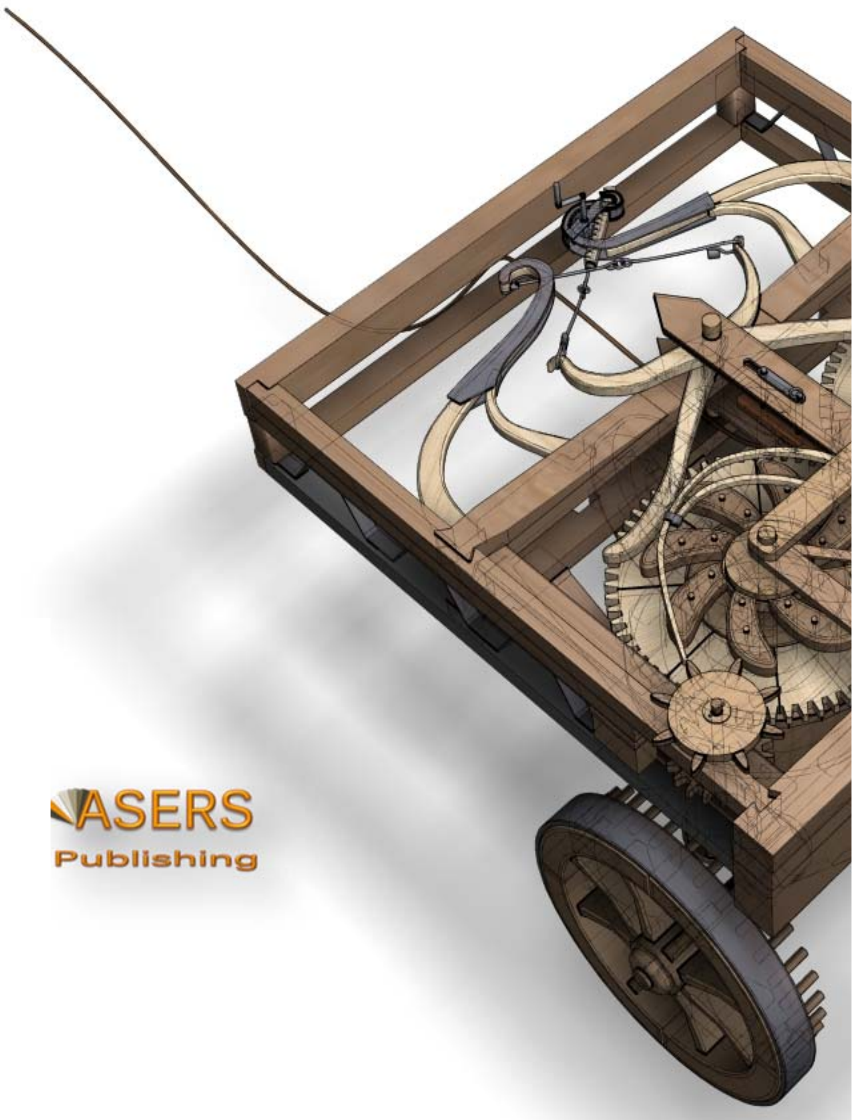
Theoretical and Practical Research in Economic Fields



ASERS Publishing

Biannually
Volume XI
Issue 2(22)
Winter 2020

ISSN 2068 – 7710
Journal **DOI**
https://doi.org/10.14505/tpref

ASERS Publishing is an advanced e-publisher struggling to bring further worldwide learning, knowledge and research. This transformative mission is realized through our commitment to innovation and enterprise, placing us at the cutting-edge of electronic delivery in a world that increasingly considers the dominance of digital content and networked access not only to books and journals but to a whole range of other pedagogic services.

In both books and journals, ASERS Publishing is a hallmark of the finest scholarly publishing and cutting-edge research, maintained by our commitment to rigorous peer-review process.

Using pioneer developing technologies, ASERS Publishing keeps pace with the rapid changes in the e-publishing market.

ASERS Publishing is committed to providing customers with the information they want, when they want and how they want it. To serve this purpose, ASERS publishing offers digital Higher Education materials from its journals, courses and scientific books, in a proven way in order to engage the academic society from the entire world.

