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Global Dispersion of Current Accounts: Is the Universe Expanding?

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This paper examines the global distribution of current accounts. Using a panel of more than 100 countries, the analysis establishes a set of stylized facts regarding the collective behavior of current accounts over the past four decades. In particular, we find that the global dispersion of current accounts has been steadily rising, which is qualitatively consistent with the view that ongoing financial globalization has allowed countries to maintain larger current account imbalances. However, this underlying trend is not quantitatively large enough to explain "global imbalances"—that is, the noticeable widening in external imbalances among major economies (for example, United States) seen in recent years. [JEL F3, F4]
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Few external variables are as closely or widely watched as the current account balance. Rightly or wrongly, it has been used as a barometer for a wide range of economic conditions—from the state of the business cycle to the sustainability of external financing. In recent years, attention to current account imbalances has taken on a global dimension, reflecting concern over

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"global imbalances." At the center is a large (albeit moderating) current account deficit in the United States, reflecting a shortfall of domestic saving relative to investment on the order of 5 to 6 percent of GDP. As a counterpart, large and/or growing current account surpluses have been recorded in Japan, China and other emerging Asia, and oil-exporting countries most recently, but less so in Europe (excluding Russia). Whether such a global constellation of widening external imbalances can be sustained and for how long constitutes a key macroeconomic risk facing the world economy.[1] Namely, the possibility of a hard landing in the U.S. dollar—the international currency of choice—has raised concerns in many parts of the world over the potential fallout from a disorderly global rebalancing.

A countervailing argument to such concerns was perhaps most notably voiced by former Federal Reserve Chairman Alan Greenspan. Turning matters around, he argued that the unprecedented size of the U.S. deficit was itself a testimony to the increasingly efficient functioning of international capital markets and its ability to mobilize such a large share of net saving from the rest of the world to the United States. Specifically, he noted the following stylized fact regarding global trade and capital flows:

> Uptrends in the ratios of external liabilities or assets to trade, and therefore to GDP, can be shown to have been associated with a widening dispersion in countries' ratios of trade and current account balances to GDP. A measure of that dispersion, the sum of the absolute values of the current account balances…has been rising as a ratio to GDP at an average annual rate of about 2 percent since 1970 for the OECD countries, which constitute four-fifths of world GDP …. More generally, the vast savings transfer has occurred without measurable disruption to the balance of international finance…Accordingly, the trend…will likely continue as globalization proceeds.[2]

This paper reexamines the global distribution of current accounts viewed from a longer term perspective. Using a panel of over 100 countries that comprise over 95 percent of world output, the analysis establishes a set of "stylized facts" regarding the individual and collective behavior of current accounts over the past four decades. In particular, we examine the dispersion properties of external imbalances and interpret these empirical regularities in the context of increasing openness in trade and financial flows—often referred to as "globalization." While an emergent literature on financial globalization has documented that *gross* financial flows (including international reserve accumulation) has increased dramatically in recent

[1]See IMF (2005), Blanchard and Sa (2005), Chinn and Lee (2009), Faruqee and others (2006a, b), and Gourinchas and Rey (2005).

[2]Remarks at the 21st annual monetary conference at the Cato Institute, November 2003.

years, what does this imply (if anything) for *net* flows?[3] More specifically, the central issues that the paper addresses include the following:

- Is the universe of current accounts expanding or narrowing? And, at what rate? What fraction of the U.S. external deficit specifically (and global imbalances broadly) can be attributed to the underlying changes in global dispersion?
- What does changing global dispersion imply for current account persistence?
- What economic factors help explain underlying trends in the dispersion of external imbalances?

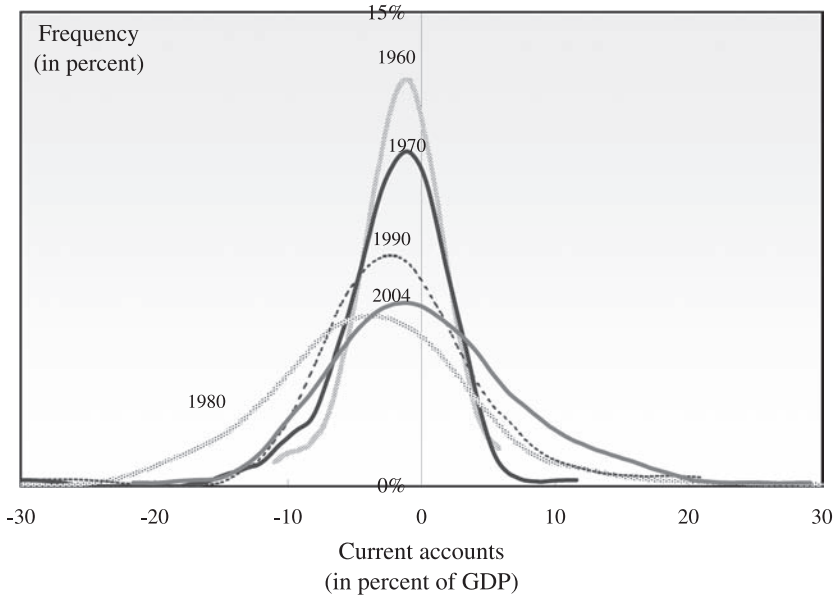
Besides risk and policy implications, the question of rising dispersion has a direct bearing on the celebrated Feldstein and Horioka (1980) puzzle. Their basic finding that savings are closely correlated with investments across countries has remained more or less intact, despite several prominent exceptions (for example, Blanchard and Giavazzi (2002) for Europe). Our query on rising dispersion would help to answer whether the background for the Feldstein-Horioka findings remains intact. If there is no trend change in the dispersion of current accounts, Feldstein-Horioka correlations should continue to be confirmed in the data with statistical significance as strong as the original results. If instead a rising trend is identified in the dispersion of current accounts, it would suggest that these findings would likely weaken over time, though not necessarily becoming extinct.

I. Dispersion and Convergence

We first ask if the global constellation of current account imbalances has been expanding or narrowing over time. Conceptually, in the case of convergence, there is a universally unique end point—that is, zero balance—around which all current accounts should converge (up to a discrepancy term). But predictions from economic theory are generally ambiguous on this and whether external balances should gravitate toward some long-run equilibrium or even be path-dependent based on the history of shocks. The answer typically depends on the class of model—for example, representative agent vs. overlapping generations framework—and its assumptions regarding market completeness, initial conditions and the history of shocks. Hence, whether current accounts actually converge or diverge and over what horizon are essentially empirical questions. To examine these issues more closely, we employ both nonparametric and parametric methods—including concepts from the growth literature on convergence—to determine if the universe of current accounts is expanding.

