The University of Manchester

Economics
Discussion Paper Series
EDP-1302

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Abdilahi Ali
Katsushi S. Imai

March 2013

Economics
School of Social Sciences
The University of Manchester
Manchester M13 9PL

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Abdilahi Ali

School of Social Sciences, University of Manchester, UK

Katsushi S. Imai*

School of Social Sciences, University of Manchester, UK &

RIEB, Kobe University, Japan

**1st March 2013**

## Abstract

In the past few decades, many African countries have implemented policies of trade and financial liberalisation. As a result, Africa is today more integrated into the global economic system than it was a few decades ago. Yet, like developing countries in other regions, African economies have also encountered their share of economic and financial crises. The objective of this paper is to explore the (independent) effects of crises and openness on a large sample of African countries. Focusing on sudden stops, currency, twin and sovereign debt crises, the paper shows that crises are associated with growth collapses in Africa. In contrast, openness is found to be beneficial to growth. More specifically, we find that, consistent with standard Mundell-Flemming type models, greater openness to trade and financial flows mitigates the adverse effects of crises. These findings are robust to various measures of both openness and crises as well as to endogeneity concerns.

**Keywords:** Financial crises, economic integration, growth, Africa

**JEL classification:** G01, F15, F43, 055

*Corresponding Author
Katsushi Imai (Dr)
Department of Economics, School of Social Sciences
University of Manchester, Arthur Lewis Building,
Oxford Road, Manchester M13 9PL, UK
Phone: +44-(0)161-275-4827
Fax: +44-(0)161-275-4928
E-mail: Katsushi.Imai@manchester.ac.uk

# Crises, Economic Integration and Growth Collapses in African Countries

## 1 Introduction

It is largely accepted that trade and financial openness can promote the transmission of business cycle fluctuations among countries, making them more vulnerable to contagion. However, notwithstanding the potential risks associated with globalisation, an increasing number of African countries have embarked on policies of trade and financial liberalisation. As a result, Africa is today more integrated into the global economic system than it was few decades ago. Yet, like developing countries in other regions, African economies have also encountered their share of economic and financial crises. As recent global events illustrate, crises can have devastating effects on economic activity and can hit countries with strong, as well as, those with weak macroeconomic fundamentals. Thus, economists and policy-makers are increasingly concerned with understanding the genesis, evolution and consequences of economic crises.

The objective of this study is to explore how crises and openness affect economic growth in Africa. More specifically, we examine whether greater openness to trade and financial flows exacerbates or lessens the adverse effects of financial crises. We distinguish between four different types of crises, namely, sudden stops, currency, twin and sovereign debt crises. To our knowledge, this is the first study to examine the effects of these types of crises in the context of African economies. Most of the existing literature focuses on mainly emerging markets, even though many African countries have also been subject to these types of crises.

A 'sudden stop' in capital inflows is a type of crisis in which access to foreign capital is abruptly and severely curtailed, precipitating large swings in the capital account of the balance of payments. It is closely associated with current account reversals (from large deficits to smaller deficits/ surpluses), reserve depletion, growth collapses as well as currency and sovereign debt

crises (Calvo, 1998)[1]. A currency crisis, on the other hand, occurs when investors substitute away from a particular country's assets in anticipation of a potential depreciation of the currency, while a sovereign debt crisis involves a default or restructuring of debt obligations. Twin crises, first coined by Kaminsky and Reinhart (1999), arise when currency crises are followed by banking crises. As shown by, among others, Bordo et al. (2001), twins tend to have much more harmful effects on the economy relative to either currency or banking crises on their own. The different types of crises may hit simultaneously, as they may be triggered off by common underlying factors, and one crisis may also help precipitate another.

The results of this study show that financial crises are associated with growth collapses in Africa. In contrast, economic openness is found to be beneficial to growth. More specifically, we find that, consistent with standard Mundell-Flemming type models, greater openness to trade and financial flows tends to mitigate the adverse effects of crises.

The paper is organised as follows. Section 2 contains a brief overview of the openness-crisis relationship. Section 3 presents the data and methods used. Section 4 contains the results while section 5 puts the main findings in a broader context. Finally, Section 6 concludes.

