash of two rationalities supported by different economic cultures and (un)explained by different theories of economic behavior. Motivated by the question whose behavior makes which sort of sense, we will present in this paper a system of utility functions that captures both logics of action simultaneously using purely rational choice based reasoning. The three formulas are integrated into a single and simple dynamic equations system which allows us accommodate the impact of government interventions, occupational dynamics, personality characteristics and the role of chance in the generation of utilities explaining the real-life diversity of work-leisure decision-making. The model sheds considerable light on the familiar yet under-investigated phenomenon of widely varying levels of what Böll calls "Arbeitsmoral," is interestingly rendered in the English translation as "productivity,"\footnote{Arbeitsmoral literally means "work ethic."} and what has rarely been acknowledged for what it is: difference in choices on work-leisure trade-offs and economic lifestyles that pose an important challenge to mainstream microeconomic and development theory.
"From men the source of life is hidden well.
Else you would lightly work enough today
To keep you a year while you lounged at play."

Hesiod in *Works and Days*,

The Story
Böll’s story is set on the south-west coast of Europe, in an area which, in 1963, was comparable to today's most rural Greece or Turkey, market economies, to be sure, but neither highly competitive nor productive, more akin to developing nations in many respects than to the by then highly industrialized economies of the United States, UK or Germany.

A German tourist has traveled to this place and is admiring the picturesque scenery on the seaside when he discovers a fisherman, shabbily dressed, dozing in his boat. Having been told that the weather on this beautiful day is ideal for fishing, the tourist politely inquires why the fisherman is not taking advantage of the opportunity. "'Because I was already out this morning'' is the answer.\(^2\) The fisherman further confirms that it is indeed a great day for fishing: "'It was so good that I don't need to go out again [...]. I even have enough for tomorrow and the day after.'"

The tourist is struck by the apparent naïveté of the fisherman's reasoning and sets out to advise the man on a more productive course of action: "'Imagine,' [he begins], 'if you were to go out a second, a third, maybe even a fourth time today, [...] go out not only today but tomorrow, the day after tomorrow, indeed on every favorable day, two, three, maybe four times'' and proceeds to explain how the fisherman could build up a thriving fishing empire rather than sitting as they are now and watching the "uncaught fish happily leaping around." Enthusiastically, the tourist comes to the conclusion of his flight of fancy: "'Then, without a care in the world, you could sit here in the harbor, doze in the sun - and look at the glorious sea.'" The fisherman's answer is clear: "'But I am already doing that,'" he compellingly disarms the tourist's logic. "And so the thus enlightened tourist walked pensively away, for at one time he had believed that he too was working so as someday not to have to work

\(^2\) Direct quotations are taken from Böll 1986.
any more, and no trace of pity for the shabbily dressed fisherman remained in him, only a little envy."

The Puzzle
This story can be meaningfully interpreted on at least three levels: as a clash between personality or character types; as a clash between economic cultures; and as a challenge for economic theory. The last two levels are of immediate relevance for the fields of economic sociology and political economy, with which we are here engaged. From the perspective of these disciplines the peculiarity in this story, at first glance, would be that the fisherman seems to breach basic assumptions of rationality used in mainstream economics: “During any specified period of time, the individual behaves so as to maximize the sum of all future utilities” (Samuelson 1937: 156) and “more income with certainty should be preferred to less income with certainty” (Quirk & Saposnik 1962: 140). The fisherman refrains from catching more fish under most suitable circumstances and thus appears to act irrationally by failing to maximize his money utility function. What is interesting, however, is not that the German tourist, who appears to have embraced these basic assumptions, warns the fisherman of the irrationality of forgoing income that is almost certain but the fact that he seems satisfied with the explanation provided by the fisherman for his seemingly irrational behavior. Therefore, Böll’s Story suggests that the industrious German tourist and the lazy fisherman have ultimately more in common than one might think.

Our first aim in this article is to show that this common basis can be formally expressed by the same utility function (or more accurately, a trio of functions that capture the dynamic relationship between two different types of utility evaluations) and to reveal that both actors maximize this same function, thus, are equally rational.

We argue that Böll’s story is not about economics as usual, that is, it is not about how to make money by investing assets or about spending money to purchase an optimal combination of goods, thus treating leisure as a kind of good (see Osberg & Jenkins 2003, Fernandez et al. 2001, Seçkin 2001, Boadway 2000, Koskievic 1999, Hek 1998, Pihlips 1978, Train & McFadden 1977, Musgrave 1973), but rather about the meaning of economic activity in the sense of its ultimate purpose, that is, the use of money, assets and goods beyond the functions of investment, purchase and consumption. In this respect, the fact that German tourist is convinced by the fisherman’s argument suggests that both protagonists subscribe to an old statement
about the ultimate purpose of economic activity, that is, “choosing the course of action that promises the greatest balance of pleasure” (Jevons 1866: 282). For both actors "goods and services - and the income that purchases them - are only intermediate goods, whereas satisfaction or happiness [is a] final good" (Lane 1992:3). This key to this final good, that is “the true goal of all other activities”, for both actors appears to be “careless leisure”, whose nature as an ultimate value was already acknowledged by Aristotle (Arendt 1971:93).

Therefore, we argue that despite their cultural and occupational differences, the fisherman and the German tourist both want to spend as many hours as possible in careless leisure, thus making and spending money appear to be means to (or useful for) accomplish(ing) this basic goal. However, they also have something else in common: They both need some kind of assurance, a degree of security, to be able to spend their leisure hours carelessly rather than with anxiety about the future. In this, however, they are different: the German tourist needs a fishing empire before he can feel safe enough to allow himself to have long stretches of leisure, but the fisherman appears to be comfortable with a few days of catch.

Our second goal in this article is to scrutinize the reasons for this difference in the magnitude of security desired by equally rational actors which, in turn, leads to two different modes of involvement in the economy: being a profit maximizer like the German tourist or a satisficer of profit like the fisherman.

This scrutiny will illuminate the enabling factors allowing our fisherman to subsist, in spite of the concerted efforts of development, modernization, labor market stimulation, and other policies supported by theories for which he is to be reformed or made extinct. In this way we hope to comprehend what it is that we (just like the German tourist) precisely envy about the lives of those who don’t go out to fish (when that’s what they do for a living), and those who do go fishing (when it’s not).

**Theoretical Framework**

**Overview**

We will argue below that the way in which individuals divide the day into work and leisure time should be determined as a result of the outcome of the interaction between two distinct utility components: use utility and exchange utility. The story above introduces these two components by the (proposed) actions of two heroes, each of whom emphasizes the existence of one component. The fisherman hints at the
existence of the use utility function (although he also has an exchange utility function),
and the German tourist hints the existence of the exchange utility function (although
he also has a use utility function). We suggest that in fact the utility evaluations of
both persons must result from the interaction between use utility and exchange utility
components.

On the one hand, every creature is aware of the fact that it must work (hunt or
graze) as a condition for remaining alive. We argue that the amount of work necessary
for life is ideally determined in the solitary mode by every individual creature.
Admittedly, in this determination the social intrudes in the forms of the degree of fear
for life generated by other creatures and of perceived responsibility for others’ lives
besides one’s own. Yet we argue that we should first account for the individualized
“use value” of work for each individual, which becomes the first component of our
system of utility functions. In the process of making this argument we dismiss a
regrettably large literature in economics which deals with leisure only as one of the
possible goods that one may purchase and instead propose an understanding of leisure
inspired by the ancient Greeks as that part of life that goes beyond merely the needs of
staying alive, the part of life that makes one human.

On the other hand, human beings live and work in a social realm. Typically, in
obtaining what we need to live we depend on others (a job, a paycheck), and we
compete with others. We propose for our model below that the interactions and
strategies of the social are contained by occupations, that is, occupations are channels
through which one exchanges time with necessities of life. These occupations must
produce utilities that are exchangeable – these will become second component of our
utility system.

The rate of exchange of an occupation is not determined in the solitary realm,
thus there is a potential basic contradiction in the relationship between the social and
the solitary. The desired time for work is determined in the latter, but this time
allocation may be incompatible with the dynamics of the former. This generates three
possible positions for the individual – dissatisfaction; profit maximization; or
satisficing, which will be further discussed below.

Combining these two components in our system moves us beyond the
important 1950s Robinson Crusoe debate (on whether the singular individual facing
nature can be used as the ideal-type in economic reasoning). In fact, the existence,
tension, and interaction between use utility and exchange utility functions as two
inevitable components of utility evaluations can be derived elegantly and compellingly from five different dualities in the literature: the distinction between work and labor as elaborated by Hanna Arendt; the distinction between Crusoe Economy and Social Exchange Economy as debated by 1950s economists; the distinction between wage and effort bargaining in industrial relations; the distinction between intrinsic and extrinsic satisfaction as discussed in the work ethics literature; and use and exchange value as discussed by Marx. Our contribution presents a fundamental critique of the utility function literature in mainstream economics for ignoring basic questions of the purpose of work and ‘conditions’ of work and thus missing a crucial point about the meaning and operationalization of utility.

Developing the Argument

The basic tension in Böll’s story results from two twists. Initially, two individuals evaluate the best course of action under identical external conditions and make contradictory choices about the merits and timing of leisure, but then, without any change in the external conditions, they agree on the same best course of action, that is, leisure should be prioritized as much as possible. The implicit moral of the story can be derived by explaining these twists in the choices of protagonists.

The main instrument that is used in economics for analyzing and making sense of any kind of choice, regardless of whether it is about work vs. leisure or any other values, is the idea of utility. Decisions are considered to be made on the basis of measurable (but individualized) entities that are called utilities, which are attributed to different choices in various magnitudes in accordance with the degree to which they satisfy individual decision-makers. Thus any choice can be conceived as an ultimate outcome of a simple operation of sorting in accordance with magnitudes.

