The Persistence and Determinants of Current Account Balances: The Implications for Global Rebalancing

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ABSTRACT:

This paper examines the dynamics of current account balances with particular focus on the statistical nature of the persistency of current account balances and its determinants. With the assumption that stationary current account series ensures the long-run budget constraint while countries may experience "local nonstationarity" in current account balances, we examine the dynamics of current account balances across a panel of 70 countries. While linear unit root tests fail to reject the null hypothesis of a unit root for a number of countries, a Markov-switching (MS)-ADF econometric framework that allows for regime switches in current account dynamics not only lead us to reject the unit root null hypothesis for a much increased number of countries, but also provide notable cross country differences in the timing and duration of stationary and locally nonstationary regimes. Armed with the structural break dates the MS-ADF testing provides, we investigate the determinants of the different degrees of current account persistence. We find that the lack of trade openness, net foreign assets, and financial development help increase the degree of current account persistence. The type of exchange rate regimes is not found to be a robust determinant of current account persistence, but fixed exchange rate regime is more likely to lead an emerging market country to enter nonstationary current account regime.

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1. Introduction

Since the breakout of the global financial crisis in 2008 and the European debt crisis that followed, sustainability of country debt has been an important policy consideration for policy makers, especially those in developed economies. Concerns of debt sustainability, often alarmed by downgrades of or speculative attacks on government bonds, have made many advanced economies, including the United States and a number of European countries, face severe constraints on fiscal policy despite the urgent need for large stimulus expenditures. Unable to meet those constraints, some countries have already sought out international bail-outs to ensure solvency or short-term liquidity. Yet, even as these countries struggle to meet their debt obligations, others are amassing savings to send abroad.

The undercurrent of the global crisis and the debt crisis of advanced economies is the state of "global imbalances" – profligacy of several advanced economies, including the U.S., has been financed by excess savings of emerging market economies, most notably China, and oil exporting countries. It is the imbalanced capital flows that have enabled some countries to run persistent and massive current account deficits and others to keep running excess current account surpluses. Researchers have investigated the causes of the global imbalances (such as Chinn, et al. 2011) and found that many factors are intricately intertwined, creating "up-hill" flows of excess savings from developing countries with high rates of return to rich countries with low rates of return but with more developed financial markets (the "Lucas paradox"). However, the global financial crisis in 2008-09 and the European debt crisis have revealed that the world economy stands on a delicate balancing act with regard to capital flows; while capital flow can veer direction suddenly, disrupting real economies, persistent capital flows may put the world economy in a crisis-prone situation akin to the one in the pre-crisis period. Given such an environment, examining the country specific determinants of persistent current account deficits or surpluses can provide a deeper understanding of the global imbalances as well as the financing of countries with massive debt.

The recent sovereign debt issues are by no means the first time capital flows have received notable attention in the international macroeconomics literature. We know from the literature that sovereign debt and current account persistency are essentially both sides of a coin. That is, theoretically, current account balances of a country should evolve in such a way that it meets the long-run intertemporal national budget constraint (LRBC). In reference to the

Feldstein and Horioka puzzle (1980), Taylor (2002) argues that the LRBC implies that savings and investment must be highly correlated as countries approach long-run steady-state. This does not preclude short-run deviations from the LRBC, however, since it can be caused by macroeconomic and institutional policy changes related to savings and investment such as capital market liberalizations.

Thus, the stationarity of the current account to GDP ratio is a sufficient condition for the LRBC to hold, and many researchers have tested it (Trehan and Walsh 1998, Taylor 2002). This view involves important economic implications. Firstly, the results of such empirical exercises help to test the validity of various intertemporal, representative agent models. Under the assumption of perfect capital mobility and consumption-smoothing behavior, the intertemporal budget constraint implies that the current account to GDP balance must be stationary. Secondly, as Trehan and Walsh (1998) suggest, current account stationarity directly implies that external debt is finite and sustainable. That is, countries are strictly bound by the intertemporal budget constraints, and the presumed lack of Ponzi games ensures international investors for the repayment of the debt. Of course, the reality we face tells us that that may not be the case, at least in the short time horizon. Countries do face the risk of default, as we have been observing in Europe.

Though the implications of current account persistence have not gone untested in the literature, it has been difficult to draw conclusions on current account sustainability because of the considerable inconsistency in the literature. This may arise, in part, from inconsistencies in methodologies, but may also represent a failure to appropriately distinguish long-run dynamics from short-run dynamics. As has recently been noted, the LRBC allows that countries may carry "unsustainable" current account balances for short periods of time (Taylor 2002, Raybaudi et al. 2004, Chen 2011). Hence, it is important, as far as implications for sustainability are concerned, not to falsely reject long-run current account sustainability because of short-run periods of current account non-stationarity.

Once current account balances are found to be stationary, either globally or locally, the degree of current account persistency can vary not just across countries but also over time. As we will show later on, in the period leading to the financial crisis of 2008-09, we witnessed both current account surplus and deficit countries experience persistent current account imbalances. Long-time persistent current account imbalances do not have to lead to the question of external

debt sustainability. That is, even if current account balances are based on the mean-reverting data generation process, the speed of reversion can differ across countries and time periods since, as Taylor argues, it can be affected by macroeconomic and institutional policies. A recent oft-debated issue is, for example, whether and how a type of exchange rate regimes contributes to current account persistency, with clear implications of China's currency policy and its impact on the country's persistent current account surplus. Chinn and Wei (forthcoming) have investigated this issue and found no significant or systematic relationship between exchange rate regimes and the degree of current account persistency contrary to a common brief that flexible exchange rate should lead to current account adjustments. Not just restricted to exchange rate regimes, it is important to investigate what kind of fundamentals contribute to different degrees of current account persistency.

Given this background, this paper will take a closer look at the dynamics of current account balances with particular focus on the persistency of current account balances and its determinants. Firstly, we will re-examine the stationarity of current account balances for about 70 countries. A number of stationarity tests we conduct for these countries let us confirm that the time series of current account balances (as a share of GDP) are not stationary for many countries contrary to what theory predicts. Secondly, we will investigate whether the lack of statistical evidence for the stationarity of current account balances is driven by the existence of regime shifts in the time series of current account balances, following a recent strand of the literature that tests structural breaks in current account dynamics (Taylor 2002, Raybaudi et al. 2004, Chen 2011). Lastly, we will examine if the degree of current account persistency among different regimes can be explained by variations, both cross-sectional and over-time, in policies, institutions, and macroeconomic fundamentals of the countries.

The remainder of this paper is as follows. Section II provides a preliminary analysis on the persistency of current accounts. This section also briefly reviews the theory of current account balances and the Long-run intertemporal budget constraint. In Section IV, we conduct a series of stationarity and parameter stability tests based on conventional linear models. Based on the results from this section, Section V presents Markov-Switching stationarity analysis. Section VI builds on the Markov-Switching results to examine the determinants of current account persistence. The paper finishes with concluding remarks in Section VII.

2. Current Account Persistency: Facts and Theory

2.1 Facts: Current Account Divergence and Persistency

In a world where financial markets are increasing becoming more intertwined, one can expect current account balances become more divergent across countries because, as Feldstein and Horioka (1980) argued, easier access to international financial markets can help delink domestic saving and investment (Faruqee and Lee, 2009). In fact, data show such current account divergence. Figure 1 illustrates the absolute mean value of current account as a share of GDP and of the cross-country variance of current account balances ($\sigma^2_{CA/Y,t}$), for our sample of 71 countries. In the figure, we can observe a rising trend for both the mean absolute value and variance of current account balances.[1] Especially in the years of global imbalances, we observe wider cross-country variance in current accounts as well as higher degree of imbalances. Increasing current account divergence also implies higher degrees of current account persistency.

While the financial crisis of 2008 seems to have contributed to rebalancing, its effect appears to be only temporary, possibly suggesting that the financial crisis did not lead to corrections of the global imbalances (as is argued in Chinn et al., 2011). But we must also note that part of the short-lived impact of the financial crisis on current account balances may be masked by the fact that we view current account balances as a fraction of GDP; the crisis may have caused shrinkage in both current account balances and nominal GDP with its impact possibly larger on the latter.

When we divide our sample into subgroups based on income levels or geographical regions, which is displayed in Figure 2, we still observe that both the levels and the variances of current account balances rose in the last decade – until the breakout of the 2008-09 crisis – for most of the country groups. As many researchers have focused, the groups of industrialized countries, emerging market economies, and Asian economies have experienced persistent rise in the size of current account imbalances.

[1] The original dataset is unbalanced and consists of quarterly data for the period of 1960 through 2010. The dataset includes countries whose CA/Y data are available for at least 10 years. Appendix 1 provides a summary table of data availability and country level summary statistics. The majority of the quarterly observations are obtained from the IMF International Financial Statistics, OECD, EuroStat, and Datastream datebases, as well as individual central banks. In some limited cases, quarterly GDP data has been splined from annual GDP to increase data availability as long as the splined series follows available quarterly series closely.

As another way of looking at the degree of current account persistency, Figure 3 shows the cross-country average of the AR(1) coefficient from the following autoregressive model applied to each of our sample countries in a rolling window of 20 quarters:

$$y_{i,t} = c_i + \alpha_{i,t} y_{t-1} + u_{i,t} \,, \qquad (1)$$

where $y_{i,t} = \frac{CA_{i,t}}{Y_{i,t}}$ in country i.

The figure shows a spike in current account persistence just prior to 1970, with a slight elevation in persistence that continues through the mid-1980s. However, average persistence had since remained fairly stable, though it has been on a moderately rising trend again during the last decade.

Despite relatively small time variations in persistence as the aggregate average, Figure 4 suggests greater variation across country groups. Cross-country variation in persistence, shown as the cross-country variance of AR(1) coefficients, has not only been on a consistently rising trend since 1970, but also has risen remarkably in the years prior to the financial crisis of 2008-09. This is also visible in Figure 5, which compares persistence across country groups. The rolling current account persistence is fairly stable across time for both industrialized countries and Euro countries whereas the Asian and emerging market countries demonstrate significant time variations of persistence. However, we do not observe any particular rise in the level of persistency in the 2000s, though developing Asian and emerging market economies seem to have had relatively high levels of persistency in the first half of the decade. Given that the mean standard deviation of current account balances for subgroups of countries has been consistently rising in recent years as we saw in Figure 2, subgroup averages may also mask different degrees of current account persistency among individual countries, which poses a question as to what is driving those differences.

In fact, more formal tests for parameter stability provide support for the presence of non-linearities in current account dynamics. We apply the Elliot-Muller (2006) quasi-local-level test (QLL), a robust parameter stability test, allowing for singular or multiple structural breaks, parameter instability, and heteroskedasticity (Baum, 2007).[2] The QLL tests the null hypothesis

[2] Complete results are found in Appendix 2.

that all regression coefficients are stable within the sample period. When applying the QLL test to the AR(1) regression for current account balances we reject the null hypothesis of parameter stability at the 10% percent level for 52% of the countries, 70% of industrialized countries, and 50% of developing countries.

2.2 Current Account Stationarity: Theory

Deriving the current account balance in the intertemporal framework provides predictions for current account sustainability in the form of the long run budget constraint. A simple theoretical framework with the infinitely-lived, consumption smoothing representative agent allows us to make such a theoretical prediction (Trehan and Walsh, 1991; Hakkio and Rush, 1991). With this framework, stationarity of current account balances is warranted as the representative agent optimizes her consumption with the long run intertemporal budget constraint (LRBC).

When we assume that the economy wide budget constraint should be given as:

$$C_t + I_t + G_t + B_t = Y_t + (1 + r_t)B_{t-1}, \quad (2)$$

where C_t , I_t , G_t , B_t , Y_t , and r_t represent consumption, private investment, government spending, net foreign assets, output, and the world real interest rate, respectively, we can isolate net foreign asset as:

$$B_t = (1 + r_t)B_{t-1} + Y_t - C_t - I_t - G_t \quad (3).$$

This can be further simplified to:

$$B_t = (1 + r_t)B_{t-1} + NX_t \quad (4)$$

or

$$CA_t = r_t B_{t-1} + NX_t \quad (5)$$

where $Y_t - C_t - I_t - G_t = NX_t$.

Hence, the current account balance is composed of the net flow of income from the domestic economy to the rest of the world in exchange for goods and services and capital.

Following Taylor (2002), we can consider eq. (4) at the steady state in a stochastic setting. Defining $R_t = 1 + r_t$ such that $E(R_{t+i} \mid \Omega_{t-1})$=R for all t and $i \geq 0$, given the information set Ω from the previous period, leads us to obtain the long run behavior of current account as:

$$B_{t-1} = \lim_{j\to\infty} R^{-(j+1)}\, E\left(B_{t+j}|\Omega_{t-1}\right) + -\sum_{j=0}^{\infty} R^{-(j+1)}\, E\left(NX_{t+j}|\Omega_{t-1}\right) \qquad (6).$$

The LRBC is conditional on:

$$\lim_{j\to\infty} R^{-(j+1)}\, E\left(B_{t+j}|\Omega_{t-1}\right) = 0 \qquad (7).$$

This condition holds as long as the world interest rate is above zero and the current account is stationary.

Even when adjusted to allow for stochastic growth, the intertemporal framework yields a similar condition for sustainability. Allowing the world economy to grow at rate of g_t with E(g_t) =g > 0, we can show that in the case with growth and stochastic shocks, the LRBC implies that

$$\lim_{j\to\infty} \rho^{-(j+1)}\, E\left(\tilde{B}_{t+j}|\Omega_{t-1}\right) = 0 \qquad (8)$$

where $\tilde{B} = \frac{B}{Y}$ and $\rho_t = \frac{R_t}{g_t}$. This will hold as long as $\rho_t = \frac{R_t}{g_t}$ is greater than one and the current account as a fraction of output is stationary.

3. Stationarity of Current Account Balances and Regime Shifts

3.1 Linear Unit Root Tests and Current Account Balances

Despite theoretical predictions that a country must obey the LRBC and that current account balances must be long-run stationary processes, empirical unit root tests have varied success supporting this conclusion. In a comprehensive survey of the recent literature on the stationarity test of current account balance series, Chen (2011) notes the conflicting empirical results and conclusions in recent papers.

As previous papers have done, we employ a number of different stationarity tests and confirm the inconsistencies found in the previous literature. The tests for unit roots include the Augmented Dickey Fuller (ADF) test on the standard data series, as well as on the generalized least squares de-trended data (ADF-GLS). To address concerns of the introduction of biases in unit root tests imposed by the seasonal de-trending, we also perform the Hylleberg, Engle, Granger, and Yoo (HEGY) unit root test for a long-run unit root in data with seasonality. Finally, for robustness we also include the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test for stationarity.

We summarize the results in Figure 6, which provides unit root rejection rates among our sample countries across the various testing methodologies.[3] The standard ADF test shows the greatest unit root rejection rate, at 86%. However, using the more reliable ADF-GLS this rate drops significantly. The KPSS, ADF-GLS, and the Hylleberg, Engle, Granger, Yoo (HEGY) unit root test all suggest long-run unit root rejection rates of less than 20%.[4] Given the oft-argued weakness of the ADF test, it is reasonable to think that unit roots are generally quite prevalent in current account series.

We can consider a number of possible explanations for the failure of rejection of the unit root in current account series. First, such results could arise *if* current account balances do have a true long-run unit root. This conclusion is somewhat troublesome, as it opposes theoretical predictions on current account sustainability. A second possible explanation is that the current account balance as a portion of GDP may have structural breaks in the levels or trends. If that is the case, simple linear stationarity tests could fail to reject the null hypothesis of unit roots. Finally, these results may result from parameter instabilities. Given the change in both domestic and international environment that countries face, it is possible that the degree of persistence (captured by α in equation (1)) can vary over time, or that the variance of shocks, or the error, can go through different regimes, or both. Depending on the nature of structural breaks, parameter instabilities, or regime switches, the power of standard unit root tests can vary significantly (Perron, 1989; Nelson, Pigot, & Zivot, 2001). As such, recent literature often incorporates non-linear models to test the stationarity of current account balances.

[3] Unit root test results for each country are reported in Appendix 3.
[4] The KPSS rate reflects the failure to reject the null hypothesis of stationarity.