[3]For recent studies on financial globalization, see Prasad and others (2003), Kose and others (2006), and the references cited therein.

Figure 1. Global Distribution of Current Accounts, 1960–2004



Unconditional Distributions

The unconditional distribution of current account ratios (in percent of GDP) at different points in time is shown in Figure 1. Kernel density estimates of the cross-sectional distribution for 101 countries suggest that the universe of current accounts has been generally expanding.[4] As shown in the figure, the distribution of current accounts shows a steady increase in dispersion from 1960 to 2004, with the mass of the distribution being less concentrated in the area around zero and moving further out toward the tails.[5] This suggests that, on a global basis, current account imbalances or the net flows of goods and services have tended to rise in proportion to the overall economy over time.[6] The notable exception to this progressive pattern of expansion is the

[4]The kernel estimator for an arbitrary point x_i in the distribution is:

$$f(x_i) = \frac{1}{Nh}\sum_{j=1}^{N} K\left[\frac{x_i - X_j}{h}\right],$$

where X_j is the jth data observation, N is the number of observations, h is the window size (that is, the degree of smoothing), and K is the kernel or weighting function. The non-parametric estimates in Figure 1 are based on the Epanechhnikov kernel (see Silverman, 1986). Results using the less efficient Gaussian kernel (that is, standard normal) are very similar.

[5]Jarque-Bera tests strongly reject normality for each of these years. Skewness in the distribution was found significant for each of these years, except 1960; excess kurtosis (that is, ''fat tails'') was statistically significant throughout.

[6]In contrast to the rising dispersion in the distribution of the current account as a share of GDP, the distribution of the ratio of the current account to trade (imports and exports) has remained stable over the years. In other words, current account positions (largely *net* trade

year 1980, when presumably the effects of oil shocks widened the dispersion of current accounts temporarily beyond that seen in later years. Notice too that the distributions for each year are *not* exactly centered around zero (but a small negative value), consistent with the global current account discrepancy.[7]

σ-Convergence

Figure 2 presents supporting evidence from a time-series perspective. The figure plots annually two dispersion measures of current account ratios over the past 45 years. They are the global standard deviation of current accounts (in percent of GDP) or σ, and the global mean absolute deviation of the current account (in percent of GDP) or μ, both calculated across countries for each year.

Two features of the figure are worth noting. First, dispersion shows significant time variation from year to year. Consistent with the impression from the previous figure, notice the considerable increase in the global spread around the time of the two major oil shocks in the mid- and late 1970s. Second, an underlying trend increase in dispersion is apparent, consistent with the global distributions shown in Figure 1. Specifically, the universe of current account positions has been expanding on average by almost 2 percent per annum, measured by its standard deviation.[8] This latter finding suggests a lack of so-called σ-convergence in external positions over this time horizon.

Note that both measures are *un*weighted, treating each country symmetrically. For comparison, a third measure of dispersion $\sum$ is shown in the figure by computing the global sum of current accounts (in absolute value) in percent of world GDP. This is equivalent to a *weighted* mean absolute deviation of current accounts (in dollar terms), where country weights are determined by own GDP (in dollar terms) as a share of world GDP (in dollar terms). All three measures are highly correlated (with correlation coefficients between 0.60 and 0.95). However, the third measure shows a steeper increase, particularly in recent years, well ahead of the other (unweighted) measures.[9] This corresponds to emergence of "global imbalances" where large deficits and surpluses emerged in the largest countries such as the United States and China.

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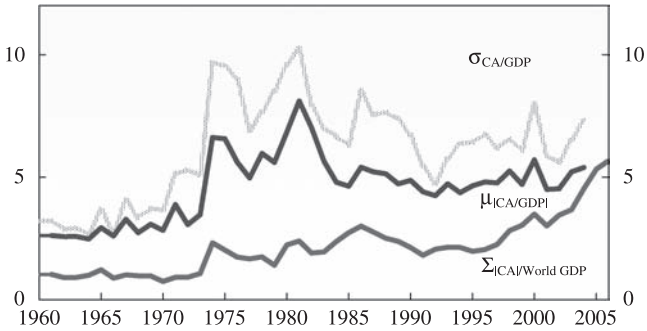
balances or exports minus imports) have expanded globally at a rate on par with *gross* trade (exports plus imports) associated with the well-known expansion in world trade as a share of world GDP.

[7]The global current account discrepancy—usually expressed in dollar terms or in percent of world imports or GDP—has mostly been negative since the early 1970s, reflecting discrepancies in both trade and income accounts; see Marquez and Workman (2001) for a discussion.

[8]A regression of the (log) standard deviation on a time trend yields the following results (with corrected standard errors given in parentheses): $\ln(\sigma_{CA/GDP}) = 1.4 + 0.017t + \varepsilon_t$; $R^2 = 0.33$.

[9]Over the sample, the rate of increasing global dispersion is $1\frac{1}{2}$ to $1\frac{3}{4}$ percent per year on an unweighted basis and $3\frac{1}{4}$ percent on a weighted basis.

Figure 2. Global Dispersion of Current Accounts (CA)



β-Convergence

Another convergence perspective—commonly used in the growth literature—is the notion of "β-convergence." In the context of current accounts, β-convergence would require that countries accumulating past imbalances eventually unwind these positions. This would allow current accounts (and trade balances) globally to converge to more similar values around zero—that is, the convergence point.[10] For example, countries with a large stock of net external debt, reflecting flow deficits in the past, would need to run current account surpluses in the future to pay down the debt or, at least, smaller current account deficits to decrease the share of debt relative to the overall economy. Comparing the initial net foreign asset ratio to the average current account ratio in subsequent years, however, provides very little support for this type of convergence. The cross-country regressions, in fact, show that countries with larger net indebtedness are more likely to run *larger* (not smaller) current account deficits in the years that follow (Figure 3).[11] And the results of the cross-section regression are:

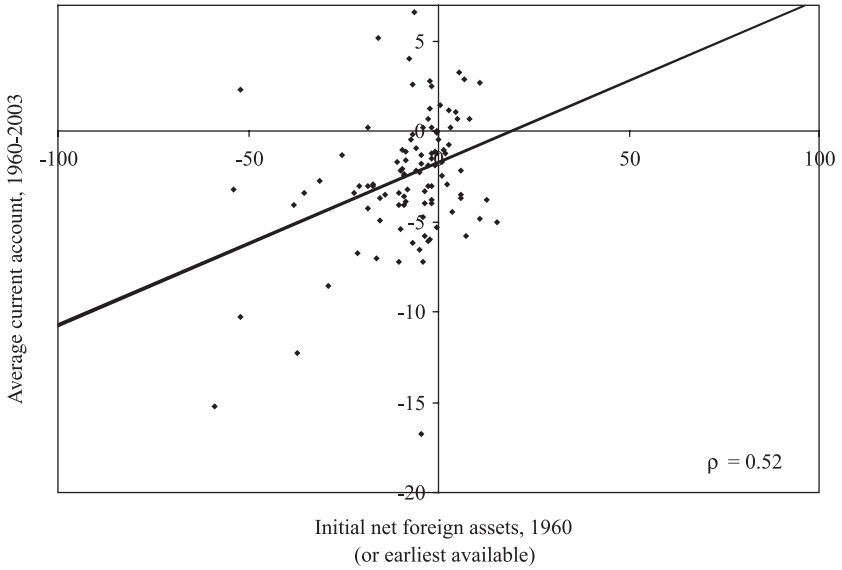
$$CA_{avg} = \underset{(0.36)}{-1.94} + \underset{(0.05)}{0.09}\, NFA_0 + v;\ R^2 = 0.13;\ NOBS = 94.$$

Moreover, the slope of the line drawn is greater than typical estimates of nominal growth in GDP, suggesting these subsequent flow imbalances tend

[10]A weaker form of convergence posits that current accounts, but *not* trade balances nor net foreign asset positions, converge toward balance. This would require that trade (not current account) surpluses be achieved in the years following current account deficits to stabilize the accumulation of net foreign liabilities. Net foreign assets data are based on Lane and Milesi-Ferretti (2001, 2007).

[11]Reflecting limitations on historical data for net foreign assets, the cross-section consists of 94 countries. Similar positive-sloped regression results follow when the sample is split into surplus and deficit countries, as well as between high vs. low deficit countries. Chinn and Prasad (2003) find a similar effect of net foreign assets on current accounts based on multivariate panel estimation that controls for a wide range of explanatory variables (for example, demographics, fiscal positions, economic development, and so on).

Figure 3. Net Foreign Assets vs. Current Accounts (*In percent of GDP*)



to augment the net stock of external assets or liabilities in relation to the size of the economy. Alternative coefficient estimates may be more comparable to nominal dollar growth rates. This would imply a reversion to the initial ratios of net foreign assets (NFA) to GDP, but this is still at variance with the notion of convergence to a common value (for example, zero balance).[12]

This result is comparable to the findings of Kraay and Ventura (2000). Using the data from less than 20 industrial countries, they found that current account imbalances are proportional to the net external balance sheet positions. In response to an increase in savings, a creditor country tended to run surplus while a debtor country tended to stay in deficit. They view this to be the result of a portfolio choice in the presence of a large investment risk. While data limitation makes it difficult to examine the validity of their prediction for a wider set of countries, their model is one possible explanation for the result that we find for a very large set of countries.

To recap, the distributional and convergence properties of current account balances suggest an expanding universe. The β-convergence results further suggest that countries who have had current account imbalances historically are the group more likely to run subsequent current account imbalances (of the same sign) in ensuing periods, leading to further accumulation of net foreign assets or liabilities.

[12]Dropping outlier countries with average current account imbalances (net external assets) greater than 10 percent (50 percent) of GDP in absolute terms would slightly lower the coefficient on initial NFA (to 0.06) but raise its significance level (p-value = 3 percent).

II. Stationarity and Persistence

We now examine aspects of the time-series properties of current accounts—in particular, stationarity and persistence. Trehan and Walsh (1991) showed that the stationarity of the current account is a sufficient condition for the intertemporal budget constraint to hold.[13] Stationarity has since been an indirect test of the basic premise of the intertemporal view of the current account. Thus, this type of behavior would indicate whether the expanding global dispersion of current accounts has also been compatible with respecting intertemporal budget constraints.

To examine the stationarity and persistence properties of current accounts, a battery of unit root and stationarity tests were conducted. In particular, the well-known augmented Dickey-Fuller (ADF) test and nonparametric Phillips-Perron (PP) test for a unit root against a stationary alternative were applied to the individual country series for the current account ratio (in percent of GDP). In addition, the Kwiatkowski and others (1992) (KPSS) test for stationarity against a unit root was also used. The corresponding test statistics and significance levels are shown in Appendix II.[14]

Figure 4 summarizes the rejection and nonrejection rates (in percent) for these unit root tests. For more straightforward comparisons, the rejection of stationarity under the KPSS test is reported as a nonrejection of the unit root. Overall, the picture is quite mixed. One test finds the majority of current accounts to be nonstationary (ADF test), another tests finds the majority to be stationary (KPSS test), and the third test is split down the middle (PP test).

Individually, for nearly a quarter of the sample (22 of 101), these tests failed to reject *both* nonstationarity and stationarity for the *same* series (see Appendix II).

This finding highlights two widely known features of these tests and the time-series data: (1) unit root and stationarity tests tend to have low power (that is, fail to reject too often) in finite samples, and (2) the current account is generally a very *persistent* series, making it difficult to distinguish between nonstationary and stationary alternatives over limited time spans.[15]

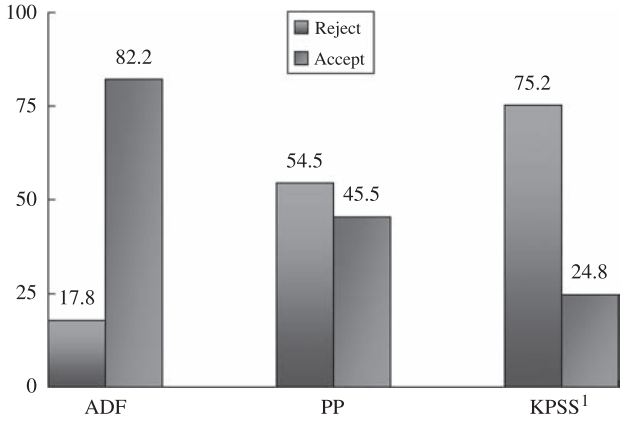
For 21 countries—including, notably, the United States and Japan, the tests indicated (at least, statistically) a *nonstationary* current account ratio over this time span. That is, the unit root tests failed to reject nonstationarity and the KPSS test further rejected stationarity. But for more than half of the sample (55 of 101 countries), at least one of the two unit root tests rejects and

[13]Trehan and Walsh showed that the stationarity of the current account was the necessary and sufficient condition, but the necessity was debated lately by Bohn (2005).