Volume XI
Issue 1(22)
Winter 2020

ASERS Publishing
http://www.aserspublishing,eu/tpref
ISSN 2068 – 7710
Journal's Issue **DOI**:
https://doi.org/10.14505/tpref.v11.2(22).00

Table of Contents:

Call for Papers
Volume XII, Issue 1(23), Summer 2021
Theoretical and Practical Research in Economic Fields

Many economists today are concerned by the proliferation of journals and the concomitant labyrinth of research to be conquered in order to reach the specific information they require. To combat this tendency, **Theoretical and Practical Research in Economic Fields** has been conceived and designed outside the realm of the traditional economics journal. It consists of concise communications that provide a means of rapid and efficient dissemination of new results, models and methods in all fields of economic research.

Theoretical and Practical Research in Economic Fields publishes original articles in all branches of economics – theoretical and empirical, abstract and applied, providing wide-ranging coverage across the subject area.

Journal promotes research that aim at the unification of the theoretical-quantitative and the empirical-quantitative approach to economic problems and that are penetrated by constructive and rigorous thinking. It explores a unique range of topics from the frontier of theoretical developments in many new and important areas, to research on current and applied economic problems, to methodologically innovative, theoretical and applied studies in economics. The interaction between empirical work and economic policy is an important feature of the journal.

Theoretical and Practical Research in Economic Fields, starting with its first issue, it is indexed in EconLit, RePEC, ProQuest, Cabell Directories and CEEOL databases.

The primary aim of the Journal has been and remains the provision of a forum for the dissemination of a variety of international issues, empirical research and other matters of interest to researchers and practitioners in a diversity of subject areas linked to the broad theme of economic sciences.

All the papers will be first considered by the Editors for general relevance, originality and significance. If accepted for review, papers will then be subject to double blind peer review.

Invited manuscripts will be due till November10th, 2020, and shall go through the usual, albeit somewhat expedited, refereeing process.

Deadline for submission of proposals: 20th of May 2021

Expected publication date: June 2021

Website: http://journals.aserspublishing.eu/tpref

E-mail: tpref@aserspublishing.eu

To prepare your paper for submission, please see full author guidelines in the following file: https://journals.aserspublishing.eu/tpref/about/ on our site.

DOI: https://.doi.org/10.14505/tpref.v11.2(22).05

AGGREGATION WITH A LABOUR-SUPPLY DECISION AND HABITS IN CONSUMPTION

Aleksandar VASILEV
University of Lincoln, UK
alvasilev@yahoo.com

Suggested Citation:
Vasilev, A. (2020). Aggregation with a labour-supply decision and habits in consumption. *Theoretical and Practical Research in Economic Field*, (Volume XI, Winter 2020), 2(22): 117- 119. DOI:10.14505/tpref.v11.2(22).05
Article's History:
Received 2nd of July 2020; *Revised* 27th of August 2020; *Accepted* 1st of October 2020; *Published* of 22nd of December 2020.

Abstract: *The objective of this paper is to study the problem of a discrete labour supply decision in an artificial economy where the households feature habits in consumption. We demonstrate how lotteries a la Rogerson (1988) can be used to make consumption choices into convex sets, and then produce an equivalent aggregate household with convex labour supply. The presence of consumption habits does not affect the main results of the paper. As in Hansen (1985) and Rogerson (1988) and no consumption habits, with a discrete labor supply decision at individual level, the elasticity of hours worked at the aggregate level increases from one to an infinitely large value.*

Keywords: aggregation; indivisible labour; consumption habits.

JEL Classification: E10; J22; J46.

Introduction and Motivation

The objective of this paper is to study the problem of a discrete labour supply decision in an artificial economy where the households feature habits in consumption. We demonstrate how lotteries a la Rogerson (1988) can be used to make consumption choices into convex sets, and then produce an equivalent aggregate household with convex labour supply. The presence of consumption habits does not affect the main results of the paper. As in Hansen (1985) and Rogerson (1988) and no consumption habits, with a discrete labor supply decision at individual level, the elasticity of hours worked at the aggregate level increases from one to an infinitely large value.

