# Lifecycle consumption plans, social learning and external habits: Experimental evidence[☆]

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## ARTICLE INFO

## ABSTRACT

We report results from a laboratory experiment exploring the extent to which individuals can solve a deterministic, intertemporal lifecycle consumption optimization problem and the effect of revealing social information on past average consumption amounts; as all individuals have identical induced preferences and lifetime incomes, such social information could be useful in solving for the optimal consumption path. Instead, we find that the provision of social information on past average levels of consumption results in a greater deviation of consumption from both the unconditional and the conditionally optimal paths. We find some improvement in consumption planning relative to the conditional optimum when social concerns (external habits) are explicitly incorporated into subject's period utility functions as in external habit formation preference specifications. Our results on the effects of social information on consumption behavior may help to explain the phenomenon of over-consumption and under-saving that has been observed in many developed countries in recent decades as social information on the behavior of others has become more readily available.

## 1. Introduction

In dynamic, intertemporal models of lifecycle consumption, it is standard to assume that agents can solve for the optimal consumption/savings plan over their expected lifetimes given all available information on income and prices. Indeed, this assumption underlies all modern micro-founded models of household behavior, beginning with Modigliani and Brumberg's (1954) lifecycle theory of consumption and Friedman's (1957) permanent income hypothesis. The possibility that individuals might condition their choices on the decisions made by other, similarly situated individuals is typically excluded (e.g., via the representative agent assumption) though there are specifications of preferences where *habit* levels of consumption as determined by the choices of other individuals do enter into agents' utility functions and therefore affect individuals' consumption choices. However, there is little doubt that individuals often look to their peers when deciding how much to consume or to save and indeed, the notion that individuals make such social comparisons was an important part of earlier theories of consumption behavior by Veblen (1899) and Duesenberry (1949). The idea that the utility derived from

consumption depends on ones' own consumption relative to that of others has been formalized in models of external habit formation or "keeping up with the Joneses" preferences, e.g., by Abel (1990). Nevertheless, there is little in the way of micro-level evidence as to whether and how such social information on the consumption choices of others actually affects an individual's own consumption and savings choices. In this paper we take a first step toward understanding how social information on the consumption choices made by contemporary peers affects an individual's own lifecycle consumption decisions.

Specifically, we examine the impact of social information on consumption and savings decisions over the lifecycle by designing and analyzing data from a controlled laboratory experiment. The control of the laboratory provides us with several benefits that are not available to researchers working with non-experimental field data. In particular, since we can control endowments, interest rates and the utility derived from consumption, we are able to make sharp predictions as to the optimal path of consumption that individuals should follow. Further, the control of the laboratory allows us to manipulate the information that individuals have available to them when making decisions so that we can assess whether information about the decisions of others, i.e., "the Joneses," really matters. Finally, and perhaps most importantly, as we endow all agents with the *same* lifetime lengths and income process and we eliminate all uncertainty, we ensure that social comparisons with others are potentially useful, i.e., that individuals could find it relevant to consider the decisions made by their peers, "the Joneses". By contrast, it is not possible ensure that the Joness are so similarly situated in studies involving field data. We note further that dynamic optimization problems are difficult to solve (the solution to the one we study in this paper is solved numerically) and so it seems entirely plausible that agents having difficulty solving such problems might reasonably look to the decisions of other, similarly situated individuals in formulating their consumption and savings plans.

Our main finding is that, instead of helping, social information on the consumption and savings plans of peers can have a detrimental effect on an individual's consumption and savings choices and thus his or her welfare, relative to the optimally chosen path. Specifically, when social information on average consumption choices is provided, subjects' consumption and savings plans depart *further* from the optimal path relative to an environment without social information on the consumption choices of others. Intuitively, observing that one's own consumption is below average may entice the observer to consume more than is individually optimal in a race to keep up with the Joneses. This finding is potentially important for understanding the dramatic decline in national savings rates that has taken place in many developed countries (France, Italy, Japan, Spain, the U.K. and the U.S.) since the 1970s as documented, e.g., by Dobrescu et al. (2012), as the availability of information on the consumption decisions of peers has likely increased over this same time period.

In addition to exploring the impact of information on peer behavior for lifecycle consumption and saving choices, we also explore how a leading theory of social preferences with regard to consumption choices – the theory of "external habit formation" – fares in the laboratory. According to this theory, an individuals's utility from consumption depends on their consumption choices relative to some external reference level of consumption, known as the "habit level" of consumption. Here we take this reference level to be the same, economy-wide prior period average level of consumption that we use in our social information treatment. Indeed, this choice for the reference point is a standard specification in the external habit formation literature. Specifically, we examine consumption decisions when the period utility function is modified so that individuals derive utility from consumption relative to the prior average level of consumption by all individuals in the economy. We are interested in whether modifying the period utility function so that agents' utility from consumption depends explicitly on the average consumption of other similarly situated individuals, yields any improvement in consumption planning relative to the case where this same reference level of consumption has no direct utility consequences.

## 2. Related literature

There already exists an experimental literature examining whether and how individuals can optimally solve dynamic, intertemporal lifecycle consumption and savings problems. See, for example, Hey (1988), Hey and Dardanoni (1988), Johnson et al. (2001), Ballinger et al. (2003, 2011), Carbone and Hey (2004), Carbone (2006), Fehr and Zych (1998, 2008), Brown et al. (2009), Feltovich and Ejebu (2013) and Meissner (2014). A general finding of this literature is that, over the lifecycle, individuals initially consume too much (or save too little) relative to the optimal path so that toward the end of their lifecycle, savings are too low and consumption is below the optimal path. While our baseline treatment involving an individual, intertemporal lifecycle consumption problem has much in common with the design used in these prior studies, one important difference is that the dynamic optimization problem that we study is *non*-stochastic, making it perhaps the simplest environment yet studied in this literature. Specifically, the entire income sequence over the lifecycle is perfectly known at date 0 as is the constant interest rate on savings as well as the length of the planning horizon. We deliberately chose such a simple environment because we wanted to minimize the role of uncertainty (and uncontrollable attitudes toward risk) and focus attention instead on the question of whether and how optimal consumption plans can be achieved, and the role played by information on the consumption decisions of other similarly situated individuals.

The role of social learning in the formation of lifecycle consumption plans has been previously addressed in experimental studies by Ballinger et al. (2003) and Brown et al. (2009). Those authors report that observation by subjects of the *prior lifecycle consumption plans* of other subjects (who faced the exact same planning problem and horizon) enables the observer subjects to form lifecycle consumption plans that are closer to the optimal intertemporal path relative to the case of no observation. Brown et al. (2009) refer to this kind of social learning as "intergenerational imitation." However, this is just *one* kind of social learning that may be operative. Another form of social learning is that individuals look to the decisions