[14]In all cases, the model specification includes a constant but no time trend. Including a time trend in the unit root tests marginally increase the number of rejections.

[15]See Campbell and Perron (1991). A peculiar finding is that for three countries, these low-powered tests *rejected* both stationarity and nonstationarity for at least one unit root test.

Figure 4. Unit Root Test Rejection Rates (*Variable = current account/GDP; in percent*)



[1] Variable is current account-to-GDP ratio; for KPSS test, failure to reject stationarity reported as rejection of unit root in the figure. N = 101.

Table 1. Stationarity of Current Accounts
(Current accounts in percent of GDP)

	Panel Unit Root Test		
Country Group	LL[1]	IPS[2]	Breitung[3]
Small (49 countries, 1960–2004)	−9.09**	−12.18**	−11.49**
Medium (77 countries, 1975–2004)	−10.38**	−12.14**	−10.70**
Large[4] (101 countries, 1985–2004)	−10.08**	−11.32**	−7.27**

Note: An asterisk *(**) denotes statistical significance at 5(1) percent.
[1]Levin, Lin, and Chu (2002). Assumes common unit root process.
[2]Im, Pesaran, and Shin (2003). Assumes individual unit root process.
[3]Breitung (2000). Assumes common unit root process.
[4]Includes countries whose current account data are available after 1985.

the stationarity test accepts their respective null hypotheses, suggesting a stationary series.

Moreover, on the basis of panel unit root tests (Table 1), nonstationarity is strongly rejected. The tests were applied to three panels comprising different groups of countries according to data availability. The first panel comprises data from 1960 to 2004 for 49 countries, the second panel comprises data from 1975 to 2004 for 77 countries, and the third panel comprises data from 1985 to 2004 for 101 countries (excluding Kuwait). The null of nonstationarity is strongly rejected for all possible specifications suggested by Levin, Lin, and Chu (2002), Im, Pesaran, and Shin (2003), and Breitung (2000). Test statistics reported in the table correspond to specifications without time trend, but a unit root was rejected for specifications with time trend, too.

Overall, these various tests suggest that the current account is a stationary but persistent series. When a simple AR(1) specification is estimated from a panel perspective, pooled ordinary least squares and fixed-effects estimates, respectively, yield the following equations (with standard errors in parentheses):

$$CA_{it} = k + \underset{(0.02)}{0.75}\, CA_{it-1} + \varepsilon_t;\ R^2 = 0.59, \tag{1}$$

$$CA_{it} = k_i + \underset{(0.01)}{0.60}\, CA_{it-1} + \varepsilon_t;\ R^2 = 0.62. \tag{2}$$

Under either specification, there is significant AR(1) coefficient on the lagged current account, though with panel fixed effects, the degree of inertia is reduced somewhat.

But these specifications are, in a sense, incomplete—failing to recognize a common component associated with the particular pattern in the movement of global dispersion over the past several decades. Moreover, the β-convergence results indicate that countries with nonzero initial NFA positions continue to accumulate assets (liabilities) on a net basis by running current account surpluses (deficits) in subsequent periods. In other words, countries tend to run significant imbalances of the *same* sign (either positive or negative) as in the past. To introduce this trend feature into the analysis, we include a *sign-preserving* time trend (*sptrend*) constructed as follows:

$$sptrend_t = sign(CA_{t-1}) \times t; \quad \text{where } sign(CA_{t-1}) = CA_{t-1}/|CA_{t-1}|. \tag{3}$$

The time trend specifies increasing surpluses or deficits depending on the sign of the current account in the previous period. Note too that this sign-preserving trend is also broadly consistent with preserving current account adding-up, but a simple time trend is not.[16] Including this term into the panel fixed effects regression yields:

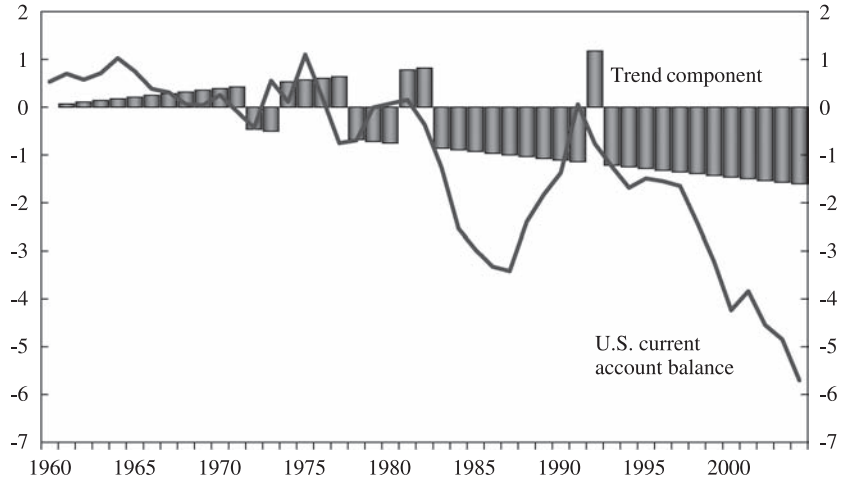
$$CA_{it} = k_i + \underset{(0.004)}{0.01}\, sptrend_t + \underset{(0.01)}{0.59}\, CA_{it-1} + \varepsilon_t;\ R^2 = 0.63. \tag{4}$$

The trend capturing increasing dispersion is statistically significant (p value = 0.08).[17] The fit of the equation is marginally improved and the persistence parameter (AR1 coefficient) is smaller, as one would expect.[18] In other words, some of the observed persistence in external

[16]Current account adding-up would be more apparent if balances were defined in a common unit (say) U.S. dollars—but this would raise issues of nominal drift. Using the current account ratio to GDP broadly preserves the level of the current account discrepancy (in percent of GDP) provided that surplus and deficit countries (as respective groups) are of similar economic size.

[17]Owing to the unbalanced panel, the sign-preserving trend coefficient in (4) is estimated for the vast majority (but not all) countries. Including the full sample (which has countries with only few observations at the end of sample) would reduce the coefficient estimate given the accumulated value of the trend term itself. A "resetting" trend for these countries would raise the point estimate. For further sensitivity analysis, see the following footnote.

Figure 5. U.S. Current Account (*In percent of GDP*)



balances appears to reflect an underlying trend phenomenon—a slowly increasing global dispersion. This is perhaps better viewed as an evolving longer-run process occurring over many decades rather than the inertia in external balances seen from year to year.