## 2 The openness-crisis interaction

One can identify two opposing hypotheses as to whether economic and financial integration mitigate or exacerbate the adverse effects of financial crises. On the one hand, some have argued that openness can be an important crisis amplifier, in that it can expose countries to external

[1] Sudden stops and the accompanying liquidity constraints imply that the current account must be abruptly adjusted (i.e. reduced). This can be avoided by depleting the reserve holdings of the central bank, provided there are enough reserves and the central bank is willing to do so (however, reserve depletion may initiate currency crises) or, alternatively, by seeking emergency funding from international financial institutions. In any case, a current account reversal can be very painful as labour and goods markets tend to be inflexible in the short-run.

shocks, while others suggest that it can act as a crisis buffer insofar as it can help accommodate external shocks.

**Openness as a crisis amplifier**

As summarised by Cavallo and Frankel (2008), a number of arguments have been put forward in support of the view that openness to trade can trigger or exacerbate crises. In particular, countries that are more integrated into the global economy are more likely to be subject to external shocks emanating from, for example, trading partners. As a result, the argument goes, these economies are more prone to export collapses and/or diminishing trade credits which in turn can trigger sudden stops and other types of crises. Empirical findings by Milesi-Ferretti and Razin (2000) and Easterly et al. (2001) suggest that openness to trade is closely linked to output volatility and a higher likelihood of external crises.

With respect to capital account openness, economists such as Stiglitz (2000) argue that it can aggravate pre-existing market distortions caused by informational asymmetries, credit market imperfections, poor institutions and moral hazards, increasing the likelihood of crises (Stiglitz, 2000). While the overwhelming majority of economists, including Stiglitz, remain in favour of long-term private capital inflows (e.g. foreign direct investment), many point to the destabilising effects of volatile and pro-cyclical surges in inflows. Hence, it has been argued that capital account openness may lead to increased inflows of short term capital and a higher risk of abrupt reversals (Agenor, 2004). Others assert that capital movements, as a result of financial openness, may increase macroeconomic instability (e.g. upward pressures on the exchange rates, asset price bubbles, credit booms, higher inflation, consumption growth volatility etc.) and lead to the presence of more short-term, high risk speculative capital in the economy (Arestis, 2005).

**Openness as a crisis buffer**

The idea that openness to trade can lower the probability of crises or, alternatively, lessen the adverse effects of external crises is not new in economics. For instance, a number of studies have postulated that there is an inverse relationship between trade openness and default probabilities. More precisely, countries with higher trade activities are less likely to default on their international obligations since their trading partners could impose harsh sanctions on them in the event of a default (Rose, 2005).

An alternative argument suggests that trade openness lessens the adjustment costs associated with external crises. In particular, it has been suggested that open economies are more likely to 'export their way out of a crisis'. This was first noted by Sachs (1985), who observed that in the early 1980s Latin American countries were subject to numerous debt crises, in spite of having similar levels of debt to GDP ratios as Asian countries, precisely because of their lower trade openness and hence their inability to generate foreign exchange to service their debt. Recently, Guidotti et al. (2004) have shown that countries with open trade regimes tend to have better growth performances and quicker recoveries in the face of sudden stop crises than those with closed economies.

How trade openness reduces the adjustment costs of external shocks has been elaborated on by, among others, Edwards (2004), Cavallo and Frankel (2008), Calvo et al. (2003) and Ripoll-i-Alcon (2010). Suppose that an economy has to abruptly adjust to a shock (e.g. a sudden stop episode). In the first instance, assume that expenditure-switching policies are not possible (i.e. the exchange rate is fixed). In this case, the country must implement spending cuts to satisfy its intertemporal resource constraint and thus run a current account surplus. In the standard

Keynesian and Mundell-Flemming type of models, the severity of the adjustment is negatively related to the marginal propensity to import, with a higher propensity implying lower adjustment costs. Thus, more open economies would, *ceteris paribus*, suffer less contraction[2].

