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A threshold model of the US current account ☆

Roberto Duncan *

Department of Economics, Ohio University, 349 Bentley Annex, Athens, OH 45701, United States

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ABSTRACT

What drives the US current account imbalances? Is there solid evidence that the behavior of the current account is different during deficits and surpluses or that the size of the imbalance matters? Is there a threshold relationship between the US current account and its main drivers? We estimate a threshold model to answer these questions using the instrumental variable estimation proposed by Caner and Hansen (2004). Rather than concluding that the size or the sign of (previous) external imbalances matters, we find that time is the most important threshold variable. One regime exists before and another one exists after the third quarter of 1997, a period that coincides with the onset of the Asian financial crisis and the Taxpayer Relief Act of 1997. Statistically significant determinants in the second regime are the fiscal surplus, productivity, productivity volatility, oil prices, the real exchange rate, and the real interest rate. Productivity has become a more important driver since 1997.

1. Introduction

The size of the US external deficit has been an issue of major concern for many years, including before the so-called Great Recession. Concerns about the consequences of a sudden reversal in domestic output, the real exchange rate, and the level of economic activity in the rest of the world were raised by several scholars and analysts.[1] Others did not hesitate to affirm the close link between the current account deficit and the 2007–09 recession or that, at least, they were the result of a common factor (Bernanke, 2009; Caballero et al., 2008; Chinn, 2013; Obstfeld and Rogoff, 2009). In this context, it is worth identifying the factors behind the US external deficit and the way that they relate to each other.

Several questions are worth addressing. What are the main drivers of the US current account? Is the behavior of the current account the same during deficits and surpluses or does the size of the (previous) external imbalance matter as some analysts suggest? Is there a threshold relationship between the current account and its drivers? In this paper, we present new evidence on this ongoing debate.

Our work might be viewed as a bridge between empirical work, which uses univariate threshold models to understand the nonlinear behavior of the US current account, and the theoretical literature, which is mainly composed of dynamic stochastic general equilibrium (DSGE) models and proposes a set of exogenous drivers of the current account. On the one hand, some economic researchers and analysts contend that thresholds in the dynamics of the current accounts exist (see, for example, Aizenman and Sun, 2010; Bergsten, 2002; Freund, 2005; Holman, 2001). More formally, Clarida et al. (2005) propose a threshold autoregressive model to test the presence of thresholds in the current account of the G7 countries using data between 1979 and 2003. They find two thresholds almost equivalent in absolute value for the US current account scaled by GDP (2.15% and −2.18% of GDP) under a first-order autoregressive process. Using a similar threshold model but with smooth transition, Christopoulos and León-Ledesma (2010) reject the null hypothesis of non-stationarity favoring the sustainability hypothesis under a nonlinear mean reversion process. Moreover, their model outperforms the linear and random walk models in terms of forecast performance.[2] On the other hand, a number of works based on DSGE models suggest that the US current account is driven by fiscal and productivity shocks (Bussière et al., 2010; Glick and Rogoff, 1995; Kollmann, 1998), as well as shocks of productivity volatility (Fogli and Perri, 2006) or oil prices (Bodenstein et al., 2011).

Even though the nonlinear empirical works might be useful for forecasting purposes, their univariate approach leaves aside the fundamentals behind the current account dynamics. The DSGE literature, in

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* Tel.: +1 740 597 1264.
E-mail address: duncanr1@ohio.edu.

[1] See, for instance, Obstfeld and Rogoff (2005) and Roubini and Setser (2004). According to some authors (e.g., Croke et al., 2005), current account reversals may entail some costs in terms of GDP growth.

[2] Another branch of the empirical literature goes beyond the univariate framework and centers its attention on medium-term fluctuations of the current account using cross-country samples (Chinn and Prasad, 2003; Gruber and Kamin, 2007; Lane and Milesi-Ferretti, 2012). The inclusion of demographic regressors, for example, is more appropriate in cross-country regressions rather than time-series models due to their low variability over time.

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turn, usually focuses on one or two factors – partly due to the curse of dimensionality – and does not address all of the variables that we consider in a multivariate empirical framework that can offer more tractability. Thus, our objective consists of estimating a threshold model with multiple regressors to explain the behavior of the US current account during the period between 1973.I and 2012.I and test for the presence of regimes in its dynamics. As threshold candidates, we try a set of variables suggested by commentators and previous empirical works. As regressors, we evaluate a similar set to the one proposed in the DSGE literature mentioned above. To accomplish this task and control for the potential endogeneity of the regressors, we use a threshold model developed by Caner and Hansen (2004), in which the slope parameters are estimated by GMM. To our knowledge, this is the first empirical application of the GMM estimation of such a threshold model.