This conceptualization of utility as a real value function “measuring an individual’s preference ratings” can be traced back to Bernoulli’s moral expectation idea (Herstein & Milnor 1953). The underlying assumption is that each individual is permanently occupied with maximizing a latent function, and all decisions ideally can be interpreted in terms of this act of maximizing. However, the basic challenge regarding such latent functions is that the way in which they attribute utilities to different courses of action is subjective, and in order to arrive at the measurement of utility one should place the individual under ideal circumstances when his behavior “would render open to unambiguous inference the form of the function which is he is
conceived of maximizing” (Samuelson 1937:155). To formulate the exact nature of the latent and individualized functions which assign utilities to a given set of preferences proved to be difficult in praxis. Two additional mental constructions were necessary in mainstream economics to overcome this challenge.

The first of these moves is to make assumptions about individuals’ preferences, that is, to construct some ideal-typical features of preferences and then “derive the functional forms of the utility functions satisfying these assumptions” (Keeney 1974: 22). This move is based on the idea that “without knowing the form of the utility function itself we can state some of the relationships that must be captured by the utility function” (Samuelson 1937:157), which implicitly assumes that the utility concept makes sense as long as there is a universally valid core which applies to all individuals despite the subjectivity of their utility evaluations.

Although, besides assuming the completeness and independence of the preference set, there is no single set of universally acknowledged core principles about ideal features of preferences, one can still point to several crucial assumptions in the literature which hint at a universal core of utility evaluation. For example, defining a common goal for all individuals proved to be facilitating the handling of the utility concept, and this step was explicitly articulated in Neumann & Morgenstein’s seminal work on utility: The aim of all participants in the economic system is defined “as money or equivalently a single monetary commodity” (Neumann & Morgenstein 1944). After the idea of utility was linked to money, some classical assumptions were fitted into the general frame of thought about utility, that is, from the perspective of wage earners or entrepreneurs “more income with certainty should be preferred to less income with certainty” (Quirk & Saposnik 1962: 140) and in the position of customer “any purchase” is to be made in such a way as to give “a maximum utility for the money spent,” implying the maximization of the quantity and/or quality of purchased goods (Afriat 1967:67). Once such a universalist core is assumed for all utility functions, then one can also argue that prior to any particular choice all individuals are at an equilibrium point where their utility function is at its maximum under the given constraints of earnings and available purchasing opportunities. Thus any choice should be made on the basis of whether its marginal effect on utility maintains this equilibrium.

This step brings us to the second mental construction which was devised in order to overcome the difficulty of identifying the latent nature of utility evaluations:
the marginal utility function which has been formulated by Pareto. This function marks the rate of change in utility as a result of a unit change in a given factor (i.e. a unit of currency or goods). It is claimed that with the invention of the marginal utility idea Pareto “rendered numerical utility inessential” and “brought relief to the discomfort of having to assume a measurable utility, the measurability of which was held in doubt” (Afriat 1967:68). In fact it is commonly argued that “the [only] utility which is uniquely measurable is the marginal utility” (Samuelson 1937:155).

Marginal utility analysis is based on the idea that, instead of using numerical expressions of utility, we should make inferences as to the soundness of various choices on the basis of indifference curves generated by decision points which are identical in terms of their marginal effect on utility. In fact the convenience of this conceptualization leads to the assumption that “utilities are of non-numerical character,” and indifference curve analysis is a way to describe this non-numerical but variable entity in mathematical terms (Neumann & Morgenstein 1964:16).

In short, the sort of utility analysis prevailing in mainstream economics operates under the assumption that there is a latent and money (or money-like-entity) related function that is always maximized, which in turn leads to the convention that this function should be at any given moment in a state of equilibrium (i.e. at the maximum value under given circumstances). From this we can formulate another function, which is the derivative of the latent one, that acts as its “watch dog which precludes all utility under it and sustains all utility above it” and ensures “the relevance of the economic use at a margin for a whole” (Leen 1992: 4).

Within this conceptualization of utility, the trade-off between leisure and work is translated into a trade-off between consumption and leisure in which work is necessary for earning money, which in turn makes consumption possible (Seçkin 2001). Individuals have various needs which can be satisfied with goods that can only be bought by money, and leisure is considered just one of these goods. But there is always a budget constraint which prevents individuals from purchasing all the goods they want. Therefore they are forced to choose a point on an indifference curve determined by their marginal utility function which is constructed by various combinations of goods, including leisure. In order to shift from one indifference curve to another which is generated by more of (in terms of quantity and/or quality) any

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3 More references will be added here.
combination of goods, individuals must earn more money, thus they must work more, although there can be some discount in the marginal utility of money as the amount of money that is earned increases (see Osberg & Jenkins 2003, Fernandez et al. 2001, Boadway 2000, Koskievic 1999, Hek 1998, Philips 1978, Train & McFadden 1977, Musgrave 1973). In this logic not only the core assumptions of utility are reiterated and thus utility maximization is based on maximization of money, but also a potentially tricky notion of leisure is smoothly incorporated into the utility framework without any major disruption.

From within this framework we can easily comprehend the puzzlement of the German tourist when he encounters the fisherman. The German tourist initially sees leisure like any other good. In order to purchase more of it, or more of any combination of goods one of which is leisure, he thinks he must shift his indifference curve upwards by making more purchasing power available. This of course is only possible if he works more. Thus he is puzzled by the attitude of the fisherman, who contradicts the assumption that more income with certainty (which would definitely enable him to shift his indifference curve) is preferable to less income with certainty. This suggests that the latent utility function of the fisherman is no longer in equilibrium but instead falls to a suboptimal point. This probably alarms the German tourist about the health of the fisherman’s marginal utility function, which is supposed to act as a watchdog of utility maximization. This line of reasoning is essentially based on the assumption of the German tourist – clearly a mainstream economist - about the nature of leisure.

However, a crucial point we want to advance here is that considering leisure as just another good which, like all goods, can be purchased by money, misses the distinctive characteristic of the leisure-and-money relationship. That is, different from all other goods, ‘purchasing leisure’ does not require spending an amount of money that is earned, but instead forces individuals not to earn money. That is, leisure is obtained by forgoing income. Thus one may argue that different from all other goods, leisure is ‘purchased’ by not earning money, or obtained by money that is not earned, or more crudely that it is bought by no-money. This of course is a peculiarity which reveals that leisure is something other than just another good, because its relationship with money is fundamentally different from that of goods.

Thus, the puzzlement of the German tourist is based on a simplification which fails to make sense in the presence of the fisherman’s relation with leisure. In order to
look at the story, thus the nature of leisure in economic decision-making, from a new perspective one should observe that within the usual conceptualization of utility, the act of preserving equilibrium appears as the ultimate goal of all activities, which then seems possible only through maximization of money income (the principle of declining returns of marginal utility does not change this). The problem here is that, in order to avoid dealing with the latent nature of an individualized utility function, an important question is by-passed: What is the purpose of work?

Hanna Arendt offers an interesting perspective in *The Human Condition* (1958). She reminds us that what the modern world understands as ‘work’ was considered ‘labor’ in the ancient world. Labor had been defined as comprising all mandatory activities which make the continuity of life possible. These activities included feeding, reproduction, self-defense etc. and all related endeavors which allow us to meet these basic needs. In this sense, for example, selling manual or mental power in the market would be included in the large category of labor.

Arendt argues that the continuity of life is a default condition of existence, thus meeting this condition only brings individuals to the point of existence. Consequently, being involved in labor does not deserve an adjective; it is a neutral state of being alive, which must be maintained with as little investment of effort and time as possible. The ancient Greeks did not see anything to be proud of in simply being alive, and thus they did not see anything worthy of praise in actions that make this possible. Consequently labor was not glorified. In fact Arendt argues that this was the reason behind the slavery practiced in the ancient world: “The opinion that labor and work were despised in antiquity because only slaves were engaged in them is a prejudice of modern historians. The ancients reasoned the other way around and felt it necessary to possess slaves because of the slavish nature of all occupations that served the needs for the maintenance of life” (Arendt 1956: 83).

Once labor is defined as the totality of all activities that help us to maintain our lives, then the definition of work becomes: all other things that people do, which are not vital for the continuity of life. It is the actions that are undertaken in this realm which were considered worthy of praise among the ancient Greeks. They were regarded necessary for the *good* life “which is no longer bound to the biological life process” (Arendt 1958: 36). This understanding of ‘work’ then would not be the precondition for but rather the purpose of all other activities.
Obviously, the modern notion of ‘work’ is essentially the ancient notion of ‘labor’ and the modern notion of ‘leisure’ would optimistically approximate the ancient concept of ‘work’. It should, however, be noted that the match is not perfect between these two pairs of modern and ancient concepts. This is because “the recreational activities that are necessary for restoration of the human labor force” which are considered part of the realm of leisure in the modern world, “belonged, in the ancient mind, still to the state of being deprived of leisure” (Arendt 1971: 93). With this caveat in mind one can cite an observation by Aristotle in order to comprehend the meaning of labor in ancient Greece, and the purpose of work in the modern world, at least for our fisherman: “act out leisure which is the true goal of all other activities” (Arendt 1971:92).

How can we reestablish the notion of utility on this basis? We take our clue from the once hot debate of the early 1950s on the ‘ideal - ideal type’ actor that should be used in economic models and to establish utility functions. Austrian economists contended that Robinson Crusoe Economy captured all features which are necessary as the building blocks of formal models: It presents “an economy of an isolated single person or otherwise organized under a single will. This economy is confronted with certain quantities and a number of wants which they may satisfy.” (Neumann & Morgenstein 1964:10) Robinson, to meet his wants, had to observe and act in response to natural conditions, and this, like anything else, he had to do in solitude. In fact he did not work in the modern sense but he labored in the ancient sense. For the sole purpose of his initial activities was survival, that is, to ensure the continuity of his life, and as he understood the patterns of natural events on his island and began controlling some of the resources, he started to feel safe and reserved more time for work in the ancient sense and leisure in the modern sense, that is, he began to study theology.