Similar conclusions can be reached if one uses traditional tradable/nontradable models. To illustrate this, assume that it is now possible for the country to implement expenditure-switching policies. In this case, to improve the trade balance, the relative price of non-tradables must fall. Hence, the needed adjustment can, at least in part, be achieved through a nominal and real depreciation of the exchange rate. This would in turn, following sticky-price open economy models and conventional Mundell-Fleming type models, improve the recovery of the economy through increased competitiveness[3].

Recent experiences from emerging markets, however, show that the effect of depreciation on output can in fact be contractionary particularly when there is a currency mismatch brought about by the so-called " original sin" [4]. As shown by a number of theoretical (see for example, Aghion et al. 2001) and empirical contributions (see for example, Aguiar, 2005), the balance sheet effects of a depreciation can cause output contraction as a result of dwindling firm net worth. However, as emphasised by Cavallo and Frankel (2008), the required devaluation may not be large for countries with higher trade to GDP ratios and, in turn, the balance sheet effects need not be large. Consequently, the prediction is that more open countries can mitigate the adverse effects of external shocks better than closed economies, which are more likely to end up in a

[2] Output losses would be inevitable if wages and prices are rigid. This is more likely to be the case in the short-run.

[3] For a survey, see Lane (2001). The beneficial effects of the depreciation would depend on a number of factors, including whether the Marshall-Lerner condition holds.

[4] This refers to the situation where developing countries cannot get loans denominated in their own currencies from international financial markets. Thus, a depreciation/ devaluation of their currencies would make the value of their liabilities rise. These balance sheet effects would reduce the net worth of firms.

recession due to the need implement more severe adjustments.

As for financial integration, Edwards (2004) and references cited therein postulate that financial openness, as trade integration, tends to reduce the adjustment costs of external shocks and thus enables the economy to recover more quickly[5].

As our discussion regarding the two competing hypotheses indicates, the openness-crisis interaction can only be settled empirically. In this study, we examine whether African countries that are more open to trade and financial flows suffer smaller reductions in output *following* external shocks relative to more closed ones. In other words, are open African economies more likely to accommodate external shocks?

## 3 Data and methodology

### 3.1 Data

Following, among others, Cavallo and Cavallo (2010), we want to explore the medium to long-term effects of crises on output growth. To this end, we construct a panel dataset on a maximum of 41 African countries and 8 non-overlapping 5-year period averages from 1970-74 through 2005-09. In line with the existing literature, the data is averaged to reduce business cycle effects. Table A1 in the appendix provides full definitions and sources of all the variables. The model we estimate takes the following form:

$$y_{it} - y_{it-1} = \beta_0 + \beta_1 y_{it-1} + \delta_1 CR_{it} + \delta_2 EO_{it} + \beta_2 X_{it} + \eta_i + \zeta_t + \varepsilon_{it}, \quad (1)$$

where for $i = 1,...N$ and $t = 1,...T$, $y$ denotes the real GDP per capita for country $i$ at time $t$, $CR_{it}$ and $EO_{it}$ denote our measures of crises and economic integration, respectively, $\eta_i$ is

[5] A careful examination of the existing literature, however, indicates that, under fairly standard assumptions, financial openness may in fact result in greater instability (see for example Kim et al. 2012 for a review).

a time invariant country-specific fixed effect, $\zeta_t$ is a time specific effect and $\varepsilon_{it}$ is the error term. We are interested in testing whether the marginal effects of crisis and openness on growth, $\delta_1$ & $\delta_2$, are statistically significant.

The $X_{it}$ is a set of standard control variables, largely drawn from the existing literature, which include inflation and the share of investment in GDP. In line with the seminal contribution by Beck et al. (2000), we account for the role of financial development in economic growth. We use the ratio of liquid liabilities to GDP as an indicator of financial development. We include population growth to control for the demographic trends of African countries. As suggested by Barro (1996), high population growth can have a negative effect on growth through its impacts on the dependency ratio and quality of human capital. Finally, we control for the level of indebtedness since it may play an important role in the relationship between crises and growth. In particular, we wish to test whether crises are significantly harmful to growth even after controlling for one of the most important correlates of crises, namely 'debt overhang'.

