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Analysis

An Equilibrium Framework for the Analysis of a Degrowth Society With Asymmetric Agents, Sharing and Basic Income

Tiina Heikkinen

University of Helsinki, Finland

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ABSTRACT

This paper presents a novel equilibrium framework, allowing for asymmetries in the initial wealth allocations, labour supplies as well as in the preferences of optimizing agents. The framework is applied to study a degrowth society where a subset of agents voluntarily limit their material consumption, thereby complying with voluntary simplicity (VS). At micro-level, the utility-maximization problems of asymmetric agents are formulated and solved for optimal labour supplies. New macro-level equilibrium solutions, accounting for wealth inequality, are presented based on different labour supply models. The equilibrium welfare is measured using a Bernoully-Nash aggregate. An increase in the share of the VS-type agents implies a degrowth transition to a lower level of average consumption. Analysis of the equilibrium framework shows that degrowth, whereby average market-based consumption falls, improves the equilibrium welfare, assuming the VS-type agents have sufficient resources, enabling a reduction in labour supplies. Sharing, collaborative consumption and basic income support welfare-increasing degrowth. Any growing economy can eventually reach the size at which degrowth would improve the welfare. Simulations suggest that degrowth can also yield a Pareto-improvement in welfare.

1. Introduction

Since 1970s, the annual global consumption has exceeded the planetary capacity of regenerating natural resources and absorbing emissions; the global ecological footprint, measuring human demand on nature, relative to the finite biocapacity has reached 1.6 (see Global Footprint Network). The size of the economy strongly affects its emissions and ecological footprint (Victor, 2012). This makes the compatibility of economic growth with remaining within the biophysical boundaries questionable. Degrowth is a paradigm and also a movement, seeking welfare-improving alternatives to continued growth (Latouche, 2009; Kallis, 2011, 2013). Schneider et al. (2010) define degrowth as "an equitable downscaling of production and consumption that increases human well-being". Other main alternatives in sustainability science include circular economy, ecological modernization and green growth, based on the belief that technology enables continued growth, see (Asara et al., 2015).

This paper presents an equilibrium framework for the study of a degrowth society with asymmetric agents (individuals). Any subset of the agents may impose voluntary restrictions on consumption, characterizing voluntary simplicity (VS) as defined in (Elgin and Mitchell, 1977; Shi, 2007; Alexander and Ussher, 2012). According to Kallis (2013), VS is necessary, yet not sufficient, for degrowth; furthermore, voluntary restrictions can be much more effective in reducing CO_2 emissions than common governmental strategies (Wynes and Nicholas, 2017). To improve the understanding of the role of VS in degrowth, this paper studies the dynamic utility-optimization problem of the VS-type agents at micro-level, while using the optimization outcome in the definition and analysis of macro-level equilibria in a degrowth society. The proposed equilibrium framework encompasses the standard growth model as a special case.

Most macroeconomic models are based on the representative agent model with identical agents. Following this approach, Bilancini and D'Alessandro (2012), Victor (2012), and Jackson et al. (2014) study degrowth using macroeconomic equilibrium models, omitting VS and asymmetries across agents. Degrowth via VS has been studied in Heikkinen (2015), applying a macroeconomic model with heterogeneous preferences while abstracting from asymmetries in both wealth allocations and labour supplies (the labour supply of the VS-type agents was assumed to follow the average). This paper develops an extended general equilibrium framework for the study of a degrowth society with VS, by making the following extensions:

- Different agents may have different initial wealth allocations;
- The dynamic utility maximization problem of the VS-type agents is formulated and solved for the optimal labour supplies;
- Equilibrium solutions, accounting for wealth inequality, are presented for different labour supply models;
- Welfare analysis is decomposed across consumer classes and time.

E-mail address: tiina.m.heikkinen@elisanet.fi.

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A degrowth transition reduces the size of the traditional economy. Degrowth may originate from a change in the distribution of the agents whereby the share of the VS-type agents increases. Brown and Vergragt (2016) expect a cultural shift towards less consumerist lifestyles to be driven by the individual pursuit of wellbeing. Welfare-increasing degrowth via VS may reflect such cultural shift. Individual wellbeing in this paper is measured in terms of a utility function similarly as in Bilancini and D'Alessandro (2012). The utility model accounts for social capital, individual leisure and consumption as well as for agent-specific restrictions on consumption. The aggregate welfare is defined using a Bernoully-Nash aggregate (Fankhauser et al., 1997), corresponding to a geometric average of the individual utilities.

Sharing and collaborative consumption (CC) are non-ownership models of utilizing goods and services. Belk (2014) defines CC as the coordinated acquisition and distribution of resources for either monetary or non-monetary compensation, encompassing bartering, trading and swapping. CC includes access-based sharing, replacing buying and ownership. VS in terms of lower monetary expenditure on consumption can reflect CC based on non-monetary exchange. Degrowth, broadly defined, encompasses a transition towards a less consumerist sharing economy based on CC.

The proposed framework is applied to address the role of basic income, BI (see BIEN and Widerquist et al., 2013), to equilibrium and welfare in a degrowth society with asymmetric agents. The main findings from the simulations can be summarized as follows:

1. Degrowth increases the welfare in terms of a Bernoully-Nash aggregate, even when permitting moderate asymmetries in wealth allocations;
2. Degrowth can yield a Pareto-improvement in welfare when VS-type agents have sufficient resources, enabling a reduction in labour supply;
3. Collaborative consumption and BI support welfare-increasing degrowth.