From the perspective of modern economists, these shifts in Robinson’s life did not count for much, because their argument was that Robinson’s “maximization problem” was not dependent on the actions of a rational opponent (Tsebelis 1989: 79). However, it is argued, the existence of rational opponents who are also willing to use the same resources makes all the difference, and this social element in the real

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4 For the sake of clarity of exposition we continue to use the word “work” in this text to refer to “labor” in the ancient Greek sense; we do not use the word “labor”.

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economy cannot be captured by Crusoe approximation regardless of the level of sophistication. Thus they argued that this ideal actor could not be used for building economic models or establishing utility functions.

We want to suggest that both the proponents and the opponents of Crusoe Economy were missing the point as they were both uncovering a partial truth. Crusoe Economy supporters were missing the inevitable social component in any economic activity which entails social exchange and strategy, but Social Exchange Economists were missing something deeper that has been captured by the ancient notion of labor, that is, humans have something in common with animals resulting from being alive and this constitutes the very basic drive for their actions. The urge to ensure the continuity of life is essentially experienced in the solitary mode, and only after this urge is satisfied individuals can “act out leisure”. Thus, any evaluation of human activity must account for this drive as well as for social interaction.

Against this background, we argue that to comprehend and formalize Böll’s story one must build a utility model which would accommodate both of these components, that is, the evaluation which is made in solitude as Robinson Crusoe would so as to meet his life needs and reserve as much time as possible for his study of theology, and the evaluation which is made in relation with other actors which requires us to adopt strategies in order to take some part of contested resources.

Thus, we reiterate that the act of working results from an internal urge for ensuring the continuity of life. The amount of work necessary for life is ideally determined in the solitary by every individual so as to keep on living while reserving some time for “acting out” leisure. We assume that every creature has an individualized sense of what is needed for life and in determination of this a level of fear resulting from uncertainties plays a role. One must first account for this individualized form of utility, that is, the “use value” of work for each individual. This leads us to the first component of our utility system: use utility. This utility is purely individualized, cannot be exchanged with others; it has the sole purpose of making us live and this would give us the most basic satisfaction. Obviously, individuals do not always live on the edge; there are levels of satisfaction (i.e. various amounts of use utility) that would ensure life. It is clear that seeking the necessities of life all day long is much less satisfying than using only a small part of the day for this purpose, but spending the entire day on leisure would endanger life as well. Thus every creature must optimize the use utility function in some individual way. The
underlying principle for this function would be that the ultimate purpose is to reserve as much time as possible for “acting out” leisure.

Under ideal circumstances a person decides how much she works and how long she acts out leisure only in accordance with the dictates of the solitary mode, like Robinson Crusoe does on his island. However, we do not only live in the solitary realm where we feel the impulses of being alive and thus the urge for work (to keep on living). There are almost no commons. Thus we must also interact with other individuals in order to remain alive. This realm of interactions may be called the “social” realm. And in this realm we must work. Hence comes the tension: We decide how much we want to work in the “solitary” mode in accordance with our urge to live, our sense of needs, and our level of fear, but we perform this work in the “social” mode (obviously there is an intrusion of the social into the solitary in the forms of fear and responsibility). One may argue that all the interactions and strategies of the social are contained in occupations, that is, channels through which one exchanges time for the necessities of life. These occupations must produce utilities that are exchangeable. This leads us to the second component of the utility system: exchange utility.

Obviously the rate of exchange of an occupation is not determined in the solitary realm, thus there is a potential and basic contradiction in the relationship between the social and the solitary. The desired time for work is determined in the latter, but this time allocation may be incompatible with the dynamics of the former. This generates three possible positions. 

**Dissatisfaction** occurs when time allocation between work and leisure is dictated by the social due to a low exchange value generating capacity of the occupation and contradicts the allocation generated in the solitary. Consequently one is dissatisfied because one works more than one wants and reserves less time for acting out leisure. 

**Profit maximization** takes place if one works more than the minimum amount dictated by the social, that is the amount implied by the occupation’s exchange utility rate. This leads to accumulation of some exchange utility, hence the maximization of profit rather than leisure. Notable here is that profit maximization makes sense only as a temporary state, i.e. only if it is accompanied by a dynamic element, that is a time dimension which incorporates a promise of eventually attaining the position of satisficing. Finally **satisficing** occurs when what is dictated by the social and what is derived from the solitary coincide. In this case one works and acts out leisure in the social in the way in which Robinson Crusoe does on his island.
We show below how this dual conceptualization of utility allows us to make sense of the story in formal terms and reveals that both the German tourist and the fisherman are not only rational in the same way but also share the same latent (system of) utility functions as the basis for their attitudes. Ultimately, this is why the tourist walks away from our story wistfully. The cognitive distance between him and the fisherman, which had to be bridged by their short dialogue, is much narrower than we may first assume.

The Model

Calculation in the “Solitary”: The Use Utility Component

It is clear from the story that our heroes need to work to be able to ‘enjoy’ their leisure, that is, accomplish their basic goal, without anxieties. This means that they do not experience leisure as a preparation for work (as employers would prefer) but as the ultimate purpose of working. Thus, having permanent leisure (due to anxieties that may result from lack of security) or permanent work (due to its very meaning) would usually have no “use value” for them. Formally this observation implies that both leisure and work must be part of the use utility function, but in such a way that complete absence of either of these elements should also nullify the entire expression. This suggests a multiplicative form rather than an additive one. For the sake of simplicity we may define this multiplicative form on the basis of hours of a day. If one has, for example, \( L \) hours reserved for leisure, then one would have \( 24 - L \) hours devoted to work.

Thus, the very basic structure of the use utility component should be \( U_{\text{use}} = L(24 - L) \). However, this basic form is not sufficient because it should also be possible to attribute various degrees of weight to each of these elements (i.e. work and leisure) and this weighing should be conducted in such a way that it should be possible to make the entire expression completely leisure- or work-dominated by accommodating a zero-weight as a possibility for both elements, but this should not contradict the logic of multiplicative form, that is, it should not nullify the totality. This requirement requires us to place the weights of leisure and work as powers. The problem, of course, is to find a rule in order to attach these ‘power’ weights appropriately. We know that weights of leisure and work must be linked because the more leisure is weighted the less should be the weight of work, and vice versa. This
can be done, for the sake of simplicity, by an assumption of unity. Let the total importance equal unity and introduce the rule that leisure and work must share this unity. Then if $\Omega$ is the importance of leisure then, $1 - \Omega$ becomes that of work. This reasoning leads us to a Cobb-Douglas type\textsuperscript{[1]} of functional form:

$$U_{use} = L^{\Omega}(24 - L)^{1-\Omega}$$

which is relatively simple and tractable (see Guilkey et al 1983, Train & McFadden 1977:350).

Now we need to incorporate another element in the story into this expression: security. It is clear from the story that our heroes do not enjoy 24 hours of careless leisure because they want some level of security, though the magnitude of this security ranges enormously from a fishing empire to a couple of kilograms of fish. The security must come from the accumulation of exchangeable utility generated by the work in the “Social”, thus it requires reserving time for working. Thus, the more one desires security the less should be the weight attached to leisure and thus the higher should be the weight of work, and this should generate an allocation which gives more hours of the day to work. Consequently our story implies that the total importance that equals unity must be distributed between work and leisure in accordance with the level of security one desires.

If $S$ is the desired security, then the expression $\Omega = \frac{\ln(1+S)}{S}$ generates the link that we seek. Because in this expression as security gets closer to zero (as in the case of our fisherman), the importance attached to leisure gets closer to unity and that of work gets closer to zero. More formally, as $S$ approaches zero, $\Omega$ approaches one, that is, $\lim_{S \to 0} \Omega = 1$ thus, naturally $\lim_{S \to 0} (1 - \Omega) = 0$. This ensures that the use utility function is dominated by leisure. Conversely, as security gets closer to infinity (as in the case of our German tourist), the importance attached to leisure gets closer to zero and that of work gets closer to one. In formal terms this means that as $S$ approaches infinity, $\Omega$ approaches zero, that is, $\lim_{S \to \infty} \Omega = 0$ and consequently $\lim_{S \to \infty} (1 - \Omega) = 1$. This makes the use utility function work dominated.

Now if we incorporate this logic into our expression we obtain a more elaborate structure for the use utility, that is, we replace $\Omega$ with $\frac{\ln(1+S)}{S}$ and obtain

$$U_{use} = L^{\frac{\ln(1+S)}{S}}(24 - L)^{1-\frac{\ln(1+S)}{S}}.$$  

This expression gives more weight to work or
leisure in accordance with the level of desired security. However, we still need to explore the concept of desired security.

We define this concept (in the sense we observe in the story) as the wish for protection from adversity that may result from lack of means to cover one’s needs. We argue that, from this perspective, one’s desired level of security is very much related to one’s level of fear. Consequently, a reasonable formal definition might be this: The desired level of security is the exchange value of one’s daily needs multiplied by one’s fear. Thus, those who fear more would desire more security. Then if fear is depicted as \( \xi \) and daily needs as \( d \), then the desired level of security would be \( S = d\xi \). With a small adjustment this formulation may be rendered more conducive to intuitive insights. If we acknowledge that courage is the inverse of fear we may define it formally as \( c = \frac{1}{\xi} \). then we obtain another expression for desired level of security \( S = \frac{d}{c} \), that is, one’s desire for security declines as one’s courage increases. This expression allows us to present some convenient parameterizations.

Let us assume that the lowest level of courage is zero and the highest level is one. Then, by examining the extreme cases, we can dig deeper into the meaning of desired security. When one is very courageous one’s courage gets closer to one, and consequently one’s desired level of security gets closer to the exchange value of one’s daily needs, that is, \( \lim_{c \to 1} S = \lim_{c \to 1} \frac{d}{c} = d \). This would be the extreme fisherman case, that is, working only to cover the expenses of a day. One the other hand, if one has a very low level of courage, this means that one’s courage is quite close to zero; then the desired level security would be enormous, that is, \( \lim_{c \to 0} S = \lim_{c \to 0} \frac{d}{c} = \infty \). This is the extreme German tourist case.

