Journal of Economic Dynamics & Control 32 (2008) 3917–3938

Contents lists available at ScienceDirect

Journal of Economic Dynamics & Control

journal homepage: www.elsevier.com/locate/jedc

Information shocks and precautionary saving

James Feigenbaum *

Department of Economics, University of Pittsburgh, 230 South Bouquet Street, Pittsburgh, PA 15260, USA

ARTICLE INFO

Article history:
Received 25 January 2007
Accepted 20 April 2008
Available online 18 May 2008

JEL classification:
E21

Keywords:
Precautionary saving
Timing of revelation of information
Euler equation
Consumption growth
Consumption hump
Lifecycle model

ABSTRACT

Skinner's [1988. Risky income, life cycle consumption, and precautionary savings. Journal of Monetary Economics 22, 237–255] second-order approximation to the consumption function under CRRA utility is generalized to accommodate any structure of uninsurable income risk. To second order, a future income shock will induce precautionary saving in the present that depends on the variance of the expectation of the income shock at each intervening period. However, the expected rate of consumption growth depends only on the currently perceived variance of the expected present value of future income. In a finite-horizon model, precautionary saving produces a hump-shaped lifecycle profile of mean consumption primarily because the variance of future income decreases with age, but the lifecycle dynamics of total wealth also affect the shape of the profile. For a Markov income process with autocorrelations on the order of 0.9 or less, the second-order approximation performs surprisingly well for common parameter choices from the literature, but it does poorly as the autocorrelation approaches 1.

Ever since Leland (1968) and Sandmo (1970) first established the theory of precautionary saving, it has been known that, for most commonly used preference specifications, an agent should respond to uncertainty about future income by saving more and consuming less in the present. This basic result was derived in a simple, two-period model, so it left unresolved two follow-up questions. First, how much will the agent increase his saving in response to uncertainty? Second, if information about income at a future time is revealed incrementally as the agent advances toward this event instead of

* Tel.: +1 412 383 8157.
E-mail address: jfeigen@pitt.edu
URL: http://www.pitt.edu/~jfeigen

0165-1889/$ - see front matter © 2008 Elsevier B.V. All rights reserved.
doi:10.1016/j.jedc.2008.04.008

all at once when he finally receives the income, how will the effects of this uncertainty on consumption and saving be distributed over time?

With constant relative risk aversion (CRRA) preferences, there is no analytic solution to the problem of a consumer who faces uninsurable, idiosyncratic income risk, so it is difficult to obtain theoretical insight regarding these questions beyond the preponderance of numerical exercises. Nevertheless, Skinner (1988) provided an approximate analytic answer to the first question by deriving a second-order Taylor expansion of the consumption function. However, this result could not be used to address the second question because Skinner assumed income innovations at different times were independent random variables, which disallows learning.[1] Blundell and Stoker (1999) generalized this approximate result for a three-period model in which third-period income could depend on the second-period income innovation. Eeckhoudt, Gollier, and Treich (EGT) (2005) further developed the theory of this three-period model by proving the exact result that precautionary saving will decrease if the third-period income is revealed in the second period rather than in the third period.

Here, I completely generalize Skinner's (1988) approximate consumption function for a model that makes no assumptions about the underlying income process aside from the existence of first and second moments. The main result is to show that a shock to future income will induce precautionary saving not just through the currently perceived variance of this income shock but also through the expected variance at all intervening periods of the expected value of the future income. Thus the consumer will also respond in a precautionary manner to his current uncertainty about any information he may receive later about this future income. Generalizing the result of EGT (2005), we find the precautionary response to each of these information shocks is a decreasing function of the time remaining over which he has to absorb this information afterward. However, while the level of consumption depends on both present and future variances of the expected value of the income, the expected rate of consumption growth from the current period to the next period depends only on the current-period variance of the expected present value of income in all future periods.

The primary motivation for studying precautionary saving is the empirical failure of the basic Lifecycle/Permanent-Income Hypothesis at explaining many details of lifecycle consumption behavior.[2] For example, the robust observation that consumption exhibits a hump-shaped lifecycle profile cannot be accounted for by the simplest lifecycle consumption models, which predict instead a monotonic profile that is increasing or decreasing depending on whether the interest rate is higher or lower than the discount rate (Thurow, 1969; Yaari, 1964). However, if uninsurable income risk is introduced into a lifecycle model, precautionary saving can account for a hump-shaped profile (Nagatani, 1972).

Skinner (1988) accounted for this by showing that the introduction of precautionary saving increases the rate of expected consumption growth by a factor proportional to the variance of income. If the rate of consumption growth would be less than one in the absence of uncertainty, the addition of enough idiosyncratic risk in early periods can raise the growth rate above one in these early periods, leading to a hump-shaped consumption profile. However, in a typically calibrated model, independent income shocks do not create enough risk to produce a consumption hump, and persistent income processes are needed to account for the hump (Carroll, 1997; Feigenbaum, 2007; Gourinchas and Parker, 2002).[3] Skinner's approximation does not address what can happen with persistent income processes, but the generalization obtained here does.

The consumption growth rate decreases gradually with age because, as an agent gets older, there will be fewer income shocks in the future to get information about. As an extra complication, the approximation shows that the consumption growth rate decreases with expected wealth (including

[1] Skinner (1988) suggested an ad hoc method for correcting this approximation to allow for an ARMA income process.

[2] See Browning and Crossley (2001) for a review of this literature.

[3] Guvenen (2007) has recently proposed that lifecycle behavior may be better explained with an income process that explicitly incorporates information shocks. An individual's income process depends on unknown idiosyncratic parameters that he must learn over time via Bayesian updating.