The use of non-linear models of current account balances does not hinge solely on the empirical finding of unit root tests, but has backing in economic intuition, as well. Taylor (2002) argues that structural breaks in either or both of savings and investment in the private and government sectors could lead to breaks in current account balances. This suggests that regime shifts in current account balances can be caused by changes in the global financial market, changes in regulatory controls on cross-border capital flows, changes in credit worthiness of a country, or changes in domestic and foreign countries' policies and institutions for savings and investment (Taylor, 2002).[5]

When we apply unit root tests with a single or double structural breaks in the trend and/or intercept to our current account balance data, we get results with increased rates of unit root rejection. The unit root rejection for the Zivot-Andrews (1992) test for a single break in the intercept is 46.5% (Figure 6). Table 1 provides country level results for unit root testing with structural breaks and shows similar results using the Zivot-Andrews or Clemente-Montanes-Reyes unit root test with structural breaks (CMR, 1998). The unit root rejection rates hardly increases when we move from a single break test and a double break test. Although these increases in the unit root rejection rates should not be used as the sole motivation for including structural breaks, they do offer support for inclusion of structural breaks. More broadly, these results suggest that non-rejection of the unit root in linear tests should not be too quickly interpreted as non-sustainability of current account balances.

While the Zivot-Andrews and CMR unit root tests allow the incorporation of certain non-linearities, they are not robust for all types of non-linear adjustment. For example, these tests restrict the number and types of breaks. Hence, the Zivot-Andrews and CMR unit root tests are invalid for any form of non-linearities that fall outside those restrictions (Nelson, et al., 2001). As such, these tests fail to address the two primary observations in Section Two: time variations in current account persistence and time variations in current account variance. One particularly concerning limitation is that if the series switches from stationary to nonstationary regimes, standard unit root tests are not valid, even if they account for structural breaks (Kim, 2003; Kerjriwal *et al.*, 2011). This gives rise to the questionable validity of these standard tests when they are applied to current account balances exhibiting persistence switches, and possible periods

[5] Furthermore, when measuring the current account relative to GDP structural breaks can arise from sudden changes in GDP behavior. For example, sudden stop growth, regime shifting or "plucking" in GDP growth (Friedman, 1964) have been supported in a number of previous papers.

of "local" non-stationarity (Chen, 2011). Local non-stationarity in current account balances is not intuitively implausible. Such switches in persistence imply that current account accumulation occurs in some short-run regimes at rates that violate the LRBC but eventually switches back to a rate that is in accordance with the LRBC. Hence, an appropriate empirical model of current account balances may need to allow for more general parameter instabilities than just breaks in the trend or the mean. We address this issue in the next section where we employ a Markov-Switching unit root test.

3.2 Markov-Switching (MS) Stationarity Analysis

3.2.1 MS-ADF Estimation

With the evidence that our data may not have a stable data generating process, we take a more general unit root testing approach, employing a Markov-Switching unit root test following Raybaudi et al. (2004) and Chen (2011). Our model extends earlier Markov-Switching unit root tests, and allows for switching persistence, constants, and variance. The model restricts one regime to a random walk regime, while the second regime is a standard AR(1) mean-reverting regime. This allows for the distinction between local non-stationarity that occurs within a regime and global non-stationarity that occurs across the entire sample (Raybaudi et al., 2004).

Estimation of the model requires maximum likelihood estimation of the parameter vector θ according to

$$\Delta y_t = [\mu_0(1 - s_t) + \mu_1 s_t] + \phi(1 - s_t) y_{t-1} + [\sigma_0(1 - s_t) + \sigma_1 s_t]\eta_t \qquad (9)$$

with $S = \{0,1\}$ and $\hat{\theta} = \{\mu_0, \mu_0, \phi, \sigma_0, \sigma_{1,} p_{00}, p_{11}\}$.

In light of cross-sectional differences in current account dynamics, we estimate the model for each of our sample countries individually. This will provide greater insight whether and to what extent cross-sectional differences drive differences in current account dynamics.[6]

The main purpose of this exercise is two-fold: to identify whether the current account series of the countries have local and global unit roots, and to identify and date regime switches. Estimation of the MS model will yield estimates of the model parameters as well as the fitted probabilities. Local stationarity is tested using the *t*-statistic of the estimated persistence

[6] Both models are estimated using the maximum likelihood based Hamilton Filter with Gauss programs provided by Kim (1998).

parameter (of the mean reverting regime) and the standard Dickey-Fuller distribution for tests including a constant. Two additional second-order stationarity criteria must be checked to confirm global stationarity (Psaradakis, et al., 2004). The following two conditions must be met as the necessary and sufficient conditions for the series to be globally stationary.

$$x = p_{00}\rho^2 + p_{11} + (1 - p_{00} - p_{11})\rho^2 - 1 < 0 \quad (10)$$

and

$$x = p_{00}\rho^2 + p_{11} - 2 < 0 \quad (11).$$

3.2.2 MS-ADF Testing Results

The first notable result of the MS-ADF test is the higher unit root rejection rate compared to linear unit root tests. Figure 7 presents the unit root test statistics for the estimated persistence parameters during the mean reverting regime across all countries, compared to the 5% critical value. We are able to reject the unit root null hypothesis in the mean reverting regime for most of the countries whose test statistics are above the 5% significance level shown with the red line. However, we are still unable to reject the unit root in the mean reverting regimes for ten countries including the United States, Thailand, Russian Federation, Norway, Japan, Indonesia, France, Finland, Argentina, and Peru. This implies that these countries' current account balances not only exhibit locally nonstationary regimes, but rather that we cannot reject global nonstationarity.

Stationarity in the mean reverting regime is not sufficient to reject global nonstationarity, and one must also consider the second-order conditions for global stationarity (Psaradakis, et al., 2004). Using these conditions, we find that we are also unable to reject the global unit root for Hong Kong. With the MS-ADF testing framework, we are now able to reject the unit root for 88% of the countries, a substantial increase compared to linear unit root tests.

3.2.3 Random Walk Episodes

The random walk regime represents time spans during which a country runs an "explosive", or non-mean reverting, current account balance. These locally nonstationary periods of current account balance would be unsustainable in the long-run. In other words, these periods can be interpreted as those with a "red signal" (Raybaudi, et al. 2004) that the country of concern

would violate the long-run budget constraint unless there is a drastic change in its current account balances.

Figure 8 illustrates the proportion of nonstationary regimes (of at least 4 quarters in duration) in the total countries for which the data are available.[7] We see a rise in the number of nonstationary regimes starting in the late 1970s, followed by a slight decrease in the 1980s. A similar rise is observed during the 1990s and the mid- to late 2000s, the latter of which coincides with the increasing persistence of current account balances in the global imbalances period as we saw previously.

Figure 9 demonstrates the fraction of countries in the nonstationary regime varies across country groups. For most years in the sample period, industrialized countries appear less prone to enter the nonstationary regime than developing countries, with a maximum nonstationary occurrence rate around 0.3. But in the mid-2000s, industrialized countries experience a rise in the nonstationary occurrence while developing or emerging market countries tend to be relatively stable over years. Emerging market countries tend to have higher nonstationary occurrence ratios than average developing countries. Both developing and emerging market country groups experience a fall in the rate in the late 1980s and the late 1990s, the latter of which coincides with the Asian crisis. Interestingly, the Euro 12 countries' ratios rapidly rise in the second half of the 2000s, which may suggest a possible link with the debt crisis that started in 2010.

Figure 10 provides an alternative characterization of nonstationary episodes, showing the mean duration of the episodes within country groups, across different time subsets. Frequent entrance and exit into the locally nonstationary regime suggests that those countries may have been forced by the market to make current account balance readjustments. Conversely, countries that remain in the nonstationary regime for long durations may not face the same kind and extent of need for market readjustments.

In the figure, we can see the difference in the duration of nonstationary regimes between industrialized and developing country groups. Nonstationary episodes in industrialized countries that begin in the 1980s have a mean duration of approximately 60 quarters. This far exceeds the maximum duration across other country groups, and suggests that industrialized economies have the ability to run more persistent periods of locally nonstationary current account balances

[7] A country can enter a nonstationary regime more than one times in a decade. A country is said to enter the random walk regime each quarter the Markov-Switching fitted probability crosses 0.5 from below.

without facing market readjustments. The Euro 12 countries appear capable of running similarly persistent periods of locally nonstationary current account balances in the 1990s with the mean duration of 40 quarters. These findings suggest that industrial countries may have better access to international financial markets and are therefore allowed to run imbalanced current account balances more persistently than developing countries. Among subgroups of non-industrialized countries, there is not much variation in the mean duration of random walk regimes. One interesting exception is that Latin American countries enjoyed long duration of nonstationary regimes in the 1970s, at a level comparable to industrialized countries, but the average duration plummets in the 1980s. This possibly reflects the occurrence of the debt crisis of the 1980s that plagued many of the countries in the region.

Although the period with nonstationary current account balances can be interpreted as the period when a country receives a "red signal" because of its risk of violating the long-run intertemporal budget constraint, "red signal" does not have to mean that the country of concern is due to experience a crisis. Table 3 reports the correlation between the dummy for the nonstationary regimes and the occurrences of different types of currency crises.[8] The correlation between the occurrence of currency crisis and nonstationary regime is -2.0% whereas the one between debt crisis and nonstationary regime is much higher, at 11.7%. When we divide the sample into the country-years with current account surplus and deficit, we can see that random-walk regimes with current account deficits are more likely to experience currency, banking, and debt crises than those with current account surplus. But still the correlation is not particularly high, except for the debt crisis. Hence, we would better interpret nonstationary regimes as the regimes with a warning of possible violation of the long-run budget constraints.

3.2.4 On-going nonstationary episodes

As we discussed previously, the issue of current account sustainability is an on-going subject of scrutiny. Our estimations find that 17 countries are currently in the nonstationary regimes. Table 3 presents the complete list of countries currently experiencing locally nonstationary episodes, along with the duration (as of the first quarter of 2011) and the start date of those episodes. This list is particularly telling for ongoing concerns of a Euro debt crisis; we

[8] Currency crisis is identified using the oft-used exchange market pressure index (Eichengreen, et al., 1994). Banking crisis is identified using the dataset developed by Laeven and Valencia (2010), and both debt and inflation crises are based on Reinhart and Rogoff (2009).

find both Greece and Spain are running locally nonstationary current account balances. Equally concerning for the Euro Zone is the finding that Austria, Finland, and Germany also fall on the list. The average duration of this most recent nonstationary episode for these Euro 12 countries is 41 quarters. While this does not necessarily imply unavoidable crisis, it suggests that concerns about debt sustainability are not empirically unfounded.

4. Determinants of Current Account Persistence

We now know that the data generation process for current account balances can go through different regimes, either stationary or nonstationary, and also that the degree of serial correlation or current account persistence can differ across countries and over time. These findings raise a natural question: what kind of economic fundamentals or policy regimes can affect the nature and the degree of current account persistence? This is what we investigate in this section.

In a purely econometric sense, a change in current account persistence means a change in the serial correlation of the current account balance. Hence, greater current account persistence means that the country takes more time to revert to its long-time mean of current account balances and therefore maintains longer periods of either current account deficits or surplus.[9] When a country receives an external shock such as a currency crisis, its consequential reversion to its long-time mean can be affected by the country's economic fundamentals, policy regimes, and other institutions. Hence, there can be a structural break in the serial correlation of the current account balance that can be affected by economic fundamentals or policy institutions.

4.1 Estimation Methodology

As a first exploration, using the dates of structural breaks in current account balance series identified by the Markov-Switching unit root tests, we examine how the economic fundamentals contribute to the probability of countries entering nonstationary regimes. This exercise will allow us to see what kind of factors would help prevent countries from rebalancing their current account imbalances. Also, in our theoretical framework, when the current account is in nonstationary regimes, or I(1), market participants would perceive that the long-run budget constraint will not hold (if the nonstationary situation continued forever). Hence, we will also be

[9] More accurately, they are able to uphold long periods of above average current account deficits or surpluses.

looking at the probability that a country enters such a regime where it receives a "red signal" from the markets.[10]

We estimate a probit model with the dependent variable indicating non-mean reverting regimes as follows:

$$I_{i,t} = X_{i,t}'\beta + \varepsilon_{i,t} \qquad (12)$$

where $I_{i,t}$ is an indicative variable that takes the value of one if country *i* is in a locally nonstationary (i.e., "explosive") regime in year *t*, and 0, otherwise. $X_{i,t}$ is a vector of economic fundamentals and policy regimes for country *i* in year *t*.[11]To avoid bidirectional causality or simultaneous bias, we lag all the explanatory variables by one year. Also, to control for external, or global, common shocks, we include time fixed effects.

We further explore the relationship between economic fundamentals and different degrees of current account persistence in a second methodology. We first identify the dates of structural breaks in the current account series based on the Markov-Switching unit root analysis. For each of the identified regimes (whose duration must be at least 12 quarters), we run the AR(1) estimation to estimate the degree of current account persistence ($\hat{\rho}_j$):

$$\left[\frac{CA}{Y}_t\right]_j = \beta_j + \rho_j \left[\frac{CA}{Y}_{t-1}\right]_j + \varepsilon_{t,j}, \qquad (13)$$

for $t_j < t < T_j$ where t_j and T_j indicate the beginning and ending dates of regime *j*, respectively.

Once we obtain the measure of current account persistence, i.e., the estimated $\hat{\rho}_j$, we then regress it collectively against a vector of candidate determinants using the OLS estimation with robust standard errors. In other words, we apply the following OLS estimation model to a semi-panel dataset composed of cross-country regimes.[12]

[10] The situation is more of concern when a country runs current account deficits persistently in a nonstationary regime. However, a country with current account surplus in a nonstationary regime can be also a subject of concern since it is not optimizing its consumption and financing behavior in the context of the intertemporal budget constraint.

[11] Model parameters are estimated using maximum likelihood and an unbalanced panel of data, i.e., a single observation for each year in each country. A country is considered to be in a nonstationary regime if it's fitted probability of the explosive regime from in the Markov-switching estimation greater than 50% in two or more quarters in a year.

[12] A country can take more than one regimes as we reported in Table 2.

$$\widehat{\rho_j} = Z'_j\delta + u_j \qquad (14)$$

where Z_j is a vector of fundamental variables for regime *j*, and $\widehat{\rho_j}$ is the estimated current account persistence in regime *j* obtained in the estimation with equation (13).

4.2 Candidate Determinants of the Current Account Persistency

Current account imbalances are inherently different than others: different in economic consequences, different in persistence, and different in costs. The literature is vast and encompasses a wide range of related topics from the sudden-stop and twin crises literature, to the savings and investment integration puzzle. Despite this span, a number of recurring themes can be found in the literature and help us narrow a list of candidate determinants of the current account persistence.

The first is the often cited claim that a certain exchange rate regime – possibly including a policy of "currency manipulation" – allows countries to maintain persistent current accounts. While a country with undervalued currency may continue to maintain current account surplus, countries with fixed, but overvalued exchange rates would often end up experiencing corrections in their current account balances (or more broadly balance of payments) in the form of currency crisis. This suggests that fixed exchange rate regime may not allow greater degree of current account persistency. Similarly, flexible exchange rate regime may facilitate current account adjustments, but it may also allow countries to run current account imbalances persistently because of the lack of the possibility of market corrections. As such, the impact of exchange rate regimes is a good subject of empirical analysis.

Chinn and Wei (Forthcoming) test the empirical relationship between exchange rate regime and current account balance persistence, but find no evidence of any strong or systematic relationship between nominal exchange rate flexibility and current account persistence, essentially reflecting the theoretical ambiguity. Considering that Chinn and Wei's framework does not incorporate time dimension into the degree of current account persistence, we should test the effect of exchange rate regimes and see how allowing current account dynamics to take different regimes and different degrees of persistence would yield any different results. Hence,

we estimate the dummies for fixed and flexible exchange rate regimes based on the index on exchange rate stability from the Aizenmann, Chinn, and Ito (2011) "trilemma indexes."[13]

Greater trade openness should reduce the cost of current account adjustment by transmitting real exchange rate changes to the trade balance (Chinn & Wei), suggesting that greater levels of trade openness should decrease current account persistence. We measure trade openness using the ratio of the sum of exports and imports divided by GDP.

A country with more open financial markets may be more susceptible to the transmission of financial shocks across countries and therefore experience weaker current account persistence. At the same time, as Faruqee and Lee (2009) and Feldstein and Horioka (1980) argue, countries with more open financial markets should be able to delink saving and investment, which may help sustain run current account imbalances more persistently. We use the Chinn and Ito (2006, 2008) index of financial openness and include it as deviations from the world average.