Our contribution relies on the following findings. First, in contrast to the univariate threshold models found in the literature, time is the most important threshold variable. We find a robust time break – not previously documented in the literature – in the relationship between the current account and its main drivers in the third quarter of 1997. This period coincides with the eruption of the Asian financial crisis and the Taxpayer Relief Act of 1997. We view the Asian crisis as the beginning of a sequence of financial crises among emerging market economies and, more importantly, as a structural change in both international investors' portfolios and policies regarding exchange rate regimes and foreign exchange reserves in emerging market economies. Second, as opposed to what other authors contend, there is no strong evidence on the importance of the size and sign of the (lagged) current account; the time line always dominates any potential threshold variable previously used or proposed by the empirical literature. Third, the most significant determinants of the US current account are productivity, the real exchange rate, the fiscal surplus, and the volatility of productivity. Other relative prices such as the oil price and the interest rate became statistically significant in the second regime. In particular, productivity shocks became more important after 1997. To a lesser degree, the Taxpayer Relief Act might have contributed to increasing the sensitivity of consumption and the current account to productivity shocks due to lower capital gains tax rates. All together, these findings might be viewed as evidence that confirms the twin-deficit hypothesis and assigns a role for the worldwide saving glut phenomenon (Bernanke, 2005) and the revived Bretton Woods hypothesis (Dooley et al., 2003).

In the next section, we discuss the empirical strategy, that is, the issues related to the model, the regressors and their expected signs, the potential threshold variables, and the data. In Section 3, we report and discuss the main results and robustness checks. Section 4 concludes briefly.

2. Empirical strategy

2.1. Model

The structural equation that we propose is the following:

$$ca_t = \beta_1' z_t 1(q_t \le \gamma) + \beta_2' z_t 1(q_t > \gamma) + \varepsilon_t \quad (1)$$

where the dependent variable ca_t is the current account surplus, z_t is a set of potentially endogenous regressors, q_t is a known real-valued continuous function of an exogenous variable and stands for the threshold variable, $1(.)$ denotes the indicator function, and ε_t is a martingale difference sequence. The parameters to be estimated are the ones in vectors β_1 and β_2 (which might differ), and the threshold parameter $\gamma \in \Gamma$, where Γ is a strict subset of the support of $q(.)$.

The reduced form is a model of the conditional expectation of z_t given x_t:

$$z_t = g(x_t, \pi) + u_t \quad (2)$$

where x_t is the exogenous k-vector with $k \ge m$, π is a $p \times 1$ vector of unknown parameters, $g(,.)$ is a known function that maps $R^k \times R^p$ to R^m, and u_t is $m \times 1$ such that $E(u_t|x_t) = 0$. The methodology allows the reduced form model to be either a linear regression or a threshold regression model.

2.2. Estimation

We follow the estimation procedure proposed by Caner and Hansen (2004). Here, the estimation of parameters is sequential. First, we estimate π from the reduced form, Eq. (2), by LS. Second, we estimate the threshold parameter γ using predicted values of the endogenous variables z_t and minimizing the sum of squared errors (SSE). We verify the statistical precision of the threshold variable chosen using the likelihood ratio test (LRT) and estimate the asymptotic confidence interval of γ. Finally, we estimate the slope parameters β_1 and β_2 by GMM on the split samples implied by our estimate of γ.

2.3. Regressors

We choose the regressors based on the exogenous variables from a standard neoclassical framework. In particular, the m-vector of regressors z_t contains an intercept, the lagged dependent variable, and measures of the fiscal surplus, total factor productivity, TFP volatility, the real exchange rate, the relative price of oil, and the real interest rate. The expected signs are as follows.

2.3.1. Fiscal surplus

We expect a positive relationship. A decrease in total government spending or an increase in total government revenues implies an increase in the overall fiscal surplus that should raise the current account surplus. The theoretical relationship between fiscal and external surpluses is sometimes called the "twin-deficit" hypothesis and is predicted by a variety of models (Chinn and Prasad, 2003).[3]

2.3.2. Total factor productivity

In principle, one could not expect a specific sign for total factor productivity. One reason for this is that this variable could be measuring persistent or temporary shocks. Therefore, the net effect on total saving and investment, and consequently, on current account balances, can only be resolved with empirical evidence. That said, the RBC literature stresses the importance of highly persistent productivity shocks on the US business cycle fluctuations. Consistent with that, we expect a negative sign for the slope coefficient of our measure of productivity. Intuitively, a persistent productivity shock increases not only consumption but also, especially, investment such that this effect on absorption compensates the increase in output. As a result, the current account surplus decreases.

2.3.3. TFP volatility

An increase in the volatility of productivity stimulates precautionary savings. The higher uncertainty about productivity discourages investment in physical capital. As a result, we expect a rise in the current account surplus. The first work that links the fall in TFP volatility, usually dated in the early 1980s, to the imbalances of the US current account is perhaps Fogli and Perri (2006).

2.3.4. Relative price of oil

From a simple perspective, a rise in the relative price of oil can be viewed as a negative supply shock that lowers output and, as a consequence, deteriorates the current account. Bodenstein et al. (2011) provide a deeper analysis. Under incomplete financial markets, both oil

[3] This is the major determinant of the US current account deficit according to Chinn (2005). There are, however, dissenting viewpoints such as Backus et al. (2009) and Greenspan (2005).

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