Taking an average trend estimate over different specifications, one can examine the extent to which the recent increase in the U.S. current account deficit is due to this underlying global trend. Figure 5 shows the observed U.S. current account deficit ratio to GDP (line) and the long-run contributions (bars) that obtain from equation (4), reflecting the common or global trend term on average. Accounting for increasing global dispersion goes part way to explaining the burgeoning U.S. deficit in past years, but clearly the widening imbalance has gone far beyond these considerations. In level terms, the long-run component (adding the trend and either a common or country-specific constant) would narrow but not nearly close the ''gap'' with the observed deficit.

[18]When the sign-preserving trend is constructed using the *contemporaneous* rather than lagged current account, the trend coefficient is always substantially larger and highly significant; and the AR1 coefficient is also substantially reduced. But this specification is susceptible to simultaneity issues. Across various specifications and samples, the range of trend estimates is roughly between 0.005 to 0.008. As a cross-check, the fitted values and implied rate of increase in global dispersion for a given trend estimate are compared to the rates from the nonparametric estimates discussed earlier.

III. Dispersion and Openness

We have seen that the cross-section dispersion of current accounts has been rising but the time series of current accounts have remained stationary. In particular, equation (4) based on sign-preserving trends suggests that the cross-section distribution of long-run average current accounts (measured by the constant terms in AR(1) regression and the sign-preserving trends) has been spreading out. What are behind these trends? Are they in fact driven by the force of globalization, experienced as a rising integration of goods and financial markets across different countries? We look into these factors empirically and theoretically in this section.

Some Evidence

We first consider two economic variables that are likely to affect the behavior of external imbalances: openness to trade and financial flows. We measure trade openness by the ratio of exports and imports to GDP, and financial openness by the Chinn-Ito index, scaled to lie between 0 and 1 (see Appendix I for details). As most economies have been opening up to rising external flows in trade and finance, a deterministic time trend will capture a large part of the common trend toward greater openness. Country-specific measures of openness will help us to extract more information on the role of openness by exploiting different speeds toward openness among countries.

Countries with more open trade regimes would find it easier to sell goods produced beyond the need for domestic use and to import goods for which demand exceeds domestic production. The trade imbalance is the aggregate accumulation of such imbalances over the whole economy. A country with more open trade regime will thus be more likely to run a trade imbalance, and also find it easier to finance them given the wider base for international lending and borrowing.

More directly, countries with more open financial account will find it easier to lend or borrow to balance its savings capacity and investment need. In addition to enabling countries to put savings to the most productive use and to finance investment needs in the most efficient manner, a greater availability of investment and funding opportunities will tend to stimulate savings and investment, and increase international financial flows further.

To develop a framework on how to incorporate these effects on the dispersion of current accounts, we consider the following AR(1) representation of the current account of country i.

$$CA_{it} = \mu_i + \beta CA_{it-1} + \varepsilon_{it}.$$

Idiosyncratic shocks ε_{it} are uncorrelated across countries and time (i and t), and have mean zero and unit variance ($\sigma^2(\varepsilon_{it}) = 1$)), evaluated over i at each point in time. The long-run average current account, $\mu_i/(1-\beta)$, is allowed to differ across countries. Because current accounts have been found

to be stationary ($0<\beta<1$), we obtain the following moving-average (MA) representation of current accounts.

$$CA_{it} = \sum_{l=0}^{\infty} \beta^{l}(\varepsilon_{it-l} + \mu_i).$$

The global dispersion of current accounts at time t is

$$\begin{aligned}\sigma^2(CA_{it}) &= \sum_{l=0}^{\infty} \beta^{2l}[\sigma^2(\varepsilon_{it-l}) + \sigma^2(\mu_i)] \\ &= (1-\beta^2)^{-1}[1+\sigma^2(\mu_i)].\end{aligned}$$

There are three ways that the global dispersion of current accounts can increase, which need not be mutually exclusive. For one, the cross-section distribution of the long-run average current account can spread out over time—reflecting an increasing ability to borrow and lend internationally, thereby increasing the global dispersion of the current account. Alternatively, a rise in the underlying persistence of a current account deviation from its long-run average can increase the observed global dispersion of current account as the effect of idiosyncratic shocks die out more slowly. This latter channel, however, is not pursued in this paper, for it appears to require a much longer span of data than used in this paper. (See Taylor, 2002) for suggestive evidence of this channel in traditional Organization for Economic Cooperation and Development countries over a span of 100 years.) Finally, the variance of idiosyncratic shocks, which has been normalized to unity here, could actually be rising over time. Indeed, Kose and others (2008) find evidence that the share of idiosyncratic shocks in global business cycles was a little larger in the 1985–2005 period than in the 1960–84 period. However, the change is quantitatively too small to account for a large part of the rising dispersion in current accounts. Nor is it possible to estimate such decompositions for each year separately, and this channel is not pursued further in this paper either.

To capture the spreading-out of the cross-section distribution, we construct sign-preserving indicators of openness. Using *tradeopen* and *finopen* to measure openness in trade and financial accounts, respectively, sign-preserving openness indictors are:

$$sptradeopen_t = sign(CA_{t-1}) \times tradeopen_t,$$

$$spfinopen_t = sign(CA_{t-1}) \times finopen_t.$$

This leads to an expanded version of equation (4).

$$\begin{aligned}CA_{it} = \mu_i &+ \beta_1 CA_{it-1} + \beta_2 sptrend_t + \beta_3 sptradeopen_{it} \\ &+ \beta_4 spfinopen_{it} + v_t. \end{aligned} \quad (5)$$

Table 2 reports the results of estimation for 77 countries whose current account data are available starting in no later than 1975. In the upper panel,

Table 2. Current Account Dispersion and Openness

	All countries		Advanced countries		Other countries	
	(1)	(2)	(3)	(4)	(5)	(6)
CA(−1)	0.58**	0.57**	0.69**	0.70**	0.58**	0.56**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
SPTrend	0.006*	−0.001	0.014**	0.021**	−0.001	−0.006
	(0.004)	(0.005)	(0.004)	(0.006)	(0.005)	(0.006)
SPTrOpenAvg		−0.357		−0.300		−0.482
		(0.231)		(0.289)		(0.328)
SPFinOpenAvg		0.947**		−0.130		1.573**
		(0.277)		(0.233)		(0.540)
R^2	0.53	0.52	0.71	0.71	0.49	0.48
	(7)	(8)	(9)	(10)	(11)	(12)
CA(−1)	0.58**	0.54**	0.68**	0.68**	0.58**	0.53**
	(0.02)	(0.02)	(0.03)	(0.04)	(0.02)	(0.03)
SPTrend	0.005	−0.019**	0.013**	−0.021*	−0.002	−0.019**
	(0.003)	(0.007)	(0.003)	(0.012)	(0.005)	(0.009)
SPTrOpenMav		0.054		0.594		−0.043
		(0.300)		(0.388)		(0.385)
SPFinOpenMav		1.464		0.893**		1.518**
		(0.315)**		(0.365)		(0.475)
R^2	0.53	0.51	0.73	0.73	0.49	0.47