Regarding the economic costs of current account deficit readjustments, Fruend and Warnock (2005) argue that current account adjustments depend inherently on the size of the current account deficit, the composition of the current account, and the source and size of financing. To test the impact of the size of current account imbalances, we include the absolute value of current account balances. We also examine if regimes with current account deficits perform differently from others by including a dummy for the regime with current account deficits.

The national or government debt may affect the extent of current account persistence, especially if it is financed by foreign investors. As the debt accumulates, pressure from the international financial markets may amount, in the form of higher government bond yield or lower credit rating. This will, in turn, make it harder for the government of concern to continue to borrow from the markets, thus making the degree of current account persistence fall. We include a variable for budget balances as a proxy for the government's debt since the debt data are often quite limited but highly correlated with budget balances.

The level of financial development may also matter for the degree of persistency. The proponents of the "saving glut" argument (such as Bernanke, 2005) have been arguing that it is the sophisticated financial markets of the United States that keep attracting capital flowing into

[13] The original Aizenman et al. index of exchange rate stability ranges from zero to one. We assign the value of one for the fixed exchange rate regime dummy if the index is above .70 and assign the value of one for the flexible exchange rate regime if the index is below .30.

the country, causing persistent current account deficits. Caballero et al. (2009) predict that a country that lacks sophisticated financial markets (e.g., China) would keep importing financial assets from a country with a well-developed financial system (e.g., the U.S.) and thereby running current account surplus. We include private credit creation (as a ratio to GDP) as a measure of financial development.

Another variable related to the current policy debate is international reserves holding. Holding ample international reserves can give ammunition to central banks to defend the country's currency value, and that may help slow down current account adjustments. We use international reserves relative to GDP and include it as deviations from the world mean.

Stages of development can be an important factor; countries with higher level of development must be equipped with better socio-economic institutions, which may help the country to maintain better access to international financial markets and thereby experience more persistent current account balances. Hence, we include the relative per capita income level (to the U.S.) in the estimation. We also conduct estimations using subsamples of countries based on the income level. Namely, we will conduct tests for the group of industrialized countries, developing countries, and emerging market economies.[14] We also include the growth rate of real GDP as a proxy for (future) productivity growth.

The level of net foreign assets may matter as well; a country with more net foreign assets may be able to run imbalanced current account more persistently whereas a country with small net foreign assets or debt may find it more difficult to run imbalanced current account persistently. We use the data from Lane and Milesi-Ferretti (2009).[15]

Lastly, we find it necessary to control for the correlation between currency crisis and current account readjustments and, therefore, include a currency crisis dummy based on the exchange market pressure index (Eichengreen, et al. 1994). However, our EMP index is calculated against the base country in the sense of Aizenman, et al. (2008).

4.3 Results of the Estimation on the Determinants of Current Account Persistency

4.3.1 Probit analysis

[14] The emerging market economies are defined as the economies classified as either emerging or frontier during 1980–1997 by the International Financial Corporation plus Hong Kong and Singapore.

[15] The Lane and Milesi-Ferretti data are updated using the international investment position data of the IMF International Financial Statistics.

Table 6 reports the marginal effects from the probit estimation across the entire sample and the country groups of industrialized, developing, and emerging market countries.

The first notable result from this analysis is that, as Chinn and Wei find, the fixed exchange rate regime does not seem to matter for current account persistency, but it does increase the probability of emerging market countries entering the nonstationary regime. Interestingly, for this group of countries, the coefficient on financial openness is also found to be significantly positive while, for industrialized countries, greater financial openness decreases the likelihood of entering the random walk regime, reducing the cost of current account adjustments. For emerging market countries, the finding that greater financial openness helps enter the periods with red signals is consistent with the literature that financial liberalization can lead emerging market countries to enter a state of financial instability if it can coincide with short-term explosive current account periods.

For all samples, trade openness decreases the likelihood of entering the random walk regime as Chinn and Wei find. A 10 percentage point increase in the ratio of trade volumes to GDP would lower the probability of a country entering a nonstationary regime by 4 to 8%. As has been discussed in the literature, trade openness does reduce the cost of current account adjustments.

Countries with net foreign assets are more likely to stay in stationary regimes compared to those with net foreign debt, which is quite reasonable given the concept of intertemporal optimization.

Higher levels of financial development, however, increase the probability of countries, whether industrialized or developing, entering the random walk regime, which may be counterintuitive. Further, this finding is also contradictory to the hypothesis of "global saving glut." One possible explanation is that a country with developed financial markets may tend to perceive the intertemporal budget constraint to be relaxed. Given the greater magnitude of the estimated coefficient for developing and emerging market countries, lack of development in other institutions and systems relevant to financial activities may also play a role and make the economy more prone to experience financial bubbles, which may lead the country to experience

more nonstationary movement in current account balances.[16] Given that the saving glut argument proponents point out that both countries with well-developed and under-developed financial markets may experience more persistent current account imbalances (with these two groups of economies trading financial assets with each other), we also tested if the effect of financial development can be non-linear by including instead the dummies for highly-developed and under-developed financial markets (in terms of private credit creation).[17] However, we do not detect such nonlinearity in the effect of financial development.

Government surplus as a percent of GDP increases the probability of entering the random walk regime across all country groups (marginally for the emerging market group). That also means that a country with budget deficit tends to stay in a stationary regime because markets create pressure to force the country to rebalance its current account imbalances. Conversely, a country with budget surplus can *afford to* be in a nonstationary regime in the short-run.

Not surprisingly, a developing country with large current account imbalances tends to enter a short-term nonstationary regime as we can see in the significantly positive coefficient on the absolute current account balances variable. Current account deficit countries appear more likely to stay in a stationary regime, but the result is not applicable for emerging market countries. This also suggests that market discipline would function more strictly on current account deficit countries.

Given the asymmetry we find between current account surplus and deficit countries, we also divide the sample into country and years with current account surplus and those with current account deficit, whose results we report in Table 6. While many of the results remain intact, there are some differences between current account surplus and deficit episodes that are worth noting.

Fixed exchange rate regime continues to contribute to an emerging market country entering explosive regimes regardless of the country's current account positions, but for industrialized countries, exchange rate regimes help those with current account surplus to stay in

[16] As Ito and Chinn (2009) among others point out, measuring the extent of financial development is extremely difficult. Higher levels of financial development measures can merely reflect market bubbles especially when stock market-related variables are also used.

[17] The results are not reported. The dummy for highly-developed financial markets takes the value of one when the level of private credit creation is above the 70th percentile and zero, otherwise. The dummy for under-developed financial markets takes the value of one when the level of private credit creation is below the 30th percentile and zero, otherwise.

the stationary regime while flexible exchange regimes have the opposite effect.[18] We now know that financial openness helps developing countries with current account deficit to enter the explosive regime while having a positive net foreign asset position would help them to stay in the stationary regime. While the effect of budget balances becomes ambiguous, financial development seems to matter regardless of the current account position for developing countries. When a developing or an emerging market country experiences a currency crisis, it tends to remain in the stationary regime. The size of the imbalances matters more for surplus countries, which may be counterintuitive.

Interestingly, the coefficient on international reserves holding is marginally negative (with the p-value of 11%) for emerging market countries with current account deficits. This finding implies that holding international reserves may help an emerging market country with current account deficit to send signals to international financial markets that it will hold on to the long-run intertemporal budget constraint. This finding is consistent with the literature on international reserves holding among emerging market countries (such as Aizenman and Lee, 2007, Aizenman and Marion, 2004, Aizenman, et al. 2011, and Cheung and Ito, 2009).

4.3.2 OLS analysis

Table 7 reports the results of the OLS estimation using as the dependent variable regime-specific degrees of current account persistence, i.e., autocorrelation coefficient on current account series for each regime. Because the regression is run using the regimes identified by the Markov-switching estimation as observations, the number of observations drops significantly.[19]

Contrary to the previous probit exercise, we now observe that the exchange rate regime matters only for emerging market countries, but with an opposite effect to what we found previously; fixed exchange rate regimes contribute to rebalancing current account balances more quickly than other types of exchange rate regimes. This result is puzzling given the previous finding that emerging market countries with fixed exchange rate regime tend to enter nonstationary regimes. The rest of the results are weaker, but more consistent with the probit estimation results.

[18] Since the Euro country dummy is included, this effect is not reflecting the Euro effect.
[19] In the estimation, we include the dummy for the stationary regimes and the variable that accounts for the number of quarters for each regime. We also include dummies for four regimes whose autocorrelation coefficients are clearly outliers.

Trade openness also helps countries to rebalance, but its impact is significant only for the full and industrial country group. Financial openness seems to help rebalancing, but only for industrialized countries. Net foreign assets allow industrialized countries to run sustained current account imbalances. While the size of current account imbalances does not matter, deficit countries, especially emerging market ones, do face the pressure for rebalances. Developing or emerging market countries with budget surplus again can run imbalanced current account more persistently; countries with budget deficits tend to face more pressure of market corrections. Industrialized countries with more well-developed financial markets may be able to run more persistent current account imbalances, somewhat consistent with the saving glut argument. Not surprisingly, the autocorrelation coefficient is smaller for the stationary regimes than nonstationary regimes.

While this analysis looks into the effect of economic fundamentals and policies on the degree of current account persistence, we need to observe the results shown in Table 7 with a grain of salt. That is because the sample the OLS estimation is applied to include both stationary and nonstationary regimes. In nonstationary regimes, the autocorrelation coefficient may not be trustworthy. Hence, we rerun the estimation, but with the sample restricted to include only stationary regimes. That will reduce the number of observations significantly, especially for the subsamples, but we still discuss the results to examine how robust the results in Table 7 are.

Table 8 reports the results only for stationary regimes. The first column reports the result for the full sample, and the second and third columns report the results of current account surplus and deficit episodes, respectively. The fourth through sixth columns show the results of the subsamples of industrialized, developing, and emerging market countries, respectively.

Among stationary regimes, exchange rate regimes no longer matter for the degree of current account persistence as Chinn and Wei find. The financial openness variable is no longer a determinant for industrialized countries, but it is a positive factor for current account surplus countries. The results for net foreign assets are intact, and some become more significant. A country with higher levels of net foreign assets is able to run current account imbalances more persistently, which is applicable for industrialized or emerging market countries and current account surplus countries.

Countries that experience higher real output growth also tend to run more persistent current account imbalances. The finding that current account deficit countries that grow rapidly

tend to run the deficit more persistently indicate that high growth countries are able to convince the markets with high future productivity growth.

Budget balances no longer matter for stationary regimes, but financial development continues to affect current account persistency. It does contribute to allowing countries, both industrialized and developing countries, to run more persistent current account imbalances, but contrary to what the saving glut proponents have argued, higher degrees of financial development seem to allow current account *surplus* countries to run more persistent imbalances.

5. Concluding Remarks

This paper aims to provide a closer look at the dynamics of current account balances with particular focus on the statistical nature of the persistency of current account balances and its determinants.

In doing so, we first re-examine the stationarity of current account balances for about 70 countries. A number of stationarity tests we conduct confirm that the time series of current account balances (as a share of GDP) are not stationary for many countries contrary to what theory predicts. However, once we allow current account series to have structural breaks and use a nonlinear, Markov-Switching unit-root tests, we significantly improve the rejection rate of unit root, verifying that current account dynamics are driven by the existence of regime shifts in the current account balances series.

Armed with these findings, we examine whether the degree of current account persistency among different regimes can be explained by variations, both cross-sectional and over-time, in policies, institutions, and macroeconomic fundamentals of the countries. By doing so, we offer important insight into the bigger picture of current account sustainability and the country-specific factors that allow some countries to run persistent current account imbalances while forcing others to make current account readjustments.

Several findings are noteworthy. In the examination of the determinants of forcing countries to enter nonstationary, or "explosive" regimes, we find that exchange rate regimes do not play a role, except that fixed exchange rate regime can increase the probability of an emerging market country to enter an explosive regime. This finding, along with the finding that financial openness can also increase the probability, suggests that emerging market countries

may tend to enter a state of financial instability, particularly emerging countries running current account deficits.

For countries with all levels of income, trade openness is found to decrease the likelihood of entering the random walk regime, presumably reducing the cost of current account adjustments. We find a similar effect in net foreign assets as well. Countries with budget deficits tend to stay in stationary regimes, so do those with current account deficits. These results imply that markets force these countries to rebalance their current account imbalances.

We shed more nuanced light on the issue of current account persistency by examining the determinants of degrees of current account persistence which we measure by the autocorrelation coefficients on the regimes identified by the Markov-switching analysis.

As has been found in the previous literature, the type of exchange rate regimes does not affect the extent of current account persistence. However, trade openness, net foreign assets, and financial development continue to be the contributors to the degree of current account persistence. High economic growth helps current account deficit countries to run the imbalance more persistently.

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APPENDIX 1: Summary statistics by country for current account (%GDP)

		Mean	SD	Min	Max	Start Date	End Date	N
1	Argentina	0.145	4.201	-6.253	11.765	1993q1	2011q1	73
2	Armenia	-14.332	12.930	-65.252	0.985	1994q1	2011q1	69
3	Australia	-3.515	1.826	-6.989	1.786	1960q1	2010q4	204
4	Austria	-0.339	3.093	-8.398	8.526	1970q1	2011q1	165
5	Belarus	-5.909	6.784	-26.296	11.865	1996q1	2011q1	61
6	Belgium	3.135	3.780	-9.043	9.987	1995q1	2010q4	64
7	Bolivia	-1.108	7.201	-11.032	16.092	1990q1	2009q4	80
8	Brazil	-1.714	2.225	-6.240	1.770	1978q1	2011q2	134
9	Bulgaria	-6.891	10.655	-36.297	12.828	1994q1	2011q1	69
10	Cambodia**	-5.415	4.207	-17.262	2.854	1994q1	2009q4	64
11	Canada	-1.595	2.215	-6.488	4.092	1961q1	2011q1	201
12	Chile**	-0.870	3.889	-9.992	9.119	1991q1	2010q4	80
13	China	2.899	2.582	-2.372	9.113	1991q1	2010q1	77
14	Colombia	-2.144	2.078	-6.794	1.661	1996q1	2010q4	60
15	Costa Rica	-4.796	2.951	-12.566	1.082	1999q1	2010q4	48
16	Croatia**	-6.102	13.391	-24.884	25.736	1994q4	2010q4	65
17	Czech Republic	-3.255	3.495	-10.004	6.030	1993q1	2011q1	73
18	Denmark	0.203	3.293	-7.702	6.740	1977q1	2011q1	137
19	El Salvador	-3.535	2.313	-8.426	0.928	1999q1	2010q4	48
20	Estonia	-7.225	6.445	-20.759	6.667	1993q1	2010q4	72
21	Finland	1.150	4.258	-7.096	11.381	1975q1	2011q1	145
22	France	0.150	1.407	-3.429	3.795	1975q1	2010q4	144
23	Georgia	-11.925	5.896	-29.395	-4.369	1997q1	2011q1	57
24	Germany	1.641	2.793	-3.561	8.740	1971q1	2011q1	161
25	Greece*	-5.151	4.649	-19.207	6.170	1976q1	2011q1	141
26	Guatemala**	-4.297	3.612	-13.816	10.294	1977q1	2010q4	136
27	Hong Kong SAR, China	8.923	4.868	1.337	19.814	1999q1	2011q1	48
28	Hungary**	-5.368	4.886	-19.219	5.526	1989q4	2010q4	85
29	Iceland*	-5.572	7.783	-39.501	5.743	1976q1	2011q1	141
30	India**	-1.191	1.646	-4.251	8.629	1960q1	2010q4	204
31	Indonesia**	-0.468	3.658	-13.379	8.163	1981q1	2010q4	120
32	Ireland	-0.354	3.009	-7.340	5.617	1990q1	2010q4	84
33	Israel	-2.771	7.042	-23.250	18.030	1972q1	2011q1	157
34	Italy	-0.586	2.177	-6.351	4.655	1970q1	2011q1	165
35	Japan	2.433	1.374	-2.490	5.224	1977q1	2011q1	137
36	Kazakhstan	-2.014	5.442	-12.993	9.901	1995q1	2010q4	64
37	Korea	0.639	4.358	-11.885	13.318	1976q1	2011q1	141
38	Kyrgyz Republic	-6.777	8.185	-33.062	4.062	2000q1	2010q4	44
39	Latvia	-5.579	10.531	-27.584	24.524	1993q1	2011q1	73
40	Lithuania	-6.873	6.426	-20.431	14.704	1993q1	2011q1	73
41	Luxembourg	9.676	4.718	-1.018	17.760	1995q1	2010q4	64
42	Malaysia	13.273	4.114	5.720	20.590	1999q1	2010q1	45
43	Mauritius	-3.132	6.451	-12.823	9.404	2000q1	2010q4	44
44	Mexico*	-1.734	2.434	-8.811	4.302	1979q1	2011q1	129
45	Moldova	-10.190	8.628	-33.876	12.938	1995q1	2010q4	64
46	Netherlands	3.857	2.785	-2.560	11.793	1977q1	2011q1	137
47	New Zealand*	-5.577	3.921	-17.034	1.523	1980q1	2011q1	125
48	Norway	4.496	8.356	-16.706	20.303	1975q1	2011q1	145
49	Paraguay	-0.129	5.426	-9.745	14.706	2000q1	2010q4	44
50	Peru	-3.605	3.940	-12.500	8.629	1979q1	2010q4	128
51	Philippines	-1.549	4.265	-10.628	6.666	1977q2	2011q1	129
52	Poland**	-3.118	3.705	-9.036	18.770	1985q1	2010q4	104
53	Portugal	-5.668	6.001	-23.729	8.276	1977q1	2011q1	137
54	Romania**	-7.306	4.993	-25.483	5.066	1991q1	2010q4	80
55	Russian Federation	7.288	5.524	-3.830	21.337	1994q1	2011q1	69
56	Slovak Republic	-5.259	4.935	-16.344	7.286	1993q1	2010q4	72
57	Slovenia	-1.676	2.714	-9.501	3.273	1995q1	2011q1	65
58	South Africa	-1.003	4.036	-11.448	14.432	1960q1	2011q1	205
59	Spain	-2.845	3.124	-10.924	4.327	1975q1	2011q1	145
60	Sri Lanka**	-5.231	5.330	-21.095	6.283	1977q1	2010q4	136
61	Sweden*	1.727	4.029	-5.926	10.174	1975q1	2011q1	145
62	Switzerland	6.416	4.346	-5.180	17.463	1972q1	2010q4	156
63	Taiwan	7.043	5.065	-7.202	22.761	1981q1	2011q1	121
64	Thailand**	-1.527	6.412	-13.209	15.505	1976q1	2010q4	140
65	Turkey	-2.121	3.395	-11.862	5.583	1987q1	2011q1	97
66	Ukraine**	0.349	7.008	-17.651	21.729	1994q1	2010q4	68
67	United Kingdom	-1.042	1.771	-5.800	4.223	1960q1	2010q4	204
68	United States	-1.508	2.054	-6.848	1.426	1960q1	2010q4	204
69	Uruguay**	-1.295	3.175	-9.551	5.054	1999q1	2010q4	48
71	Venezuela	5.411	6.682	-6.652	24.883	1997q1	2011q1	57
72	Vietnam**	-3.657	7.736	-32.045	12.684	1996q1	2010q4	60