1. Model Setup

The artificial economy is a static setup without physical capital; the households face a non-convex labour supply decision. The focus of the paper is on a one-period framework, the model economy abstracts away from additional complications like technological progress, population growth and uncertainty. It will be assumed in the exposition below that there is a continuum of identic alone-member households. Households will be indexed by index i and distributed uniformly on the unit interval. In the exposition below, we will use small case letters to denote individual variables and suppress the index I to economize on notation.

1.1. Model Description

Each household will be assumed to maximize a utility function of the form:

$$U(c,l) = \ln(c - \phi c_{-1}) + \alpha \ln l, \qquad 1.1$$

Where c denotes current consumption of output, c_{-1} is past consumption (taken as given), $0 < \phi < 1$ denotes the persistence in consumption, or the strength of the consumptionhabits; l is the leisure enjoyed by each individual household, and $\alpha > 0$ is the relative weight attached to utility of leisure. Each household is endowed with a time endowment of unity, which can be split between hours worked, h, and leisure, so that

$$h + l = 1. \quad 1.2$$

The households make a discrete labor supply choice: whether to work full-time, or not at all. In other words, $h \in \{0; \bar{h}\}$ and 0<$\bar{h} < 1$. The hourly wage rate is w. Finally, the households own the representative firm, and are entitled an equal share of the profit (π).

The household that decides to work full-time sets $h = \bar{h}$ and enjoys

$$U^w = \ln(w\bar{h} + \pi - \phi c_{-1}) + \alpha \ln(1 - \bar{h}), \quad 1.3$$

while a household that decides not to work, sets $h = 0$ and enjoys

$$U^u = \ln(\pi - \phi c_{-1}) + \alpha \ln(1) = \ln(\pi - \phi c_{-1}). \quad 1.4$$

1.2. Stand-in Firm

There is a representative firm in the model economy, which produces a homogeneous final product using a production function that requires labor H as the only input. For simplicity, output price will be normalized to unity. The production function f(H) features decreasing returns to scale: $f'(H) > 0, f''(H) < 0, f'(0) = \infty, f'(\bar{h}) = 0$. The representative firm acts competitively by taking the wage rate*w*as given and chooses *H* to maximize profit:

$$\pi = f(H) - wH \text{ s.t. } 0 \leq H \leq \bar{h} \quad 1.5$$

In equilibrium, there will be positive profit, which follows from the assumptions imposed on the production function.

1.3. Decentralized Competitive Equilibrium (DCE): Definition

A DCE is defined by allocations $\{c^w, c^u, c_{-1}, h\}$, wage rate $\{w\}$, aggregate profit ($\pi = \Pi$)s.t. (1) all households maximize utility; (2) the stand-in firm maximizes profit; (3) all markets clear.

2. Characterization of the DCE and Derivation of the Aggregate Utility Function

In this section it will be shown that in the DCE we defined above, if it exists, only some of the households will be employed and work full-time, while the rest will optimally choose to be unemployed. Following the arguments in Rogerson (1988) and Hansen (1985), it can be established that the polar case in which either every household choosing the same - working, or does not, cannot not be equilibrium outcomes. Therefore, in equilibrium only some of the agents in the economy will be working, while the rest will not. Denote this mass of employed by λ, and the mass of unemployed by $1 - \lambda$. Workers will receive consumption c^m, while those staying unemployed will consume c^u. Alternatively, the proportion$\lambda$of individuals chosen for work can be interpreted also as the probability of being chosen to work: This probability will be endogenously determined, as workers would optimally balance at the margin between the net benefit from working vs leisure. Eventually, and independently from the employment outcome, it turns out that every household enjoys the same utility level. Thus, in equilibrium $H = \lambda\bar{h}$.

From the firm's point of view then the wage is set equal to:

$$w = f'(\lambda\bar{h}). \quad 2.1$$

Firm's profit is then

$$\Pi = f(\lambda\bar{h}) - f'(\lambda\bar{h})\lambda\bar{h} > 0, \quad 2.2$$

which follows from the decreasing returns to scale assumption imposed on the production function.