Note: Statistically significant at 5 percent (**) and 10 percent (*). All regressions included country fixed effects. Based on 77 countries whose current account data were available starting before 1975, comprising 21 advanced economies and 56 other (emerging and developing) economies.

the openness was measured by the average over the whole sample period, thus using current accounts since 1960 for countries with available data. In the lower panel, the openness in trade and finance was measured as three-year moving averages, thereby restricting the sample to 1970 onwards (Chinn-Ito index available from 1970). In both upper and lower panels, the two left columns report estimates obtained from using the sample of all 77 countries, the two middle columns report estimates from the sample of 21 advanced countries, and the two right columns report estimates from the remaining (emerging-market and developing) countries.

The estimates indicate that financial opening (integration) played a large role behind the sign-preserving trend that was documented in the previous section. In estimations (1) and (2) of the upper panel where the average measures of openness are used, the sign-preserving trend loses statistical significance when the sign-preserving financial openness term is included.

This evidence turns out to be a combined effect between advanced and other economies: in estimations (3)–(6), the sign-preserving trend remains statistically significant under the advanced-economy sample, but the sign-preserving financial openness is statistically significant only for other economies. The indirect support for the role of financial openness in advanced economies is probably due to the limited "cross-section" variation in financial openness among advanced economies. Nevertheless, a clear contrast can be drawn vis-à-vis the conspicuous absence of statistical evidence that trade openness played an important role behind the sign-preserving trend.

More convincing evidence on the role of financial openness is provided in the lower panel, where moving averages of openness is used, thereby allowing a greater variation in financial openness among advanced economies as well as among other economies. In addition to the decline in the effect of sign-preserving trend observed in estimations (7) and (8) for the whole sample, estimates (9) and (10) show a clear decline in the effect of sign-preserving trend, combined with a strong statistical significance of the sign-preserving financial openness. The same pattern is also observed in estimates (11) and (12) for other countries.

A Simple Model of Expanding Dispersion and Financial Integration

Building upon the evidence that financial openness appears to have played a pivotal role in expanding the global dispersion of current accounts, we present an illustrative (steady-state) model where the ongoing integration in international financial markets increases the global dispersion of current accounts. Some form of heterogeneity is a necessary condition for global dispersion, and we introduce a heterogeneity in discount rates. Combined with a small cost of financial intermediation, which represents financial market friction, we generate a nondegenerate steady-state distribution of net foreign assets. Further introducing growth in aggregate output, we show that the global dispersion of current accounts rises, as the cost of financial intermediation falls. And we assume a deterministic world.[19]

World economy is assumed to comprise N open economies, each of which commands a fixed stream of endowment (y_i), and has an identical utility function $u(c_{it})$ but with a heterogeneous discount rate (β_i). The heterogeneity in the discount rate gives rises to international lending and borrowing (thus current account imbalances). It is further assumed that countries incur a financial transaction cost when they lend or borrow. The period-by-period

[19]In a deterministic setup, the ratio of the current account to GDP has a well-defined relationship to the steady-state ratio of NFA to GDP. In a stochastic setting, stationary shocks to the current account (changes in NFA) will have a nonstationary effect on NFA, and the stochastic steady-state relationship between the current account and NFA remains unclear.

budget constraint is written as:

$$a_{it+1} = (1 + r_t)a_{it} - c_{it} + y_{it} - \frac{\gamma}{2}(a_{it})^2 + \eta(a_{it}),$$

where a_{it} denotes the net foreign assets of country i, and r_t the world interest rate. The financial transaction cost, $\frac{\gamma}{2}(a_{it})^2$, captures the cost needed to maintain a nonzero international asset position. The quadratic form is akin to the adjustment cost widely used in the macroeconomic literature, and is assumed to be the fee paid to competitive financial intermediaries when international financial position is adjusted away from the zero balance.[20] The fees paid to competitive intermediaries are distributed back to each country ($\eta(a_{it}) = \gamma/2(a_{it})^2$) ex post, and thus financial frictions affect the ex-ante decision making of each country without draining global resources.

The first-order condition for each country's consumption-saving choice is:

$$(\beta_i)^t u'(c_{it}) = (\beta_i)^{t+1} u'(c_{it+1})(1 + r_t - \gamma a_{it}). \tag{6}$$

In the steady state, $c_{it+1} = c_{it} = \bar{c}_i$, and equation (6) simplifies to $1/\beta_i = 1 + r - \gamma\bar{a}_i$ and the net foreign asset position is determined by the difference between the world interest rate and the subjective discount rate:

$$\bar{a}_i = \frac{1}{\gamma}\left(1 + r - \frac{1}{\beta_i}\right).$$

The world interest rate is determined at a level that equates the global demand and supply of assets: $\sum_{i=1}^{N} \bar{a}_i = 0$:

$$1 + r = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{\beta_i}.$$

In a no-growth economy just described, the steady-state distribution of net foreign assets can be maintained with zero balance in all current accounts, thereby generating no dispersion in current accounts. A steady-state dispersion in current accounts can be generated by introducing economic growth; now assume that each country's population grows at the same rate g. The aggregate output of a country at time t becomes: $Y_{it} = (1 + g)^t \bar{y}_i$, normalizing the initial population (that is, at time $t = 0$) at unity. Denoting the aggregate net foreign assets by a capitalized letter, A_{it}, the change in the ratio of net foreign assets to GDP can be rewritten in terms of the current account as follows.

$$\frac{A_{it+1}}{Y_{it+1}} - \frac{A_{it}}{Y_{it}} = \frac{A_{it+1}}{Y_{it+1}}[1 - (1 + g)] + \frac{A_{it+1} - A_{it}}{Y_{it}} = -g\frac{A_{it+1}}{Y_{it+1}} + \frac{CA_{it}}{Y_{it}}.$$

[20]See Ghironi, Lee, and Rebucci (2007) for further discussion of these costs and their role in determining the steady-state values of the NFA-to-GDP ratio.