* Data uses IMF GDP projections, **GDP data splined from annual data

Appendix 2: Tests for parameter stability and nonlinearities

	Country	Qll
1	Argentina	-9.429
2	Armenia	-21.037***
3	Australia	-14.951**
4	Austria	-46.183***
5	Belarus	-18.498***
6	Belgium	-16.319**
7	Bolivia	-8.478
8	Brazil	-16.327**
9	Bulgaria	-18.423***
10	Cambodia	-8.862
11	Canada	-23.737***
12	Chile	-13.506*
13	China	-10.425
14	Colombia	-11.301
15	Costa Rica	-7.860
16	Croatia	-6.203
17	Czech Republic	-15.711**
18	Denmark	-26.713***
19	El Salvador	-13.627*
20	Estonia	-17.623***
21	Finland	-26.919***
22	France	-29.525***
23	Georgia	-8.779
24	Germany	-13.638*
25	Greece	-29.521***
26	Guatemala	-7.985
27	Hong Kong SAR, China	-9.608
28	Hungary	-10.231
29	Iceland	-16.031
30	India	-18.263***
31	Indonesia	-10.881
32	Ireland	-18.316***
33	Israel	-36.377***
34	Italy	-17.015**
35	Japan	-11.321
36	Kazakhstan	-8.010
37	Korea, Rep.	-8.216
38	Kyrgyz Republic	-10.092
39	Latvia	-12.856*
40	Lithuania	-24.965***
41	Luxembourg	-9.374
42	Malaysia	-12.028
43	Mauritius	-11.740
44	Mexico	-6.623
45	Moldova	-14.282*
46	Netherlands	-18.368***
47	New Zealand	-12.412
48	Norway	-6.434
49	Paraguay	-8.172
50	Peru	-8.792
51	Philippines	-21.223***
52	Poland	-8.273
53	Portugal	-11.363
54	Romania	-17.810***
55	Russian Federation	-10.262
56	Slovak Republic	-15.798**
57	Slovenia	-17.287**
58	South Africa	-9.577
59	Spain	-26.068***
60	Sri Lanka	-26.685***
61	Sweden	-9.353
62	Switzerland	-10.737
63	Taiwan	-18.573***
64	Thailand	-14.087*
65	Turkey	-16.534**
66	Ukraine	-18.681***
67	United Kingdom	-15.397**
68	United States	-7.899
69	Uruguay	-9.353
70	Venezuela, RB	-20.323***
71	Vietnam	-11.250

Notes: ***, **, * denotes rejection of the null hypothesis of parameter stability at the 1%, 5%, and 10% level, respectively

Appendix 3: Unit Root Tests for Individual Countries

	Country	ADF	KPSS	HEGY	DFGLS	MAIC lags	N	Start Date	End Date
1	Argentina	-2.326	3.235†††	-2.245	-0.846	11	61	1993q1	2011q1
2	Armenia	-6.182***	1.650†††	-1.506	-0.288	8	58	1994q1	2011q1
3	Australia	-5.180***	4.838†††	-3.751**	-1.674*	14	189	1960q1	2010q4
4	Austria	-9.194***	3.458†††	-1.094	-1.125	13	151	1970q1	2011q1
5	Belarus	-4.269***	1.275†††	-0.002	-0.159	3	50	1996q1	2011q1
6	Belgium	-7.294***	1.614†††	-1.209	-0.288	7	53	1995q1	2010q4
7	Bolivia	-1.887	5.405†††	-1.245	-1.067	2	68	1990q1	2009q4
8	Brazil	-1.394	2.084†††	-2.372	-1.871	8	121	1978q1	2011q2
9	Bulgaria	-4.727***	1.900†††	-1.163	-1.093	7	58	1994q1	2011q1
10	Cambodia	-6.318***	0.316	-1.853	-0.654	3	53	1994q1	2009q4
11	Canada	-4.907***	4.345†††	-2.500	-1.553	10	186	1961q1	2011q1
12	Chile	-4.407***	2.362†††	-2.112	-1.798	7	68	1991q1	2010q4
13	China	-2.486	2.734†††	-2.229	-2.942***	1	65	1991q1	2010q1
14	Colombia	-2.519	0.790†††	-2.145	-1.751*	1	49	1996q1	2010q4
15	Costa Rica	-4.886***	0.150	-2.905	-2.002**	3	38	1999q1	2010q4
16	Croatia	-10.198***	0.031	-2.097	-0.575	7	54	1994q4	2010q4
17	Czech Republic	-6.396***	0.294	-2.546	-0.940	4	61	1993q1	2011q1
18	Denmark	-4.309***	8.679†††	-0.812	0.450	8	124	1977q1	2011q1
19	El Salvador	-4.500***	0.578††	-2.561	-1.977**	1	38	1999q1	2010q4
20	Estonia	-3.593***	0.592††	-1.408	-0.998	7	60	1993q1	2010q4
21	Finland	-4.343***	6.711†††	-1.770	-0.557	9	131	1975q1	2011q1
22	France	-4.559***	1.403†††	-1.358	-0.983	7	130	1975q1	2010q4
23	Georgia	-2.570	1.709†††	-1.833	-1.662*	2	46	1997q1	2011q1
24	Germany	-3.395**	3.150†††	-1.459	-1.639*	12	147	1971q1	2011q1
25	Greece	-6.732***	4.257†††	-1.023	-0.996	11	127	1976q1	2011q1
26	Guatemala	-9.800***	0.417†	-3.622**	-0.552	7	123	1977q1	2010q4
27	Hong Kong SAR, China	-4.689***	0.873†††	-2.300	-0.645	7	38	1999q1	2011q1
28	Hungary	-3.847***	0.811†††	-2.144	-0.947	11	73	1989q4	2010q4
29	Iceland	-4.901***	4.311†††	-2.609	-1.652*	9	127	1976q1	2011q1
30	India	-9.370***	0.544††	-3.430**	-1.864*	7	189	1960q1	2010q4
31	Indonesia	-3.475**	5.790†††	-2.000	-2.102**	3	107	1981q1	2010q4
32	Ireland	-3.733***	4.135†††	-1.512	-0.957	2	72	1990q1	2010q4
33	Israel	-8.868***	3.646†††	-1.997	-2.209**	11	143	1972q1	2011q1
34	Italy	-5.667***	0.895†††	-2.403	-1.938*	11	151	1970q1	2011q1
35	Japan	-3.213**	4.893†††	-1.845	-1.131	7	124	1977q1	2011q1
36	Kazakhstan	-5.704***	0.226	-4.083**	-0.875	6	53	1995q1	2010q4
37	Korea, Rep.	-3.672***	2.922†††	-2.945	-1.362	5	127	1976q1	2011q1
38	Kyrgyz Republic	-5.210***	0.378†	-1.793	-1.456	3	34	2000q1	2010q4
39	Latvia	-3.144**	1.762†††	-2.440	-0.387	11	61	1993q1	2011q1
40	Lithuania	-4.832***	0.339	-1.628	-2.229**	4	61	1993q1	2011q1
41	Luxembourg	-7.130***	0.458†	-3.673**	-0.542	10	53	1995q1	2010q4
42	Malaysia	-2.665	1.928†††	-1.433	-1.427	5	35	1999q1	2010q1
43	Mauritius	-3.125	2.542†††	-0.865	-0.638	3	34	2000q1	2010q4
44	Mexico	-3.218**	0.602†††	-3.039**	-3.520***	2	116	1979q1	2011q1
45	Moldova	-5.529***	0.457††	-1.507	-0.964	3	53	1995q1	2010q4
46	Netherlands	-4.846***	4.729†††	-1.700	-0.993	3	124	1977q1	2011q1
47	New Zealand	-6.728***	0.457††	-2.918	-1.587	7	112	1980q1	2011q1
48	Norway	-2.605*	10.058†††	-1.765	0.404	13	131	1975q1	2011q1
49	Paraguay	-5.233***	0.179	-1.572	-1.153	3	34	2000q1	2010q4
50	Peru	-3.908***	2.540†††	-3.524**	-2.459**	5	115	1979q1	2010q4
51	Philippines	-4.323***	4.435†††	-2.153	-2.191**	5	109	1977q2	2011q1
52	Poland	-5.516***	1.625†††	-3.297**	-1.260	7	91	1985q1	2010q4
53	Portugal	-5.002***	2.531†††	-1.912	-1.524	11	124	1977q1	2011q1
54	Romania	-8.098***	0.313	-2.399	-1.716*	7	68	1991q1	2010q4
55	Russian Federation	-3.092**	0.830†††	-1.949	-1.976**	5	58	1994q1	2011q1
56	Slovak Republic	-5.620***	0.655††	-2.310	-0.769	8	60	1993q1	2010q4
57	Slovenia	-5.643***	1.003†††	-1.825	-0.984	3	54	1995q1	2011q1
58	South Africa	-5.078***	1.063†††	-3.460**	-2.428**	7	190	1960q1	2011q1
59	Spain	-3.842***	5.231†††	-1.358	-2.003	7	131	1975q1	2011q1
60	Sri Lanka	-7.485***	0.978†††	-4.151**	-1.736**	7	123	1977q1	2010q4
61	Sweden	-2.170	11.293†††	-0.528	-0.784	12	131	1975q1	2011q1
62	Switzerland	-3.306**	9.438†††	-2.185	-0.512	8	142	1972q1	2010q4
63	Taiwan	-3.888***	1.263†††	-1.913	-0.763	7	108	1981q1	2011q1
64	Thailand	-3.703***	5.133†††	-1.904	-1.519	13	126	1976q1	2010q4
65	Turkey	-4.266***	2.950†††	-2.489	-1.081	11	85	1987q1	2011q1
66	Ukraine	-4.518***	0.880†††	-1.502	-0.701	3	57	1994q1	2010q4
67	United Kingdom	-5.567***	5.072†††	-2.356	-2.585**	4	189	1960q1	2010q4
68	United States	-2.087	15.078†††	-1.283	-0.589	14	189	1960q1	2010q4
69	Uruguay	-5.219***	0.161	-2.751	-2.296**	3	38	1999q1	2010q4
70	Venezuela, RB	-3.138	1.952†††	-1.678	-0.755	9	46	1997q1	2011q1
71	Vietnam	-4.712***	0.591††	-3.137**	-0.964	5	49	1996q1	2010q4

Note: ADF is run using a constant, no time trends, and no lags. The KPSS test is run without a time trend and results reported are for zero lags, though longer lag lengths are tested and yield similar results. All DFGLS tests are run without a trend, using the reported MAIC lag lengths, and the Elliot, Rothenberg, and Stock critical values. The table reports the Hylleberg, Engle, Granger, Yoo (HEGY) test long run unit roots using no lags. ***, **, * denotes rejection of the unit root hypothesis at the 1%, 5%, and 10% level, respectively. †††,††,† denotes rejection of the null hypothesis of stationarity at a 1%, 5%, and 10% level, respectively.

Appendix 4: Persistence Parameter Summary Statistics for Individual Countries

Country	N	Mean	SD	Min	Max
Argentina	2	0.583382	0.001355	0.582424	0.58434
Armenia	2	0.262778	0.482841	-0.07864	0.604198
Australia	6	0.608657	0.182102	0.497829	0.973473
Austria	3	-0.08125	0.665163	-0.82385	0.459902
Belarus	2	-0.13889	0.039559	-0.16686	-0.11092
Belgium	2	0.072516	0.331817	-0.16211	0.307146
Bolivia	2	0.661853	0.144951	0.559358	0.764349
Brazil	3	0.680463	0.510863	0.090573	0.977282
Cambodia	4	-0.10506	0.671735	-1.10089	0.336372
Canada	2	0.747215	0.186242	0.615522	0.878909
Chile	1	0.594655	0.594655	0.594655	
Colombia	2	0.300413	0.442361	-0.01238	0.613209
Costa Rica	1	0.075047	0.075047	0.075047	
Denmark	2	0.450738	0.442105	0.138123	0.763354
El Salvador	2	0.109142	0.292359	-0.09759	0.315871
Finland	2	0.584286	0.410501	0.294018	0.874553
France	4	0.271187	0.595411	-0.55114	0.848183
Georgia	2	0.417621	0.179404	0.290764	0.544479
Germany	5	0.579957	0.133787	0.394863	0.752612
Greece	2	0.080125	0.165043	-0.03658	0.196828
Guatemala	1	0.227325	0.227325	0.227325	
Hong Kong	1	0.372712	0.372712	0.372712	
Iceland	2	0.534325	0.393032	0.25641	0.812241
India	4	0.39193	0.244074	0.169794	0.649427
Indonesia	5	0.337751	0.079301	0.218909	0.433015
Ireland	3	0.59151	0.186583	0.376066	0.700197
Israel	3	0.137882	0.281848	-0.14117	0.422446
Italy	3	0.556602	0.131846	0.404442	0.637003
Japan	4	0.604626	0.291463	0.271042	0.884494
Kazakhstan	1	0.324501	0.324501	0.324501	
Korea,	5	0.695566	0.137825	0.52667	0.86563
Kyrgyz	1	-0.17734	-0.17734	-0.17734	
Luxembourg	2	0.031951	0.143481	-0.0695	0.133408
Malaysia	2	0.058676	0.127682	-0.03161	0.148961
Mauritius	2	0.140091	0.204041	-0.00419	0.284369
Mexico	3	0.673615	0.114438	0.553896	0.781916
Netherlands	4	0.268632	0.15843	0.126912	0.442129
New Zealand	2	0.27018	0.081495	0.212554	0.327806
Norway	2	0.890949	0.021902	0.875462	0.906435
Paraguay	2	-0.00728	0.009735	-0.01416	-0.00039
Peru	1	0.64249	0.64249	0.64249	
Philippines	4	0.449993	0.261409	0.224398	0.819721
Portugal	2	0.476532	0.23278	0.311932	0.641133
South Africa	6	0.57528	0.460752	-0.19944	1.193722
Spain	3	0.435573	0.469361	-0.06977	0.857863
Sri Lanka	3	0.485643	0.395718	0.033905	0.771027
Sweden	3	0.376538	0.504378	-0.05765	0.929797
Switzerland	3	0.759207	0.119878	0.653179	0.889289
Thailand	4	0.588613	0.159403	0.392059	0.734861
Turkey	2	0.413738	0.016665	0.401954	0.425521
United Kingdom	1	0.730881	0.730881	0.730881	
United States	2	0.441102	0.36987	0.179565	0.70264
Uruguay	1	0.238831	0.238831	0.238831	
Venezuela,	2	0.697596	0.140904	0.597962	0.79723
Vietnam	2	-0.36026	0.261531	-0.54519	-0.17533

Notes: Summary statistics for the OLS estimated persistence parameters across both the mean reverting and non-mean reverting regimes. The regime dates are estimated using a Markov-Switching unit root test.

