Research Article

A Philosophical Theory of Quality Time: The Seneca Model

Joao Ricardo Faria[1]

1. Department of Economics, Florida Atlantic University, United States

This paper incorporates Seneca's concept of quality time into the Ramsey model by treating it as a state variable. The resulting framework yields an optimal allocation of time that rises with the utility weight on quality time and falls with its initial stock, impatience, learning costs, and its rate of change. When preferences between quality time and consumption are non-separable, time allocation also increases with consumption. In this case, the Ramsey golden rule no longer holds, optimal consumption, capital, and quality time must be jointly determined—implying that philosophical reflection can shape economic growth, in contrast to Seneca's original skepticism.

Corresponding author: João Ricardo Faria, jfaria@fau.edu

1. Introduction

This paper explores Seneca's reflections on time and the value of life as presented in *On the Shortness of Life*[1]. Central to Seneca's argument is the notion that mere consumer maximization is ultimately wasteful; to live a fulfilling life, one must maximize life itself by prioritizing the effective use of time.:

> "It is not that we have so little time but that we lose so much. Life is long enough and our allotted portion generous enough for our most ambitious projects if we invest it all carefully. But when squandered through luxury and indifference, and spent for no good end, we realize it has gone (...) so it is: the life we receive is not short but we make it so; we are not ill provided but use what we have wastefully"[1].

Seneca's prescription for maximizing life is that one should dedicate every available moment to oneself[1]. This inward focus defines what he terms "quality time." To live optimally through quality time,

Seneca advises embracing philosophy, purging disruptive emotions, and maintaining a tranquil mind[1] [2]. As he famously states, it is only those "who take time for philosophy" who truly live[1].

In this paper, we incorporate the concept of quality time into the Ramsey model to derive its optimal allocation, illustrating how it depends on fundamental economic parameters such as utility preferences, time discounting, and technology[1]. Through this, we develop a theoretical framework of quality time grounded in Seneca's philosophy.

While Seneca's notion of quality time might be loosely associated with the Roman ideal of *Carpe diem* ("seize the day")—popularized by Horace's *Odes* (Book I, XI):

> *sapiās, vīna liquēs, et spatiō brevī*
>
> *spem longam resecēs. Dum loquimur, fūgerit invida*
>
> *aetās: carpe diem, quam minimum crēdula posterō..*[2]

—the two concepts diverge fundamentally. *Carpe diem* promotes impatience and an emphasis on immediate gratification to fully live. In contrast, as our analysis will show, Seneca's optimal quality time decreases with impatience, suggesting a deeper and more reflective engagement with time than mere present-focused urgency.

2. The Seneca model

In the Seneca model, the representative patrician[3] maximizes the value of life through the optimal allocation of time. It modifies the Ramsey model in two issues: 1) time *t* is an explicit variable, and 2) time only enters explicitly as an argument in the instantaneous utility function. Therefore utility *U* is a function of consumption *c* and time *t*, *U(c,t)*, and consumption and time can be complement, substitute or independent of each other: $U_c(c,t) > 0$, $U_t(c,t) > 0, U_{cc}(c,t) < 0, U_{tt}(c,t) < 0, \ U_{ct}(c,t) \gtrless 0$. Therefore, the Seneca model is apparently a non-autonomous version of the Ramsey model[4].

Economic theory relates time to labor supply. Leisure enters in the utility function, and as time is normalized to 1, substituting leisure for 1 minus labor, one can find the optimal labor supply. Becker[3] derives a theory of time allocation by assuming that the household simply trade-off time for money and faces a single budget constraint,

$$\sum_{i=1}^{m} \mathbf{p}_i' \mathbf{x}_i + \mathbf{w}_i' \mathbf{T}_i \leq S$$

Where $\mathbf{x}_i$ is a bundle (quantity vector) of goods; the vector $\mathbf{T}_i$ allows him to distinguish between daytime from nighttime hours, or weekdays from weekends and p and w are prices of goods and times. His model can be decomposed into two stages, first calculating full income S, then maximizing household utility U $[f_1(\mathbf{x}_1,\mathbf{T}_1),...f_m(\mathbf{x}_m, \mathbf{T}_m)]$ under the single budget constraint that total resources do not exceed S (see [4]).

It is important to recognize that Seneca's concept of time reflects the experience of a Roman patrician—pure leisure time, since all labor is performed by slaves. Consequently, for Seneca, the optimal allocation of time is entirely disconnected from labor supply. The ideal use of leisure is for a person to dedicate every available moment to themselves, which constitutes what he calls quality time. According to Seneca, the highest value of quality time lies in its use for philosophical reflection.