Obviously, if one has very high daily expenses, then the desired security may still be very high despite a high level of courage (the situation of a knight with a lavish lifestyle), and naturally the opposite situation, that is, having a very low level of courage and very low expenses (the situation of a petty state official) might generate the exact outcome in terms of desired security. Moreover, the basic construction ensures that (in this static mode), the minimum level of desired security for anyone is the amount of exchangeable utility required for covering the needs.
necessary for one day. Thus, we argue that the parametric space \((d, c)\) accommodates many possibilities that can match the variety of real life situations.

Now if we insert this parametric space into our use utility component by replacing \(S\) with \(\frac{d}{c}\), we obtain

\[
U_{use} = L \left[ \frac{\ln(1 + \frac{d}{c})}{\ln(1 + \frac{d}{c})^2} \right] - \left[ \frac{1 - \ln(1 + \frac{d}{c})}{1 - \ln(1 + \frac{d}{c})^2} \right] \left(24 - L\right)
\]

and this can be conveniently reformulated as

\[
U_{use} = L \left(24 - L\right) \ln(1 + \frac{d}{c})^2 \left(24 - L\right) 1 - \ln(1 + \frac{d}{c})^2
\]

for the sake of making the most explicit exposition.

One can show that\(^2\) the leisure value that maximizes this function is

\[
L_{\text{max}} = 24 \ln(1 + \frac{d}{c})^2 \quad \text{or equivalently} \quad L_{\text{max}} = 24 \ln(1 + S) = 24 \Omega
\]

Therefore it is clear that if leisure has more weight than work, that is, \(\Omega\) is closer to 1 than \(1 - \Omega\), then naturally a higher \(L_{\text{max}}\) value would make \(U_{use}\) maximum. But if the opposite is the case, then the \(L_{\text{max}}\) value that makes \(U_{use}\) maximum would be smaller. Thus, maximization of \(U_{use}\) with respect to \(L\) would automatically generate the best division of the day into work and leisure for an individual in accordance with her desired level of security so as to maximize the use utility: \(L_{\text{max}}\) for leisure and \(24 - L_{\text{max}}\) for work.

In figure 1 we visually illustrate the way in which the use-utility function is generated. In the upper graph and in panel A we see the German tourist and the fisherman in the basic parametric space whose dimensions are courage and daily needs. From their locations in this space one can derive the level of security they desire as depicted in panel B. Obviously, the German tourist, who has less courage and more expenses, desires more security than the fisherman, who is not only more courageous but also more modest. In panel C we see our two heroes in the weight space. The locations here are derived from the desired security levels. Finally panel D reveals their use-utility functions generated by the locations in the weight space. One can see that the use utility function of the German tourist reaches its maximum at 3.5 hours of leisure but the fisherman’s function has its maximum at approximately 14.5 hours.
In the lower graph of Figure 1 we equalize the daily expenses of the fisherman and the German tourist in order to see the extent to which the hours allocated for leisure would change as courage remains the same but daily expenses increase. As one can see, under these circumstances, the fisherman’s desire for security increases but his location in the weight space (panel C) is not radically transformed. In this case the use utility function derived from the new coordinates of the fisherman reaches its maximum at approximately around 10.5 hours, less than the fisherman function in the upper graph, but still substantially higher than the German tourist’s maximizing value.
Figure 1: Use utility functions for two security levels
Operating in the “Social”: The Exchange Utility Component

Now we can move to the second component: the exchange utility function that is to be derived from the dynamics in the “social” realm. Here individuals convert the hours they reserved for work into exchangeable utilities so as to attain the desired level of security. Obviously this entails social interaction whose dynamics cannot be controlled by any single individual.

We assume that individuals would (prefer to) divide the day between leisure and work in such a way that their use utility function would be maximized. Then, the number of hours reserved for leisure would be $L_{\text{max}} = 24 \left( \ln(1+S)^{1/3} \right)$ and consequently $24 - L_{\text{max}}$ hours would be devoted to work in order to ensure the desired level of security.

Obviously, how much one would earn from these hours of work depends on one’s occupation. There must be a rate of exchangeable utility that is generated by each occupation per hour, let us denote this with $\Psi$ (and for now assume that it is constant), then we can define our exchange utility function as $U_{\text{exc}} = \Psi(24 - L_{\text{max}})$. Therefore by reserving $24 - L_{\text{max}}$ hours to work in accordance with $U_{\text{use}}$ one would produce exchangeable utility equivalent to $U_{\text{exc}}$. Of course, for this function (or amount) to make sense, one’s occupation must at least be capable of generating exchange utility which is sufficient to cover the needs of a day (Marx 1864, Webb 1912), that is, $\Psi(24 - L_{\text{max}}) \geq d$. But this condition can also be read from the other direction $d \leq \Psi(24 - L_{\text{max}})$, namely, one should determine one’s daily needs in accordance with one’s occupation in order to be able to afford the division of the day between leisure and work in accordance with one’s use utility function.

However, for now, if we think that $d$ is unalterable, then we can envisage a condition attached to the exchange utility component: One’s occupation should be capable of generating exchange utility compatible with one’s daily needs and courage, that is, the allocation of time implied by the use utility component. Formally this means that $\Psi \geq \frac{d}{(24 - L_{\text{max}})}$. This is possible only if there exists an external authority which ensures that all occupations have hourly exchange rates that are compatible with each single individual’s daily needs and use utility based time allocations. A
more somber proposition would be this: If one’s occupation is not compatible with the use utility based allocation of time, then a qualitative shift occurs in the relationship between $U_{use}$ and $U_{exc}$: Instead of the situation where $U_{use}$ determines the number of hours reserved for leisure as $L_{max} = 24\frac{\ln(1+S)^{\frac{1}{3}}}{\Psi}$ and work as $24 - L_{max}$, we will have a situation in which the opposite relationship would be initiated, that is, the exchange utility component would determine how one’s day is to be divided between work and leisure. One can show that $\Psi$ in this situation at most $\frac{24\Psi - d}{\Psi}$ hours would be reserved for leisure and at least $24 - \frac{24\Psi - d}{\Psi}$ hours for work. Indeed this observation requires us to present a detailed comparison between these two entities, that is, the hours allocated to leisure by the use utility component, $L_{max} = 24\frac{\ln(1+S)^{\frac{1}{3}}}{\Psi}$, and the maximum amount of leisure one can enjoy due to one’s occupation $L_{exc} = \frac{24\Psi - d}{\Psi}$. There are three situations:

First, if $L_{max} > L_{exc}$, that is, the number of hours allocated to leisure by use-utility is larger than the maximum amount of leisure one can enjoy due to one’s occupation, then the exchange-utility based division of the day into leisure and work must prevail instead of the use utility based division. Because, if there is no other source from which one might cover one’s needs, then one cannot live by reserving more hours to leisure than dictated by the exchange utility function. One might call this the situation of dissatisfaction due to negative enforcement of $U_{exc}$. In our story neither of our heroes appears to be in this situation, but the fear of finding himself in this situation might be the prime motivation of the German tourist’s eagerness to work more, though this is rather a paradoxical fear: working more in order to avoid being forced to work more.

Second, if $L_{max} < L_{exc}$, that is, the number of hours allocated to leisure by use-utility is smaller than the maximum amount of leisure one can enjoy due to one’s occupation, then there would be some extra exchange utility generated by each hour of work. This is the situation of profit maximization in which one works more than necessary (i.e. more than the absolute minimum dictated by the exchange utility
function) in order to attain the desired level of security. It is important to note that in this situation one is still maximizing one’s use-utility function, but this use-utility function allocates less hours to leisure than what is ‘socially’ possible due to one’s fears and expenses. Thus there is an intrinsic handicap in the use utility functions of individuals (such as the German tourist) who are in the profit maximization position given that the ultimate aim is always to have as many hours as possible for leisure. Thus profit maximization is an awkward position: On the one hand one desires a maximum amount of leisure, but, on the other hand, despite the fact that, thanks to one’s occupation, one can afford more leisure than one currently has, one cannot allow oneself to enjoy these extra hours of leisure due to what we here simply call fear. In fact, one may interpret the German tourist’s envy of the fisherman as his realization of this handicap. Of course, there is a more optimistic variant: It is possible to have an occupation whose $\Psi$ is so high that it covers not only one’s daily needs but also one’s desired security in an instant. In this case, too, it would be $U_{exc}$ which would be determining the hours reserved for leisure instead of $U_{use}$. This may be seen as positive enforcement of $U_{exc}$; however, as we show below, this occurs to individuals with high levels of courage.

Finally, if $L_{max} = L_{exc}$, that is, the number of hours allocated to leisure by use-utility equals the maximum amount of leisure one can enjoy due to one’s occupation, then one is in the situation of satisficing. This means that one works only sufficiently to cover the needs of a day and at the same time obtains maximum use-utility from this allocation. However, there might be some ambiguity and anxiety in this situation if one does not have a high level of courage. This is because it is possible that one desires a high level security but does not have the capacity to accumulate this security because of one’s occupation (one would expect such an individual to reduce her expenses so as to move to the position of profit maximization). Therefore one might be in the situation of satisficing without ambiguity and anxiety if one has a low level of desired security presumably due to high levels of courage. Obviously, this is the situation of our fisherman.

Figure 2 explores all these contingencies. The upper graph is identical with the upper graph in Figure 1 except now in Panel D we see three occupations in the form of the maximum hours of leisure they dictate, that is, $L_{exc} = \frac{24\Psi - d}{\Psi}$ values which
are depicted as straight lines. In this picture, if we focus on the fisherman and assume that he has occupation 1 then he will be in the situation of dissatisfaction because although his utility function is maximized at approximately 14.5 hours of leisure occupation 1 would not allow him to enjoy leisure more than 7 hours unless he has some other source to supplement his daily needs. If, on the other hand, he has the occupation 2, then he will be in the situation of satisficing because the number of hours allocated to leisure by the use and exchange utility functions would be almost equal (see the correspondence between straight line depicting occupation 2 and the dashed line indicating the maximizing leisure value for the use utility). Moreover, this would be satisficing without ambiguity and anxiety thanks to his low desire for security depicted in panel B. Finally, if the fisherman has occupation 3, then he would be in the situation of profit maximization because in this case while his occupation would allow him to enjoy 18 hours of leisure, he would only use 14.5 hours of it and would use the remaining time for extra work so as to attain his desired level of security. However, if we take the tranquility of the fisherman in our story into account we might guess that the fishing near his home should resemble occupation 2 and he should be in the situation of satisficing. Now, if we look at the utility function of the German tourist, we can see that he is in the position of profit maximization with respect to all three occupations given in the upper graph.