Table 1: Unit Root Tests with Single Structural Breaks

	Country	Zivot Andrews Break Date	T-Stat	CMR AO Break Date	T-Stat	CMR IO Break Date	T-Stat	N	Start Date	End Date
1	Argentina	2001q2	-4.999**	2000q3	-0.948	2000q4	-4.011	61	1993q1	2011q1
2	Armenia	2008q1	-5.503***	2000q3	-0.553	2000q1	-1.754	58	1994q1	2011q1
3	Australia	1980q3	-4.937**	1979q2	-3.785**	1980q1	-4.195	189	1960q1	2010q4
4	Austria	2001q3	-2.761	2001q1	-1.743	2001q2	-2.846	151	1970q1	2011q1
5	Belarus	2008q4	-7.015***	2008q1	-2.262	2008q2	-2.288	50	1996q1	2011q1
6	Belgium	2007q4	-9.063***	2004q4	-0.602	2005q1	-1.204	53	1995q1	2010q4
7	Bolivia	2003q2	-3.674	2003q4	-3.836**	2003q1	-3.145	68	1990q1	2009q4
8	Brazil	1994q4	-3.672	1985q1	-3.417	1982q4	-3.364	121	1978q1	2011q2
9	Bulgaria	2008q3	-7.146***	2004q1	-2.336	2004q2	-2.949	58	1994q1	2011q1
10	Cambodia	2007q2	-5.984***	2007q3	-2.869	2006q4	-3.529	53	1994q1	2009q4
11	Canada	1994q2	-3.131	1994q4	-2.484	1995q1	-3.150	186	1961q1	2011q1
12	Chile	2007q4	-3.717	2003q1	-4.205**	2003q2	-2.956	68	1991q1	2010q4
13	China	2004q3	-3.559	2003q3	-3.579**	2003q4	-3.734	65	1991q1	2010q1
14	Colombia	1998q4	-6.751***	1998q1	-1.631	1998q2	-4.173	49	1996q1	2010q4
15	Costa Rica	2009q1	-7.655***	2007q4	-2.576	2008q1	-5.117**	38	1999q1	2010q4
16	Croatia	2000q2	-18.445***	2007q4	-2.164	2008q1	-2.093	54	1994q4	2010q4
17	Czech Republic	2005q1	-7.410***	2003q2	-4.101**	2004q2	-4.429**	61	1993q1	2011q1
18	Denmark	1987q1	-3.062	1989q2	-2.437	1989q4	-2.427	124	1977q1	2011q1
19	El Salvador	2009q1	-5.822***	2001q1	-2.848	2002q1	-3.714	38	1999q1	2010q4
20	Estonia	2008q1	-3.461	2008q4	-1.724	2008q4	-2.143	60	1993q1	2010q4
21	Finland	1993q3	-4.787**	1994q3	-3.343	1992q4	-3.922	131	1975q1	2011q1
22	France	2004q2	-2.591	2006q3	-1.722	1982q4	-1.228	130	1975q1	2010q4
23	Georgia	2005q3	-3.836	2004q4	-1.853	2005q1	-3.497	46	1997q1	2011q1
24	Germany	1990q2	-3.598	2002q4	-2.186	2003q2	-3.036	147	1971q1	2011q1
25	Greece	1986q1	-3.515	2005q1	-2.884	2005q2	-2.644	127	1976q1	2011q1
26	Guatemala	1987q2	-3.759	2008q2	-3.505	1986q4	-3.830	123	1977q1	2010q4
27	Hong Kong SAR, China	2009q2	-6.642***	2003q4	-5.767**	2004q1	-5.767**	38	1999q1	2011q1
28	Hungary	2007q3	-2.360	1991q3	-2.344	1992q2	-3.368	73	1989q4	2010q4
29	Iceland	2004q4	-4.954**	2004q1	-3.395	2004q2	-4.621**	127	1976q1	2011q1
30	India	1980q1	-3.724	1973q3	-2.838	1973q4	-2.849	189	1960q1	2010q4
31	Indonesia	1997q4	-5.041**	1997q1	-3.267	1997q2	-6.593**	107	1981q1	2010q4
32	Ireland	2004q2	-3.298	1999q4	-3.430	2004q1	-3.203	72	1990q1	2010q4
33	Israel	1984q4	-3.830	1984q1	-2.106	1984q2	-5.888**	143	1972q1	2011q1
34	Italy	1993q1	-2.673	2004q1	-4.158**	2004q2	-3.279	151	1970q1	2011q1
35	Japan	1983q2	-3.808	1982q3	-5.222**	1979q4	-3.877	124	1977q1	2011q1
36	Kazakhstan	2001q2	-5.935***	2008q4	-5.461**	2008q2	-5.607**	53	1995q1	2010q4
37	Korea, Rep.	1983q2	-4.332	1982q3	-3.746**	1982q4	-4.702**	127	1976q1	2011q1
38	Kyrgyz Republic	2006q4	-6.700***	2006q1	-0.495	2006q2	-6.584**	34	2000q1	2010q4
39	Latvia	2008q2	-4.766**	2008q4	-1.936	2008q3	-3.257	61	1993q1	2011q1
40	Lithuania	2008q2	-3.929	2009q1	-3.115	2008q4	-3.147	61	1993q1	2011q1
41	Luxembourg	2003q3	-8.129***	2007q4	-3.897**	2008q1	-4.116	53	1995q1	2010q4
42	Malaysia	2005q1	-4.214	2004q2	-3.421	2004q3	-2.062	35	1999q1	2010q1
43	Mauritius	2005q2	-5.966***	2004q3	-2.674	2004q4	-2.887	34	2000q1	2010q4
44	Mexico	1988q2	-3.969	1981q3	-2.800	1981q4	-3.618	116	1979q1	2011q1
45	Moldova	2000q3	-7.154***	2002q3	-2.172	1998q4	-3.287	53	1995q1	2010q4
46	Netherlands	1998q1	-2.897	2003q1	-3.392	2002q1	-3.965	124	1977q1	2011q1
47	New Zealand	1988q1	-3.338	1987q2	-2.537	1987q3	-4.532**	112	1980q1	2011q1
48	Norway	1985q3	-5.066**	1998q2	-4.200**	1998q3	-4.228	131	1975q1	2011q1
49	Paraguay	2002q2	-5.147**	2002q1	-7.809**	2001q4	-2.617	34	2000q1	2010q4
50	Peru	1998q3	-4.916***	1999q4	-5.782**	1998q1	-5.769**	115	1979q1	2010q4
51	Philippines	1989q2	-3.888	2002q1	-6.348**	2003q1	-6.251**	109	1977q2	2011q1
52	Poland	1991q4	-4.410	1989q4	-7.420**	1990q1	-5.440**	91	1985q1	2010q4
53	Portugal	1983q3	-3.817	1997q1	-2.093	1995q2	-2.934	124	1977q1	2011q1
54	Romania	2003q4	-4.460	2003q3	-3.023	2002q4	-2.746	68	1991q1	2010q4
55	Russian Federation	1998q4	-6.494***	1999q1	-3.543	1998q1	-4.103	58	1994q1	2011q1
56	Slovak Republic	1996q1	-4.887**	1995q1	-4.370**	1995q2	-5.737**	60	1993q1	2010q4
57	Slovenia	2004q2	-6.347***	2005q1	-2.953	2005q2	-4.746**	54	1995q1	2011q1
58	South Africa	1977q1	-4.869**	1979q3	-2.749	1979q4	-4.849**	190	1960q1	2011q1
59	Spain	1998q4	-2.606	2003q2	-4.314**	2003q3	-4.475**	131	1975q1	2011q1
60	Sri Lanka	1984q1	-5.143***	1983q1	-5.199**	1983q3	-5.694**	123	1977q1	2010q4
61	Sweden	1994q1	-3.235	1996q2	-3.118	1994q3	-2.869	131	1975q1	2011q1
62	Switzerland	1979q2	-4.248	1996q1	-4.628**	1991q3	-3.692	142	1972q1	2010q4
63	Taiwan	1987q4	-4.412	1988q2	-2.817	1987q2	-4.010	108	1981q1	2011q1
64	Thailand	1997q3	-4.261	1996q4	-3.193	1997q1	-5.052**	126	1976q1	2010q4
65	Turkey	1994q2	-6.509***	2003q1	-5.628**	2002q2	-2.434	85	1987q1	2011q1
66	Ukraine	1999q2	-6.551***	2006q1	-1.913	2004q4	-2.291	57	1994q1	2010q4
67	United Kingdom	1986q2	-3.419	1986q3	-4.111**	1985q3	-4.283**	189	1960q1	2010q4
68	United States	1998q2	-2.249	1998q4	-2.750	1997q4	-3.005	189	1960q1	2010q4
69	Uruguay	2002q1	-6.460***	2007q4	-2.825	2001q3	-5.556**	38	1999q1	2010q4
70	Venezuela, RB	2008q4	-7.487***	2003q3	-2.170	2002q4	-2.972	46	1997q1	2011q1
71	Vietnam	1999q1	-5.589***	2007q3	-1.920	2006q4	-3.338	49	1996q1	2010q4

***, **, * denotes rejection of the null unit root hypothesis at the 1%, 5%, and 10% level

Table 2: Random Walk Episodes

Country	Start	End	Duration
Argentina	1985q1	1986q3	6
	1988q1	1989q2	5
	1991q1	2001q4	43
	2002q2	2010q3	33
Armenia	2000q3	2011q1	42
Australia	1970q4	1973q1	9
	2003q1	2004q4	7
	2005q4	2007q4	8
Austria	1971q4	1981q4	40
	1994q3	2011q1	66
Belarus	2008q4	2011q1	9
Belgium	1995q1	2002q4	31
Bolivia	2003q1	2009q3	26
Brazil	1979q1	1994q3	62
	1995q1	1997q2	9
	1998q2	2011q2	52
Bulgaria	2005q4	2009q3	15
Canada	2000q1	2011q1	44
China	1992q1	1993q4	7
	1996q4	1998q2	6
	1998q4	2000q3	7
	2004q2	2005q2	4
	2005q4	2007q2	6
	2007q4	2008q4	4
Colombia	1996q1	1998q2	9
	1998q4	2000q3	7
	2001q1	2005q1	16
Costa Rica	2008q1	2009q1	4
Denmark	1977q1	1992q2	61
El Salvador	2002q4	2008q3	23
Estonia	2006q3	2010q3	16
Finland	2000q2	2011q1	43
France	1975q1	1979q2	17
	1979q4	1987q2	30
	2007q1	2010q3	14
Georgia	2006q1	2008q4	11
Germany	1985q3	1991q2	23
	2003q3	2011q1	30
Greece	2005q4	2011q1	21
Hungary	1989q4	1993q1	13
	1994q1	1996q3	10
	2008q4	2010q3	7
Iceland	1977q1	2007q1	120
Indonesia	1984q4	1986q2	6
	1987q1	1990q2	13
	1991q1	1997q3	26
	2000q1	2003q3	14
	2006q4	2010q3	15
Ireland	2004q4	2008q2	14
Israel	1997q2	2011q1	55
Japan	1989q3	2001q3	48
	2003q1	2005q4	11
Korea	1976q3	1982q4	25
	1983q2	1988q3	21
	1989q2	1992q1	11
	1993q3	2001q2	31
	2002q3	2006q4	17
	2007q2	2011q1	15
Lithuania	2006q3	2011q1	18
Malaysia	2000q1	2002q3	10
Mauritius	2000q3	2004q4	17
Mexico	1979q1	1981q4	11
	1988q3	1994q3	24
	1996q1	2011q1	60
Netherlands	1977q1	1981q2	17
	2004q3	2007q1	10
Norway	1976q4	1985q4	36
	1986q3	2008q3	88
	2009q3	2011q1	6
Peru	1991q2	1992q2	4
	1997q4	1999q2	6
	2003q2	2005q3	9
Philippines	1977q4	1987q2	38
	2002q1	2007q2	21
Portugal	2004q1	2010q1	24
Russian Federation	1996q4	1998q1	5
	2001q3	2002q3	4
	2008q2	2009q3	5
Slovak Republic	1994q1	1995q2	5
	2009q2	2010q3	5
South Africa	1960q1	1961q1	4
	1963q2	1965q2	8
	1969q3	1970q4	5
	1974q4	1976q1	5
	1993q4	1995q2	6
	1995q4	1998q3	11
	2004q3	2008q2	15
Spain	1993q4	1998q2	18
Spain	1999q3	2011q1	46
Sri Lanka	1977q1	1979q1	8
	1979q4	1985q1	21
Sweden	1976q3	1978q1	6
	1979q2	1982q3	13
	1989q3	2011q1	86
Switzerland	1972q1	1980q3	34
	1982q2	1998q4	66
	1999q3	2000q3	4
Taiwan	1985q1	1987q2	9
	1992q4	2002q2	38
	2002q4	2004q3	7
Thailand	1976q1	1979q3	14
	1982q3	1997q2	59
	1998q2	2004q3	25
Ukraine	1996q4	1998q2	6
	2002q1	2008q3	26
	2009q3	2010q3	4
Venezuela	1999q4	2001q1	5
	2002q1	2008q2	25
	2009q2	2011q1	7
Vietnam	1996q1	1997q2	5
	1999q1	2001q2	9
	2009q2	2010q2	4

Note: Duration is measured in quarters. Random walk periods are determined using the 0.5 rule proposed by Hamilton. Table includes all random walk periods of 4 quarters or more.

Table 3: Correlations between Nonstationary Regimes and Crises

	Random Walk Regime	w/ CA Surplus	w/ CA Deficit
Currency Crisis	-0.020	-0.075	0.018
Inflation Crisis	0.010	-0.038	0.050
Bank Crisis	0.021	0.014	0.015
Debt Crisis	0.117	0.056	0.147

Table 4: Countries currently in locally nonstationary episodes (as of 2011q1)

Country	Start Date	Duration
Armenia	2000q3	42
Austria	1994q3	66
Belarus	2008q4	9
Brazil	1998q2	52
Canada	2000q1	44
Finland	2000q2	43
Germany	2003q3	30
Greece	2005q4	21
Israel	1997q2	55
Korea	2007q2	15
Lithuania	2006q3	18
Mexico	1996q1	60
Norway	2009q3	6
Spain	1999q3	46
Sweden	1989q3	86
Venezuela	2009q2	7

Table 5: Probit Analysis on the Probability of Entering the Nonstationary Regime

	(1) FULL	(2) Industrial	(3) Less Developing	(4) Emerging Market
Flex ERR	-0.006	-0.069	0.052	-0.002
	(0.036)	(0.053)	(0.057)	(0.064)
Fixed ERR	0.069	-0.092	0.078	0.196
	(0.042)	(0.066)	(0.061)	(0.064)***
KA Openness‡	-0.068	-0.131	0.019	0.067
	(0.013)***	(0.025)***	(0.019)	(0.023)***
Trade Openness	-0.455	-0.402	-0.755	-0.651
	(0.075)***	(0.110)***	(0.137)***	(0.170)***
Relative income	-1.048	1.901	0.892	1.037
	(0.236)***	(1.617)	(0.637)	(0.685)
Rel. income sq.	1.105	0.001	-0.990	-1.237
	(0.227)***	(1.039)	(1.009)	(1.065)
NFA	-0.130	-0.212	-0.211	-0.170
	(0.054)**	(0.073)***	(0.111)*	(0.153)
IR holding	1.088	1.847	0.599	-0.491
	(0.309)***	(0.743)**	(0.477)	(0.557)
Output growth	0.701	-1.948	1.112	0.366
	(0.505)	(1.248)	(0.649)*	(0.762)
Budget balance	2.414	1.819	1.225	1.299
	(0.467)***	(0.741)**	(0.716)*	(0.826)
Fin. Development	0.124	0.130	0.510	0.422
	(0.045)***	(0.070)*	(0.091)***	(0.106)***
Abs. CAB	0.505	0.937	1.363	2.208
	(0.507)	(0.839)	(0.778)*	(1.085)**
Dummy for CAD	-0.135	-0.137	-0.147	-0.030
	(0.036)***	(0.053)***	(0.057)***	(0.063)
Currency Crisis	0.001	0.097	-0.112	-0.095
	(0.055)	(0.093)	(0.078)	(0.090)
Dummy for Euro	0.294	0.626		
	(0.067)***	(0.064)***		
Number of Obs.	1,274	686	578	433

Note: Dependent variable is an indicator variable set to one whenever a country enters the random walk regime. Table reports marginal effects estimated using a maximum-likelihood probit model. All the explanatory variables are lagged by one year. Time fixed effects are included in the estimation, but not reported. Standard errors reported in brackets. ***, **, * denotes significance at the 1%, 5%, and 10% level**,** ‡ Represents variables measured as deviations from the sample mean.