However, Seneca's view assumes that one can freely control and manage time to use it optimally, a notion that poses challenges when integrating his ideas into the Ramsey model. Specifically, treating time as a control variable within non-autonomous optimal control frameworks appears conceptually problematic.

Fortunately, existing literature offers approaches to address this issue. In time-optimal control problems (e.g., [5]), the goal is to reach a predetermined target in the least possible time, yet time itself is neither a control nor a state variable. Vind[6] and Arrow and Kurz[7] introduce the concept of jumps in state variables, creating an artificial time index that allows natural time to pause during these jumps while artificial time continues to advance. Within this framework, natural time effectively becomes a new state variable, an approach further elaborated by Kamien and Schwartz[8] and Léonard and Van Long[9].

Seneca assumes that time spent on oneself is the best use of time, this we call quality time Q. Quality time can be thought of as an index for artificial time. Quality time changes along real time as:

$$\dot{Q} = q \tag{1}$$

Where parameter q is the time variation of quality time and lies in the closed interval: $0 \leq q \leq \bar{q}$. Integration of Eq. (1) shows how real time t relates to quality time:

$$Q = qt + Q_0 \rightarrow q = \frac{Q - Q_0}{t} \tag{2}$$

Where Q_0 is the initial quality time and Q is the actual quality time. Both equations make explicit that quality time evolves, which means that the representative patrician learns how to live in a better way.

Equation (2) helps us realize that real time t can be expressed as a function of q and Q, and using Eq. (1), one can see that t depends on $\dot{Q}$ and Q. Replacing t into the instantaneous utility function allows us to

rewrite it as $U(c,\ t) =\ U\left(c,\ Q,\ \dot{Q}\ \right) = U(c, Q,\ q)$.

Consequently, introducing these ideas into the Ramsey framework yields the Seneca model, the representative patrician solves the following problem

$$Max \int U(c,\ Q, q\ )e^{-\theta t} dt \qquad (3)$$

Subject to Eq. (1) and

$$\dot{k} = f(k) - c - (n+\delta)k \qquad (4)$$

Where c is consumption, k is capital, output accruing to the patrician net from his expenses with slaves and inputs is given by $f(k)$, i.e., a neoclassical production function [concave, satisfying Inada conditions], all in per capita terms; n is the population growth rate, δ is the depreciation rate and θ is the rate of time preference [the subjective discount rate][5].

In the Seneca model the state variables are k and Q, and the control variables are c and q. The present value Hamiltonian function, H, of the Seneca model is:

$$H = U(c,\ Q,\ q\ )e^{-\theta t} +\ \gamma\,[f(k) - c - nk] + \mu q \qquad (5)$$

Where γ is the shadow price of k and μ is the shadow price of Q.

To solve the model and obtain crisp conditions we need to further elaborate on it. Seneca recommends people to philosophize P, but people need to learn to philosophize, spend quality time on it, which has a cost, assumed to be linear in q: $P(q)=pq$. This allows us to rewrite the instantaneous utility function as: $U(c, Q,\ q) = v(c, Q) - pq$. In what follows we provide solutions for the Seneca model for two different functions $v(c, Q)$, one separable between c and Q, and another non–separable.

Note that with the above considerations the Hamiltonian in Eq. (5) is linear in the control q. The optimality conditions are:

$$v_c(c,\ Q)e^{-\theta t} =\ \gamma \qquad (6)$$
$$-\dot{\gamma} = H_k = \gamma(f_k(k) - \theta - n - \delta) \qquad (7)$$
$$-\dot{\mu} = H_Q = v_Q(c,\ Q)e^{-\theta t} \qquad (8)$$

The optimal value of q depends on the sign of the coefficient of q in H.

   i. If $\mu > pe^{-\theta t}$ then $q = \overline{q}$ and $Q = \overline{q}t + B$ where B is a constant.

   ii. If $\mu < pe^{-\theta t}$ then $q = 0$ and $Q = A$ where A is a constant.

   iii. If $\mu = pe^{-\theta t}$ then deriving it with respect to time and substituting into Eq. (8) yields: $v_Q(c, Q) = \theta p$.