We then extend our analysis by allowing the growth effect of crises to vary with the level of economic integration. We do this by interacting the crises measures with indicators of openness, as follows:

$$y_{it} - y_{it-1} = \beta_0 + \beta_1 y_{it-1} + \delta_1 CR_{it} + \delta_2 EO_{it} + \gamma_1 (CR_{it} \cdot EO_{it}) + \beta_2 X_{it} + \eta_i + \zeta_t + \varepsilon_{it} \qquad (2)$$

A good way to understand how growth reacts to external shocks in countries with varying levels of openness is to examine the marginal effect from equation (2)

$$\frac{\partial (y_{it} - y_{it-1})}{\partial CR_{it}} = \delta_1 + \gamma_1 EO_{it} \qquad (3)$$

Thus, we interpret the signs of the coefficients of $CR_{it}$ and the interaction term as follows: if $\delta_1 < 0$ and $\gamma_1 > 0$, this would confirm the hypothesis that openness acts as a crisis buffer,

which would suggest that the adverse effects of crises are decreasing with the level of economic integration. On the other hand, if $\delta_1 < 0$ and $\gamma_1 < 0$, this would confirm the hypothesis that economic integration can amplify the negative effects of crises on output growth.

**Crises indicators**

To identify episodes of sudden stop crises, we closely follow the work of Guidotti et al. (2004) and Calvo et al. (2004) to define a sudden stop as a fall in the financial account that is at least one standard deviation below the sample mean and more than 5 percent of the country's GDP. However, we impose an additional requirement in that we require the episode to be *disruptive*. One way to do this is to follow the procedure by Hutchison and Noy (2006). They focus on episodes that coincide with other types of crises. Our approach is broader and requires the episode to coincide with, or be followed by, other forms of financial crises, namely, currency and debt crises. In this way, our measure of a sudden stop reflects not only changes in the mood of global capital markets, but also how harmful the episode might be. Hence, we use a dummy variable that takes on a value 1 if there is a sudden stop in a country during a particular year and 0 otherwise.

We also make use of similar dummy variables capturing the incidence of currency and sovereign debt crises. Our currency crisis measure is based on that of Reinhart and Rogoff (2009), who define it as an annual depreciation (local currency vs US dollar) of 15 percent or more. Our sovereign debt crisis measure comes from the same source and is defined as a failure to meet a principal or interest payment on the due date (or specified grace period) including rescheduling of debt agreements irrespective of the nature of any new terms.

Following Kaminsky and Reinhart (1999) and Bordo et al. (2001), we also consider the effects of the joint ('twin') occurrence of banking and currency crises on output growth in

Africa. The data on banking crises comes from the dataset by Laeven and Valencia (2008). Finally, to capture the severity and intensity of financial crises, we construct a composite crisis index, which can take on a value between 0 and 4, depending on the number of types of crises encountered by a country in a particular year. For example, in 1992 Nigeria simultaneously experienced a sudden stop episode with currency, twin, and sovereign debt crises. Hence, we award Nigeria an index score of 4 for that particular year. We then weigh the index by the share of each country's GDP in world output. A similar procedure has been adopted by Reinhart and Reinhart (2010). The composite index is our preferred indicator as it captures whether simultaneously encountering different types of crises has an additional adverse effect on growth, above and beyond the adverse effect of each crisis individually.

Using the definitions and sources detailed above, we identify a total of 202 currency crises, 172 sovereign debt crises, 249 sudden stop episodes and 56 twin crises (banking and currency). Figure 1 shows the distribution of currency crises over time. It seems that the highest number of currency crises were recorded in 1994, when the CFA franc was devalued by 50%. The occurrence of sovereign debt crises peaked during the mid to late 1980s (Figure 2), while a significant number of countries experience sudden stop episodes from the late 1970s onwards (Figure 3). Twin crises were the least frequent type of crisis during the sample period, occurring mostly in the 1990s (Figure 4).