The upper graph in Figure 2 examines the positions of only two actors distinguished by their courage and daily needs, thus it does not allow us to observe all possible contingencies. For a more detailed visualization we generated the lower graph of Figure 2. Here we plotted leisure hours against a range of expense values (from 0.1 to 4). Two curves are generated by maximum values of use-utility functions, that is, \[ L_{\text{max}} = 24 \left( \ln(1 + S) \right) \] , which are derived at each expense value for two extreme courage levels (0.99 and 0.05). Therefore these two curves consist of many actors, each of whom is represented by the maximum point of her use utility function. A similar logic applies to the straight lines: they represent the maximum number of hours allowed for leisure, that is, \[ L_{\text{exc}} = \frac{24 \psi - d}{\psi} \] , for three different occupations across the range of daily expense values. Finally, the uppermost horizontal axis gives
two series of desired security levels that are generated from the division of each expense value by two courage levels (0.99 and 0.05).

Let us focus on the ABC line which is generated by maximums of use-values of actors with courage of 0.99. For all the actors on this line occupation 1 would generate a situation of dissatisfaction (except for the actor on the extreme left) because they would all be forced to reserve less hours to leisure than they want. This is the negative enforcement situation in which instead of the use-utility function the exchange utility function dictates the allocation of hours for leisure and work. Now if all these actors have occupation 2, not surprisingly those who are to the right of actor B (such as C) would still be dissatisfied (thus in the situation of negative enforcement) because they would still be forced to work more than they want. But the interesting thing is that the leisure hours of those who are to the left of actor B (such as A) would also be dictated by occupation 2, though this time due to a better reason: we know that all actors desire the highest amount of leisure provided that they have the level of security they desire, and all actors on the ABC line desire security that almost equals their daily needs, but to the left of actor B occupation 2 provides them with this security and still allows them to have more leisure hours than they can conceive via their use utility function. Thus here again it would be the exchange utility function rather than the use-utility that would determine the number of hours reserved for leisure. This is the situation of positive enforcement. It is important to note that this situation emerges due to the high level of courage that is common to all actors on the ABC line (note that if all these actors had occupation 3, then they would all be in the positive enforcement situation). Finally if we focus on actor B in occupation 2 it is clear that she is in a situation of satisficing (and without any ambiguity), because in occupation 2 she can have all the security (which almost equals her daily needs) she desires without working more than she wants. In other words, her allocation of time for leisure and work is simultaneously and identically determined by her use and exchange utility functions.

Now let us look at the actors on the DEF line who are characterized by a very low level of courage (0.05). If we assume that these actors all have occupation 1, than those who are to the right of actor E (such as F) would be dissatisfied because they would have to work more than they want: their needs cannot be met if they divide the day into leisure and work in accordance with their use utility function. Once again this is the situation of negative enforcement where it is the exchange utility function that
dictates the number of leisure hours. Obviously those actors to the left of actor E (such as D) would be in the situation of profit maximizing because they work more than ‘socially’ possible and thus reserve less hours to leisure than their exchange utility function allows them to (in fact all actors on the DEF line would be in this situation if they had occupation 2 or 3). The interesting thing, however, is the situation of actor E: in fact her circumstances resemble those of actor B, who is in the situation of satisficing: in occupation 1 E’s division of time into leisure and work is simultaneously and identically determined by her use and exchange utility functions. However, there is an important distinction: E, unlike B, desires quite a high level of security due to her low level of courage, therefore her situation is satisficing with ambiguity: on the one hand she is better off than those actors on her right (such as F) because, unlike them, E does not need to work more than she wants. However, she, unlike those who are on her right, cannot accumulate in order to attain her desired level of security. Thus, actually E and B are quite different in terms of their satisficing: E satisfices with and B without ambiguity and anxiety (under these circumstances one would expect E to reduce her expenses so as to move to the position of profit maximization). There is one more thing we should observe about the actors on the DEF line: unlike the actors on the AB line in occupation 2 and the ABC line in occupation 3, they would never be in the situation of positive enforcement in either occupation, because of their high desire for security (see the difference between the security series at two extreme courage levels in the upper horizontal axis), which results from their very low courage.

In this analytical landscape one might place the fisherman ideally at point B in occupation 2, thus in the situation of satisficing without ambiguity and anxiety. However, he might also be placed at any point on the AB line so long as he has occupation 2 or at any point on the ABC line if he has occupation 3, that is, he might also be in the situation of positive enforcement. The German tourist, on the other hand, should be placed at any place on DEF line if he has occupation 2 or occupation 3. But if he has occupation 1 he would probably be to the left of actor E, because only in this way he might afford a vacation.
Figure 2: Interaction between Use-Utility and Exchange-Utility functions
Adding a Dynamic Element to the Model

Finally, we can focus on the dynamic element in the story. It is clear that our German tourist, who is in the situation of profit maximization, makes sense of his life by thinking that he needs a lot of security (a fishing empire!) and therefore he must work hard (i.e. more than the absolute minimum dictated by his occupation), but once this level of security is attained, he dreams, he will enjoy more, perhaps even permanent leisure. This is a dynamic perspective, which is based on the idea that one can accumulate exchange utility so as to get closer to the level of desired security and, as this happens, one would adjust one’s use utility function, which in turn, would make for a new division between leisure and work, presumably devoting more hours to the former. Now in order to complete the formalization of Böll’s story we should also incorporate this dynamic element into the system that we have built up until now.

Let us assume that \( \Psi > \frac{d}{(24 - L_{\text{max}})} \), that is, one’s occupation is capable of generating sufficient exchange utility so as to cover more than the needs of a day. At time \( t \) one can earn the equivalent of \( U_{\text{exc}(t)} = \Psi(24 - L_{\text{max}(t)}) \) exchange utility. As we explored above, the hours devoted to work, that is, \( (24 - L_{\text{max}(t)}) \), are determined by the use utility component in accordance with the desired level of security at time \( t \); let this be \( S_t \). Now, the exchange utility function will produce some exchangeable utility, and a portion of this utility, that is, an amount equal to daily needs \( d \), will inevitably be spent and \( U_{\text{exc}(t)} - d \) amount of exchangeable utility will remain. With this extra amount one can pursue two different strategies: the strategy of saving, that is, accumulating this amount without any investment, and the strategy of investment, that is, using this amount in order to initiate a commercial venture. Obviously such an investment cannot occur immediately. One needs to have some savings for initiating any enterprise, thus the first strategy must precede the second one at least for a while.\(^6\) For this reason we will here explore the dynamic element from the perspective of the strategy of saving.

In the strategy of saving an individual works \((24 - L_{\text{max}(t)})\) hours at time \( t \) and obtains \( U_{\text{exc}(t)} = \Psi(24 - L_{\text{max}(t)}) \) units of exchangeable utility. After spending for her daily needs an amount equal to \( d \), she saves the remaining \( U_{\text{exc}(t)} - d \), that is, accumulates a little in order to take a step forward towards attaining her desired level
of security, thus her level of desired security should decline at \( t + 1 \) as now she has some accumulated amount that makes her feel a little safer.

Under this new condition the desired level of security at time \( t + 1 \) requires the following adjustment: \( S_t - \left( U_{exc(t)} - d \right) \). This means a reduction in the desired security that equals the magnitude of the accumulated amount. This can be rewritten conveniently as \( S_{t+1} = S_t + d - U_{exc(t)} \). Now we know that we have to rewrite our use utility component once again, but in accordance with this new level of desired security. This new version of use utility would allocate

\[
L_{max(t+1)} = 24 \left( \ln(1 + S_{t+1}) \right)^{\frac{1}{S_{t+1}}} 
\]

hours to leisure and \( 24 - L_{max(t+1)} \) to work. And at time \( t + 1 \) the exchange utility would be estimated as \( U_{exc(t+1)} = \Psi(24 - L_{max(t+1)}) \). We can repeat the same adjustment for the desired security at time \( t + 2 \). This would be \( S_{t+2} = S_{t+1} + d - U_{exc(t+1)} \) and lead to a new evaluation for leisure hours

\[
L_{max(t+2)} = 24 \left( \ln(1 + S_{t+2}) \right)^{\frac{1}{S_{t+2}}} ; \quad \text{on the basis of this we will estimate new exchange utility as} \quad U_{exc(t+2)} = \Psi(24 - L_{max(t+2)}) \quad \text{and readjust the desired security for} \quad t + 3 : \quad S_{t+3} = S_{t+2} + d - U_{exc(t+2)} . \]

We can continue in the same way.

Of course when/if \( S_{t+n} \approx 0 \) is attained we have an interesting situation where

\[
L_{max(t+n)} = 24 \left( \ln(1 + S_{t+n}) \right)^{\frac{1}{S_{t+n}}} = 24 \ln e = 24 \quad \text{becomes the number of hours for leisure that maximizes the use utility function. This is a situation peculiar to the dynamic mode in which one may enjoy a degree of leisure even though one’s level of courage does not suffice at any static position to afford such a choice. This would be, of course, the dream: permanent leisure, or more correctly, a situation where one only works for needs of a day,} \quad d . \]

 Obviously, this is the equivalent of having complete courage \( c = 1 \) and thus requiring \( S = \frac{d}{c} = \frac{d}{1} = d \) amount of security, or the position of the fisherman as envied by the German tourist.