Let us ignore corner solutions $q = 0$ and $q = \overline{q}$ and concentrate in case q lies in the open interval $(0, \overline{q})$. Consider the expression $v_Q(c, Q) = \theta p$, it has different implications for the determination of optimal quality time when considering whether function $v(c, Q)$ is separable or not between c and Q. Let us study both cases:

1. Considering a separable function as $v(c, Q) = a \ln Q + (1 - a) \ln c$, then we have:

$$v_Q(c, Q) = \frac{a}{Q} = \theta p \rightarrow Q^* = \frac{a}{\theta p} \tag{9}$$

The optimal quality time Q^* grows with the utility parameter of quality time a, and decreases with impatience θ and marginal learning cost of philosophy p. Then using Eq. (2) one derives optimal allocation of real time that yields the best value of life:

$$t^* = \frac{1}{q}\left(\frac{a}{\theta p} - Q_0\right) \tag{10}$$

The life lessons from Seneca are that the utility parameter of quality time a is good, and initial level of quality life Q_0, impatience θ, marginal learning cost of philosophy p, and time variation of quality time q, are bad[6].

2. Considering a non-separable function as $v(c, Q) = Q^a c^{1-a}$, then we have:

$$v_Q(c, Q) = a\left(\frac{c}{Q}\right)^{1-a} = \theta p \rightarrow Q = c\left(\frac{a}{\theta p}\right)^{\frac{1}{1-a}} \tag{11}$$

Note that the main difference between (9) and (11) is that now quality time also depends positively on consumption, the parameters a, θ, p, have the same impact as in (9). Using Eq. (2) yields:

$$t = \frac{1}{q}\left(c\left(\frac{a}{\theta p}\right)^{\frac{1}{1-a}} - Q_0\right) \tag{12}$$

In case of (12) the allocation of real time depends positively on consumption, while the parameters a, θ, p, Q_0, q, have the same impact as in (10).

It is crucial to highlight that the non-separability of the utility function significantly influences the determination of optimal consumption *c* and capital *k*. When the utility function *v(c,Q)* is separable, the Seneca model aligns closely with the classic Ramsey framework: the *modified golden rule* (MGR) uniquely determines the optimal capital stock *k*∗ [Eq. (7)], after which optimal consumption *c*∗ can be derived [Eq. (4)]. However, when *v(c,Q)* is non-separable, the optimal values of quality time Q, consumption c, and

capital k must be solved simultaneously. This simultaneity means the MGR—central to the Ramsey model —no longer applies.

A striking implication of this finding is that philosophizing, represented by quality time, can influence income, capital accumulation, and economic growth. This insight stands in contrast to Seneca's own views on knowledge and technological progress. As Segal[10] observes, Seneca regarded invention, mechanical skill, and economic growth as products of human folly rather than wisdom, asserting that "the path of wisdom and happiness lies elsewhere" (see also [11])[7].

3. Concluding remarks

Seneca's reflections on the use of time inspire a theory of quality time and its optimal allocation. For Seneca, life's ultimate goal is not the maximization of consumption but the maximization of life itself through the wise use of time. The individual should dedicate every available moment to self-reflection and personal growth—what defines quality time.

This paper incorporates quality time as an additional state variable within the Ramsey model to formalize Seneca's theory. The resulting optimality conditions establish a "Seneca equilibrium," which characterizes the optimal use of time. Under a separable utility function, the optimal allocation of time rises with the utility weight on quality time and declines with the initial level of quality time, impatience, marginal philosophical learning costs, and changes in quality time over time. This equilibrium remains consistent with the Ramsey model, as the modified golden rule holds.

In contrast, when utility is non-separable between quality time and consumption, optimal time allocation also positively depends on consumption. In this scenario, the modified golden rule breaks down, and the optimal consumption, capital stock, and quality time must be jointly determined. Surprisingly, this suggests that philosophizing can influence economic growth and capital accumulation, challenging Seneca's original skepticism toward the economic benefits of knowledge and progress.

Footnotes

[1] Our model is in line with the approach of analyzing Philosophical ideas through growth models, see Faria[12] on Spinoza and William James and Fagan et al.[13] on Kant. For less technical and more general approaches see, among others, Devletoglou[14].

2 In the A.S. Kline[15] translation: "Be wise, and mix the wine, since time [LIFE] is short: limit that far-reaching hope. The envious moment is flying now, now, while we're speaking: Seize the day, place in the hours that come as little faith as you can".

3 Note, this is not a yeoman model as the typical Ramsey model, so there is no representative agent. Rome had very distinct social classes: patricians, plebeians and slaves. Seneca was known to his contemporaries as "super-rich Seneca" (*Seneca praedives*, as Martial calls him), see Wilson[16]. Wilson[17] calls him the fat-cat philosopher.

4 We will not delve into the literature of utility function and speculate on this Seneca specification. See Fumagalli (2013) for a discussion of three notions of utility: decision utility[18][19], experienced utility[20], and neural utility[21].

