1 INTRODUCTION

Dynamic portfolio models in line with Brainard and Tobin (1968) have obtained a prominent place in economic literature on the allocation of wealth to liquidities and other investments. Notwithstanding the elegant structure and the strong theoretical foundation of these models, the empirical results are generally not wholly satisfying. Auspicious is the generally very good fit, probably due to the large number of adjustment parameters. Inauspicious are the sometimes implausible parameter values and the low degree of statistical significance of some of the coefficients of the exogenous variables. This may be due to statistical problems such as multicollinearity and to specification problems such as omitted explanatory variables and a poor modelling of the error process. The aggregation of subsectors with different behaviour and other simplifying modelling assumptions and estimation problems such as the neglect of the simultaneity in the system may also play a role.

It is striking that empirical studies based on portfolio models as a rule ignore the problem of implausible parameter values and at best mention that some of the parameters have unexpected values or signs. An exception is e.g. Fase (1981, 1984). Frequently, the estimated interest rate coefficients have signs which are not in accordance with the theory of gross substitution (Tobin, 1982). This theory refers to the long-term interest rate coefficients in particular, which depend on both the short-term interest rate parameters and the adjustment parameters. In this article we focus on this problem. Our empirical results are based on a non-standard estimation procedure, due to the complex relation between adjustment parameters and long-term coefficients, which allows for restrictions on long-term coefficients. We apply this newly developed procedure to two sectors of the Dutch economy: households and banks. These portfolio models are part of the macroeconomic policy model of the Dutch central bank, MORKMON II (Fase et al., 1990, 1992).

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Dynamic portfolio models integrate short-run dynamics and long-run portfolio behaviour. A natural estimation approach would be a two-step Granger-and-Engle-like ECM-procedure, provided the data series are long enough to yield plausible results for the static cointegration equations in the first step. In view, however, of the lengths of our data series we choose not to follow such a procedure. Then, two possibilities remain: a simultaneous ECM-procedure and the simultaneous partial adjustment approach of Brainard and Tobin. We opt for the latter, which is a special case of the former. Our motivation is that the partial adjustment procedure is easier to handle in the presence of multicollinearity among the assets' returns and therefore yields better simulation results.

The structure of this article is as follows. Section 2 gives an outline of the dynamic portfolio model and further pays attention to the interpretation of its coefficients. The balance sheets and the general structure of the portfolio models for households and banks are described in section 3. The next section contains the empirical results. Simulation results are given in section 5. Section 6 summarizes the main conclusions.

2 GENERAL MODEL STRUCTURE

The general model structure used in this article is Brainard and Tobin's (1968) famous 'pitfalls' model of wealth allocation. This model provides a thorough and useful approach to the empirical analysis of portfolio behaviour. It simultaneously explains asset holdings in equilibrium, which is often referred to as 'target' or long-run 'desired' asset holdings as well as the dynamics of adjustment to this equilibrium.

2.1 Target Asset Holdings

The general equilibrium framework is based on the specific sector's long-run desired or target asset holdings. Each sector of the economy allocates its wealth ($W$) to $n$ different assets and liabilities, for reasons of simplicity hereafter referred to as assets. The desired or target level of holdings of each individual asset in the portfolio, denoted by $A^*_i (i = 1, \ldots, n)$, depends on a common set of observable explanatory variables. This follows from the theory of portfolio selection developed by Markowitz (1952, 1959) and Tobin (1958, 1965). Individual agents arrange their portfolios, given their balance sheet total, so as to maximize expected utility at the end of the decision period. Utility is a function of the means and variances of the future returns on the assets in the portfolio. The exact functional form explaining $A^*_i$ depends on the form of the underlying utility function. In empirical applications, additional explanatory variables are frequently used to describe the agent's perception of risk and return. In line with this theory, we assume that the target asset holdings of each sector of the economy are determined by:

$$A^*_i/W = \alpha_0 + \sum_j \alpha_j r_j + \sum_l \beta_{il} x_l \quad i, j = 1, \ldots, n$$

(1)