In its entirety this dynamic logic can be expressed as a continuously readjusted trio of functions as follows:
\[ \frac{d}{c} = S_0 \rightarrow \text{UTILITY}_{(0)} = \begin{cases} \frac{L}{S_0} \left( \ln(1 + S_0) \right) \left( 1 - \frac{\ln(1 + S_0)}{S_0} \right) \rightarrow S_1 = S_0 + d - U_{\text{exc}(0)} \rightarrow \text{UTILITY}_{(1)} \\ U_{\text{exc}(0)} = \Psi(24 - L_{\text{max}(0)}) \end{cases} \]

\[ \cdots \quad S_j \rightarrow \text{UTILITY}_{(j)} = \begin{cases} L_{\text{max}(j)} = 24 \left( \ln(1 + S_j) \right)^{\frac{1}{N}} \rightarrow S_{j+1} = S_j + d - U_{\text{exc}(j)} \rightarrow \text{UTILITY}_{(j+1)} \\ U_{\text{exc}(j)} = \Psi(24 - L_{\text{max}(j)}) \end{cases} \]

This process is the expression of the hope (or illusion) that one may compensate for lack of courage (i.e. low \(c\)) and/or excessive consumption (i.e. high \(d\)) with hard work. The question is, of course, whether, or under which conditions, this is possible. It is easy to observe that in the situations of dissatisfaction and satisficing with ambiguity and anxiety, one cannot benefit from the dynamic process, because in these situations the dynamic process would lead to constant or increasing levels of desired security and more hours of work, not less. Thus the question only applies to the situation of profit maximization: is it possible to accumulate enough to feel secure when one is a profit maximizer?

In formal terms this is the question of whether the sequence \(S_{j+1} = S_j + d - U_{\text{exc}(j)}\) which equals \(S_{j+1} = S_j + d - \Psi \left( 24 - 24 \left( \ln(1 + S_j) \right)^{\frac{1}{N}} \right)\) converges, or more accurately, whether it converges to zero. One can show that\(^7\) this sequence may approximate zero if one’s occupation rate \(\Psi\) is very high, that is, one has a very good job and/or one has very low daily expenses. (It should be noted that the two conditions in reality rarely occur together.) Thus not all occupations could ever lead to the dream of the German tourist.

In Figure 3 we illustrate this dynamic process actually leading to the ideal outcome. In the upper graph and in panel A we see an individual who has an occupation with \(\Psi = 0.398\). She has a courage level around 0.78 and daily expenses around 2.1. The first bar in panel B depicts her initial desired level of security, and this level generates her initial location in the weight space in panel C. The resulting
use utility function in panel D has its maximum around 11.5 hours of leisure, but one can see in the same panel that her occupation allows this individual to have around 20 hours of leisure. Thus she is in the situation of profit maximization. Now, the dynamic process commences: as depicted in panel B at time \( t_1 \) she needs less security than the initial point due to the accumulation of some exchangeable utility that is obtained at the initial point. In panel C we see that the location at \( t_1 \) has moved in the south-east direction by giving much more weight to leisure; this is because of the decline in the desired security. The resulting shift in the use utility function is clear in panel D: now this function reaches its maximum by allocating approximately 22.5 hours for leisure. Obviously this is more than the hours allocated by the occupation, thus in order to enjoy these leisure hours the individual must use a part of the accumulated amount in order to cover her daily needs, thus reducing the accumulated amount. The result is clear in panel B when we look at time \( t_2 \): now she needs more security compared to time \( t_1 \) (because she has used part of the accumulated amount) but still less than the initial point (because there still remains some accumulated amount). Now in panel C we observe a shift in the north-west direction from \( t_1 \) to \( t_2 \) which means more weight is attached to work in \( t_2 \) compared to \( t_1 \). The resulting use utility function in panel D reaches its maximum at around 13.5 hours of leisure, which is higher than the initial value but substantially lower than the amount that is made possible by the occupation. Thus once again there is accumulation which reduces the level of desired security to level zero at point \( t_3 \) as depicted in panel B. The corresponding point in the weight space in panel C has unity as the weight of leisure, and thus the resulting use utility function in panel D attains its maximum at 24 hours of leisure. This is the dream of the German tourist. Now, since she has the security that she desires as an accumulated amount safely put somewhere she does not need to be a profit maximizer anymore. She only needs to work enough to cover her daily needs, that is, she can become a satisficer. This means she can work the minimum number of hours required by the occupation and use the rest of her time for leisure. Consequently, she becomes “the fisherman” without changing her position in the courage & daily expenses space in panel A.

Two observations are to be made here: first, it is clear that this outcome is closely related to the capacity of the occupation to generate exchange utility (in this case \( \Psi = 0.398 \) per hour). Second, in order to understand whether a dynamic process leads to the ideal outcome it is sufficient to observe the changes in the desired security.
levels depicted in panel B. If the desired security declines to zero we know that the
dynamic process leads to the ideal outcome and makes the individual a satisficer.
Otherwise, if the desired security stabilizes somewhere above zero we know that the
person would forever remain a profit maximizer who deceives herself with the
illusion of becoming a satisficer in future.

With these insights in mind let us focus on the lower graph in Figure 3. Here
the dynamic process that is given in the upper graph is reinitiated for the same
individual but for different occupations
\( \Psi_1 = 0.105, \Psi_2 = 0.235, \Psi_3 = 0.285, \Psi_4 = 0.335, \Psi_5 = 0.385, \Psi_6 = 0.398 \).
It is clear that the first four occupations generate dynamic processes that lead to constant levels
of desired security after several iterations, indicating that if our individual had one of
these occupations she would remain a hard-working profit maximizer who can never
be a satisficer. Occupation 5, on the other hand, generates not a stable but oscillating
levels of desired security. This implies that having this occupation would allow one to
have some daily escapes from the dictates of the exchange utility function but would
never free one from the situation of profit maximization. As one can see, occupation 6
is identical to the occupation that generates the dynamic process in the upper graph,
and it is the only one that leads to the ideal outcome that converts one from a profit
maximizer into a satisficer. Thus it might be called an “emancipating occupation”.

In our story, if the German tourist does not have an emancipating occupation
he would never reach his dream of being in the situation of the fisherman without
being as courageous and/or modest as he is. The fact that the German tourist is a
tourist, that is, he is on vacation and thus does not work at the moment of the
encounter with the fisherman, should not give any consolation to him or to us. As we
show in the lower graph of figure 3, some occupations such as occupation 5 might
allow the German tourist to have a few days of escape from work by occasionally
generating use-utility functions like the one at time t1 in the upper graph, but these
occupations are not truly emancipating. They do not have sufficient accumulation
generating power to reduce the desired level of security to zero.

We argue that this dynamic process captures the dynamic element embedded
in our story, but there is an implicit assumption: \( c, d \) (courage and daily expenses) do
not change. It is possible to ease these restrictions,[8] but for the sake of simplicity we
use this simple dynamic mode in our analysis.
Figure 3: Dynamic Process

(a) parametric space

(b) desired security levels through time

(c) time points in the weight space

(d) use-utility functions of the same person through time

Commercial Venture: Accumulation for investment

I don't know how detailed I should write this, but it is essentially about making $\phi$ a random variable with a probability distribution.

escapes from work by occasionally generating use-utility functions like the one at time $t_1$ in the upper graph but these occupations are not truly emancipating. They don't have sufficient accumulation generating power to reduce the desired level of security to zero.
Implications: Fisherman and Tourist in Political Context

Perhaps the most important point of our re-told story is that our model shows that, with appropriate formalization, the fisherman can be depicted as a rational actor: Given his information\(^5\) he will choose the course of action that will yield the highest possible utility by maximizing his use utility component provided that this is rendered possible by his occupation and courage at any given time. However, it is important to note that the very concept of use utility is based on the idea of maximizing the hours reserved for leisure, that is, the fisherman does not value work itself, nor fish, nor the things that fish can buy.\(^6\) The only thing valuable to the fisherman, his ultimate and permanent goal, is carefree leisure, and this is the logic underlying his conception of utility. In fact, our model also reveals that, regardless of how differently they behave, both the fisherman and the German tourist can be shown to operate in accordance with this conceptualization of utility. But then, the fisherman appears in a more enviable position than the German tourist; he is satisfied while the German tourist endures the hard work imposed by profit maximization. Why this difference?

It is clear in the analytical presentation (in the lower panel of Figure 3) that living in the happy state of “satisficing”, like our fisherman, results from personal features which determine the level of desired security, but also from external conditions. The latter are reflected in our model, for simplicity’s sake, by one’s occupation\(\Psi\).

Given that the German tourist, as a profit maximizer, envies the fisherman (like many of us), and ultimately works to attain the position of the fisherman by relying on the dynamic process outlined above, to benefit from the story and its analytical version outlined by our model we should scrutinize what makes it possible for the fisherman to be a satisficer. Let us focus on the features of fishing, that is, on \(\Psi\) in our model, and the way in which they are related to the personal features of the fisherman in order to better understand the nature of satisficing.

In our opinion the most plausible assumption in order to account for the behavior of the fisherman is to think that fish is a public resource, a resource for the

\(^5\) The role of information in utility maximization was most famously explored by Herbert Simon. See for example *Models of Man* (1957).

\(^6\) It is of course possible to think of our fisherman as using past fish to buy present leisure. In this sense the fisherman values what fish can buy. The crux of the matter, however, remains that work for him remains at most a means to the end of leisure, an expense to be minimized, not a value in itself.
collection of which the fisherman does not have to pay. Moreover, we must also argue that the cost to the fisherman of going out to fish is minimal. The boat is paid off or has been in the family for generations, gas and parts are cheap, and a costly fishing license is not required. In short, fishing is (close enough to) free.7

The fact that fish is free to the fisherman does, however, not mean that this resource is always readily available in sufficient quantity. The amount of fish that can be caught by the fisherman at any given time depends on circumstances beyond his control: the weather, water currents, the season, and perhaps other natural factors, which the fisherman not only has no control over, but which he also cannot predict with sufficient accuracy to make probability estimates. Therefore, the fisherman is uncertain how much fish he will be able to catch at any time in the future. He may starve next week. He may never go hungry. He simply does not know.