Table 6: Probit Analysis only with Current Account Surplus/Deficit Country-Years

	Current Account Surplus Country-years				Current Account Deficit Country-years			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FULL	Industrial	Less Developing	Emerging Market	FULL	Industrial	Less Developing	Emerging Market
Flex ERR	0.124	0.619	-0.135	-0.140	-0.016	-0.214	0.094	0.028
	(0.073)*	(0.105)***	(0.116)	(0.121)	(0.044)	(0.062)***	(0.072)	(0.086)
Fixed ERR	-0.210	-0.482	0.184	0.220	0.184	0.128	0.015	0.232
	(0.078)***	(0.109)***	(0.140)	(0.114)*	(0.053)***	(0.108)	(0.075)	(0.083)***
KA Openness‡	-0.129	-0.422	-0.024	0.001	-0.059	-0.154	0.042	0.095
	(0.030)***	(0.109)***	(0.044)	(0.048)	(0.016)***	(0.032)***	(0.023)*	(0.031)***
Trade Openness	-0.470	-0.037	-1.222	-1.114	-0.369	-0.324	-0.688	-0.587
	(0.129)***	(0.198)	(0.313)***	(0.345)***	(0.113)***	(0.200)	(0.176)***	(0.253)**
Relative income	-1.093	11.787	-4.233	-4.519	-0.842	-1.769	2.215	3.187
	(0.528)**	(8.433)	(1.778)**	(2.026)**	(0.291)***	(1.934)	(0.812)***	(0.960)***
Rel. income sq.	1.642	-4.481	6.958	7.237	0.895	2.654	-2.917	-4.402
	(0.496)***	(5.027)	(2.575)***	(2.867)**	(0.287)***	(1.307)**	(1.319)**	(1.516)***
NFA	-0.515	-0.912	-0.196	-0.053	-0.093	-0.045	-0.368	-0.300
	(0.103)***	(0.194)***	(0.252)	(0.302)	(0.089)	(0.157)	(0.151)**	(0.273)
IR holding	-0.401	-1.006	0.537	0.161	1.662	3.721	0.430	-1.356
	(0.538)	(1.593)	(1.029)	(1.009)	(0.452)***	(1.118)***	(0.671)	(0.864)
Output growth	2.707	-8.865	3.927	5.244	0.201	-2.171	0.678	-0.526
	(1.113)**	(3.781)**	(1.769)**	(1.967)***	(0.600)	(1.565)	(0.782)	(1.064)
Budget balance	0.867	4.985	-1.378	-1.688	2.578	1.766	1.363	1.202
	(1.004)	(2.090)**	(1.911)	(2.118)	(0.561)***	(0.917)*	(0.853)	(1.106)
Fin. Development	0.123	-0.079	0.615	0.589	0.120	0.062	0.595	0.547
	(0.085)	(0.143)	(0.212)***	(0.225)***	(0.058)**	(0.099)	(0.118)***	(0.156)***
Abs. CAB	4.515	7.410	4.198	3.423	-0.167	0.915	1.208	2.791
	(1.174)***	(2.332)***	(1.853)**	(1.947)*	(0.697)	(1.422)	(0.996)	(1.601)*
Currency Crisis	0.010	0.115	0.278	0.325	-0.013	0.158	-0.245	-0.348
	(0.121)	(0.257)	(0.110)**	(0.060)***	(0.063)	(0.115)	(0.080)***	(0.110)***
Dummy for Euro	0.221	0.434			0.243	0.693		
	(0.118)*	(0.172)**			(0.100)**	(0.107)***		
Number of Obs.	438	274	146	128	829	402	414	284

Note: Dependent variable is an indicator variable set to one whenever a country enters the random walk regime. The sample is now divided to groups with country and years with current account surplus or deficit. Table reports marginal effects estimated using a maximum-likelihood probit model. All the explanatory variables are lagged by one year. Time fixed effects are included in the estimation, but not reported. Standard errors reported in brackets. ***, **, * denotes significance at the 1%, 5%, and 10% level**,** ‡ Represents variables measured as deviations from the sample mean

Table 7: OLS analysis on Regime-specific Degrees of Current Account Persistence

	(1) FULL	(2) Industrial	(3) Less Developing	(4) Emerging Market
Flex ERR	0.025	0.063	-0.015	-0.098
	(0.070)	(0.071)	(0.096)	(0.080)
Fixed ERR	-0.025	0.022	-0.085	-0.273
	(0.065)	(0.130)	(0.079)	(0.097)**
KA Openness‡	-0.019	-0.089	-0.016	0.020
	(0.018)	(0.050)*	(0.035)	(0.041)
Trade Openness	-0.334	-0.388	-0.296	-0.030
	(0.095)***	(0.111)***	(0.183)	(0.263)
NFA	0.032	0.089	-0.001	0.335
	(0.032)	(0.050)*	(0.182)	(0.212)
IR holding	0.250	0.050	0.531	-0.794
	(0.447)	(0.871)	(0.560)	(0.724)
Relative income	-0.133	0.374	-0.105	-0.437
	(0.141)	(0.264)	(0.283)	(0.135)***
Output growth	0.019	0.039	0.008	-0.014
	(0.010)*	(0.026)	(0.016)	(0.014)
Budget balance	1.754	1.430	3.627	5.949
	(1.069)	(1.177)	(1.057)***	(0.944)***
Fin. Development	0.214	0.349	0.074	-0.052
	(0.087)**	(0.095)***	(0.111)	(0.137)
Abs. CAB	-0.152	-2.213	0.589	2.555
	(0.689)	(1.919)	(0.862)	(1.854)
Dummy for CAD	-0.098	-0.033	-0.144	-0.262
	(0.067)	(0.117)	(0.089)	(0.063)***
Currency Crisis	0.000	-0.005	0.020	-0.031
	(0.055)	(0.122)	(0.083)	(0.081)
Dummy for Euro	0.159	0.224		
	(0.129)	(0.199)		
Stationary Regime Dummy	-0.131	-0.039	-0.241	-0.238
	(0.051)**	(0.081)	(0.078)***	(0.047)***
Obs.	0.53	0.50	0.53	0.49
Adj. R-Squared	134	61	73	51

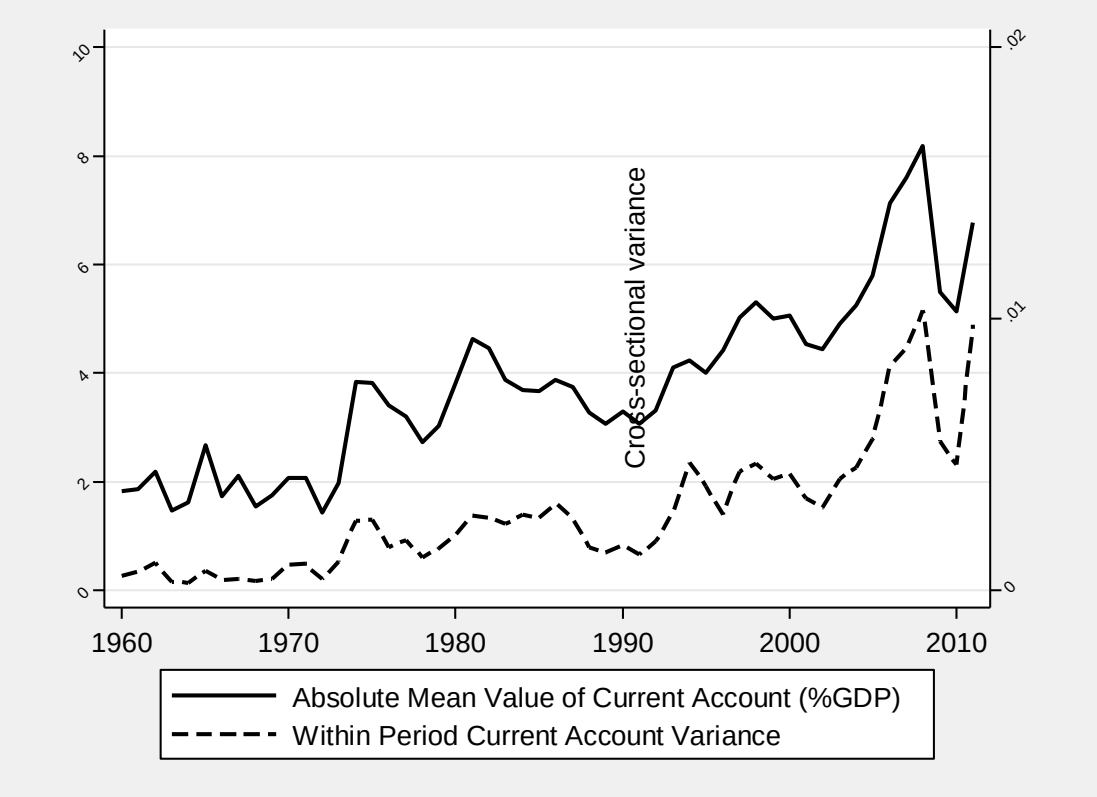
Notes: The dependent variable is the serial correlation coefficient on the AR(1) estimation on current account balance series. Standard errors reported in brackets. ***, **, * denotes significance at the 1%, 5%, and 10% level. ‡ Represents variables measured as deviations from the sample mean. The estimate on the constant term is omitted from presentation.

Table 8: OLS analysis on Regime-specific Degrees of Current Account Persistence – Stationary Regimes Only

	(1) Full	(2) Full-CA Surplus	(3) Full-CA Deficit	(4) Industrial	(5) Developing	(6) Emerging Market
Flex ERR	0.029	-0.187	0.044	-0.042	0.068	-0.106
	(0.094)	(0.256)	(0.111)	(0.103)	(0.177)	(0.277)
Fixed ERR	0.034	-0.168	0.042	0.035	0.078	-0.263
	(0.077)	(0.185)	(0.095)	(0.100)	(0.117)	(0.415)
KA Openness‡	-0.004	0.164	0.007	0.010	0.058	-0.058
	(0.030)	(0.076)**	(0.040)	(0.058)	(0.073)	(0.138)
Trade Openness	-0.358	-0.584	-0.248	-0.653	-0.231	-0.117
	(0.145)**	(0.168)***	(0.232)	(0.256)**	(0.224)	(0.579)
NFA	0.096	0.661	0.012	0.154	0.054	0.759
	(0.049)*	(0.299)**	(0.110)	(0.079)*	(0.211)	(0.271)**
IR holding	0.538	1.705	-0.471	1.368	1.000	0.112
	(0.463)	(1.164)	(0.988)	(1.300)	(0.732)	(1.547)
Relative income	-0.246	-2.197	-0.145	0.286	-0.771	-0.213
	(0.194)	(0.653)***	(0.175)	(0.365)	(0.287)**	(0.379)
Output growth	0.019	-0.004	0.041	0.073	0.034	-0.097
	(0.016)	(0.021)	(0.014)***	(0.033)**	(0.014)**	(0.088)
Budget balance	0.948	-2.811	1.993	0.113	1.120	5.129
	(1.208)	(3.710)	(1.437)	(2.091)	(1.956)	(3.394)
Fin. Development	0.385	1.001	0.271	0.442	0.450	0.110
	(0.119)***	(0.224)***	(0.168)	(0.190)**	(0.239)*	(0.286)
Abs. CAB	-0.920	-4.859	-0.987	-0.280	-2.055	-0.984
	(0.780)	(1.872)**	(1.013)	(2.960)	(1.104)*	(4.013)
Dummy for CAD	0.000			0.140	-0.085	-0.097
	(0.075)			(0.144)	(0.118)	(0.314)
Currency Crisis	0.048			0.198		
	(0.080)			(0.102)*		
Dummy for Euro	0.286	0.901	0.720	0.573		
	(0.206)	(0.274)***	(0.237)***	(0.280)*		
R2_A	0.66	0.53	0.73	0.60	0.62	0.17
N	69	21	48	33	36	19

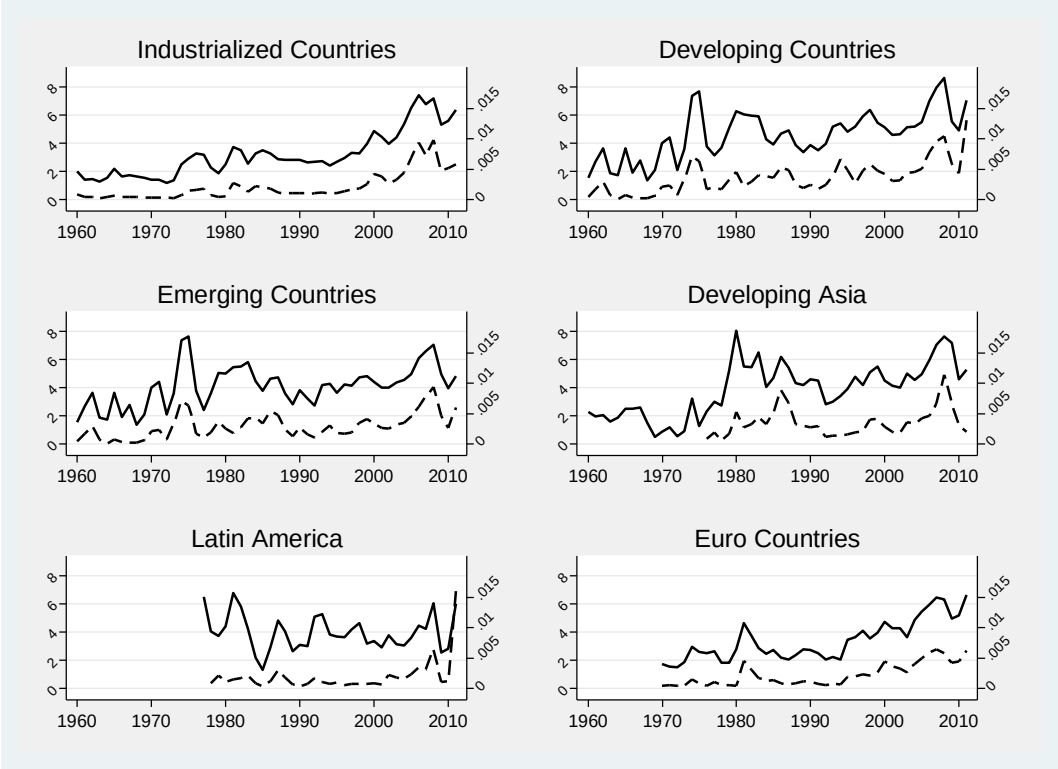
Notes: The dependent variable is the serial correlation coefficient on the AR(1) estimation on current account balance series. Standard errors reported in brackets. ***, **, * denotes significance at the 1%, 5%, and 10% level
‡ Represents variables measured as deviations from the sample mean. The estimates on the constant term and also the variable that captures the duration of the regimes are omitted from presentation.