Next, to prove that the characterized DCE actually exists, it will be sufficient to show the existence of a unique value for λ in the unit interval consistent with the fact that in equilibrium utility isthe same for all households. In particular, it is trivial to show that everyone working (λ= 1) is not an equilibrium, since then w = 0. Next, from the ex-ante symmetry assumption imposed on all individual households in the model, final consumption would be the same for both the workers and those not selected for work, while the latter would enjoy higher utility out of leisure(holding *h* fixed), hence there is no benefit of working. Similarly, nobody working in the market sector (*h*= 0) is not an equilibrium outcome either, since the firm would then offer a very high wage for the first unit of labor supplied, and then a marginal worker could increase his/her utility a lot by taking a full-time job.

Thus, if there is a DCE, then it must be that not all households would receive the same consumption bundle. If $0 < \lambda < 1$ is an equilibrium, then total utility for households that work should equal to the utility of households that do not work any hours. This equation is monotone in λ, as the utility function is a sumof monotone functions, and we can explore the behavior of that function as we let λ varyin the unit interval: As λ approaches zero, the left-hand-side dominates (utility of working is higher),while when λ approaches one, the right-hand-side dominates (utility of not working is higher), where the results follow from the concavity of the utility functions and the production technologies. Next, from the continuity and the monotonicity of those two functions, it follows that there should be a unique $\lambda \in (0,1)$, which is consistent with the DCE. Finally, let c^{m*} and c^{u*}denote the equilibrium consumption allocations of the individuals selected for work, and those who will not work, respectively.

However, given the indivisibility of the labor supply in the market sector, the equilibrium allocation obtained above is not Pareto optimal, as demonstrated in Rogerson (1988). More specifically, a social planner (SP) could make everyone better off by using an employment lottery: in the first stage and choosing the fraction$\lambda$of individual households to work in the market sector and give everyone consumption$\lambda c^{m*} + (1-\lambda)c^{u*}$. In order to show this, we need to (i) check that such an allocation is feasible - which is trivial as total hours and total consumption are identical to the corresponding individual equilibrium values, and (ii) that it provides a higher level of total utility. Showing that the new allocation - which is independent of a household's employment status - makes households better off, is also easy; it generates strictly higher utility on average, where the strict inequality follows from the convexity of the production function and the concavity of the logarithmic function. Thus, the SP is indeed giving in expected utility terms an allocation that is an improvement over the initial equilibrium allocation. If households can pool income together and doing so, they will be able to equalize consumption across states, i.e. $c = c^{m*} = c^{u*}$:

$$\ln(c - \phi c_{-1}) + \lambda\alpha \ln(1 - \bar{h}) \tag{2.3}$$

Observing that for the aggregate household $H = \lambda\bar{h}$, substituting the expression in the aggregate utility above and rearranging terms yields

$$\ln(c - \phi c_{-1}) + AH, \tag{2.4}$$

where

$$A = \frac{\alpha \ln(1-\bar{h})}{\bar{h}} < 0 \text{ as } \ln\left(1 - \bar{h}\right) < 0 \tag{2.5}$$

The resulting aggregate utility function is of an interesting and novel form. At the aggregate, the representative agent obtained from the aggregation features convex preferences of work in terms of aggregate hours, as compared to the individual household, which was faces with a discrete labour choice. Interestingly, the result is not affected in any major way by the presence of consumption habits.