5 As this is a patrician model, so per capita terms refer to the dynastic patrician family. Introduction of slave labor S changes the model slightly, instead of (4) assume: $\dot{k} = f(k, S) - c - (n + \delta)k - BS$, where B is the subsistence level of slaves. Provided that slave owners do not derive direct utility from S, and $f_S(k, S) > 0; f_{SS}(k, S) < 0; f_{kS}(k, S) = 0$, all results obtained in this paper hold even assuming slave labor.

6 An intriguing research agenda lies here linking Seneca's findings with the concept of happiness, see Kenny[22].

7 This view may contrast with Cicero's, see Vivenza[23] study that shows that Cicero's synthesis of life in society results from various kinds of exchange. Prendergast[24] argues that this stoic view of Seneca is one that Mandeville sought to controvert.

References

1. a, b, c, d, e*Seneca (1958). The Stoic Philosophy of Seneca. Translated by Hadas M. New York: Norton.*

2. ^*Groenendijk L, de Ruyter D (2009). "Learning from Seneca: A Stoic Perspective on the Art of Living and Education." Ethics Educ. 4:81–92.*

3. ^*Becker G (1965). "A Theory of the Allocation of Time." Econ J. 75:493–517.*

4. ^*Chiappori P-A, Lewbel A (2015). "Gary Becker's A Theory of the Allocation of Time." Econ J. 125:410–442.*

5. ^*Chiang AC (1992). Elements of Dynamic Optimization. New York: McGraw-Hill.*

6. ^*Vind K (1967). "Control Systems with Jumps in the State Variables." Econometrica. 35:273–277.*

7. ^*Arrow K, Kurz M (1970). Public Investment, the Rate of Return, and Optimal Fiscal Policy. Baltimore: Johns Hopkins University Press.*

8. ^*Kamien MI, Schwartz NL (1991). Dynamic Optimization. Amsterdam: North-Holland.*

9. ^*Léonard D, Van Long N (1992). Optimal Control Theory and Static Optimization in Economics. Cambridge: Cambridge University Press.*

10. ^*Segal J (1991). "Alternative Conceptions of the Economic Realm." In: Coughlin RM, ed. Morality, Rationality, and Efficiency. New York: M.E. Sharpe. pp. 287–306.*

11. ^*Baloglou C (2012). "The Tradition of Economic Thought in the Mediterranean World from the Ancient Classical Times Through the Hellenistic Times Until the Byzantine Times and Arab-Islamic World." In: Backhaus JG, ed. Handbook of the History of Economic Thought. New York: Springer. pp.7–92.*

12. ^*Faria JR (2011). "Emotions, Happiness and Growth: Spinoza, James and Ramsey." Econ Issues. 16:81–92.*

13. ^*Fagan G, Gaspar V, McAdam P (2016). "Immanuel Kant and Endogenous Growth Theory." Scott J Polit Econ. 63:427–442.*

14. ^*Devletoglou NE (1969). "The Economic Philosophy of Montesquieu." Kyklos. 22:530–541.*

15. ^*Horace (2003). The Odes. Translated by Kline AS.*

16. ^*Wilson E (2014). The Greatest Empire: A Life of Seneca. Oxford: Oxford University Press.*

17. ^*Wilson E (2015). "Seneca, the Fat-Cat Philosopher." The Guardian. https://www.theguardian.com/books/2015/mar/27/seneca-fat-cat-philosopher-emily-wilson-a-life.*

18. ^*Broome J (1991). "Utility." Econ Philos. 7:1–12.*

19. ^*Hausman DM, McPherson MS (2009). "Preference Satisfaction and Welfare Economics." Econ Philos. 25:1–25.*

20. ^*Kahneman D (2000). "Experienced Utility and Objective Happiness: A Moment-Based Approach." In: Tversky A, Kahneman D, ed. Choices, Values, and Frames. New York: Cambridge University Press and Russell Sage Foundation. ch. 37.*

21. ^*Camerer CF (2007). "Neuroeconomics: Using Neuroscience to Make Economic Predictions." Econ J. 117:C26–C42.*

22. ^*Kenny C (2006). "Were People in the Past Poor and Miserable?" Kyklos. 59:275–306.*

23. ^*Vivenza G (2004). "Renaissance Cicero. The 'Economic' Virtues of De Officiis I, 22 in Some Sixteenth Century Commentaries." Eur J Hist Econ Thought. 11:507–523.*

24. ^Prendergast R (2014). "Knowledge, Innovation and Emulation in the Evolutionary Thought of Bernard Ma ndeville." *Camb J Econ.* 38:87–107.

Declarations