Figure 1: Absolute mean value of current account (%GDP) and current account variance



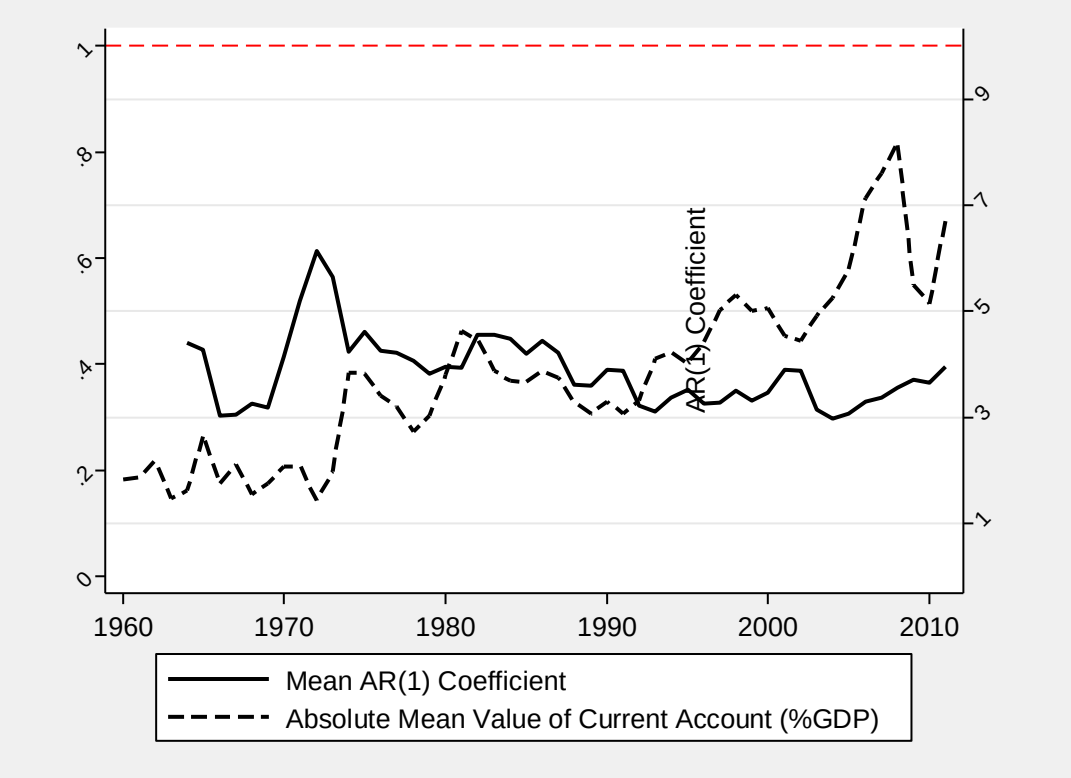
Notes: Solid lines represent mean absolute current account balances as a percentage of GDP, while the dashed lines represent rolling cross-sectional variance. The original dataset is unbalanced.

Figure 2: Mean absolute current account (%GDP) and cross-sectional variance by country subsamples



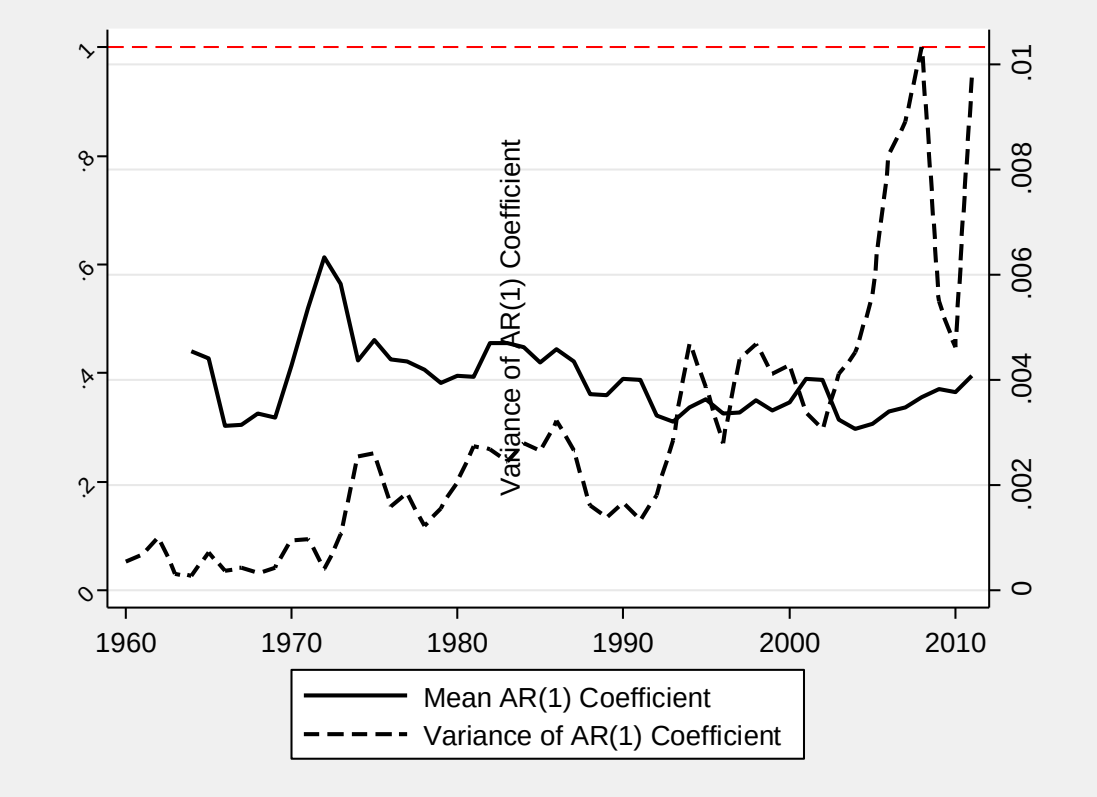
Notes: Solid lines represent mean absolute current account balances as a percentage of GDP, while the dashed lines represent rolling cross-sectional variance. Right hand axis measures current account balances as a percentage of GDP. Left hand axis measures rolling cross-sectional variance.

Figure 3: Current account persistence



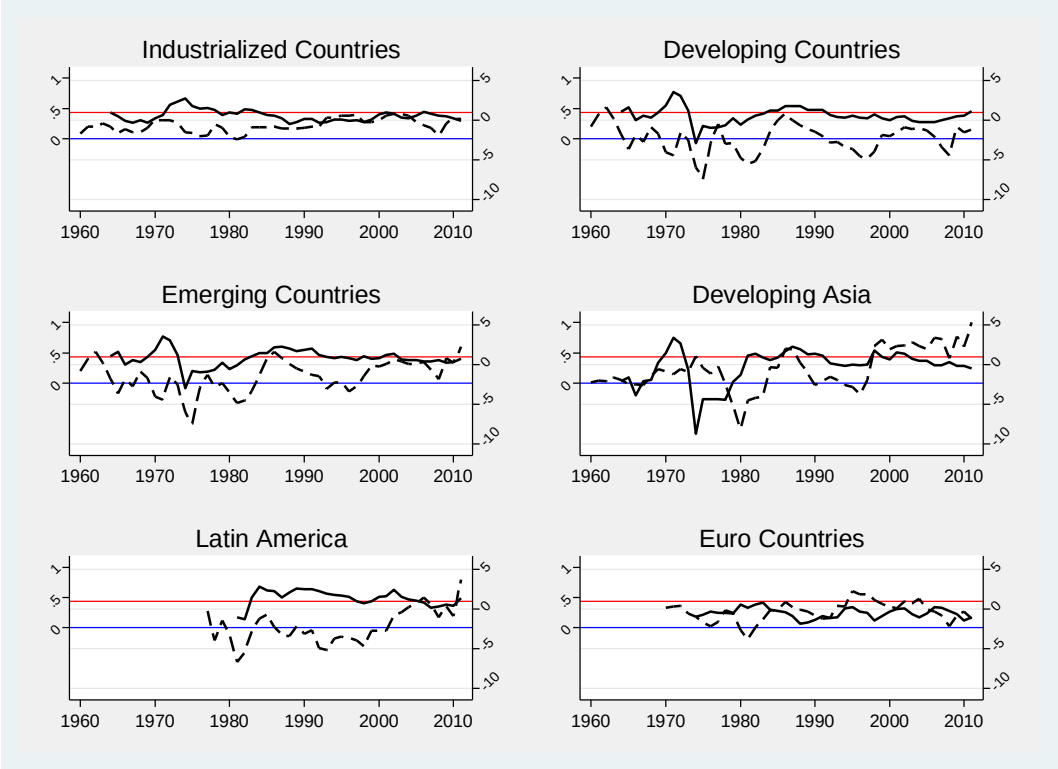
Notes: Solid lines represent rolling estimates of AR(1) coefficients , while the dashed lines represent mean current account balances as a percentage of GDP. All regressions are run using a constant and a rolling window of 20 quarters. The figures show annual averages.

Figure 4: Current account persistence and variance



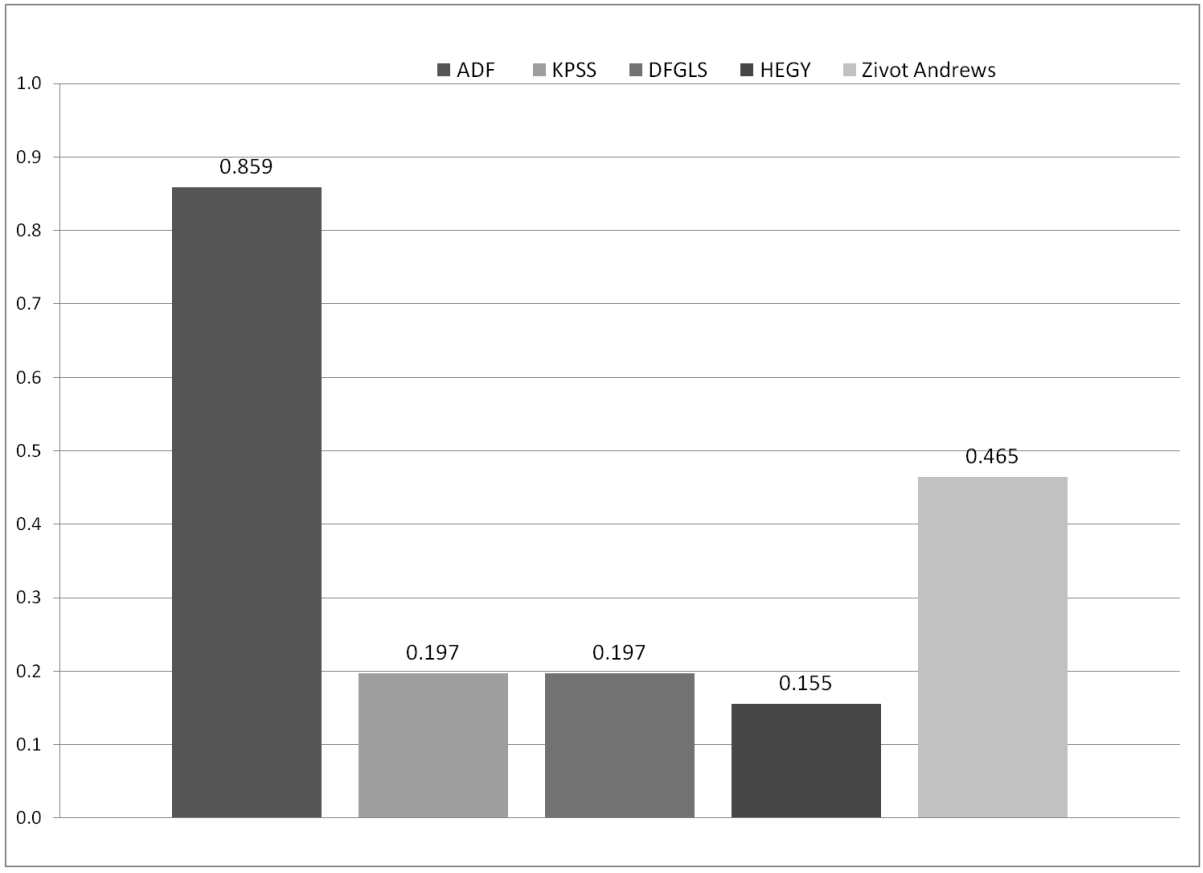
Notes: Solid lines represent rolling estimates of AR(1) coefficients and dashed lines represent cross-sectional variance of the AR(1) coefficients. All regressions are run using a constant and a rolling window of 20 quarters.

Figure 5: Current account (%GDP) and estimated persistence by country subsamples



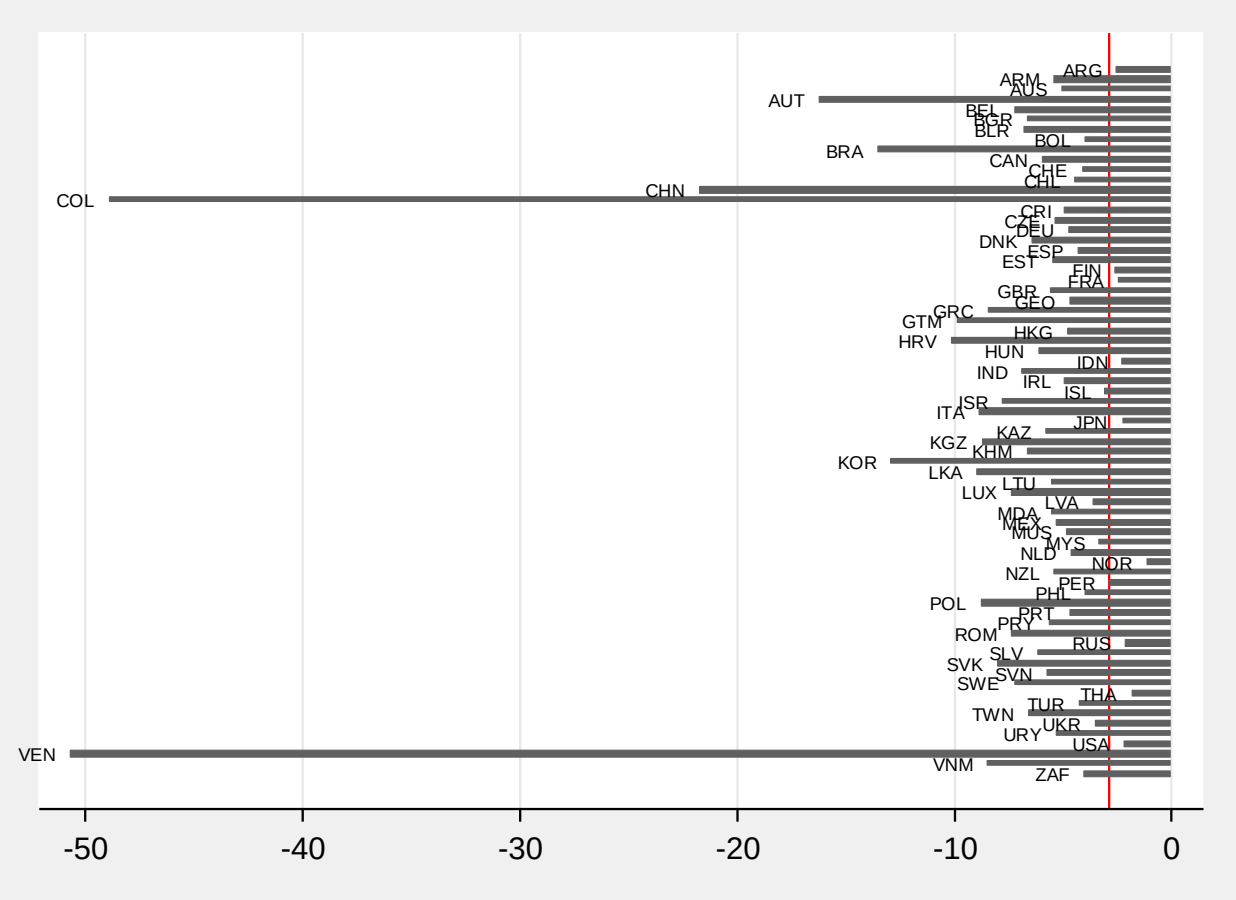
Notes: Solid lines represent current account balances as a percentage of GDP, while the dashed lines represent rolling estimates of AR(1) coefficients. All regressions are run using a constant and a rolling window of 20 quarters. The figures show annual averages. The red line represents the value of one for the AR(1) estimate.