In the steady state with a constant ratio of the aggregate net foreign assets to GDP,

$$\overline{\left(\frac{CA_i}{Y_i}\right)} = g\overline{\left(\frac{A_i}{Y_i}\right)} = g\bar{a}_i = \frac{g}{\gamma}\left[\left(\frac{1}{N}\sum_{i=1}^{N}\frac{1}{\beta_i}\right) - \frac{1}{\beta_i}\right],$$

a tighter integration of international financial markets, represented as a decline in γ which lowers the cost of international financial transactions, increases the dispersion in the ratio of the current account to GDP.

IV. Concluding Remarks

Examining current accounts for a wide spectrum of countries over the past four and a half decades, we can summarize our key findings or "stylized facts" as follows:

- *The universe of current accounts has been expanding over the past half century*. Based on a variety of measures and methodologies, the global constellation of external current account positions has markedly widened over time. Although dispersion can vary significantly from year to year—ostensibly in response to large international shocks, there is a steady, underlying rate of expansion of around 2 to 3 percent per year.
- *In other words, in a context where global gross trade and financial flows have grown rapidly, net flows have also increased (on a sustained basis) to individual countries*. And sign reversals in the current account are occasional, but not frequent. Reflecting this persistence in current account imbalances, countries that have run larger external imbalances in the past also tend to run subsequent, larger imbalances (of the same sign), suggesting an extenuation of international lending or borrowing patterns. However, the presence of an underlying, long-run trend toward greater global dispersion suggests that inertia in current accounts from year to year may be overstated by simple estimates of persistence.
- *Rising dispersion is also found to be closely associated with increasing financial integration of the world economy*. Rising financial openness or integration appears to have played a large role, perhaps more so than trade openness, in accounting for the expanding universe of current accounts. At the same time, individual current account series and changes in net foreign assets (as ratios to GDP) are found to be stationary (albeit persistent), indicating that while dispersion is rising, basic intertemporal resource constraints are not likely violated for individual countries.
- *Global imbalances though have run well ahead of underlying dispersion trends*. The recent acceleration of external positions in major countries (including the United States) is clearly *not* fully accounted for by the trend behavior exhibited by the universal expansion.

From an economic standpoint, the results lend support to recent views that some, though not all, of the large global current account imbalances are due

to the ongoing integration of the world economy. In particular, it is not surprising that we would see, in an increasingly integrated global economy, higher levels of current account deficits (including in the United States) and surpluses in key partner countries. The other side of this trend is the likely weakening in the statistical hold of the Feldstein-Horioka results. However, we also find that the underlying pace of the increase in global dispersion is not as fast as sometimes claimed and has bounds, indicating that a sizable part of today's global imbalances is likely in excess (relative to the underlying trend) and would probably be unwound to a significant degree. Some movements in that direction appear to have finally started in the United States, while the counterpart movements are less evenly distributed.

APPENDIX I
Data Description

The main variable is the ratio of the current account to the GDP, both of which were obtained from various issues of *International Financial Statistics* (IMF) and W*orld Development Indicators* (World Bank). The capital account liberalization index was developed by Chinn and Ito (2006), and is the first principal component of several variables that reflect the ease of cross-border financial transactions. In our estimation, the index was normalized to take a value between 0 and 1, increasing with the liberalization of capital account regime. For each value of Chinn-Ito index CI_{it}, our indicator is defined as follows:

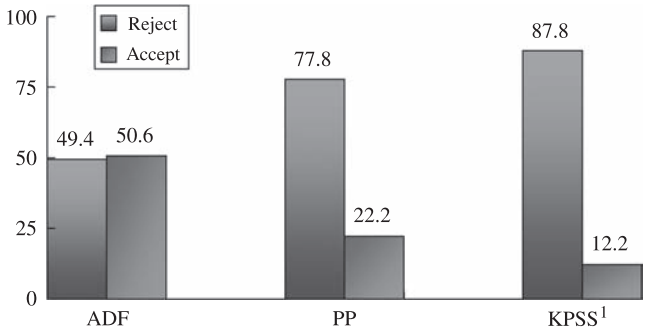
$$finopen_{it} = \frac{CI_{it} - \text{Min}\{CI_{it}\}}{\text{Max}\{CI_{it}\} - \text{Min}\{CI_{it}\}}.$$

APPENDIX II
Alternative Measures of External Positions and Their Behavior

A related but distinct measure is the change in net foreign assets (NFA). It essentially differs from the current account by the amount of capital gains (valuation change), which is driven by asset price fluctuations, including exchange rate variations. Because these asset price movements are broadly described as a random walk, the change in NFA will contain a much larger white-noise component and exhibit smaller persistence than the current account. This is indeed confirmed by the data, as summarized in the following two charts. Note that due to data limitations regarding NFA, the sample size is smaller.

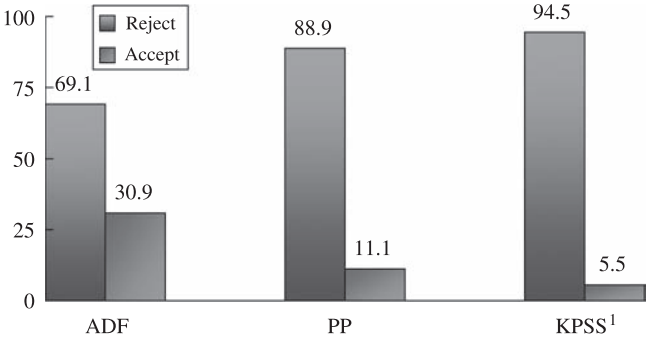
First, the change in NFA (in percent of GDP) is subjected to the same battery of stationarity and unit root tests as for the current account, summarized in Figure 4. The test results uniformly show a higher rejection rate of nonstationarity. See Figure A1. Second, for the change in the *ratio* of NFA to GDP—that is, (NFA/y)— the indications toward stationarity are even stronger; see Figure A2. Changes in the ratio also include a growth term (related to the change in the scaling variable GDP). This helps toward finding stationarity in the ratio given that GDP (that is, the denominator) is growing over time. Excluding the growth factor term (by considering NFA/y) weakens the stationarity finding, but does not overturn it. That is, the NFA concept appears to be much more stationary (less persistent) series than the current account.

Figure A1. Unit Root Tests Rejection Rates
(*Variable=Δnet foreign assets/GDP; in percent*)



[1] Variable is change in net-foreign-assets as a ratio to GDP; for KPSS test, failure to reject stationarity reported as rejection of unit root in the figure. N = 81.