But there is another factor that we should be taking into account: There is a major difference between depending on the forces of nature to attain a resource, and interacting with other people who also want to use the same resource for their ends, that is, competition. It is quite probable that, even as our fisherman is basking in the sun, other fishermen are out on the sea catching the fish he is missing, a possibility which undoubtedly would greatly concern the German tourist in our story.

Fortunately (from the perspective of our fisherman), competition means more than the mere presence of other economic actors providing the same good or using the same resource. It requires a lack of demand or surplus of supply or a scarcity of resources needed to ensure supply which can lead to effective competition in the market: the crowding out of suppliers which cannot provide their goods at the market price. As long as our fisherman can be sure that he will be able to sell all the fish he wants to at the price he needs in order to survive, he has no need to worry. The fact that he does not have to pay for the fish he catches since it is a public resource and the fact that it costs him next to nothing to harvest this resource help him to sell his fish cheaply. As long as demand for fish does not drop significantly, he is safe, and even if demand drops he still has a fair chance to sell at least some of his catch.

Thus, one may argue that it is three external factors: 1) the status of fish as a public resource, 2) reasonably conducive natural conditions, and 3) lack of competition, which determine the exchange rate of fishing (i.e. the Ψ of our

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7 Fishing is free, of course, only in the sense that it does not involve the expense of material resources. It does, however, cost time, that is, it carries opportunity costs associated with loss of leisure.
fisherman) and generate the difference between the fisherman and the German tourist, making one a satisficer and the other a profit maximizer.

However, one may also argue that the precariousness of these enabling factors which make satisficing through fishing possible generates some uncertainty as to the future of the fisherman’s happy state of affairs. Given this uncertainty about the future, one might expect future benefits to be discounted in favor of present ones. Thus, we may argue that one of the reasons that make the fisherman a satisficer (and thus make him different from the German tourist) is that he values today’s leisure more than tomorrow’s due to all the uncertainty embedded in the factors that make satisficing through fishing possible today but not necessarily tomorrow. This would, to some degree, be compatible with mainstream economic thought as well. As Jevons points out, “to secure a maximum of benefit in life, all future events, all future pleasures or pains should act upon us with the same force as if they were present, allowance being made for their uncertainty [...] But no human mind is constituted in this perfect way: a future feeling is always less influential than a present one.” (Jevons 1941:85)

On the other hand, one might, by appealing to the underlying logic of our model, object to explaining the position of satisficing by the uncertainty of future: The fisherman, regardless of the uncertainties imposed on future leisure by the precariousness of the three external factors, values today's leisure today exactly as highly as he would value tomorrow's leisure tomorrow. For there is a constant intrinsic value associated with the careless leisure which remains the same regardless of its “amount”. If leisure is not a means to an end but the end in itself of all economic activities, it cannot be valued more or less. This would, one may argue, lead to the conclusion that any person would be a satisficer as long as and as soon as the external conditions permit, and uncertainties about future would not play a role.

Obviously, the very existence of the prudent German tourist in Böll’s story contradicts this assessment. For when the tourist imagines himself in the position of the fisherman, he becomes (or continues to be) a profit maximizer rather than a satisficer. Thus we must admit that it is not only the three external factors, or their precariousness, that generate the difference between our two protagonists. There are personal differences as well. Our model envisages three personal features that enable one to be a satisficer, namely, courage, expenses, and the level of security that is determined by the first two.
Some people, like our fisherman, have sufficient courage and modest expenses, and thus a low level of desired security about the future as captured by $S = \frac{d}{c}$. Consequently they will enjoy the present without paying much attention to the future, and if external conditions allow (as reflected in their occupations’ $\Psi$), they would live as satisficers. But some others, like the German tourist, would lack sufficient courage and perhaps would also have higher expenses and therefore will be locked in the unenviable position of profit maximization due to the high level of desired security, or they will be in the equally unenviable position of satisficing with ambiguity and anxiety (i.e. at point E in the lower panel of figure 2), even if they start to fish in Greece (and thus their occupation’s $\Psi$, i.e. external factors, allows them to become satisficers). Following this logic, a maximizer of profit, that is, of material security, must of necessity be a person who lacks courage and/or is addicted to high expenses.

A courageous fisherman will not go fishing until his supply of fish runs out and he feels an immediate need to replenish it, that is, his desired level of security would approximately equal his daily needs so that $S = \frac{d}{c} \approx d$. But another fisherman (who resembles the German tourist) with similar expenses but without sufficient courage, thus with high level of desired security, will keep fishing until a point at which he either faces hard constraints (such as physical exhaustion or bad weather) or until there is no fish left in the sea. Our formalization of the story shows that this behavior is based on the hope (or illusion) that one can substitute lack of courage with hard work and may become a satisficer in the long run. However, it is clear in our model that, regardless of how hard one works, it is external conditions, that is, one’s occupation’s $\Psi$, which determine whether one ceases to be a profit maximizer and moves into the position of satisficing, as long as one’s courage and expenses remain stable.

Thus we may conclude that the difference between the fisherman and the German tourist results not only from three external factors (status of fish as a public resource, conducive natural conditions, and lack of competition) but also from three personal features (courage, expenses, and desired security). Moreover, these two groups of factors are related in such a way that they constrain long-term strategies of profit maximizers; lack of courage or high expenses cannot be substituted for by hard
work if external conditions do not allow one’s occupation to have appropriate 
\( \Psi \) value as revealed in the dynamic part of our model. Thus, when everything else is 
equal, that is, even if the German tourist becomes a fisherman in 1950s southern 
France, it would be the level of courage that makes the French fisherman different 
from the German.

This of course requires us to ask what makes a person more or less courageous. 
One may argue that uncertainties generated by the precariousness of external enabling 
factors which make satisficing possible may operate at a more personal level, making 
some people more and others less courageous. Thus, as a step forward, we may think 
of decomposing the courage factor in our model into sub components, and argue that 
at least part of it results from the interaction between one’s personal history and 
external conditions. This would, to a large extent, make the external conditions (once 
again) the prime culprit for the emergence of personalities without much courage. But 
we are of the opinion that there might be an individual component of courage that 
operates regardless of external conditions and constrains the German tourist’s 
imagination so that even as a fisherman he remains a profit maximizer.

But is there then not any sense in the worldview of the German tourist? Is he 
simply a person who lacks courage? Is it not possible that his advice would make 
sense for the fisherman in some way? Might following the advice of profit 
maximization actually generate some preferable outcomes for a satisficer? In fact the 
tourist’s advice would make sense for our fisherman if one of the other fishermen in 
the village, or more likely an investor or developer, decided to build the fishing 
empire envisioned by the tourist. Then our story would take a different turn: The 
fishing enterprise could catch more fish, sell it cheaper, and even with high demand 
our fisherman would not be able to sell his fish. Finally, after years of overfishing by 
the insatiable fishing enterprise, there might not even be enough fish left in the bay for 
him to eat and he would have to find employment in the newly opened cannery in 
town.

We might consider this outcome undesirable, but how could it be avoided? 
How can our fisherman survive in a thriving market? This is where politics comes in, 
and the most salient question becomes what sort of good life our polities should be 
designed to enable. The easiest, but perhaps not so elegant way to ensure the survival 
of satisficing, of course, is to prevent fishermen in the village from pursuing the 
advice of the German tourist, that is, banning profit maximization through restrictions
on economic activity (or perhaps one might play with the idea of banning tourism entirely in order to preclude the spread of the profit maximization ideology). But if this is not feasible or desirable, then to let our fisherman survive in the face of profit-maximizing competition, his government might guarantee that he can sell his fish at a "living" price, either by dictating a fixed or minimum price or, somewhat more in tune with market mechanisms, by buying up large amounts of fish and taking them off the market.\(^8\) If government ensures that a product can be sold at a "living" price, producers can "satisfice" profit.\(^9\) Alternatively, government could attempt to discourage profit-maximizing activity (and make money itself in the process), for example by imposing highly progressive income or high corporate taxes or restricting the size of firms.\(^10\) It should be obvious that these sorts of possible interventions run the gamut from state socialism to the liberal versions of social market economy.

While in our fisherman's world there exists no built-in advantage to profit-maximization because fishing costs nothing but time and needs are simple, in a competitive free market economy in the absence of government interventions non-profit maximizers will not long be able to withstand competition from profit-maximizers who, at least over time, will be able to sell their products cheaper and will be better able to survive fluctuations in demand. It is probable that micro-economic decision makers in competitive settings are generally aware of this risk: Knowing that they will not survive if they do not maximize profit ensures that their uncertainty about future profit gives way to extremely low levels of courage, if not a quas-certainty of their economic demise should they pursue non-profit maximizing strategies.

From the above reasoning we can generalize not only to other one-man firms, but to all individuals who work for a living, be they entrepreneurs or employed workers, as well as to decision-making collectives. A situation of employment of course creates additional incentives to work, but the morale of our story, the trade-off

\(^8\) This would do nothing to change the price advantage of the fisherman's competition, while preventing our fisherman from starving (or having to adapt his lifestyle).

\(^9\) Loosening the assumption that work has no other value than to allow for leisure of course opens the door to other motivations for work, such as satisfaction derived from working as discussed by Lane (1991), the desire for status, or the impact of values and social psychological enforcement mechanisms such as a Puritan work ethic or the imitative reaction discussed by Sen (1987). Presumably, if the fisherman in our story began to envy the tourist for his expensive suit and superior airs, this might give him another incentive for being more productive.

\(^10\) Of course there are many less direct ways to achieve part of the same effect, such as e.g. through regulations on unionization for firms over a certain size.
between present carefree leisure and the material security which is meant to ensure future leisure, remains in essence unaffected. Our model allows for a range of work-leisure trade-offs that encompasses distinctly different lifestyles, or economic “cultures”. To what extent we want to protect variety in work-leisure trade-offs, or different economic lifestyles, from market competition is of course a question of enormous policy relevance. At stake is inter alia the survival of profit satisficing as a rational choice.