**(Figures 1 - 4 here)**

**Openness indicators**

We utilise several measures of economic and financial openness. We use the economic dimension of the KOF index of globalisation (Dreher, 2006). It is a weighted index of actual

economic flows (trade, foreign direct investment, portfolio investment and income payments to foreign nationals each measured as a percentage of GDP) and their restrictions (hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions). This is our preferred indicator since it captures the degree to which economies are connected to the rest of the world. As sensitivity tests, we also employ the actual economic flows sub-index from the same dataset and the share of trade (sum of exports and imports) in GDP, each capturing different aspects of cross border transactions.

To measure financial openness, we use the de facto indicator constructed by Lane and Milesi-Ferretti (2007). This variable measures the external assets and liabilities of economies (as a share of GDP) and thus provides a useful overview of a country's financial linkages to the rest of the world. As a robustness check, we disaggregate the gross external liabilities and use the sub-component of FDI as an additional measure of financial integration[6]. Finally, we use the *de jure* index of capital account openness proposed by Chinn and Ito (2008). This measure is the first principal component of four binary dummy variables related to restrictions on cross-border financial transactions.

## 3.2 Methodology

A particular issue of concern in estimating our model (equation 1 or 2) is endogeneity bias which may arise from omitted variables, simultaneity or reverse causality. To overcome this, we use the generalised method of moments (GMM) estimators proposed by Holtz-Eakin et al. (1988) and Arellano and Bond (1991) and further developed by Arellano and Bover (1995) and Blundell and

[6] Kose et al. (2009) do a similar disaggregation of stocks of liabilities into debt, FDI and equity components (from Lane and Milesi-Ferretti, 2006), arguing that the benefits of financial openness are closely linked with the effects of these inflows.

Bond (1998). Controlling for time-specific effects, equations (1) or (2) can be written more concisely as:

$$y_{it} = \alpha y_{it-1} + \beta' X_{it} + \eta_i + \varepsilon_{it} \tag{4}$$

Given that $y_{it}$ and $x_{it}$ may be correlated with $\eta_i$ and that $y_{it-1}$ and $X_{it}$ are not strictly exogenous (i.e. they are not uncorrelated to past, present and future error terms), one can use the differenced GMM estimator (D-GMM) suggested by Arellano and Bond (1991) which allows for the elimination of the possible source of omitted variable bias, namely $\eta_i$, by differencing both sides of equation (4):

$$y_{it} - y_{it-1} = \alpha(y_{it-1} - y_{it-2}) + \beta'(x_{it} - x_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1})$$

or (5)

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \beta' \Delta x_{it} + \Delta \varepsilon_{it}$$

However, by construction, the lagged dependent variable is correlated with the differenced error term $(E[\Delta y_{it-1}, \Delta \varepsilon_{it}] \neq 0)$. In addition, the endogeneity of the regressors remains. Arellano and Bond (1991) show that if one assumes the transient errors to be uncorrelated ( $E[\varepsilon_{it}, \varepsilon_{it-s}] = 0$ for all $s \geq t$ ) and the explanatory variables to be weakly exogenous (i.e. they are uncorrelated with future realisations of the error term), one can use lagged values as instruments. Hence, the moment conditions defining the differenced GMM is given by:

$$E[y_{i,t-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0, \tag{6}$$

$$E[X_{i,t-s}(\varepsilon_{it} - \varepsilon_{it-1})] = 0, \text{ for } s \geq 2; t = 3,...T \tag{7}$$

Hence, we can use 'deeper' internal instruments dated $t-2$ or earlier as instruments. However, as shown by Arellano and Bover (1995) and Blundell and Bond (1998), in cases where

the data series displays persistence, the lagged levels of the variables could be weak instruments, resulting in downward biased estimates, especially in short panels. In recognition of this, we use the system GMM (SGMM) dynamic panel estimator advanced in Arellano and Bover (1995) and Blundell and Bond (1998), which has been shown to have superior finite sample properties. Retaining the weak exogeneity assumption, the SGMM applies a system of equations, one in levels (equation 4) and one in differences (equation 5), and uses lagged first differences of the regressors as instruments in the first case and lagged levels of the dependent and explanatory variables as instruments in the latter case. The validity of the additional instruments requires, however, that the first differences of the regressors in equation (5) are uncorrelated with the country specific effects, $\eta_i$, across all periods. That is,

$$E[y_{i,t+p} \cdot \eta_i] = E[y_{i,t+q} \cdot \eta_i] \tag{8}$$

$$E[X_{i,t+p} \cdot \eta_i] = E[X_{i,t+q} \cdot \eta_i] \ \text{for all p and q} \tag{9}$$

Based on this and on the previous assumption of weak exogeneity, the moment conditions for the regression in levels become:

$$E[(y_{i,t-s} - y_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{it})] = 0 \tag{10}$$

$$E[(X_{i,t-s} - X_{i,t-s-1}) \cdot (\eta_i + \varepsilon_{it})] = 0 \ \text{for} s = 1; t = 3,...T \tag{11}$$

Whether the lagged values of the variables in the growth model are valid instruments can be examined by a test on the appropriateness of the moment restrictions. We use three specification tests suggested by Blundell and Bond (1998): 1) a Hansen $J$ test for over-identifying restrictions, which evaluates the joint validity of the instrument matrix by testing the null hypothesis that they are uncorrelated with the residuals, 2) a difference-in-Hansen $J$ test for the validity of the additional moment restrictions required for the 2-step SGMM (i.e.

the additional instruments for the levels equation), and 3) the Arellano-Bond test of second-order serial correlation examining the hypothesis that the error term, $\varepsilon_{it}$, is not serially correlated. Even though the two-step SGMM estimator is asymptotically efficient, its standard errors are downward biased making inference problematic (Blundell and Bond, 1998; Roodman, 2006). We solve this by implementing Windmeijer's (2005) finite sample correction, which makes the two-step GMM efficient asymptotically. As shown by, among others, Windmeijer (2005) and Roodman (2009), a large number of instruments can have serious consequences in finite samples because they overfit the endogenous variables and also weaken the Hansen *J* test. To avoid this, we follow the procedure suggested by Roodman (2009), collapsing the instrument matrix and restricting the instrument set to the closest possible lags of all non strictly exogenous variables.

# 4 Results

## 4.1 Baseline results

Table A1 in Appendix reports the summary statistics of all the variables used in the estimations. As can be seen, economic growth and our measures of openness display considerable heterogeneity among the sample countries. As a starting point, Table 1a depicts the pairwise correlation coefficients between each of our crisis indicator and the dependent variable. As expected, we observe a negative relationship - that is, financial crises are associated with a poor economic performance. The table also shows that, even though the crisis variables capture different dimensions of shocks, they are related to one another. As Table 1b indicates, growth is significantly and positively correlated with economic integration, cross border transactions and trade openness. Finally, Table 1c indicates that there is a mixed associatyion between crises and openness.

In Table 1, we explore the (independent) effects of crises and openness on economic growth (i.e. without interaction terms). Across the 5 regressions, we augment our growth model with the five different indicators of crises described above, along with our preferred measure of economic integration. These regressions are based on the fixed effects panel estimator. The estimated coefficients of economic integration are all positive and generally significant at conventional levels, suggesting that openness is associated with a better growth performance. Consistent with the existing literature, a sudden stop crisis is harmful to output growth. Similarly, the rest of the financial crisis indicators are inversely related to growth, the coefficients of these variables being statistically significant at the 1% level. Hence, these preliminary findings support the notion that crises tend to disrupt economic activity while openness, perhaps by relaxing credit constraints and thus improving capital accumulation, is beneficial to economic performance.

**(Table 1 here)**

In general terms, all the conditioning variables are consistent with our prior expectations. More specifically, initial income carries a significant negative sign, confirming the conditional convergence hypothesis. The estimated coefficients of inflation are significantly negative, implying that macroeconomic instability is linked to low growth rates. In line with the so-called 'debt overhang' hypothesis, we obtain negative and generally significant coefficients of external debt. There is no evidence to support the idea that population growth or financial depth have a significant influence on growth. Investment, on the other hand, helps to explain the variation in growth, further underlying the importance of capital accumulation for economic development.

However, a legitimate concern with these results is that some of the right hand side

variables may be endogenously related to growth. A particular source of endogeneity which may plague our baseline model is reverse causality. For example, it is likely that the level of economic integration may change with the growth performance of the economy, so that countries may open up their current and capital accounts precisely because of improved domestic growth performance. To overcome these concerns, we re-estimate the baseline regressions in Table 1 using the two-step SGMM. The results are reported in Table 2.

**(Table 2 here)**

Once endogeneity concerns are addressed, economic integration retains its positive and significant effect on growth. Across all specifications, the coefficients of this variable are significant at the 1% level, emphasising that openness does matter for growth in Africa. Focusing on regression [1], the results imply that a 1% increase in the economic openness to GDP ratio is accompanied by a rise in income of 0.25 percentage points. We find robust evidence that crises are detrimental to economic performance. The results suggest that currency crises have a marginally stronger depressing impact on output growth than the other types of crises, closely followed by twin crises, sovereign debt and sudden stops. Interestingly, the coefficient of our composite measure, which captures the intensity with which countries encounter multiple crises, is somewhat lower than the other crisis indicators but, nonetheless, negative and highly significant. Accordingly, crisis-hit African economies are expected, on average, to grow between 1.68 and 1 percentage points less than those that do not suffer from any crises.

The three specification tests are all well-behaved; the Hansen test of over-identifying restrictions fails to reject the null that the instruments are valid. Similarly, the difference-in-Hansen test fails to reject the null that the orthogonality conditions derived from

the levels equation are appropriate. Finally, the regressions pass the second order serial correlation test, confirming that there is no second-order serial correlation in the error term of the first-differenced equation. Hence, these tests support the validity and consistency of the SGMM estimator.

## 4.2 Varying the impact of crises across levels of openness

In order to investigate whether the level of economic integration influences the relationship between crises and growth, we interact the openness variable with our crises indicators. The results are summarised in Table 3.

**(Table 3 here)**

Regression [1] shows that sudden stop episodes have a highly significant negative association with economic growth: an African country which experiences a sudden stop episode in a given period is expected to grow 4 percentage points less than a country without such an episode. On the other hand, openness has a significant beneficial effect on economic performance. The coefficient of the interaction term carries a significant positive sign, suggesting that economic integration mitigates the adverse effects of a sudden stop crisis. So a highly open economy such as South Africa with an average openness to GDP ratio of 0.60, would be able to avoid any output losses around sudden stops[7]. On the other hand, in a period of crisis, the output growth of the least open economy (i.e. Rwanda with an average openness to GDP ratio of 0.16) would drop by more than 3 percentage points[8].

In regression [2], we consider currency crises, which are found to be inversely related to

[7] The overall growth effect following a sudden stop for South Africa would be given by the following equation; $-4.191+(0.07*0.60)*100=0.009$

[8] Following the marginal effect equation, for Rwanda this is calculated as: $-4.191+(0.07*0.16)*100=-3.071$

output growth. When we interact this variable with openness, we find a positive and significant sign. This implies that openness tends to attenuate the negative relationship between currency crises and growth. Economic integration itself retains its positive and significant sign. Regression [3] examines how debt crises relate to growth. The coefficient of this type of crisis is negative and highly significant. This suggests that debt crises, similar to the other types of crises, is detrimental to growth. The coefficient of the interaction term is significantly positive, indicating that the more an African economy is integrated with the rest of the world, the weaker the negative association between debt crises and economic performance. The pattern is the same across the remaining specifications, the coefficients of our indicators of twin crisis and composite crisis measures both being negative, the latter significantly so at the 1% level. However, the former is marginally insignificant and likewise its interaction term. The coefficient of the interaction between the composite crisis index and openness is positive and significant.