The distribution of the resources affects the relation between degrowth and welfare. For the relation to be positive, each agent should have the option to choose a lower impact lifestyle with a lower labour supply (not just a lower consumption). Rather than VS, Kallis (2013) prefers to talk about "the right to simplicity", meaning the "safeguarding of a set of conditions that make the choice of a simpler living possible and hence facilitate adaptation to climate change". By making the distribution of the resources more equal, both CC and BI support welfare-improving degrowth. Assuming both resources and working hours are equally distributed, degrowth to a lower level of average consumption improves welfare via increased average leisure (Heikkinen, 2015). This is in line with Kallis (2013), stating that "the degrowth proposal calls for a reduction of working hours in the paid sector", substituted by increased activity in the self-employed or unpaid sectors. The coexistence of a high standard of life with a 15-hour workweek was predicted to take place by 2030 already by Keynes (1930) who (correctly) forecasted a large increase in productivity.

There is an ongoing debate on whether basic income should be seen as a promoter of growth or degrowth. According to Van Parjis (1992), the crucial argument for BI must be that basic income is growth-friendly (in order to support a maximal BI). However, the latter argument need not be true in a degrowth society, consisting of asymmetric agents with different valuations. More recently, Van Parjis (2013) defends BI as a means of supporting the freedom of choosing between different lifestyles. Accounting for asymmetric agents, the analysis in this paper shows that BI supports welfare-improving degrowth by supporting the freedom to choose between VS and standard consumerist lifestyles; by reducing the impact of an uneven distribution of the initial allocations on the labour supplies, BI improves the potential of degrowth to improve both the individual and the social welfare.

The outline is as follows. Section 2 introduces the dynamic equilibrium model with asymmetric agents. The utility model and its solution is presented for two types of agents: VS-type agents, voluntarily limiting their material consumption and standard-type agents, conforming to the standard axiom of insatiability. Section 3 presents equilibrium solutions based on different labour supply models. In Section 4 the relation between degrowth and the equilibrium welfare is studied using the different equilibrium solutions. Numerical analysis demonstrates that both CC and BI can support welfare-improving degrowth under wealth inequality. A simplified model, abstracting from the variability of the labour supplies, is applied to analyse sufficient conditions for a positive relation between degrowth and welfare. Section 5 presents a disaggregated welfare analysis, decomposing the post-transition utilities across consumer classes and time. The stability of the equilibrium consumption to degrowth is also addressed, accounting for the intertemporal constraints (preventing living on debt).

2. A Dynamic Model With Optimizing Heterogeneous Agents

As a framework for the analysis of autonomous degrowth driven at micro-level by optimizing agents, an equilibrium model with asymmetric agents in terms of preferences, wealth allocations and labour supplies is presented below. In the special case without social capital and VS, the model reduces to a standard growth model with identical agents.

Given a constant population, consider a model with N different classes of households (consumers). Let p_j, $j = 1,\ldots,N$ denote the share of agents in class $j = 1,\ldots,N$. The utility function of agents in class j is defined as (Heikkinen, 2015):

$$u_j(c_j, \bar{c}, l_j, V) = \begin{cases} \dfrac{(c_j \bar{c}^{\gamma_j} l_j^{\phi} V^{\mu})^{1-\theta}}{1-\theta}, \ j = 1,\ldots,N, & \text{if} \quad c_j \le c_{j,\max}, \\ \dfrac{(c_{j,\max} \bar{c}^{\gamma_j} l_j^{\phi} V^{\mu})^{1-\theta}}{1-\theta}, \ j = 1,\ldots,N, & \text{if} \quad c_j > c_{j,\max}, \end{cases} \tag{1}$$

where c_j is the consumption of each agent of type j, $\bar{c} = \prod_j c_j^{p_j}$ is the geometric average consumption, $l_j \in [0,1]$ denotes the leisure of agents in class j, V is the stock of social capital, $\phi > 0$, $\mu \ge 0$ are utility parameters associated with leisure and social capital, respectively, and $\theta > 1$ denotes the inverse of the intertemporal elasticity of substitution; the preference for material status competition is measured by γ_j, denoting the consumption externality parameter of agents in class j. An upper bound for the consumption of agents in class j is defined by $c_{j,\max}$. The agents following voluntary simplicity (VS) limit their material consumption (or individual ecological footprint) as a free choice (Elgin and Mitchell, 1977). Accordingly, the VS-type agents belong to the set

$K = \{n \in \{1, ..,N\} | c_{n,\max} < \infty\}$.

Unless otherwise stated, c_n, $n \in K$ is defined in terms of market-based monetary consumption, omitting the (subjective) value of non-monetary collaborative consumption. VS may partly reflect a more active role of the consumers in a sharing economy with CC and local (non-market) production. According to Shi (2007), VS also means committing to conscientious rather than conspicuous consumption. Formally, this means that the VS-type agents are less affected by negative consumption externalities:

Assumption 1. Let $\gamma_n > \gamma_j \ \forall j \notin K$, $n \in K$ where for agents of type $j \notin K$, $\gamma_j < 0$ due to negative consumption externalities.

Denoting the discount rate by $\rho > 0$ and the time index by t, the objective of agents in class j can be stated using Eq. (1) as:

$$\max \int_0^{\infty} u_j(c_j(t)) e^{-\rho t} dt, \tag{2}$$

taking the social capital V as given. The average leisure is designated by l: