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Are There Thresholds of Current Account Adjustment in the G7?

Richard H. Clarida, Manuela Goretti, and Mark P. Taylor

5.1 Introduction

The sustainability and adjustment of current account imbalances among the world's major industrialized countries is a subject that is receiving considerable attention among policymakers, financial market practitioners, and academics. At more than $600 billion and nearly 6 percent of U.S. gross domestic product (GDP), the U.S. current account deficit attracts the most focus, but there are also material current account imbalances in other deficit countries, such as the United Kingdom, and in surplus countries, such as Japan and Germany.

Some respected experts have expressed concern that current account imbalances of this magnitude and persistence indicate that the global economy is operating in a danger zone in which disruptive and volatile reactions in currency, bond, and equity markets are likely to result. For example, C. Fred Bergsten (2002, 5) has argued that "research at both the Federal Reserve Board and the Institute for International Economics reveals that industrial countries, including the United States, enter a danger zone of current account unsustainability when their deficits reach 4–5 percent of GDP. . . . At these levels, corrective forces tend to arise either sponta-

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neously from market forces or by policy action." Other observers have made a similar point, arguing that there is a threshold current account imbalance beyond which current account adjustment must ultimately take place, even if evidence of adjustment is scarce or nonexistent before the threshold is reached. This point of view is represented clearly in a recent survey paper on this subject prepared by the Federal Reserve Bank of Kansas City (Holman 2001):

> While there is considerable uncertainty about the precise threshold . . . a current account deficit greater than 4.2 percent of GDP is unsustainable. This estimate, based on the 1980s and early 1990s, represents the average threshold at which current account deficits in several industrialized economies started to narrow after trending up for a sustained period. (16)

Existing empirical work on this subject is suggestive but is not in fact specifically aimed at answering the question, Are there thresholds of current account adjustment? or exploring its implications. Influential papers by Milesi-Ferretti and Razin (1998) and Freund (2000) employ a careful and informative methodology to pull together a set of empirical regularities about how adjustments of large current account deficits have taken place in previous episodes that meet certain ex ante criteria. For example, in order for a current account deficit adjustment episode (called a *reversal*) to be included in the Freund sample, it must meet the following four criteria:

1. The current account deficit exceeded 2 percent of GDP before the reversal.
2. The average deficit was reduced by at least 2 percent of GDP over three years (from the minimum to the three-year average).
3. The maximum deficit in the five years after the reversal was not larger than the minimum deficit in the three years before the reversal.
4. The current account was reduced by at least one-third.

These are very similar to the criteria introduced by Milesi-Ferretti and Razin (1998) in their study. Their motivation for focusing on the adjustment of large current account deficits that meet these criteria is explained as follows:

> In the definition of reversal events we want to capture large and persistent improvements in the current account imbalance, that go beyond short-run current account fluctuations as a result of consumption smoothing. The underlying idea is that "large" events provide more information on determinants of reductions in current account deficits than short run fluctuations. (12)

The work of Milesi-Ferretti and Razin (1998), Freund (2000) and—using a somewhat different methodology—Mann (2002) has had an impact on the way that policymakers discuss current account adjustment, especially in the context of the record U.S. deficits recorded in recent years. For example, Federal Reserve Chairman Greenspan (2003), citing Freund's work has said:

> [W]hat do we know about whether the process of reining in our current account deficit will be benign to the economies of the United States and the world? According to a Federal Reserve staff study, current account deficits that emerged among developed countries since 1980 have risen as high as double-digit percentages of GDP before markets enforced a reversal. The median high has been about 5 percent of GDP.

While much can be and has been learned by studying past episodes of adjustment of large current account deficits (as defined by the criteria used by Milesi-Ferretti and Razin [1998] and Freund [2000]), there remains a number of unresolved empirical questions pertaining to the modeling, estimation, and interpretation of the current adjustment process among the large industrialized countries. These questions include the following:

- Does the process of adjusting to current account deficits differ from the process of adjusting to current account surpluses? (*Does sign matter?*)
- Does the process of adjusting to large current account imbalances differ from the process of adjusting to smaller current imbalances? (*Does size matter?*)
- If so, is there a way to estimate how large is "large," and does this estimate differ from country to country? (*Does one size fit all?*)
- Is the absence of evidence about the adjustment of a large current account imbalance evidence in favor of the sustainability of said large imbalance? (*Is the absence of evidence evidence of sustainability?*)

It is the aim of this paper to provide an empirical framework that can be used to begin to answer questions such as these. We will argue that, for any particular country, all four of these issues are, in fact, intrinsically related to one another and to the specification of the econometric model that best describes that country's current account dynamics. If the current account, suitably scaled by net output (GDP net of investment and government purchases), is a linear, stationary stochastic process with a constant unconditional mean, as is often assumed in empirical work, then the answers to these four questions are straightforward: no, no, moot, and yes.

An immediate implication of stationarity is that any current account or net output ratio not equal to the unconditional mean is unsustainable by the definition of a stationary stochastic process. This applies to surpluses as well as deficits. However, as an empirical matter, the dynamic process by which the current account adjusts to its unconditional mean depends crucially on whether the process is linear or nonlinear. In particular, if the process is linear, adjustment is symmetric above and below the long-run equilibrium, and the speed of adjustment is independent of the magnitude of the displacement from long-run equilibrium (the unconditional mean). For a linear, stationary current account-net output process, there is nothing to be gained by just focusing on the adjustment of current account deficits and excluding the data on adjustment to surpluses (all relative to the unconditional mean current account to net output ratio which may be either positive or negative). Moreover, there is no reason to focus on the adjustment to large deficits as providing different or more information than episodes of adjustment to small deficits (relative to the unconditional mean) as all episodes provide the same information. Finally, as should be obvious by now, for a linear stationary stochastic process, there is no particular threshold beyond which markets or shifts in policy force a reversal and below which adjustment is absent.

By contrast, if the stationary stochastic process that governs the current account adjustment to its long mean is nonlinear, then both the "sign" and "size" of the current account imbalance *do* matter for the adjustment process, and the size of the current account imbalance beyond which adjustment takes place may well be country specific (as alluded to by Chairman Greenspan and as is suggested by the empirical work cited previously). Finally, if the stationary stochastic process is nonlinear, absence of evidence of adjustment of a large current account imbalance is not evidence of the absence of the ultimate adjustment of the imbalance.

There is a tractable and testable nonlinear time series model that conveniently exhibits all of the features of the current account adjustment process that have been the focus of recent discussions and that nests as a special case the linear stationary stochastic process model for the current account that is often assumed in empirical work. It is the threshold autoregression model introduced in Tong (1978) and studied extensively by Hansen (1996, 1999a,b). For a stationary stochastic threshold model with mean μ and thresholds $\underline{\delta}$ and $\overline{\delta}$, there is no tendency for ca = current account/net output – μ to adjust to its mean of 0 unless it has crossed either the threshold $\underline{\delta}$ or the threshold $\overline{\delta}$. In the regime with $\underline{\delta} < \text{ca} < \overline{\delta}$, deficits or surpluses (relative to μ) persist, and there is no tendency for imbalances to revert. However, the absence of evidence of mean reversion in this regime is not evidence that deficits or surpluses relative to μ are sustainable as, by stationarity, the only sustainable current account imbalance is equal to the unconditional mean.

In a threshold model, a necessary condition for adjustment to commence is for ca to cross either the deficit threshold $\underline{\delta}$ or the surplus threshold $\overline{\delta}$, parameters that can be estimated from the data, not imposed ex ante. In the deficit adjustment regime, $\text{ca} < \underline{\delta}$, and $\text{ca}_t = \underline{\rho}\text{ca}_{t-1} + \varepsilon_t$. Adjustment continues until ca reaches $\underline{\delta}$ at which point any further adjustment is driven by shocks to ε_t. In the surplus regime adjustment regime, ca > $\overline{\delta}$, and $ca_t = \overline{\rho} ca_{t-1} + \varepsilon_t$. Adjustment continues until ca reaches $\overline{\delta}$ at which point any further adjustment is driven by shocks to ε_t. Evidently, in a threshold model, the sign and size of the ca imbalance can matter, thresholds can differ across countries, and the absence of evidence of adjustment is not the evidence of absence of future adjustment of the ca imbalance.

The plan of the paper is as follows. In section 5.2, we review some basic empirical predictions of the modern workhorse model of the current account, the rational expectations, intertemporal approach model developed in Sachs (1981, 1982), estimated by Sheffrin and Woo (1990), and recently extended by Kano (2003). The basic prediction of this model, once one allows for permanent shocks to the level of net output as in Campbell and Deaton (1989), is that the ratio of the current account to net output (GDP less investment less government purchases) should be a stationary stochastic process with an unconditional mean determined by the relationship between the real interest rate and the per capita rate of growth. We also argue that a general equilibrium, two-country version of the Weil (1989) infinite horizon, overlapping generations model of the current account—a model in which the global real interest rate and the net foreign asset or liability position of each country is endogenously determined—also has the prediction that the current account to net output ratio is constant in steady state and determined by underlying parameters such as rates of time preference, the steady-state rate of global growth, and the relative size of the two countries. In our paper, we will follow most of the empirical work in this area and take the stationarity of the current account to net output ratio as given. The question at the heart of the present paper is whether the stationary stochastic process that describes the current account to net output ratio in the G7 countries features linear or nonlinear adjustment to the unconditional mean. We conclude section 5.2 by presenting, for each G7 country, the results of a nonparametric statistical test of the null hypothesis of a linear adjustment of the current account to net output ratio against the alternative of nonlinear adjustment, using quarterly data for the sample 1979:1 to 2003:3. This is an application of a test for nonlinearity developed by Terasvirta (1994). For the G7 countries in our sample, we find statistically significant evidence against the null of linear adjustment of the current account to net output ratio and in favor of the alternative of nonlinear adjustment.

In section 5.3 of the paper, we estimate for each G7 country a threshold autoregressive model of the current account to net output ratio, allowing for country-specific thresholds of current account surplus and deficit adjustment in each country (as suggested, for example, by Chairman Greenspan's comments) and also allowing for country specific means for the ratio of the current account to net output (as suggested, for example, by the general equilibrium version of the Weil model reviewed in section 5.2). Our main findings in this section are as follows. For most of the G7 countries, we find significant evidence of threshold effects in current account adjustment. We also find that we cannot reject the null hypothesis of a random walk for the current account imbalance in each country when that ratio does not exceed (in absolute value) the country-specific surplus and deficit thresholds (relative to the country specific mean) estimated for that country. For most of the G7 countries, unless the current account imbalance is too large—as suggested by Milesi-Ferretti and Razin (1998)—there does not appear to be a systematic tendency for adjustment to occur. A further advantage of our approach is that we can estimate from the data how large a current imbalance has to be before this imbalance triggers an adjustment, and we can allow these estimated thresholds to differ across countries. In fact, we find substantial cross-country variation in the surplus and deficit thresholds that trigger current account adjustment in each country. We also find evidence of cross-country and cross-regime variation in the autoregressive dynamics estimated during adjustment regimes for each country.

In section 5.4, we investigate what happens to the probability distributions of nominal exchange rate changes, stock price index changes, and long-term interest rate differentials during the various current account adjustment regimes that we estimate for each country in section 5.3. The motivation is to determine whether crossing the current account adjustment threshold is itself associated with shifts in the probability distributions for exchange rates, stock prices, and interest differentials. We specifically account for—and allow for current account regime-specific shifts in—autoregressive conditional heteroscedasticity as well as for shifts in the mean by estimating generalized autoregressive conditionally heteroskedastic (GARCH) models for nominal exchange rate changes, stock prices changes, and interest differentials. We also in this section explore, for the United States, whether the expectation of a future adjustment in the current account imbalance is associated with a present shift in the probability distribution of exchange rates, stock prices, or interest differentials. We proxy this by including in the GARCH models two dummy variables (one for deficits and one for surpluses) that represent the distance between the current account imbalance and its country-specific mean when the imbalance is between the thresholds.

In section 5.5, we draw on our empirical results to take stock of the present U.S. current account deficit. Our empirical results indicate that compared to other G7 countries, the United States over our sample exhibited relatively wide thresholds within which current account adjustment is absent and relatively slow speeds of adjustment once these thresholds, especially the deficit threshold, are crossed. Moreover, the present U.S. current account deficit substantially exceeds—and has for some time—our estimated thresholds of current account deficit adjustment for the United States. We explore several possible explanations. The first is that the threshold model, while a useful description of current account adjustment for other G7 countries, does not apply to the United States and that the present deficit of nearly 6 percent of GDP is, in fact, sustainable. The second explanation is that there are thresholds of current account adjustment for the United States, but that adjustment has been delayed over the past several years, due to unusual circumstances that were not in evidence during the sample over which the models were estimated, 1979 to 2003. These circumstances could include (a) the low level of global real interest rates (which support higher levels of investment and lower levels of saving in the United States than would be the case with historically average or above average real interest rates); (b) the more muted and less uniform decline in the dollar than occurred, for example, during the 1985 to 1987 Plaza-Louvre episode (reflecting the intervention activities of Asian central banks); (c) the fact that the United States continues to run a substantial surplus in dividends, interest, and profits on its stock of foreign assets compared with the dividends, interest, and profits that it pays out on its much larger stock of foreign liabilities; and (d) the adjustment in the net foreign liability position of the United States that occurs as a result of dollar depreciation (which in 2003 offset almost 80 percent of that year's current account deficit). We review and evaluate these potential explanations for the absence of adjustment to date in the U.S. current account deficit even though it has passed well beyond thresholds that would have triggered adjustments in other G7 countries.

Section 5.6 provides some concluding remarks.

5.2 A Test for Nonlinear Current Account Adjustment

5.2.1 Theoretical Considerations

In our empirical work, we shall be modeling the dynamics of G7 current account adjustment. However, it is important to take a stand as to exactly what it is to which G7 current account imbalances are adjusting. In this paper, we draw on the implications for long-run current account equilibrium of the workhorse intertemporal model of the current account (Sachs 1981; Sheffrin and Woo 1990, via Campbell 1987). This model can be written $\text{CA}_t = -E_t \Sigma(1 + r)^{-i}\Delta Z_{t+i}$, where $Z_t = Y_t - I_t - G_t$ is the level of net output. The intertemporal approach models have been estimated and tested many times, and their high frequency implications—that current account dynamics are fully described by the discounted sum of future changes in net output—are usually rejected. However, we argue that the intertemporal model, properly specified to allow for stationarity in long-run growth rates, contains an important insight about the long-run behavior of the current account. It would seem preferable to model $\Delta \log Z_t = \Delta z_t$ as stationary. Following Campbell and Deaton (1989), it is straightforward to show (Kano 2003) that the log-linear approximation of the intertemporal approach model is given by $CA_t/Z_t \approx E_t \Sigma(1 + r - g)^{-i}\Delta z_{t+i}$, where g is the unconditional mean of Δz_t. Note that if the log difference of net output is stationary, it is the current account to net output *ratio* that is stationary, not simply the current account itself. This seems like a more sensible long-run equilibrium condition than to assume that the current account itself is stationary.

The intertemporal approach model is partial equilibrium and is usually studied for the special case in which r is equal to the rate of time preference. However, the basic prediction of that model—that the ratio CA/Z is constant in the long run—also holds in the steady state of a two-country version of Weil's (1989) infinite horizon overlapping generations model. As shown in Obstfeld and Rogoff (1994, 188), the Weil model with discount factor β implies that the steady-state current account to net output ratio is constant and given by $CA/Z = (n + g)\theta$, where n is the rate of population growth, g is the rate of net output growth, and θ is the endogenous ratio of net foreign assets to net output given by the solution to $\theta[1 - (1 + r)\beta/(1 + n)(1 + g)] = [(1 + r)\beta - (1 + g)]/(1 + n)(1 + g)(r - g)$. Now imagine two such economies trading goods and bonds with one another that differ in two respects: size and the discount factor. Let $\beta_1 < \beta_2$, and suppose that country 2 is larger than country 1. It is easy to show that in the steady state of a two-country version of the Weil model, the β_1 smaller country will run a steady state current account to net output deficit and the larger, more patient β_2 country will run a steady-state current account to net output surplus. Based on these considerations, we shall assume that for each G7 country, the ratio CA/Z is stationary and allow for country-specific means in the CA/Z ratio.

5.2.2 Testing for Nonlinearities in G7 Current Account Adjustment

This paper is an empirical study of G7 current account adjustment, based on quarterly data for the period 1979:1 to 2003:3 (the data available when we began our study in the fall of 2003). We choose our starting date to begin six years after the advent of floating exchange rates and the initial globalization of the international capital market that occurred at that time and in conjunction with the first oil shock. The data in the analysis are obtained from the International Financial Statistics Database by the International Monetary Fund (IMF). All variables are seasonally adjusted and expressed in national currency. According to national account statistics, the current account variable is estimated as the sum of net exports and net primary income from abroad (NPIA); net output is obtained by subtracting government consumption expenditure and gross fixed capital formation (investment) to GDP.

Table 5.1

Country	Terasvirta linearity tests (marginal significance level)
Canada	0.369
France	0.029
Germany	0.035
Italy	0.136
Japan	0.027
United Kingdom	0.184
United States	0.069

We test for nonlinearity in G7 current account or net output adjustment following the nonparametric test for nonlinearity developed by Luukkonen, Saikkonen, and Terasvirta (1988) and Terasvirta (1994). These authors propose a Lagrange Multiplier test for a third-order Taylor approximation to the regression function of the form $\text{ca}_t = \beta_{00} + \Sigma_{i=1}^{P}(\beta_{1i}\text{ca}_{t-1} + \beta_{2i}\text{ca}_{t-i}\text{ca}_{t-d} + \beta_{3i}\text{ca}_{t-i}\text{ca}^2_{\text{t-d}} + \beta_{4i}\text{ca}_{t-i}\text{ca}^3_{\text{t-d}}) + \varepsilon_t$. This artificial regression allows to identify general nonlinearity through the significance of the higher order terms. The main advantage of this type of test is that it can be carried out by simple ordinary least squares (OLS) and that—despite being designed for smooth transition regressions—is sensitive to a wide range of nonlinearities (Granger and Terasvirta 1993) although there is reason to suspect that the power of the test may be weak against some nonlinear alternatives. The results of this test are reported in table 5.1.

Hence, evidence of nonlinear adjustment is indicated at the 5-percent significance level for France, Germany and Japan and at the 7-percent level for the United States.

Using the multivariate bootstrap test procedure developed by Hansen (1997), the null hypothesis of linear adjustment in all countries is rejected at the 14-percent level. Given the possibly poor power characteristics of these tests, therefore, we felt encouraged to investigate the estimation of nonlinear models more directly.

5.3 Estimating and Testing Thresholds Models of G7 Current Account Adjustment

In this section of the paper, we estimate and test for each G7 country a threshold autoregression model of the current account to net output ratio using the univariate approach developed in Hansen (1996). We allow for and estimate country-specific means, country- and regime-specific thresholds, and country- and regime-specific dynamic adjustment once the current account has crossed either of the thresholds. Letting $\text{ca} = \text{CA}/Z - \mu$, we write the equilibrium threshold autoregressive (TAR) model as

$$\text{(1)} \quad \text{ca}_t = \overline{\rho} \times 1(\text{ca}_{t-d}, \overline{\delta}) \times \text{ca}_{t-1} + \underline{\rho} \times 1(\text{ca}_{t-d}, \underline{\delta}) \times \text{ca}_{t-1} + [1 - 1(\text{ca}_{t-d}, \overline{\delta})] \times [1 - 1(\text{ca}_{t-d}, \underline{\delta})] \times \text{ca}_{t-1} + e_t,$$

where $1(\text{ca}_{t-d}, \overline{\delta})$ is an indicator function that takes on a value of 1 when $\text{ca}_{t-d} > \overline{\delta} \geq 0$ (and zero otherwise), and $1(\text{ca}_{t-d}, \underline{\delta})$ is an indicator function that takes on a value of 1 when $\text{ca}_{t-d} < \underline{\delta} \leq 0$ (and zero otherwise). This approach postulates that the persistence of the current account imbalance in a country may depend upon whether the current account imbalance has crossed a surplus threshold of $\overline{\delta} \geq 0$ or a deficit threshold of $\underline{\delta} \leq 0$. We note that a special case of the threshold model is the case in which $\overline{\delta} = \underline{\delta} = 0$ and $\overline{\rho} = \underline{\rho} < 1$, in which case it collapses to a linear stationary AR(1) process. We experimented with a threshold TAR(2) specification but found in general the second lag terms to be insignificant and thus confine our presentation to the TAR(1) models. We also select a delay parameter d of two quarters as this maximizes the fit of the regression in each case.

The threshold model can potentially identify three regimes of current account adjustment: a surplus adjustment regime; a deficit adjustment regime; and an inertia regime $\overline{\delta} < \text{ca}_{t-2} < \underline{\delta}$, in which the current account appears to follow a random walk. In a more general, smooth threshold transition autoregressive (STAR) model (e.g., Taylor, Peel, and Sarno 2001), the speed of adjustment does not increase discontinuously at the threshold; rather, the further way is the current account to GDP ratio from its long-run mean, the faster the current account imbalance adjusts. Interestingly, when we experimented with estimating smooth transmission models, we found they did not capture G7 current account dynamics in a sensible way. As we shall report next, there does in fact appear to be important, discrete threshold effects that influence current account adjustment.

Before presenting the results, we will discuss some issues involved in the estimation and testing of these models for a system comprised of the G7 countries. The ca variables for the G7 group are first demeaned, in order to allow for the existence of long-run deficit or surplus means for each country rather than a zero ca balance. A nonzero mean proves to be applicable for all G7 countries, with the single exception of Italy. In particular, we detect a structural break in the German series in 1991, corresponding with the German unification and the resulting change in the country national accounts; we account for the break by allowing two different means in the current account for the pre- and postunification periods.

The two asymmetric thresholds in the TAR model are selected jointly by minimization of the overall sum of squared errors. The estimation method involves a double grid search over ca. Following Hansen (1997), the range for the grid search is selected a priori to contain ca observations in between the 15th ($\underline{\text{ca}}$) and the 85th percentile ($\overline{\text{ca}}$). This reduction in the grid range is needed in order to avoid sorting too few observations in one regime for extreme values of the thresholds. As a result, the appropriate ranges are defined as $\overline{R} = [\mu, \overline{\text{ca}}]$ and $\underline{R} = [\mu, \underline{\text{ca}}]$, for $\overline{\delta}$ and $\underline{\delta}$ respectively.

As the minimization process for a three-regime or two-threshold TAR process is numerically intensive, we rely on the estimation methodology proposed by Hansen (1999a) for multiple thresholds. This consists of a three-stage grid search, where the second-stage estimation of the two-threshold model is made conditional on the first-stage, single-threshold estimate of δ (either $\overline{\delta}$ or $\underline{\delta}$), the third stage being used as a refinement.

Furthermore, final estimates of slope parameters and standard errors for the G7 group of countries are obtained by seemingly unrelated regression (SUR) estimation, in order to allow for potential correlation between the disturbances of the different ca equations due to common unobservable factors.

Once the thresholds have been selected, according to standard asymptotic theory, (1) is linear in the parameters. As with any simple dummy-variable regression, it can be estimated by linear methods. However, statistical inference in a TAR model bears the difficulty that the thresholds $\overline{\delta}$ and $\underline{\delta}$ may not be identified under the null hypothesis in question (Davies 1987). In this case, the usual chi-square distribution needs to be replaced by an approximated empirical distribution obtained by bootstrapping the residuals (Hansen 1997). In particular, artificial observations are calibrated using the restricted estimates and are then used to obtain new estimates of the restricted and unrestricted model (for an application, see Peel and Taylor 2002). The percentage of bootstrap samples—we run 1000 replications—for which the simulated likelihood-ratio statistics exceed the actual one forms the bootstrap approximation to the *p*-value of the test statistic under question.

The estimation and testing results are presented in table 5.2. First, the test results: when we test the null hypothesis a single threshold for all countries versus the alternative hypothesis of two thresholds, we reject the null hypothesis in favor of the alternative. This is consistent with three regimes for each country—a surplus adjustment regime, a deficit adjustment regime, and an inertia (absence of adjustment) regime. Second, when we test the hypothesis that the current account follows a random walk inside the inertia regime against the alternative that it follows a mean reverting autoregressive process inside the inertia regime (a more general formulation of the threshold model), we are unable to reject the null of a random walk inside the inertia regime. In summary, the statistical tests find evidence of nonlinear current account adjustment and also identify significant thresholds beyond which current account adjustment takes place.

We now discuss the parameter estimates for the threshold models estimated for each G7 country. To repeat, these estimates allow for country-specific means, country- and regime-specific thresholds, and country- and regime-specific autoregressive dynamics. A number of interesting results

Table 5.2 Threshold models of de-meaned CA/NO (Q1:1979–Q3:2003)

	Thresholds (asymmetric band)		Slope coefficients (estimation by SUR)			Means	
Country	Upper threshold	Lower threshold	Above	Band	Below	Surplus	Deficit
Canada	1.41	–4.05	0.927 (0.048)	1.000	0.930 (0.060)		–1.792
France	2.13	–1.13	0.931 (0.048)	1.000	0.910 (0.045)	1.646	
Germany	2.84	0.00	0.880 (0.070)	1.000	0.827 (0.064)	6.185 1.496	Pre-1991 Post-1991
Italy	0.00	–0.37	0.944 (0.058)	1.000	0.867 (0.059)		–0.269
Japan	0.84	–0.18	0.908 (0.058)	1.000	0.894 (0.037)	3.951	
United Kingdom	1.08	0.00	0.777 (0.073)	1.000	0.929 (0.064)		–1.764
United States	2.15	–2.18	0.907 (0.039)	1.000	0.973 (0.034)		–2.011

Note: Bootstrap: LR-test for band coefficient equal to 1 (SUR): marginal significance level = 0.520; LR-test for single threshold (SUR): marginal significance level = 0.004. Standard errors are in parentheses.

are obtained. First, as suggested by Greenspan's comment cited previously, we see there is wide cross-country variation in the estimated current account deficit adjustment thresholds. For example, the estimated deficit adjustment threshold for the United States is –2.18 percent of net output, while for Japan it is only –0.18 percent of net output. This means that empirically, there is no evidence from these estimates of systematic adjustment in the U.S. current account deficit until the deficit exceeds –4.19 percent of net output (equal to the mean of –2.01 plus the threshold of –2.18), while for Japan, adjustment begins to take place when the surplus falls below 3.77 percent of net output (equal to the mean of 3.95 plus the deficit threshold of –0.18). We estimate a similar pattern for the other structural surplus countries, France and Germany. For France, we estimate that adjustment begins to take place once the surplus falls below 0.51 percent of net output; for Germany adjustment begins to take place once the surplus falls below the mean of 6.19 before unification and 1.19 percent after unification. Second, we see that for most G7 countries, there are thresholds of adjustment to current account surpluses as well as for current account deficits. Third, we see from table 5.3 substantial cross-country variation in the estimated autoregressive dynamics once countries cross their current account deficit or surplus thresholds. For deficit adjustment episodes, the estimated autoregressive coefficients range from 0.827 for Germany to 0.973 for the United States. For surplus adjustment episodes, the estimated

Table 5.3 Empirical Distribution of Current Account Regimes

	Canada	France	Germany	Italy	Japan	United Kingdom	G6 average	United States
	Percent of sample spent in each regime							
Surplus	34	23	20	51	36	37	34	20
Inertia	48	35	20	3	30	17	25	63
Deficit	18	42	60	46	34	46	41	17
	Adjustment per quarter during adjustment regimes (measured from peak and as percent of net output)							
Surplus	0.687	0.507	1.081	0.467	0.336	0.644	0.620333	0.303
Deficit	0.604	0.246	0.693	0.575	0.361	0.612	0.515167	0.327

Table 5.4 Estimated Half-life of Displacement from Current Account Threshold

	1 percent	2 percent	3 percent
Half-life of displacement from deficit threshold (in quarters)			
Canada	1.14	2.49	3.30
France	2.64	4.08	4.79
Germany	3.65	3.64	3.64
Italy	3.18	3.84	4.13
Japan	4.79	5.48	5.69
United Kingdom	9.41	9.41	9.41
G6 average	4.17	4.82	5.16
United States	6.25	9.99	12.49
Half-life of displacement from surplus threshold (in quarters)			
Canada	3.07	4.58	5.48
France	2.43	3.88	4.84
Germany	1.09	1.81	2.32
Italy	12.03	12.03	12.03
Japan	3.29	4.50	5.13
United Kingdom	1.09	1.56	1.82
G6 average	3.83	4.72	5.27
United States	1.77	2.82	3.53

autoregressive coefficients range from 0.777 in the United Kingdom to 0.944 in Italy.

In the top panel of table 5.4, we compute the half life of 1, 2, and 3 percent of net output displacements of the current account imbalance from the deficit threshold. In our equilibrium threshold model, the speed of adjustment to a given displacement from the deficit (or surplus) threshold is a function of the distance between the imbalances and the unconditional mean, not just to the threshold itself (as for example would be the case for a so-called band threshold model). As is evident from the table, the United States stands out in terms of the slow speed of adjustment to current account deficits, even when it is adjusting. For example, in response to a 2 percent of GDP displacement of the U.S. current account from the estimated deficit threshold of –2.18 percent (to a deficit of –4.18 percent of net output), it takes the United States nearly ten quarters on average to close 1 percentage point of that displacement, whereas for the average G6 country (G7 minus United States), it takes fewer than five quarters to close such a displacement. In the bottom panel of table 5.4, we compute the half life of 1, 2, and 3 percent of net output displacements of the current account imbalance from the upper (surplus) threshold. As before, we estimate substantial cross-country variation in the speeds of adjustment to displacements of the current account away from the adjustment thresholds. Note that the United States actually adjusts faster than the G6 average to current account surpluses.

In table 5.3, we present some summary statistics for the three current account regimes estimated for each G7 country. We see that the average G6 (excluding the United States) country spent only roughly 25 percent of the 1979 to 2003 sample in the inertia regime and thus spent 75 percent of the sample adjusting to either current account surpluses (34 percent of the sample) or deficits (41 percent of the sample). Of course, there is cross-country variation, but the G6 country spending the maximum time in the inertia regime was Canada, which spent 48 percent of sample in the inertia regime. The United States, by contrast, spent a full 63 percent of the sample in the inertia regime, and only 17 percent of the sample adjusting to current account deficits, and 20 percent of the time adjusting to current account surpluses. The bottom panel of table 5.3 reports, for each country, the average adjustment per quarter that actually occurred during the sample (as a percentage of net output) when that country was estimated to be in a deficit adjustment regime or a surplus adjustment regime. These adjustments are measured from the peak current account imbalance reached during the adjustment episode to the level reached when the adjustment regime concludes. Thus, for the average G6 country, once current account deficits (relative to mean) peak and begin to contract, they adjust at an average rate of 0.51 percent of net output per quarter (2 percent of net output per year) until adjustment concludes with the current account imbalance crossing the deficit adjustment threshold. The table also shows that for the G6, on average, once current account surpluses peak and begin to contract, they adjust at an even faster average rate 0.62 percent of net output per quarter (2.4 percent of net output per year) until adjustment concludes with the current account imbalance crossing the surplus adjustment threshold. Evidently, adjustment of current account imbalances in the U.S. data is much more sluggish than the G6 average, with the U.S. current account imbalance falling by roughly 0.3 percent of net output during each quarter (1.2 percent per year) that the United States is in an adjustment regime.

To summarize the results of this section, having tested and found evidence of nonlinearity in G7 current account adjustment data, we estimated for each G7 country a threshold autoregressive model that allows for asymmetric, country-specific thresholds, country-specific means, and regime- and country-specific speeds of adjustment. We find evidence in favor of deficit as well as surplus thresholds for most countries, as well as evidence of substantial cross-country differences in the amount of time spent in the three different regimes, as well as in the pace at which adjustments occur. Compared with other G7 countries, the United States has large thresholds of current account adjustment, spends relatively little time in adjustment regimes, and adjusts slowly even when in those imbalance adjustment regimes. In the next section of the paper, we explore what happens to the probability distributions of exchange rates, stock prices, and interest rate differentials during current account adjustment regimes in each country.

5.4 Exchange Rates, Stock Prices, and Interest Rates during Current Account Adjustment Regimes

In this section, we investigate what happens to the probability distributions of nominal exchange rate changes, stock price index changes, and long-term interest rate differentials during the various current account adjustment regimes that we estimate for each country in section 5.3. The motivation is to determine whether crossing the current account adjustment threshold is itself associated with shifts in the probability distributions for exchange rates, stock prices, and interest differentials. We specifically account for—and allow for current account regime specific shifts in—autoregressive conditional heteroscedasticity as well as for shifts in the mean by estimating GARCH models for nominal exchange rate changes, stock prices changes, and interest differentials. We also in this section explore, for the United States, whether the expectation of a *future* adjustment in the current account imbalance is associated with a present shift in the probability distribution for exchange rates, stock prices, or interest differentials.

Switching models of exchange rates were introduced in Engel and Hamilton (1990). They hypothesized that the log difference in the nominal exchange rate is a stochastic process with a regime-specific mean and a regime-specific (but constant) variance. In their model, the regimes themselves are unobservable states; the probability that the exchange rate is in a particular regime is inferred from the exchange rate data itself. Our approach is different, but similarly motivated. Having found evidence of three regimes of current account adjustment for each G7 country, we estimate and test whether being in a current account adjustment regime is associated with shifts in the drift and variance of exchange rate changes for that country. We allow for autoregressive conditional heteroscedasticity in exchange rate changes. We estimate similar models for the log difference in stock price changes and for long-term interest rate differentials, allowing for regime specific drifts and variances.

The GARCH models we estimate in this section are of the form

$$\Delta_t = d + d1\text{DUMS}_t + d2\text{DUMD}_t + u_t \tag{2}$$

$$\sigma_t^2 = c + au_{t-1}^2 + b\sigma_{t-1}^2 + c1\text{DUMS}_t + c2\text{DUMD}_t,$$

where DUMD_t is a dummy variable that takes on a value of 1 when a country is in a deficit adjustment regime, DUMS_t is a dummy variable that takes on a value of 1 when a country is in a surplus adjustment regime, σ_t^2 is the conditional variance of u_t, and Δ_t is the log difference in the exchange rate, the log difference in the equity price index, or the interest rate differential (adjusted for first order autocorrelation) observed at a monthly frequency. Thus, in each quarter in which a country is in a particular regime, there will be three observations on the monthly change in the asset price during that quarter. Because Italy and France were part of the European Monetary System (EMS) during most of the sample, the behavior of their exchange rates and interest rates reflected their EMS commitments to stabilize their exchange rates vis-à-vis Germany. We exclude them from the analysis of this section. Estimation is by maximum likelihood. For each country, we report the results for the log (change) in the trade weighted exchange rate, the log (change) in a broad stock market index, and the differential between each country's long-term interest rate and G7 average (adjusted for first order autocorrelation). When significant, we also report the results for key bilateral exchange rates. In what follows "**" indicates significance at the 5 percent level, "*" significance at the 10 percent level, and "†" at the 15 percent level. Data sources are the IFS for long-term interest rates and Bloomberg for exchange rates and stock market indexes. The sample is monthly from 1979:2 to 2003:9 with some exceptions as noted in the following.

5.4.1 Results

U.S. Results

For the U.S. dollar index, we see that the estimated coefficient on the surplus regime dummy is positive, and the estimated coefficient on the deficit regime dummy is negative (table 5.5). This means that the dollar index tends to appreciate during U.S. surplus adjustment regimes and to depreciate during U.S. deficit adjustment regimes, although the coefficients are not measured precisely. For the pound, we estimate a statistically significant shift in the probability distribution of exchange rate changes that coincides with U.S. surplus adjustment regimes, in favor of an appreciation of the dollar relative to the pound. For the Canadian dollar, we estimate a statistically significant shift in the probability distribution of exchange rate

Table 5.5 **Asset prices during U.S. current account adjustment regimes**

U.S. dollar index

$$\Delta_t = -.0004 + \underset{(.0028)}{.0035}DUMS_t - \underset{(.0025)}{.0028}DUMD_t + u_t$$

$$\sigma_t^2 = .0001 - .0325u_{t-1}^2 + .5976\sigma_{t-1}^2 + \underset{(.00003)}{.0002}DUMS_t - \underset{(.00003)}{.0002}DUMD_t$$

Pound per dollar

$$\Delta_t = -.0013 + \underset{(.0044)^{**}}{.0101}DUMS_t - \underset{(.0038)}{.0019}DUMD_t + u_t$$

$$\sigma_t^2 = .0002 + .2151u_{t-1}^2 + .6013\sigma_{t-1}^2 + \underset{(.0001)}{.0001}DUMS_t - \underset{(.00007)}{.0002}DUMD_t$$

Canadian dollars per U.S. dollar

$$\Delta_t = .0009 + \underset{(.0019)}{.0006}DUMS_t - \underset{(.0025)^{*}}{.0044}DUMD_t + u_t$$

$$\sigma_t^2 = .0002 - .0161u_{t-1}^2 - .5754\sigma_{t-1}^2 + \underset{(.0001)}{.00001}DUMS_t + \underset{(.00007)^{**}}{.0002}DUMD_t$$

Equity prices

$$\Delta_t = .0107 - \underset{(.0061)}{.0029}DUMS_t - \underset{(.0091)^{\dagger}}{.0139}DUMD_t + u_t$$

$$\sigma_t^2 = .0014 + .0004u_{t-1}^2 + .0681\sigma_{t-1}^2 + \underset{(.0004)}{.00027}DUMS_t + \underset{(.0011)^{**}}{.00223}DUMD_t$$

Long-term interest differentials

$$\Delta_t = .0094 - \underset{(.0304)}{.0154}DUMS_t - \underset{(.0181)}{.0014}DUMD_t + u_t$$

$$\sigma_t^2 = .0002 - .0177u_{t-1}^2 + .9788\sigma_{t-1}^2 + \underset{(.0009)^{**}}{.00305}DUMS_t + \underset{(.00014)}{.00007}DUMD_t$$

**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Significant at the 15 percent level.

changes that coincides with U.S. deficit adjustment regimes, in favor of a depreciation of the dollar relative to the Canadian dollar. We also estimate a statistically significant rise in the volatility of the Canadian dollar exchange rate that coincides with U.S. deficit adjustment regimes. For U.S. equity prices, we estimate a significant (at the 12 percent level) fall in equity returns during U.S. current account deficit adjustment regimes. We also estimate a significant rise in equity volatility that occurs during U.S. current account adjustment regimes. For long-term interest rate differentials, we do estimate a significant increase in volatility during U.S. current account surplus adjustment regimes.

Japanese Results

For the yen index, we see that the estimated coefficient on the Japan current account surplus adjustment regime dummy is positive and significant, indicating that the yen index tends to appreciate during Japan's current ac-

Table 5.6 Asset prices during Japan current account adjustment regimes

Yen index

$$\Delta_t = -.0016 + \underset{(.0034)^{**}}{.0093}\text{DUMS}_t + \underset{(.0031)}{.0005}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0006 - .2115u_{t-1}^2 - .2848\sigma_{t-1}^2 + \underset{(.00013)}{.00012}\text{DUMS}_t - \underset{(.00012)}{.00005}\text{DUMD}_t$$

Dollar per yen

$$\Delta_t = .0008 + \underset{(.0050)}{.0066}\text{DUMS}_t - \underset{(.0048)}{.0044}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00001 - .0095u_{t-1}^2 + .9383\sigma_{t-1}^2 + \underset{(.00005)^{**}}{.00012}\text{DUMS}_t + \underset{(.00003)^{**}}{.00008}\text{DUMD}_t$$

Equity prices

$$\Delta_t = -.0031 + \underset{(.0084)}{.0105}\text{DUMS}_t + \underset{(.0076)}{.0093}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0006 + .1245u_{t-1}^2 + .7605\sigma_{t-1}^2 - \underset{(.0003)}{.00017}\text{DUMS}_t - \underset{(.00029)^{\dagger}}{.00044}\text{DUMD}_t$$

Long-term interest differentials

$$\Delta_t = -.1045 - \underset{(.0344)}{.0153}\text{DUMS}_t - \underset{(.0371)^{**}}{.0844}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0049 + .0082u_{t-1}^2 - .1245\sigma_{t-1}^2 + \underset{(.0142)^{**}}{.028796}\text{DUMS}_t + \underset{(.01493)^{**}}{.03240}\text{DUMB}_t$$

**Significant at the 5 percent level.

†Significant at the 15 percent level.

count surplus adjustment regimes (table 5.6). For the dollar-yen exchange rate, we estimate a statistically significant increase in exchange rate volatility during both Japan surplus adjustment regimes and Japan deficit adjustment regimes. We also obtain point estimates that suggest that the yen tends to appreciate relative to the dollar during Japanese current account surplus regimes and to depreciate during Japanese current account deficit adjustment regimes, although these coefficients are not measured precisely. For Japanese equity prices, we estimate a significant fall in equity volatility during Japan current account deficit adjustment regimes. For long-term interest rate differentials, we do estimate a significant increase in volatility during both Japan's current account surplus adjustment regimes and current account deficit adjustment regimes. We also estimate a significant widening in Japanese long-term interest differential (it becomes larger in absolute value) during Japan's current account surplus adjustment regimes as well as a widening during Japan's current account deficit adjustment regimes (although the latter is not significant).

German Results

For the volatility of the deutsche mark (DM) index through 1998:12, we see that the estimated coefficient on the German current account deficit adjustment regime dummy is positive and significant (table 5.7). For the

Table 5.7 **Asset prices during German current account adjustment regimes**

DM index

$$\Delta_t = .0021 - \underset{(.0014)}{.0013}\text{DUMS}_t - \underset{(.0012)}{.0012}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00002 + .0886u_{t-1}^2 + .1619\sigma_{t-1}^2 + \underset{(.00001)}{.00001}\text{DUMS}_t + \underset{(.00001)^{**}}{.00003}\text{DUMD}_t$$

Dollar per DM

$$\Delta_t = -.0058 - \underset{(.0066)}{.0013}\text{DUMS}_t - \underset{(.0053)^{\dagger}}{.0082}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00127 + .0921u_{t-1}^2 - .2801\sigma_{t-1}^2 - \underset{(.0004)}{.00004}\text{DUMS}_t + \underset{(.00031)}{.00008}\text{DUMB}_t$$

Equity prices

$$\Delta_t = .0037 - \underset{(.0144)}{.0025}\text{DUMS}_t + \underset{(.0102)}{.0053}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0015 + .0726u_{t-1}^2 + .7386\sigma_{t-1}^2 - \underset{(.0006)}{.00026}\text{DUMS}_t - \underset{(.00051)^{**}}{.00115}\text{DUMD}_t$$

Long-term interest differentials (1979:1–1990:12)

$$\Delta_t = -.0129 - \underset{(.0481)}{.0282}\text{DUMS}_t - \underset{(.0541)^{**}}{.2147}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0242 + .2351u_{t-1}^2 - .0644\sigma_{t-1}^2 + \underset{(.0122)}{.01303}\text{DUMS}_t + \underset{(.02499)^{\dagger}}{.03635}\text{DUMD}_t$$

Long-term interest differentials (1991:1–1998:12)

$$\Delta_t = .0074 - \underset{(.0927)}{.0619}\text{DUMS}_t - \underset{(.0247)^{\dagger}}{.0358}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = -.0001 + .0804u_{t-1}^2 + .7183\sigma_{t-1}^2 + \underset{(.0152)}{.01583}\text{DUMS}_t + \underset{(.00294)^{\dagger}}{.00455}\text{DUMD}_t$$

**Significant at the 5 percent level.
†Significant at the 15 percent level.

dollar-DM exchange rate estimated through 1998:12, we estimate a statistically significant depreciation of the DM during German current account deficit adjustment regimes. For German equity prices, we estimate a significant fall in equity volatility during German current account deficit adjustment regimes. For long-term interest rate differentials, we do estimate a significant increase in volatility during German current account deficit adjustment regimes. German interest rate differentials increase in absolute value during deficit adjustment regimes before unification and narrow after unification. We split the sample at unification because of an obvious shift in the mean of the interest differential series at that time.

U.K. and Canadian Results

For the Canadian dollar index, we see that the estimated coefficient on the Canadian current account deficit adjustment regime dummy is negative and significant, indicating that the Canadian dollar index tends to depreciate during Canada's current account deficit adjustment regimes (table

Table 5.8 **Asset prices during U.K. current account adjustment regimes**

Pound index

$$\Delta_t = -.0013 + \underset{(.0029)}{.0012}\text{DUMS}_t + \underset{(.0028)}{.0019}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00011 + .2775u_{t-1}^2 + .5646\sigma_{t-1}^2 - \underset{(.00005)^{\dagger}}{.00007}\text{DUMS}_t - \underset{(.00005)^{*}}{.00008}\text{DUMD}_t$$

Dollar per pound

$$\Delta_t = .0049 - \underset{(.0044)^{**}}{.0093}\text{DUMS}_t - \underset{(.0045)}{.0035}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00024 + .1959u_{t-1}^2 + .5747\sigma_{t-1}^2 - \underset{(.0001)}{.00004}\text{DUMS}_t + \underset{(.0001)}{.00001}\text{DUMD}_t$$

Equity prices

$$\Delta_t = -.0006 + \underset{(.0082)^{**}}{.0185}\text{DUMS}_t + \underset{(.0081)}{.0048}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0040 + .0224u_{t-1}^2 - .8964\sigma_{t-1}^2 - \underset{(.0003)^{**}}{.00084}\text{DUMS}_t + \underset{(.00070)}{.00091}\text{DUMD}_t$$

Long-term interest differentials

$$\Delta_t = .0312 + \underset{(.032)}{.0073}\text{DUMS}_t + \underset{(.028)}{.0177}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00037 + .0461u_{t-1}^2 + .9402\sigma_{t-1}^2 + \underset{(.0018)}{.00048}\text{DUMS}_t - \underset{(.0012)}{.00037}\text{DUMD}_t$$

**Significant at the 5 percent level

*Significant at the 10 percent level.

†Significant at the 15 percent level.

5.8). For the U.S. dollar-Canada exchange rate, we estimate a similar result, but it is not statistically significant. For the United Kingdom, the most noteworthy result is a significant increase in equity returns during current account surplus adjustment regimes, a fall in equity volatility during U.K. current account surplus adjustment regimes, and a rise in equity volatility during U.K. current account deficit adjustment regimes (table 5.9). Because of a break in the U.K. equity price data series at 1984:1, the U.K. equity sample is 1984:1 to 2003:9.

Summary of Results for Section 5.4.1

In this subsection, we have reported evidence of statistically significant shifts in the mean and variance of the probability distribution of several G7 exchange rates, equity prices, and interest rate differentials that occur in conjunction the current account adjustment regimes estimated in section 5.3. Our approach cannot answer the question of which triggers what, but we do find evidence that regimes of current account adjustment do coincide with shifts in the distribution of some important asset prices. The estimates that are significant tend to show exchange rate depreciation during current account deficit regimes and exchange rate appreciation during current account surplus regimes. We also find statistically significant increases

Table 5.9 Asset prices during Canada current account adjustment regimes

CAD index

$$\Delta_t = .0002 - \underset{(.0014)}{.0015}\text{DUMS}_t - \underset{(.0017)^{\dagger}}{.0025}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00004 + .1961u_{t-1}^2 + .4708\sigma_{t-1}^2 - \underset{(.00001)}{.000002}\text{DUMS}_t + \underset{(.00002)}{.000002}\text{DUMD}_t$$

U.S. dollar per Canadian dollar

$$\Delta_t = .0003 - \underset{(.0014)}{.0018}\text{DUMS}_t - \underset{(.0018)}{.0021}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00001 + .0608u_{t-1}^2 + .8727\sigma_{t-1}^2 + \underset{(.00006)}{.00004}\text{DUMS}_t + \underset{(.00005)}{.00002}\text{DUMD}_t$$

Equity prices

$$\Delta_t = .0051 + \underset{(.0067)}{.0030}\text{DUMS}_t - \underset{(.0065)}{.0030}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0007 + .0534u_{t-1}^2 + .7576\sigma_{t-1}^2 - \underset{(.0002)^{\dagger}}{.00041}\text{DUMS}_t - \underset{(.00047)}{.00062}\text{DUMD}_t$$

Long-term interest differentials

$$\Delta_t = .1855 - \underset{(.0605)}{.0429}\text{DUMS}_t + \underset{(.0331)}{.0300}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0124 + .1002u_{t-1}^2 + .6336\sigma_{t-1}^2 + \underset{(.0033)^{\dagger}}{.05082}\text{DUMS}_t + \underset{(.00396)}{.00013}\text{DUMD}_t$$

†Significant at the 15 percent level.

in exchange rate volatility during current account deficit adjustment regimes for the United States, Japan, and Germany. For equity markets, we estimate that current account deficit adjustment regimes are associated with significantly lower U.S. equity returns and higher U.S. equity volatility, while in the United Kingdom, equity returns are higher during current account surplus adjustment regimes, equity volatility is lower, while U.K. equity volatility is higher during current account deficit adjustment regimes.

5.4.2 Do Expectations of Future U.S. Current Account Adjustment Trigger Adjustment in Present Asset Prices?

We now explore, for the United States, whether the expectation of a *future* adjustment in the current account imbalance is associated with a *present* shift in the probability distribution for exchange rates, stock prices, or interest differentials. As discussed previously, compared with other G7 countries, the United States has wide thresholds of current account adjustment, spends relatively little time in adjustment regimes, and—as shown in table 5.3—adjusts slowly even when in deficit or surplus adjustment regimes. To capture the hypothesis that expectations of future current account adjustment may have an impact on present asset prices, we augment our basic GARCH specification to include two additional dummy variables. Let DUMBD equal one when $-2.18 < \text{ca} < -1$, and let

DUMBS equal one when $1 < \text{ca} < 2.15$. Thus DUMBD equals one when the current account deficit is more than 1 percentage point below its mean but still less (in absolute value) than the deficit threshold, while DUMBD equals one when the current account is more than 1 percentage point above its mean but still less (in absolute value) than the surplus threshold. Our specification becomes

$$(3)\quad \Delta_t = d + d1\text{DUMS}_t + d2\text{DUMD}_t + d3\text{DUMBS}_t + d4\text{DUMBD}_t + u_t$$
$$\sigma_t^2 = c + au_{t-1}^2 + b\sigma_{t-1}^2 + c1\text{DUMS}_t + c2\text{DUMD}_t + c3\text{DUMS}_t + c4\text{DUMBD}_t.$$

In order to focus on significant results, we proceed in two steps. In the first step, we estimate specification (3). In the second step, we drop any dummy variable that in the first-stage estimate is not significant at the 15 percent level or better. The results are reported in table 5.10.

From table 5.10, we see that when current account deficits are large but *before* the United States enters a current account deficit adjustment regime, the dollar index starts to depreciate, at a pace of roughly 7 percent per year. We also see that the volatility of the dollar index is lower when deficits are small but before the United States enters a current account surplus adjustment regime. As for equity prices, the results reported in table 5.5 are robust to the inclusion of the two additional dummy variables. We continue to find a significant negative effect of current account deficit adjustment regimes on equity returns and a significant positive effect on equity volatility. Interestingly, we also find that equity volatility is lower when

Table 5.10 Asset prices before and during U.S. current account adjustment regimes

U.S. dollar index

$$\Delta_t = .0006 - \underset{(.0033)^{*}}{.0064}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .00012 - .05u_{t-1}^2 + .7083\sigma_{t-1}^2 - \underset{(.00003)^{**}}{.00006}\text{DUMBS}_t$$

Equity prices

$$\Delta_t = .0115 - \underset{(.0087)^{\dagger}}{.0131}\text{DUMD}_t + u_t$$

$$\sigma_t^2 = .0015 + .0058\text{u}_{t-1}^2 + .1106\sigma_{t-1}^2 - \underset{(.0003)^{**}}{.0007}\text{DUMBS}_t + \underset{(.00097)^{**}}{.0019}\text{DUMD}_t$$

Long-term interest differentials

$$\Delta_t = -.0020 + \underset{(.0194)^{**}}{.0384}\text{DUMBS}_t$$

$$\sigma_t^2 = .0003 + .0241\text{u}_{t-1}^2 + .9418\sigma_{t-1}^2$$

**Significant at the 5 percent level.

*Significant at the 10 percent level.

†Significant at the 15 percent level.

deficits are small but before they have entered a current account surplus adjustment regime. Finally, we see that long-term interest differentials in favor of the United States are larger when current account deficits are small.

5.5 Assessing the Present U.S. Current Account Deficit

In this section we draw on our empirical results to take stock of the present U.S. current account deficit. Our empirical results indicate that compared to other G7 countries, the United States over our sample exhibited relatively wide thresholds within which current account adjustment is absent and relatively slow speeds of adjustment once these thresholds, especially the deficit threshold, are crossed. Moreover, the present U.S. current account deficit substantially exceeds—and has for some time—our estimated thresholds of current account deficit adjustment for the United States. We explore several possible explanations. The first is that the threshold model, while a useful description of current account adjustment for other G7 countries, does not apply to the United States and that the present deficit of nearly 6 percent of GDP is, in fact, sustainable. The second explanation is that there are thresholds of current account adjustment for the United States, but that adjustment has been delayed over the past several years due to unusual circumstances that were not in evidence during the sample over which the models were estimated, 1979 to 2003. These circumstances could include (a) the low level of global real interest rates (which support higher levels of investment and lower levels of saving in the United States than would be the case with historically average or above average real interest rates); (b) the more muted and less uniform decline in the dollar than occurred, for example, during the 1985 to 1987 Plaza-Louvre episode (reflecting the intervention activities of Asian central banks); (c) the fact that the United States continues to run a substantial surplus in dividends, interest, and profits on its stock of foreign assets compared with the dividends, interest, and profits that it pays out on its much larger stock of foreign liabilities; and (d) the adjustment in the net foreign liability position of the United States that occurs as a result of dollar depreciation (which in 2003 offset almost 80 percent of that years current account deficit). We review and evaluate these potential explanations for the absence of adjustment to date in the U.S. current account deficit even though it has passed well beyond the thresholds that would have triggered adjustments in other G7 countries. We begin by reviewing the data on the U.S. net foreign liability position.

Almost all claims held by foreigners against the United States are dollar denominated, while U.S. claims against the rest of the world are denominated in foreign currency. Thus, as has been emphasized by Pierre-Olivier Gourinchas and Hélène Rey (chap. 1 in this volume), a real depreciation of the dollar, by increasing the real value of U.S. holdings of foreign assets relative to foreign holdings of U.S. assets (which, of course, are dollar-denominated liabilities of the United States) is an important channel of international adjustment, over and above the impact of said real depreciation on the trade balance. This channel operates by narrowing the gap between the market value of foreign claims against the United States and the market value of U.S. claims against the rest of the world. In effect, because of the willingness on the part of the rest of the world to lend to the United States in the form of dollar-denominated debt and equity instruments, there is a transfer of wealth to the United States from the rest of the world as a result of a real depreciation of the dollar, all other things—including other asset prices—equal, a qualification to which we return below. It is important to note that while the United States benefits from this transfer effect that increases the real value of U.S. assets relative to U.S. liabilities, there is, of course, another implication of real dollar depreciation, which is the terms of trade deterioration that results from it. This terms of trade deterioration lowers the real purchasing power of any given flow of U.S. income, and it increases the relative price of imported inputs to U.S.-based production. In addition, as Obstfeld and Rogoff (chap. 9 in this volume) have emphasized, moving toward current account sustainability requires that resources be shifted from nontradable to tradable production. Empirically, this channel of international adjustment is potentially quite important in complementing the traditional channel in which the factors that contribute to a narrowing of the current account deficit also result in a real depreciation of the dollar.

Every year, the U.S. Commerce Department reports data on the net foreign liability position of the United States, and it provides detail on the revaluation of U.S. assets and liabilities that occurs as a result of exchange rate movements as well as asset price changes. The data on net foreign assets and liabilities is subject to substantial revisions. However, until quite recently—April 2005—the Commerce Department did not go back and revise the exchange rate and asset price revaluation attributions to make them consistent with the revised data on foreign assets and liabilities. However, at the request of one of the authors of this paper, the Commerce Department has now revised the exchange rate and asset price revaluation attributions to make them consistent with the revised data on foreign assets and liabilities. The newly released data are reported in table 5.11, and they tell an interesting story.

We begin with the most recent data available as of the time of writing, for year end 2003 (data for year end 2004 are preliminary). The United States began 2003 with gross foreign assets of \$6.6 trillion and gross foreign liabilities of \$9.2, for a stock of net foreign liabilities of \$2.6 trillion. During that year, the United States ran a current account deficit of \$530 billion that, after adjustment for errors and omissions, resulted in a net capital

Table 5.11 **Components of change in the net international investment position, with direct investment at market value, 1989–2004**

Year	Position beginning	Changes in position attributable to valuation adjustments: Financial flows (a)	Price changes (b)	Exchange rate changes[a] (c)	Other changes[b] (d)	Total [(a) + (b) + (c) + (d)]	Position ending
1988							10,466
1989	10,466	–49,545	7,129	–15,392	355	–57,453	–46,987
1990	–46,987	–60,337	–148,620	57,042	34,407	–117,508	–164,495
1991	–164,495	–46,421	–95,789	4,643	41,243	–96,324	–260,819
1992	–260,819	–96,253	–75,554	–74,991	55,312	–191,486	–452,305
1993	–452,305	–81,489	292,716	–21,969	118,779	308,037	–144,268
1994	–144,268	–127,052	23,172	73,069	39,828	9,017	–135,251
1995	–135,251	–86,298	–152,461	39,018	29,156	–170,585	–305,836
1996	–305,836	–137,687	84,188	–66,076	65,387	–54,188	–360,024
1997	–360,024	–221,334	–92,069	–207,625	58,320	–462,708	–822,732
1998(r)	–822,732	–69,740	–287,874	68,120	41,457	–248,037	–1,070,769
1999(r)	–1,070,769	–236,148	329,672	–125,970	65,778	33,332	–1,037,437
2000(r)	–1,037,437	–486,373	133,716	–270,594	79,681	–543,570	–1,581,007
2001(r)	–1,581,007	–400,243	–224,184	–151,685	17,671	–758,441	–2,339,448
2002(r)	–2,339,448	–500,316	–59,582	231,247	212,985	–115,666	–2,455,114
2003(r)	–2,455,114	–560,646	–1,716	415,507	229,599	82,744	–2,372,370
2004(p)	–2,372,370	–584,597	146,514	272,278	–4,070	–169,875	–2,542,245

Note: (p) = preliminary; (r) = revised.

[a]Represents gains or losses on foreign-currency-denominated assets and liabilities due to their revaluation at current exchange rates.

[b]Includes changes in coverage, capital gains and losses of direct investment affiliates, and other adjustments to the value of assets and liabilities.

inflow of $560 billion. In a simple textbook model that abstracts from asset price or exchange rate changes, this should have resulted in a dollar-for-dollar increase in net foreign liabilities, to approximately $3 trillion. During that year, asset price changes in local currency terms were substantial, but they roughly canceled out, having a minimal impact on the net foreign liabilities of the United States. By contrast, the exchange rate valuation effects were substantial. Dollar depreciation that year increased the value of U.S. assets abroad by $416 billion. By year end 2003, the net foreign liabilities of the United States were valued at $2.4 trillion dollars, an increase of only $83 billion compared with the previously discussed U.S. capital inflow of $560 billion.

Of course, a real dollar depreciation has a one-off impact on the value of U.S. net foreign assets, and a stabilization of net foreign liabilities as a ratio of U.S. GDP will require a reduction in the ratio of the current account to GDP. However, the current account deficit to GDP ratio need not return to zero for sustainability to be achieved. Indeed, a U.S. current account deficit-to-GDP ratio in the range of 2 to 3 percent is probably consistent with sustainability at something like the global level of interest rates and equity valuations. Consider this fact: in 2001, U.S. net foreign liabilities were 22.8 percent of U.S. nominal GDP. Two years later, U.S. net foreign liabilities to GDP had risen by a very modest 1.3 percentage points, to 24.1 percent of GDP, notwithstanding current account deficits of roughly 5 percent of GDP in each of 2002 and 2003. The data in table 5.11 show that exchange rate valuation effects have been important in previous years. For example, in 2002, the exchange rate revaluation of U.S. foreign assets offset 46 percent of the foreign capital inflow; in 1994 and 1995, the exchange rate valuation effect offset 52 percent of the net capital inflow. Of course, exchange rate appreciation has the opposite effect. Of the $1.3 trillion rise in U.S. net foreign liabilities that accumulated in the three years 1999 to 2001, $549 billion, or 43 percent, was due to the valuation impact of the appreciation of the dollar that occurred during those years.

Another factor that should be considered when thinking about sustainability and adjustment of international imbalances is the longstanding evidence for the United States of substantial differences in the rates of return that U.S. investors earn on their foreign investments compared with the rate of return that foreign investors earn and require on their investments in the United States. That is, even though the United States is, and has been for many years, the world's largest net debtor, with net foreign liabilities estimated to be some $2.4 trillion dollars at year end 2003, the United States still to this day earns more interest and dividends on its foreign assets than it pays out on its foreign liabilities, even though the latter exceed the former by more than 2 trillion dollars. Specifically, for 2004, income receipts on U.S. assets abroad totaled $366 billion, while income payments on foreign assets in the United States totaled $344 billion. How can the United States

Table 5.12 **Portfolio shares (%)**

	1989	1995	1997	1998	1999	2000	2001	2002	2003
				Private U.S. investment abroad					
FDI	39.7	36.8	36.4	38.4	39.6	37.5	34.6	32.0	35.9
Securities and currency	15.0	32.5	34.0	34.6	35.2	33.2	31.6	29.0	32.6
Other private assets	45.3	30.7	29.6	27.1	25.2	29.3	33.7	39.0	31.5
				Private foreign investment in the U.S.					
FDI	26.0	28.0	30.7	34.3	37.4	35.0	31.5	25.5	26.9
Securities and currency	34.9	40.9	42.5	42.1	40.6	41.0	42.6	44.6	47.0
Other private assets	39.1	31.1	26.8	23.6	22.0	24.0	25.9	30.0	26.0

continue to run a surplus on international investment income with its large stock of international liabilities? Differences in portfolio composition can probably account for some of this. For example, in recent years 60 percent of U.S. assets abroad were invested in foreign equities and foreign direct investment. By contrast, only 40 percent of foreign claims against the United States were invested in U.S. equities and direct investment. However, in order to account for the persistent surplus in the U.S. international investment income account, portfolio composition is probably not sufficient. In addition, it is likely the case that the United States earns consistent higher returns on its foreign direct investment (FDI) than the rest of the world earns on its U.S. FDI. (See table 5.12.)

We see that in both 2003 and 2004, the United States earned high returns on FDI, earning profits of 8.7 percent of FDI assets at market value in 2004 and 9.2 percent of FDI assets at market value in 2003. By contrast, foreign owned direct investment assets in the United States earned 4.3 percent of assets at market value in 2004 and 3.4 percent of assets at market value in 2003. This disparity is not a recent phenomenon. As the table shows, the United States has consistently since 1989—the year the U.S. net foreign asset position turned negative—earned higher returns on its FDI assets than foreigners have earned on their U.S. investments. Table 5.12 also reports the rate of return on non-FDI assets and liabilities. The absolute return differentials are much smaller, and are consistently negative, indicating that foreign non-FDI holdings pay slightly higher returns than U.S. non-FDI holdings. Once we take into account the differences in portfolio composition between U.S. assets abroad and foreign assets in the United States (reported in table 5.12), we obtain the time series on the total return differential reported in table 5.13.

Another factor that may have delayed adjustment in the U.S. current account is the more modest decline in the broad, real trade-weighted dollar as compared with the decline in the dollar that occurred during 1985 to 1988. The Federal Reserve's real, broad trade-weighted dollar index is plotted in figure 5.1.

Table 5.13

	1989	1995	1997	1998	1999	2000	2001	2002	2003	2004
					U.S. owned assets abroad					
Total assets	2,350,235	3,964,558	5,379,128	6,174,518	7,390,427	7,393,643	6,898,707	6,613,320	7,863,968	
U.S. private assets	2,094,878	3,703,433	5,158,094	5,941,744	7,169,782	7,180,075	6,683,092	6,369,409	7,595,619	
FDI assets	832,460	1,363,792	1,879,285	2,279,601	2,839,639	2,694,014	2,314,934	2,039,780	2,730,289	
Foreign securities	314,294	1,203,925	1,751,183	2,052,995	2,525,341	2,385,353	2,114,734	1,846,879	2,474,374	
Other U.S. private assets	948,124	1,135,716	1,527,626	1,609,148	1,804,802	2,100,708	2,253,424	2,482,750	2,390,956	
Income receipts										
Total receipts	160270	208065	254534	258871	290474	347614	283761	263861	291354	365886
FDI receipts	61981	95260	115323	103963	131626	151839	128665	147291	187522	237564
Returns on U.S.-owned assets abroad (%)										
Return on all assets	8.0	6.3	5.5	4.8	4.7	4.7	3.8	3.8	4.4	4.7
Return on FDI	9.0	8.5	7.2	5.5	5.8	5.3	4.8	6.4	9.2	8.7
Return on non-FDI assets	7.5	5.1	4.6	4.4	4.1	4.3	3.3	2.5	2.3	2.5
					Foreign-owned assets in the U.S.					
Total liabilities	2,397,222	4,270,394	6,201,860	7,249,895	8,437,115	8,982,199	9,206,868	9,166,727	10,514,958	
Liabilities to private foreigners	2,055,476	3,587,521	5,328,144	6,353,721	7,486,027	7,951,491	8,124,572	7,954,004	9,040,797	
FDI liabilities	534,734	1,005,726	1,637,408	2,179,035	2,798,193	2,783,235	2,560,294	2,025,345	2,435,539	
Securities and currency (Cash, US)	716,523	1,466,328	2,262,490	2,675,016	3,042,633	3,260,616	3,459,610	3,545,585	4,251,500	
Other liabilities to private foreigners	804,219	1,115,467	1,428,246	1,499,670	1,645,201	1,907,640	2,104,668	2,383,074	2,353,758	
Income receipts										
Total payments	–141463	–189353	–244195	–257554	–280037	–329864	–263120	–259626	–261106	–344925
FDI payments	–7045	–30318	–42950	–38418	–53437	–56910	–12783	–46460	–68657	–105262
Returns on U.S.-owned assets abroad (%)										
Return on all liabilities	7.1	5.5	4.9	4.2	3.9	2.9	2.8	2.8	3.3	
Return on FDI	1.8	4.0	3.5	2.3	2.5	2.0	0.5	1.8	3.4	4.3
Return on non-FDI liabilities	8.4	5.9	5.3	4.8	4.5	4.8	4.0	3.2	2.7	3.0
Return differentials (%)										
Total	0.9	0.8	0.6	0.7	0.8	0.8	0.9	1.0	1.6	1.4
FDI	7.2	4.5	3.7	3.2	3.3	3.3	4.3	4.5	5.8	4.4
Non-FDI	–0.9	–0.8	–0.7	–0.4	–0.4	–0.5	–0.7	–0.7	–0.4	–0.5

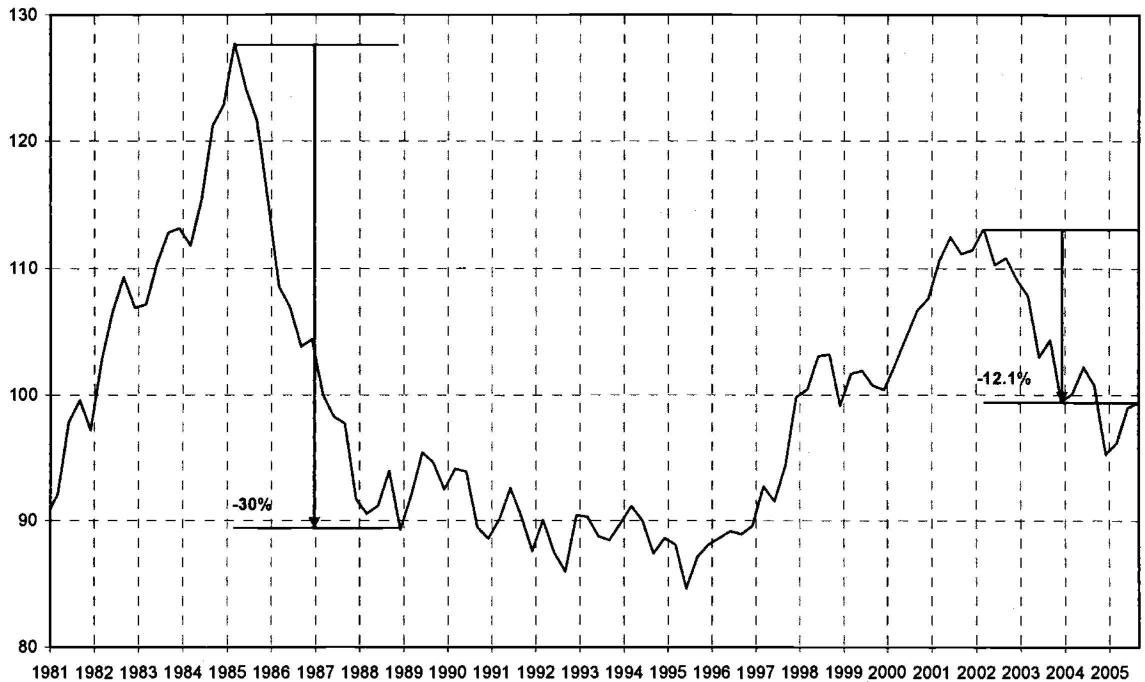

Fig. 5.1 U.S. real, broad trade-weighted dollar index (percentage decline from February 1985 to November 1988 versus February 2002 to November 2005)

In the three years after the dollar's peak in early 1985, the broad dollar index declined by 30 percent. By contrast, in the three years since the dollar's recent peak in early 2002, it has declined by less than 15 percent. Obviously, the intervention by Asian central banks has limited the depreciation of the dollar against a number of significant U.S. trading partners.

Our final point is that the U.S. current account deficit is in part an endogenous, general equilibrium outcome of global financial and macroeconomic integration. As such, we believe it reflects a global excess supply of saving relative profitable investment opportunities. In a world in which there is a global excess supply of saving relative to investment, we would expect to find and indeed find today that global real interest rates are low and that some country or group of countries must absorb the surplus of internationally mobile capital. Required real rates return—as measured by yields on Treasury inflation-protected securities (TIPS) in the United States and indexed gilts in the United Kingdom—are unusually low (below 2 percent as of this writing). In the late 1990s, the opposite was the case, and rapid (in retrospect unsustainable) world investment rates surged ahead of savings, pushing up real interest rates (TIPS yields were at 4 percent in March 2000 when the bubble peaked). Although no one can say for sure how long the present imbalance between global saving and investment will persist, it seems clear that this global imbalance between saving and investment is contributing to the size of the U.S. current account deficit and its failure to adjust as May 2005.

5.6 Conclusion

Are there thresholds of current account adjustment? This paper has reported evidence in favor of this proposition. We found statistically significant evidence of differing adjustment dynamics in the current account to net output ratio for all of the G7 countries examined. In particular, each country displayed three regimes—a surplus regime; a deficit regime in which the current account tended to revert toward its long-run mean, albeit at different speeds in each regime (showing that sign does indeed matter); and an inertia regime in which, for intermediate levels of the current account balance between the surplus and deficit regimes, current account adjustment was negligible (showing that size also matters). We also showed, however, that one size does not fit all in the sense that we found significant cross-country variation in the size of the estimated thresholds. We also found substantial cross-country variation in the estimated speed of adjustment once countries cross their current account deficit or surplus thresholds.

Our results support the findings of Caroline Freund and Frank Warnock (chap. 4 in this volume) by providing econometric evidence on the nonlinearities and differences in current account adjustment across industrial countries. In line with their results, countries with large deficits such as the United States exhibit relatively wide thresholds within which current account adjustment is absent and relatively slow speeds of adjustment once these thresholds, especially the deficit threshold, are crossed. While our analysis focuses on the relatively homogeneous post-Bretton Woods period, Muge Adalet and Barry Eichengreen (chap. 6 in this volume) present an historical analysis of current account reversals starting from the gold standard period and find evidence of substantial differences in current account adjustments episodes also across time.

We also found evidence of statistically significant shifts in the mean and variance of the probability distribution of several G7 exchange rates, equity prices, and interest rate differentials that occur in conjunction with our estimated current account adjustment regimes. In particular, we found a tendency toward exchange rate depreciation during current account deficit regimes and exchange rate appreciation during current account surplus regimes and statistically significant increases in exchange rate volatility during current account deficit adjustment regimes for the United States, Japan, and Germany. This suggests that a multivariate approach involving the joint modeling of exchange rates and the current account within a nonlinear framework would be a fruitful exercise, as well as being consistent with substantial evidence in favor of nonlinear adjustment in real exchange rates (see, e.g., Obstfeld and Taylor [1997]; Taylor and Taylor [2004]). This is an avenue we intend to pursue in future research.

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Comment Robert E. Cumby

This paper provides an ideal opening to this conference on current account imbalances and adjustment in the G7 countries. Like the good paper that it is, it both answers some interesting questions and raises several more. Because the paper deals with univariate current account dynamics, one is naturally led to ask questions about what might be generating these univariate dynamics. These questions involve both the nature of the underlying shocks and the way those shocks are propagated through the economies.

The paper presents persuasive evidence that, in the G7 countries, current account imbalances are more likely to decline when they are large relative to historical averages than when they are small. In addition, the evidence is consistent with country-specific thresholds. Unless current account imbalances exceed these thresholds, it is difficult to discern any adjustment of current account imbalances. The evidence is also persuasive that both average current account imbalances and the thresholds differ substantially across the G7 countries.

In this discussion, I would like to touch on some of the questions raised by these results. I will begin with a question involving the paper's treatment of the average imbalances and then proceed to ask questions about what might be behind the current account adjustment that the paper documents. In the course of doing so, I will raise three questions about fiscal policy and its potential role in helping to explain the behavior described in the paper.

The average current account imbalances (expressed as a fraction of net output—output less government purchases less investment) reported in the paper range from approximately –2 for Canada, the United Kingdom, and the United States to approximately 4 for Japan and 6 for preunification Germany. The paper treats these average imbalances as estimates of the long-run values to which current account ratios will tend to converge rather than evidence of average imbalances during the sample. The paper quite reasonably points out that there is no reason that a country's current needs to be balanced in steady state and presents an expression for the steady-state current account ratio from a benchmark two-country, overlapping generations model. One interesting question that arises is how closely the sample average current account ratios reported in the paper correspond to the steady-state current account ratios predicted by the benchmark model. Of course that comparison is not straightforward because the model's steady-state current account ratio depends on the unobservable rate-of-time preference. One possibility would be to compute the value of the rate-of-time preference that would be required to equate the model's

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predicted current account ratio to the sample averages from the G7 countries.

Why is it that large current account imbalances—that is, current account ratios that are large relative to their mean—tend to get reversed, but small imbalances exhibit no tendency to decline? One possibility is that large imbalances arise when realizations of the shocks that impinge on an economy are in the tails of their joint probability distribution. If this is the case, subsequent draws are unlikely to be as extreme, and current account ratios are likely to be smaller. This is not a particularly interesting explanation, and it is perhaps more consistent with smooth-transition dynamics and with threshold dynamics. The fact that the authors were unable to fit models with smooth-transition dynamics to the data suggests that something more is behind the current account adjustment dynamics in the G7 countries.

Two explanations of reversals of substantial current account imbalances—particularly current account deficits—that are commonly found in the literature are increases in private savings (perhaps driven by wealth effects) and a change in the willingness of foreign creditors to continue to finance large current account imbalances. While it is not obvious how the first of these is consistent with threshold effects in current account dynamics, the second is perhaps a more promising possibility. It would be interesting to see if it is possible to model creditor behavior in a way that is consistent with the threshold effects documented in this paper and with the dynamics of adjustment documented in Freund and Warnock (chap. 4 in this volume).

Might other forces behind current account adjustment exhibit threshold effects? Threshold effects can arise when agents face fixed costs, an idea that has been fruitfully applied to a number of problems, including market entry and exit decisions in foreign markets (Dixit 1989a,b). Another potentially interesting possibility that could conceivably contribute to threshold behavior in current account dynamics is fiscal policy. Casual empiricism suggests that significant political costs are incurred when a substantial fiscal tightening is enacted. This might lead to legislative behavior in which fiscal policy does not adjust until fiscal imbalances are sufficiently extreme. An interesting extension of this paper would be to investigate whether fiscal policy exhibits threshold effects.

Two countries stand out in the results reported in table 5.2, Canada and the United States. Unlike Italy, Japan, and the United Kingdom, the size of the inertia region is large. The difference between the estimated surplus and deficit thresholds is nearly 4.5 percent of net output for the United States and nearly 5.5 percent of net output for Canada. In contrast, it is less that 0.5 percent of net output for Italy and just above 1 percent of net output for Japan and the United Kingdom. In addition, unlike Japan, Germany, and France, where the deficit thresholds correspond to current account surpluses, the deficit thresholds for Canada and the United States correspond to substantial deficits.

Is there anything different about the adjustment to current account deficits in these countries that is different from adjustment in the other countries? The paper provides some interesting evidence in section 5.4 when they examine whether the probability distribution of exchange rate changes, stock price changes, and long-term interest differential is different when current accounts are adjusting. One concern that frequently arises in discussions of adjustment to large current account imbalances (particularly deficits) is that adjustment may result in stress in financial markets. The evidence in section 5.4 does not suggest that increased volatility in financial markets is associated with adjustment to large deficits. Although estimated U.S. equity volatility is significantly greater during periods of adjustment to current account deficits, Canadian equity volatility is estimated to be lower (although not statistically significantly lower) during periods of adjustment to current account deficits.

Are there other differences that characterize adjustment to large deficits that might help us understand the causes of the current account dynamics documented in the paper? A second interesting question involving fiscal policy might be to ask if fiscal policy in the United States and Canada behaves differently during periods of adjustment to large current account deficits.

The final section of the paper asks why the U.S. current account deficit has not declined despite being substantially above the estimated threshold for a sustained period. An additional possibility that might be interesting to explore is whether U.S. fiscal policy has behaved differently during this period than it did over the sample used to estimate current account dynamics.

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