Figure 6: Results of Unit Root Tests on the Stationarity of the Current Account Balance Series



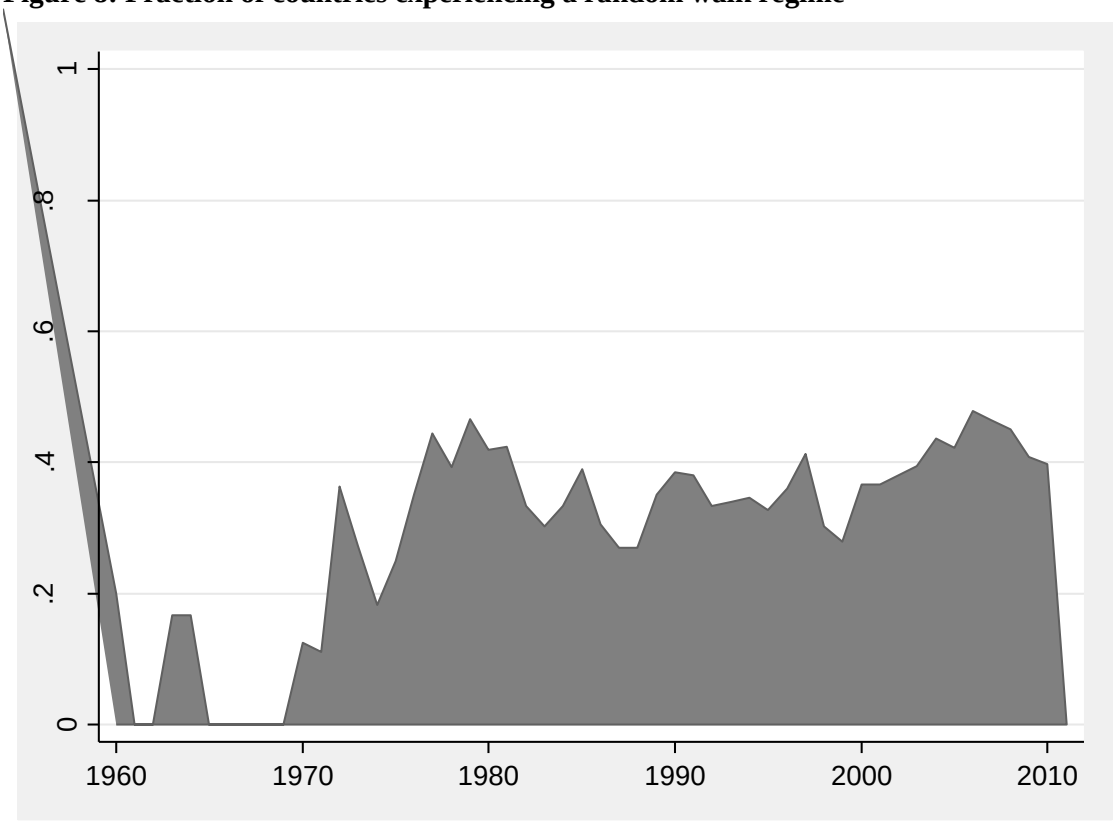
Notes: The ADF, HEGY, and DFGLS results report unit root rejection rates across all countries. The KPSS results report the failure to reject stationarity rate across all countries. The original ADF is run using no constant, no time trends, and no lags. The second bar reports the ADF tests using lag lengths chosen by the Schwartz Criteria. The KPSS test is run without a time trend and results reported are for zero lags, though longer lag lengths are tested and yield similar results. All DFGLS tests are run without a trend, use the reported Schwartz Criteria lag lengths, and the Elliot, Rothenberg, and Stock critical values. The chart reports the Hylleberg, Engle, Granger, Yoo (HEGY) test long run unit roots using no lags.

Figure 7: MS-ADF mean reverting regime test statistics



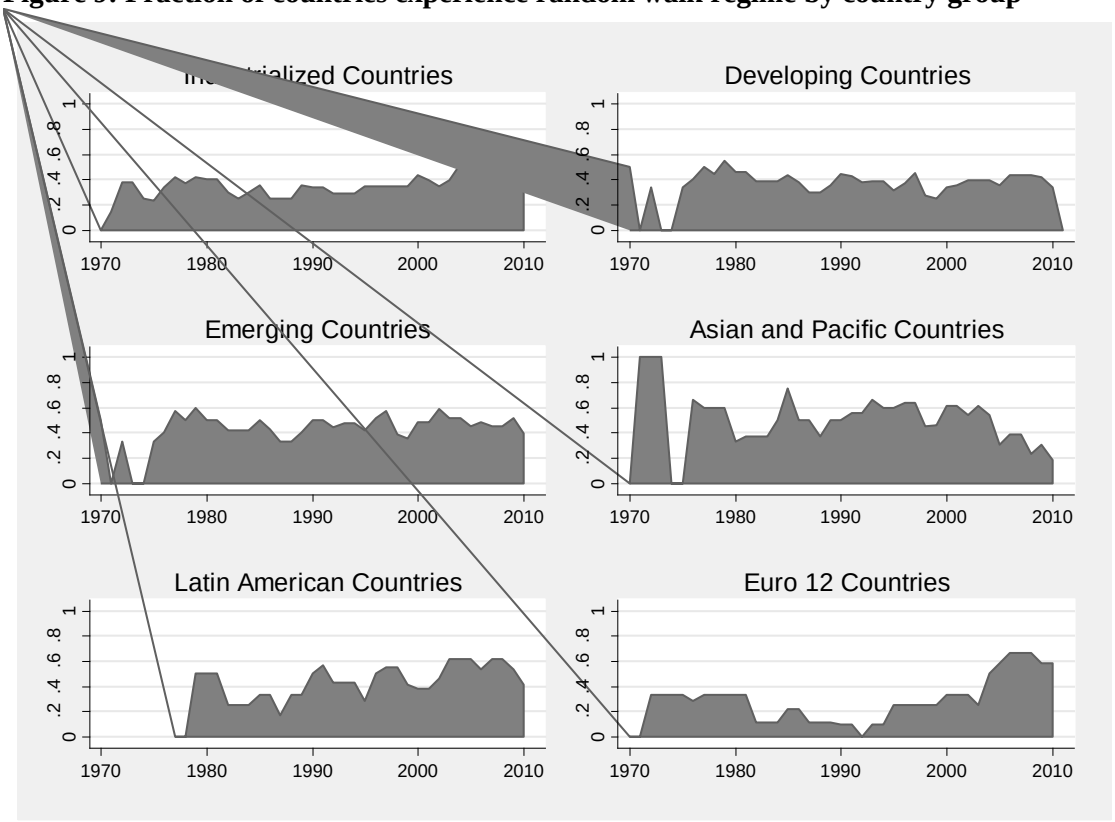
Notes: The red line represents 5% ADF critical value for the case with a constant and no trend. The econometric model for this figure allows for switching constant, variance, and persistence parameter across regimes. One regime is restricted to a random walk model. We are unable to reject the unit root in the first regime for nine countries including the United States, Thailand, Russian Federation, Norway, Japan, Indonesia, France, Finland, and Argentina.

Figure 8: Fraction of countries experiencing a random walk regime



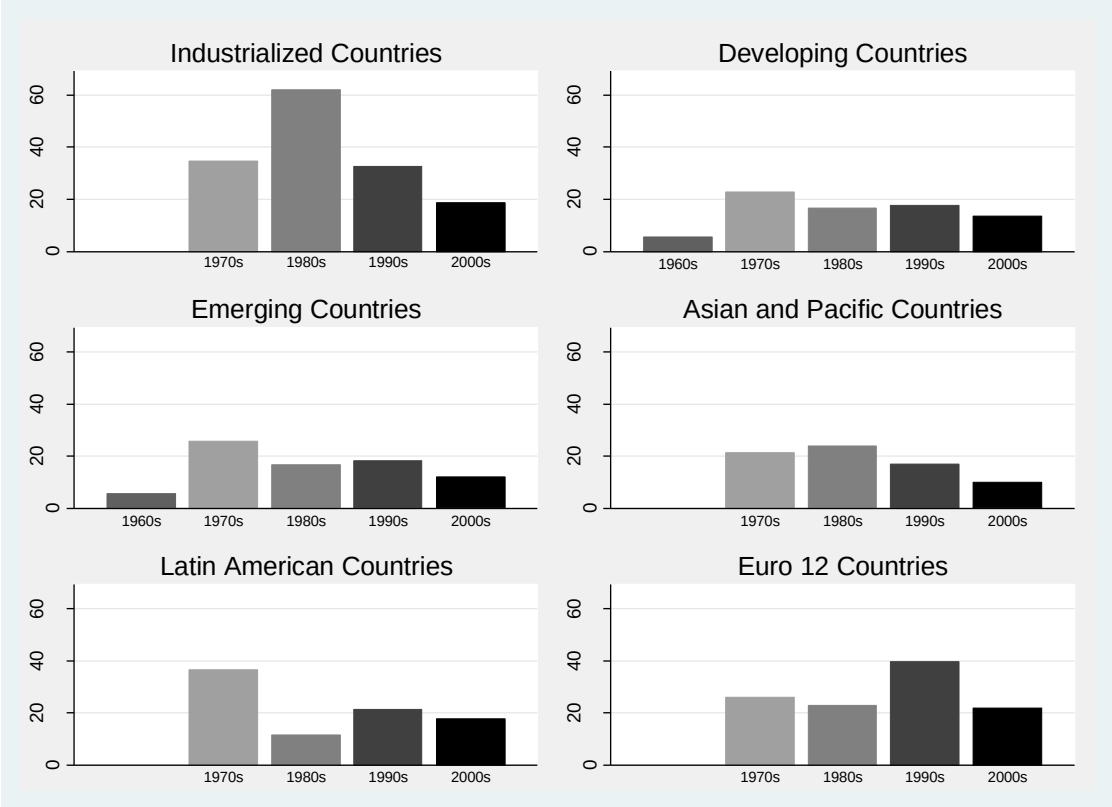
Note: Results are generated using the MS model with switching constants, coefficients, and variances.

Figure 9: Fraction of countries experience random walk regime by country group



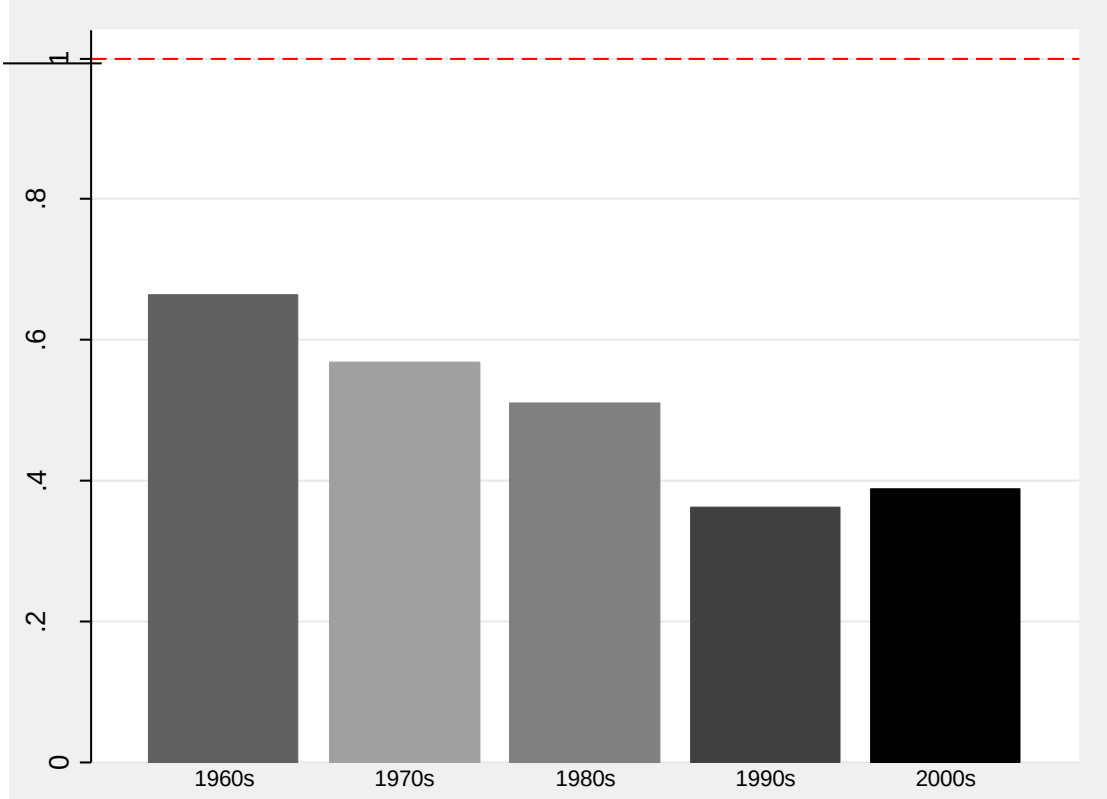
Note: This figure reflects the number of times countries enter random walk episodes across generations. The results are generated using the MS model with switching constants, coefficients, and variances.

Figure 10: Mean duration of random walk episodes by country groups



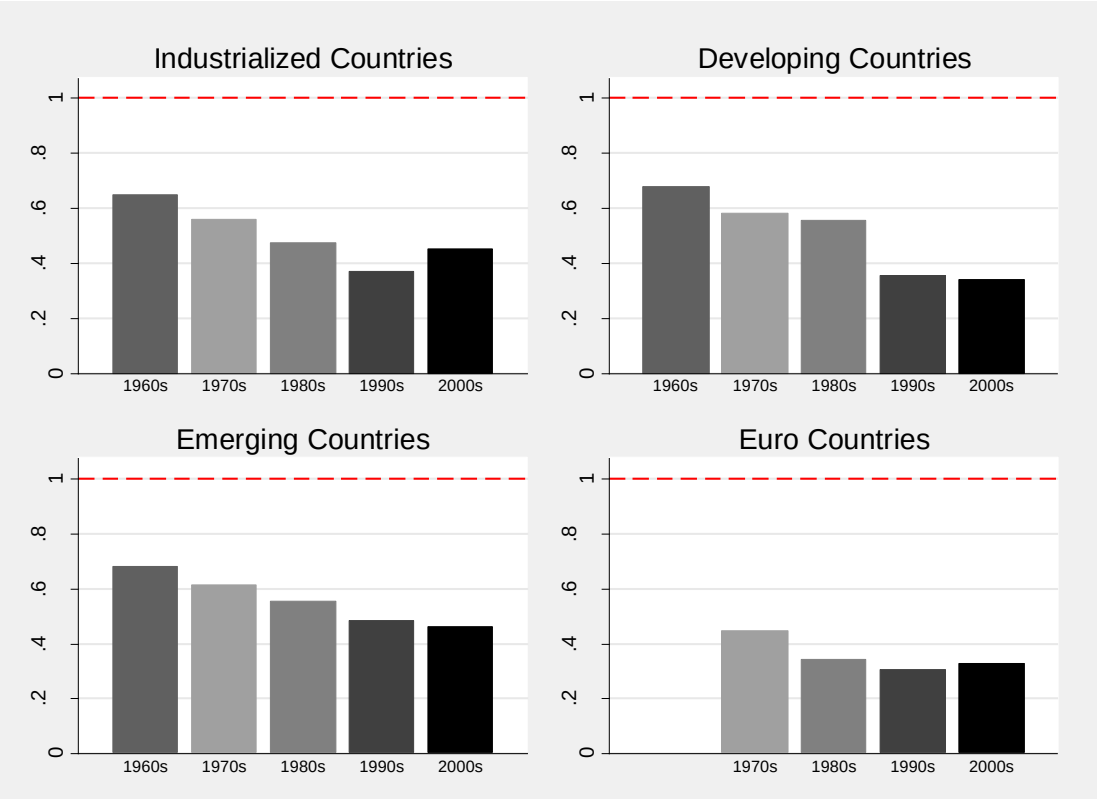
Note: This figure reflects the number of times countries enter random walk episodes across generations. The results are generated using the MS model with switching constants, coefficients, and variances.

Figure 11: Mean persistence by country groups



Notes: Bars represent the mean OLS estimated persistence parameters across both the mean reverting and non-mean reverting regimes. The regime dates are estimated using a Markov-Switching unit root test.

Figure Three: Mean estimated persistence across decades by country groups



Notes: Bars represent the mean OLS estimated persistence parameters across both the mean reverting and non-mean reverting regimes. The regime dates are estimated using a Markov-Switching unit root test.