At the core of this policy challenge lies a dilemma contained with liberalism itself: On the one hand, as per the prescriptions of mainstream (neo)liberal economic theory, the selfish pursuit of maximum profit of the few benefits the many. On the other hand, as per especially political liberalism, we rightfully value pluralism and diversity. How many people can make a living just because others do not maximize ruthlessly? On the one hand, where government support is needed to protect a nonproductive lifestyle, the money to do so will of necessity have to come from the productive, who will be disinclined towards such policies. On the other hand, the meeting with the ragged fisherman, whom he pitied at first sight, leaves the tourist in our story wistful and wondering whether he himself might not be missing out on a very real need, the need to enjoy the present, to live without constant fear of what the future might bring, and the ability to be more easily contented. The fundamental policy question this poses at the societal level is to what extent society is willing to collectively support profit satisficing and leisure maximization. This is to a large extent a cultural question – and cultural variation can still be observed across relevant policies and outcomes even within the European Union, where economic governance is currently being supranationalized with haste. At the same time, the political pressures to root out profit satisficing and leisure maximization are enormous. In mainstream development policy the superiority of the tourist’s lifestyle has never been questioned, and with the continued rise of “there-is-no-alternative”-neoliberalism since the 1980s the parametric space for work-leisure trade-off decision-making has shrunk, at the individual as well as the societal level. The recent

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11 If we move beyond the normative parameters of liberalism and include values of solidarity or social justice, the case to protect satisficers is further strengthened, but we need not do so here to make our point.
fall from grace of Europe’s ancient cultural poster child Greece, the cradle of the work-labor distinction, can well be viewed in this light.12

**Conclusion**

Failing to work to maximize profit is not an irrational, a “crazy” thing to do. Neither is working overtime for the sake of a potentially distant future of more leisure. A very broad range of decisions regarding how to divide up one’s life between work and leisure can be modeled within the same system of utility functions based on the assumption of individual rationality. The decisions an individual will make regarding this time division basically depend on her material expectations (or lifestyle needs), her courage to risk not making provisions for the future, and her ability to generate income through work (captured here as her occupation). This may in and of itself not be surprising, yet at least two contributions have been made here which are by and large overlooked and well worth exploring in more detail.

First, it has been shown that, unless her occupation is exceptionally strong at generating security-through-income, it is unlikely that a profit-maximizer will ever achieve the position of satisficing (while it is certainly possible at any time that, due to changes in labor market position, she will end up dissatisfied). To move from the taxing state of profit maximization to the often dreamt-of state of satisficing, it will usually be necessary to either adjust downward one’s material expectations or increase one’s courage, or both. This boils down to a change in lifestyle.

Second, we have begun to show how political intervention can make and has made satisficing possible. Whether we want to ensure the rationality of a larger range of possible work-leisure trade-offs (and the survival of satisficing as a rational choice) is a deeply political question, a question regarding the good life we want to choose for society and make possible for the individual (and how we deal with possible tensions between the two). Currently, we see our economic cultures polarizing between dissatisfaction and profit maximization. The space for satisficing, even just for periods of our lives, small as it was to begin with, is rapidly shrinking further. Before we accept this trend as inevitable, we should stop to reflect: Can we honestly say that Hesiod was wrong?

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12 A disapproving and green-eyed chorus of international media coverage (and politicians in the EU) blamed the Greeks for retiring too early, saving too little, and enjoying life too much. Incidentally, it may not be coincidence that none of the PIIGS’s are majority-Protestant.
(1) SOME MORE ON THE TRACTABILITY OF COBB-DOUGLAS FUNCTION

(2) Maximization of the use utility function

$$U_{use} = L \ln(1 + \frac{d}{c}) (24 - L)^{1 - \ln(1 + \frac{d}{c})}$$

implies

$$U_{use} = L \left( \frac{\ln(1 + \frac{d}{c})}{c} \right) (24 - L)^{1 - \frac{\ln(1 + \frac{d}{c})}{c}}$$

but we know that $$S = \frac{d}{c}$$ then

$$U_{use} = \omega((24 - L)^{1 - \omega}$$

now let us use logarithmic differentiation

$$\log(U_{use}) = \omega \log(L) + (1 - \omega) \log(24 - L)$$

$$\frac{1}{U_{use}} \frac{\partial U_{use}}{\partial L} = \frac{\omega}{L} - \frac{1 - \omega}{24 - L}$$

$$1 \frac{\partial U_{use}}{\partial L} = \frac{\omega(24 - L) - L(1 - \omega)}{L(24 - L)}$$

$$\frac{\partial U_{use}}{\partial L} = \left[ \frac{\omega(24 - L) - L(1 - \omega)}{L(24 - L)} \right] L^{\omega - 1} (24 - L)^{1 - \omega}$$

Now we should find the value of leisure which makes the derivative zero, that is, $$L_{max}$$

$$\frac{\partial U_{use}}{\partial L} = 0 \Rightarrow \left[ \frac{L^{\omega - 1}}{(24 - L)^{\omega}} \right] [\omega(24 - L) - L(1 - \omega)] = 0$$

There are two solutions to this equation. The trivial solution is $$L_{opt} = 0$$ And the parametric

$$\omega(24 - L) - L(1 - \omega) = 0 \Rightarrow \omega(24 - L) = L(1 - \omega)$$

solution is $$L - \omega L = 24\omega - \omega L$$

$$L_{max} = 24\omega$$

Now let us express the parametric solution in terms of courage and daily expenses

$$\omega = \frac{\ln(1 + S)}{S} = \frac{\ln(1 + \frac{d}{c})}{\frac{d}{c}} = \frac{c \ln(1 + \frac{d}{c})}{d} = \frac{\ln(1 + \frac{d}{c})^c}{d}$$
from this we can have two equivalent expressions in the text:

\[ L_{\text{max}} = 24 \left( \ln(1 + \frac{d}{c}) \right) \] and \[ L_{\text{max}} = 24 \left( \ln(1 + S)^{\frac{1}{S}} \right) \]

(3) Maximum hours of leisure imposed by the exchange utility component:

\[
\Psi(24 - L_{\text{max}}^*) = d \\
24\Psi - \Psi L_{\text{max}}^* = d \\
\Psi L_{\text{max}}^* = 24\Psi - d \\
L_{\text{max}}^* = \frac{24\Psi - d}{\Psi}
\]

(4) Needless to say this kind of allocation is physically possible when \( \frac{24\Psi - d}{\Psi} > 0 \), that is, despite the exchange utility based allocation between work and leisure there remains some time for the latter, and in occupational terms this mean that any occupation must satisfy \( \Psi > \frac{d}{24} \), and this is obviously an easier condition to be satisfied by an external authority than \( \Psi > \frac{d}{(24 - L_{\text{max}})} \) which requires adjustment of the hourly rate of exchangeable utility generated by the occupation for each individual.

(5) In order to examine the degree of dissatisfaction occurring in this situation we need to mark \( U_{exc} \) based allocation in the use utility function \( U_{use} \) and, estimate the magnitude of lost use utility as follows:

\[ U_{\text{lost use}} = L_{\text{max}} \left( 24 - L_{\text{max}} \right) \left( 1 - \frac{\ln(1 + S)}{S} \right) - L_{\text{max}}^* \left( 24 - L_{\text{max}}^* \right) \left( 1 - \frac{\ln(1 + S)}{S} \right) \]

\[ L_{\text{max}}^* = \frac{24\Psi - d}{\Psi} \quad \text{and} \quad L_{\text{max}} = 24 \left( \ln(1 + S)^{\frac{1}{S}} \right) \]

therefore we obtain the following:

\[ U_{\text{lost use}} = \left( 24 \ln(1 + S)^{\frac{1}{S}} \right) \left( \frac{\ln(1 + S)}{S} \right) - \left( 24 - 24\ln(1 + S)^{\frac{1}{S}} \right) \left( \frac{\ln(1 + S)}{S} \right) - \left( 24\Psi - d \right)^{\frac{1}{\Psi}} \left( 24 - 24\Psi - d \right)^{\frac{1}{\Psi}} \]
(6) Now we must also shortly reflect on the other possible strategy, that is, after some accumulation, initiating a commercial venture. This, in formal terms, implies the replacement of one’s occupation rate $\Psi$, which has hitherto been considered constant, with a random variable, that is, an entity which assumes positive and negative values randomly at each time point in accordance with a probability distribution. Although this alteration would lead to a more complicated dynamic form, in substantive terms it would not require us to be occupied with it extensively. MORE ON THIS.

(7) The general expression of the sequence is:

$$S_{t+1} = S_t + d - \Psi \left[ 24 - 24 \left( \ln(1 + S_t) \right) \right].$$

It is clear that if the convergence is attained $S_{t+1} = S_t$ would be true. Consequently we can write $S_{t+1} = S_t = S$. Thus

$$S = S + d - \Psi \left[ 24 - 24 \left( \ln(1 + S) \right) \right],$$

then $d = \Psi \left[ 24 - 24 \left( \ln(1 + S) \right) \right]$,

$$d = 24\Psi \left[ 1 - \frac{\ln(1 + S)}{S} \right]$$

and we have $\frac{d}{24\Psi} = 1 - \frac{\ln(1 + S)}{S}$ and thus

$$\frac{\ln(1 + S)}{S} = 1 - \frac{d}{24\Psi}.$$  

In this expression $\frac{\ln(1 + S)}{S}$ approaches 1 as $S$ approaches zero, and $1 - \frac{d}{24\Psi}$ approaches 1 as $\Psi$ approaches infinity (or $d$ approaches 0).

Therefore $S$ approaches zero as $\Psi$ approaches infinity. [A MORE DETAILED PROOF WHICH ALSO EXPLORES THE OSCILLATIONS]

(8) MORE DYNAMIC MODE IN WHICH COURAGE AND EXPENSES ARE LINKED TO THE CHANGING LEVELS OF SECURITY
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