



# Habit formation and the present-value model of the current account: Yet another suspect

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## ARTICLE INFO

### Article history:

Received 1 August 2007

Received in revised form 29 January 2009

Accepted 10 February 2009

### Keywords:

Current account

Habit formation

World real interest rate

Present-value model

Small open economy model

Bayesian analysis

### JEL classification:

F32

F41

E32

## ABSTRACT

In a recent paper, Gruber (Gruber, J.W., 2004. A present value test of habits and the current account. *Journal of Monetary Economics* 51, 1495–1507) claims that habit formation in consumption plays an important role in current account fluctuations in selected developed countries, extending the present-value model of the current account (PVM) with consumption habits. In this paper, however, I show that the habit-forming PVM is observationally equivalent to the PVM augmented with persistent transitory consumption, which is induced by world real interest rate shocks. Based on a small open-economy real business cycle (SOE-RBC) model endowed with consumption habits as well as persistent world real interest rate shocks, this paper resolves the inherent identification problem of the habit-forming PVM by Bayesian methods to seek effects of habit formation on current account fluctuations in typical small open economies, Canada and the United Kingdom. Results reveal no clear evidence that habit formation plays a crucial role in current account fluctuations.

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## 1. Introduction

A small open-economy model endowed with rational, forward-looking economic agents serves as a benchmark for studying current account dynamics in the recent literature of open-economy macroeconomics. This model, as known as the intertemporal approach to the current account or, more recently, a small open-economy real business cycle (SOE-RBC) model, stresses the consumption-smoothing behavior of economic agents in the determination of the current account in a small open economy.<sup>1</sup> When they expect changes in future income, forward-looking agents smooth their consumption by borrowing or lending in international financial markets and hence by generating current account movements. This role of consumption-smoothing behavior in current account determination is clearly expressed by the present-value model (PVM) of the current account, which is a closed-form solution of the canonical SOE-RBC model. For example, the PVM predicts that the current account of a small open economy

moves into deficit when the economy's income is expected to decline temporarily, while no change in the current account occurs if the decline in income is expected to be permanent.<sup>2</sup>

Many empirical studies including Sheffrin and Woo (1990), Otto (1992), Ghosh (1995) and Bergin and Sheffrin (2000), however, fail to find empirical support for the standard PVM of the current account in postwar data of many of the G-7 economies. The cross-equation restrictions that the standard PVM imposes on unrestricted vector autoregressions (VARs) are statistically rejected for all of the G-7 economies except the United States. Moreover, the forecasts of the standard PVM are too smooth to track actual current account movements. The empirical failures of the standard PVM have led some researchers to explore the role of consumption-tilting motives in current account movements: the current account might be adjusted to factors that deviate consumption away from the random-walk, permanent income level.

One way to introduce consumption-tilting motives into the standard SOE-RBC model is habit formation in consumption. Habit

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<sup>1</sup> Obstfeld and Rogoff (1995) provide a most detailed survey of the intertemporal approach to the current account.

<sup>2</sup> A crucial prediction of the PVM is that only country-specific shocks matter for the current account of a small open economy. A global shock does not give a small open economy an opportunity to borrow or lend in international financial markets because all economies have identical preferences, technologies and endowments and hence react to a global shock symmetrically. For empirical tests of this prediction, see Glick and Rogoff (1995), İřcan (2000), Nason and Rogers (2002), and Kano (2008a).

formation makes optimal consumption decisions of households depend not only on permanent income but also on past consumption. Habit-forming households tend to maintain their past consumption levels against unexpected shocks to permanent income. Therefore, habit formation makes consumption smoother and more sluggish than in the basic permanent income hypothesis (PIH). The sluggishness of consumption in turn implies more volatile current account movements than the standard PVM predicts. Gruber (2004) augments the otherwise standard PVM with consumption habits.<sup>3</sup> Estimating a parameter representing the degree of habit formation by generalized method of moments (GMM), he finds that consumption habits help improve the ability of the PVM to track actual current account movements in postwar quarterly G-7 data. He concludes that habit formation plays an important role in current account dynamics.

Habit formation, however, is not the only source of the consumption-tilting behavior. For example, a stochastic world real interest rate introduces a consumption-tilting motive into the PVM of the current account. Expected changes in the world real interest rate tilt the optimal consumption path away from the random-walk, permanent income level and, as a result, create consumption-tilting in the PIH.<sup>4</sup> Blankenau et al. (2001) and Nason and Rogers (2006, hereafter NR) provide evidence that persistent world real interest rate shocks play a crucial role in explaining net trade balance/current account movements in small open economies. In particular, NR examine several economic factors in a canonical SOE-RBC model as “usual suspects” that might lead to the empirical failure of the standard PVM in postwar Canadian data. Among the suspects, which do not incorporate habit formation, their Bayesian Monte Carlo exercise shows that persistent world real interest rate shocks, when combined with an internalized risk premium in international financial markets, can explain the rejection of the standard PVM in Canadian data best.