Figure A2. Unit Root Test Rejection Rates
(*Variable=Δ(net foreign assets/GDP); in percent*)



[1] Variable is change in net-foreign-assets-to-GDP ratio; for KPSS test, failure to reject stationarity reported as rejection of unit root in the figure. N = 81.

[1]Variable is change in net-foreign-assets-to- GDP ratio; for KPSS test, Failure to reject stationarity reported as rejection of unit roof in the figure.N = 81.

Table A1. Current Account Balances, Stationarity Tests, 1960–2004
(Percent of GDP)

Country	ADF[1]	PP[2]	KPSS[3]	Country	ADF[1]	PP[2]	KPSS[3]
United States	0.21	−0.15	1.16*	Argentina	−2.24	−3.45*	0.13
United Kingdom	−3.11*	−2.59	0.45	Taiwan POC	−1.70	−2.60	0.400
Austria	−3.03*	−3.04*	0.12	Côte d'Ivoire	−1.47	−2.39	0.32
Denmark	−2.18	−1.97	0.85*	Kenya	−2.40	−3.95*	0.30
Germany	−2.15	−2.42	0.08	Uruguay	−2.38	−3.24*	0.16
Italy	−2.90	−3.05*	0.21	Algeria	−0.75	−2.64	0.62*
Norway	−1.76	−1.46	0.97*	Mauritius	−2.52	−3.47*	0.15
Sweden	−0.07	−0.24	0.56*	Benin	−2.47	−4.84*	0.10
Switzerland	−0.36	−1.09	1.40*	Togo	−2.29	−4.05*	0.43

Table A1 *(continued)*

Country	ADF[1]	PP[2]	KPSS[3]	Country	ADF[1]	PP[2]	KPSS[3]
Canada	−1.06	−1.81	0.49*	Indonesia	−1.67	−2.47	0.52*
Japan	−1.90	−2.74	0.98*	Thailand	−2.05	−2.14	0.43
Finland	−1.39	−1.58	0.66*	Uganda	−1.49	−4.11*	0.94*
Greece	−2.69	−3.21*	0.22	France	−2.31	−2.77	0.53*
Iceland	−3.23*	−4.72*	0.10	Netherlands	−2.75	−3.07*	0.25
Ireland	−1.64	−2.08	0.58*	New Zealand	−3.05*	−3.41*	0.11
Spain	−3.92*	−3.25*	0.25	Saudi Arabia	−1.25	−2.14	0.40
Turkey	−2.32	−4.75*	0.13	Pakistan	−0.87	−2.68	0.55*
Australia	−1.60	−2.80	0.87*	Gabon	−1.81	−3.37*	0.19
South Africa	−3.57*	−3.48*	0.17	Niger	−2.83	−2.56	0.47*
Bolivia	−1.85	−4.43*	0.24	Senegal	−2.24	−2.76	0.32
Brazil	−2.05	−2.20	0.13	Gambia	−2.64	−2.88	0.20
Chile	−1.41	−3.08*	0.21	Madagascar	−2.67	−5.10*	0.11
Costa Rica	−2.19	−3.04*	0.46	Hungary	−1.53	−3.18*	0.33
Dominican Republic	−2.44	−4.73*	0.31	Congo	−0.91	−3.16*	0.33
El Salvador	−3.42*	−5.51*	0.07	Romania	−1.18	−2.35	0.39
Guatemala	−2.13	−4.15*	1.09*	Portugal	−1.31	−2.90	0.18
Haiti	−1.84	−2.31*	0.17	Papa New Guinea	−1.02	−2.24	0.42
Honduras	−2.87	−3.57*	0.28	Bangladesh	−1.48	−2.62	0.85*
Mexico	−3.28*	−3.49*	0.06	Mauritania	−1.44	−2.48	0.41
Panama	−2.22	−2.99*	0.26	Oman	−1.56	−3.81*	0.24
Paraguay	−2.75	−2.98*	0.20	Burkina Faso	−0.45	−2.11	0.56*
Peru	−4.29*	−3.80*	0.26	Bahrain	−3.35*	−2.79	0.18
Venezuela	−0.07	−4.27*	0.20	Kuwait	−2.55	−4.69*	0.23
Jamaica	−2.28	−3.32*	0.10	Bostwana	−1.91	−2.57	0.61*
Trinidad and Tobago	−3.06*	−3.02*	0.36	Lesotho	−1.53	−2.53	0.40
Israel	−2.08	−3.19*	0.39	Ecuador	−2.45	−4.08*	0.41
Jordan	−3.40*	−4.55*	0.11	Nepal	−0.67	−1.64	0.28
Egypt	−1.73	−2.26	0.68*	Poland	−1.80	−2.71	0.32
Myanmar	−2.63	−3.04*	0.42	Cameroon	−2.00	−4.67*	0.41
Sri Lanka	−3.04*	−3.73*	0.22	C. African Rep.	−2.82	−5.64*	0.14
India	−2.11	−2.32	0.18	Zimbabwe	−2.65	−3.41*	0.08
Korea	−1.28	−2.81	0.68*	Cambodia	−3.47*	−3.83*	0.09
Philippines	−1.70	−2.43	0.26	Lao P.D. Rep.	−3.40*	−2.86	0.13
Ghana	−2.25	−4.26*	0.15	Namibia	−3.12*	−4.39*	0.41
Morocco	−1.46	−2.35	0.34	Albania	−1.88	−4.05*	0.49*
Nigeria	−2.44	−4.86*	0.20	Bulgaria	−1.44	−3.09*	0.43
Sudan	−1.81	−3.43*	0.41	China, P.R.	−1.81	−2.74	0.41
Tunisia	−3.12*	−3.14*	0.27	Mongolia	−1.47	−1.27	0.61*
Colombia	−3.64*	−3.44*	0.05	Moldova	−1.78	−3.08*	0.13
Hong Kong	−2.48	−3.19*	0.29	Russia	−1.01	−1.72	0.40
Malaysia	−2.24	−2.46	0.28				

Note: An asterisk * denotes statistical significance at the 5 percent level.

[1]Augmented Dickey-Fuller t-test statistic for unit root against level stationary alternative; lag length chosen based on Schwarz BIC.

[2]Phillips-Perron Z_t test statistic for unit root against level stationary alternative.

[3]Kwiatkowski and others (1992) $\eta(\mu)$ test statistic for level stationarity against nonstationary alternative.

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