Conclusion

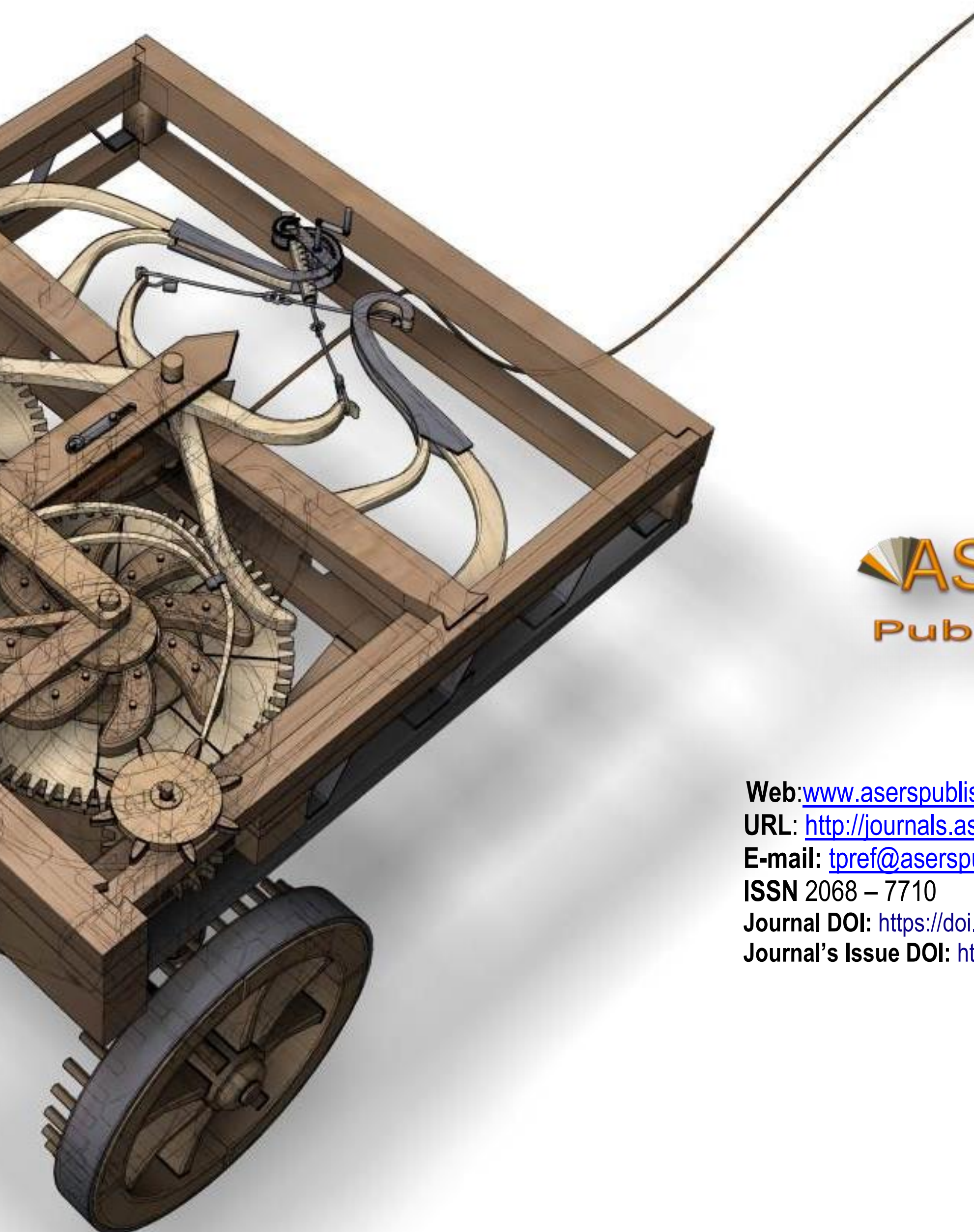
This paper studies the problem of a discrete labour supply decision in an artificial economy where the households feature habits in consumption. We demonstrate how lotteries a la Rogerson (1988) can be used to make consumption choices into convex sets, and then produce an equivalent aggregate household with convex labour supply. The presence of consumption habits does not affect the main results of the paper. As in Hansen (1985) and Rogerson (1988) and no consumption habits, with a discrete labor supply decision at individual level, the elasticity of hours worked at the aggregate level increases from one to an infinitely large value.

References

[1] Hansen, G. 1985. Indivisible labor and the business cycle. *Journal of Monetary Economics* 16: 309-327. DOI:https://doi.org/10.1016/0304-3932(85)90039-X

[2] Rogerson, R. 1988. Indivisible labor, lotteries, and equilibrium. *Journal of Monetary Economics* 21: 3-16. DOI:https://doi.org/10.1016/0304-3932(88)90042-6

ASERS



ASERS Publishing

Web:www.aserspublishing.eu
URL: http://journals.aserspublishing.eu/tpref
E-mail: tpref@aserspublishing.eu
ISSN 2068 – 7710
Journal DOI: https://doi.org/10.14505/tpref
Journal's Issue DOI: https://doi.org/10.14505/tpref.v11.2(22).00