In this paper, I show that the PVM augmented with habit formation (hereafter, the habit-forming PVM) is observationally equivalent to a canonical PVM modified with an arbitrary transitory consumption component that follows an AR(1) process. The two PVMs, thus, imply the same time series of the current account. Perhaps more importantly, observational equivalence also holds between the habit-forming PVM and a PVM predicted by an SOE-RBC model with an AR(1) world real interest rate.<sup>5</sup> Since the two PVMs, which are derived as closed-form solutions of different small open-economy models, yield identical sample statistics, tests of the habit-forming PVM are not informative for detecting the role of habit formation in current account movements. Rather, statistics of the habit-forming PVM might capture effects of persistent world real interest rate shocks on current account fluctuations.<sup>6</sup>

The identification problem comes from the fact that the habit-forming PVM, as a partial equilibrium model, imposes no restrictions on stochastic dynamics of net output growth. SOE-RBC models, on the other hand, impose restrictions on stochastic processes of both net output growth and the current account. This paper, hence, exploits restrictions of SOE-RBC models imposed on joint dynamics of net output growth and the current account to identify the role of habit formation in current account fluctuations. To do so, I add habit formation to NR's list of “usual

suspects” by extending their model with consumption habits. I then investigate the extended model by two Bayesian methods. In the first method, I estimate the extended SOE-RBC model nesting both habit formation and an AR(1) world real interest rate (hereafter, the Benchmark model) by applying a Bayesian posterior simulator to post-Bretton Woods data of two proto-type small open-economies, Canada and the United Kingdom.<sup>7</sup> As in Bayesian posterior inferences of DSGE models examined by Schorfheide (2000), Chang et al. (2002), and Bouakez and Kano (2006), the first method lets actual data of Canada and the United Kingdom update a researcher's prior on the two specifications of consumption dynamics, habit formation and persistent world real interest rate shocks.

Deriving the posterior distributions of the parameters of habit formation and world real interest rate shocks, I infer which of the two mechanisms is more significant for current account fluctuations of the two small-open economies. Moreover, using degenerated prior distributions, I construct two restrictive models that incorporate either of habits (hereafter, the Habit model) or the persistence of the world real interest rate (hereafter, the WRI model). After estimating the two restrictive models, I compare the marginal likelihoods of the three models in order to figure out how much habit formation and persistent world real interest rate shocks contribute to the overall statistical fit of the benchmark SOE-RBC model to actual data.

The second method, which is developed by DeJong et al. (1996) and Geweke (2007) and applied to the literature of SOE-RBC models by NR, treats Gruber's (2004) GMM statistics of the habit-forming PVM as the selected “business-cycle moments” an SOE-RBC model needs to match. Taking into account uncertainty in the structural parameters with their posterior probability distributions estimated by the first method, I then simulate synthetic data with the Benchmark, Habit, and WRI models, and construct the corresponding theoretical distributions of the moments of interest. Estimating the empirical (posterior) distributions of Gruber's (2004) GMM moments based on unrestricted VARs with actual data of Canada and the United Kingdom, I choose one of the three SOE-RBC models that yields theoretical distributions overlapping with the empirical counterparts to a better degree as the underlying data generating process (DGP) of the current accounts in the two proto-type small open-economies.

Results of the Bayesian analysis in this paper reveal no evidence for an important role of habit formation in current account fluctuations. The following three observations strictly reject habit formation as a prime suspect of the observed excellent statistical fit of the habit-forming PVM. First, the estimated Benchmark model implies a negligibly small habit parameter but a large persistence of the world real interest rates. Second, the estimated Benchmark model dominates the estimated Habit model in terms of the overall statistical fit. Finally, as the third result, the estimated Benchmark model replicates Gruber's (2004) statistics of the habit-forming PVM more successfully than does the estimated Habit model.

The rest of this paper is organized as follows. Section 2 reviews the habit-forming PVM and discusses its observational equivalence problem. In Section 3, the habit-forming PVM is estimated with the data of Canada and the United Kingdom to construct the empirical distributions of Gruber's (2004) GMM statistics. Section 4 introduces the SOE-RBC model in this paper and conducts the Bayesian analysis. Section 5 concludes.

## 2. The habit-forming PVM and observational equivalence

### 2.1. The habit-forming PVM

In this section, I introduce the habit-forming PVM this paper investigates and argue its observational equivalence property.<sup>8</sup>

<sup>3</sup> A similar modification of the standard PVM with consumption habits is also found in Bussière et al. (2004).

<sup>4</sup> See Campbell and Mankiw (1989) for tests of the PIH, and Bergin and Sheffrin (2000) and Kano (2008a) for tests of the current account PVM. In particular, Bergin and Sheffrin (2000) extend the standard PVM with stochastic variations in real interest rates as well as real exchange rates, which yield a serially-correlated transitory consumption component independent of permanent income. They observe that the extension improves the PVM's forecasts particularly in Australia and Canada.

<sup>5</sup> The list of other potential sources of transitory consumption shocks includes transitory government expenditure shocks affecting the utility function, real exchange rate shocks, and terms of trade shocks.

<sup>6</sup> In other words, tests of the habit-forming PVM potentially lead an econometrician to commit a Type II error by accepting the null hypothesis of habit formation when habit formation is a false specification of important consumption-tilting motives.

<sup>7</sup> I am grateful to the editor Charles Engel for his suggestion of the first method.

<sup>8</sup> The working paper version of this paper (Kano 2008b) provides the detailed derivation and discussion of the habit-forming PVM of this paper below.

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