To sum up, in line with both the theoretical and the empirical literature, our results show that financial crises are associated with output losses. Our findings also indicate that the crisis-growth relationship is conditional on the openness of the country to trade and financial flows. More specifically, in open countries, the harmful impacts of crises is lessened. This is not the case in closed economies. This suggests that open countries tend to experience a smoother adjustment following an external shock, perhaps driven by the performance of the tradable goods sector. It could also be that countries that are more integrated with the rest of the world may perhaps be given more room to manoeuvre (e.g. trade credits) by international partners. These opportunities may not be available to more closed economies.

## 4.3 Alternative measures of economic integration

To ensure that our results are not sensitive to the choice of openness indicator, we use various other measures that capture the degree to which economies are integrated with the rest of the world. For the sake of brevity, Tables 4 and 5 contain only the results for our variables of interest (i.e. measures of openness, crises and their interaction terms)[9]. As can be seen in Panel A of Table 4, our previous findings remain largely robust when we use 'cross border transactions' as a measure of openness. However, while the coefficient of this variable is positive, it is only significant in 2 out of the 5 regressions. Nonetheless, our measures of crises retain their expected (negative) signs and are statistically significant at conventional levels. More importantly, the interaction effects remain positive and generally statistically significant.

**(Table 4 here)**

In panel B of Table 4, we apply trade openness as an indicator of economic integration and the results are broadly in line with our previous findings. The coefficients of trade openness and crises carry the expected signs and are significant in all specifications, suggesting that countries that are relatively more open tend to experience better growth performance than those that are more closed. Similarly, crisis-hit countries tend to suffer from higher output losses than those that do not encounter any crises. The coefficient of the interaction term is positive and generally significant. Overall, these findings tend to support the view that openness can mitigate the negative effects of crises.

We also consider other openness measures that exclusively focus on the capital account. In panel A of Table 5, we use the financial openness indicator of Lane and Milesi-Ferretti

[9] The regressions include the set of control variables employed so far.

(2007), which enters with positive and mostly significant coefficients across the different specifications. Once again, crisis is negative and significant, except in the second regression. It is worth noting that the interaction term is positive, albeit insignificant in three out of the five regressions. Panel B reports the results using FDI liabilities as an openness measure. The estimated coefficients of crisis and openness suggest that, while the first exerts a statistically significant negative effect on growth, the latter is significantly beneficial in an economically meaningful way. Similarly to our previous findings, the interaction term is positive and mostly significant.

**(Table 5 here)**

Interestingly, when we use the Chinn and Ito measure of capital account openness (Panel C) we find that it is insignificant. This is perhaps not too surprising since this indicator is a *'de jure*' measure, solely focusing on restrictions on the capital account. However, financial crises and the interaction terms are in line with our previous results.

## 4.4 Further robustness analyses

### 4.4.1 Additional controls

To ensure that our crises indicators do not merely proxy for other events that may influence growth, we control for a number of additional variables. In the following sensitivity analyses, we report only the results for our preferred measures of openness and crisis, namely, economic integration (proxied by the economic dimension of the KOF index) and the composite crisis

indicator[10]. The results are summarised in Table 6. In the first sets of regressions, we account for the roles political and institutional variables play in determining output growth (e.g. Acemoglu et al. 2003). Recent evidence also suggests that political variables can have a significant influence on the growth outcomes of financial crises (Cavallo and Cavallo, 2010). Hence, we add indicators such as regime type, polity and political rights to the baseline specification. These variables are not significantly related to output growth in our sample countries, of more interest in the present context, our central findings remain robust.

**(Table 6 here)**

We need to rule out the possibility that crisis incidence and the extent to which it influences growth may depend on the availability of sufficient reserves or changes in the terms of trade (see for example, Li and Ouyang, 2011). Thus, we explore the influence of reserve holdings and terms of trade on growth and find that the first carries a significant and positive sign while the latter is insignificant (regressions [4] and [5]). This implies that a high level of reserves may be interpreted as a significant deterrent of potential economic difficulties. As expected, the coefficient of crisis exhibits a negative and statistically significant effect on growth. The coefficient of the interaction between crisis and openness is positive and significant (with a p-value of 0.022) in column [4] but the significance level drops to 10 percent in column [5]. Based on this, we can posit that the (negative) relationship between crises and growth gets weaker the more integrated an economy becomes. In other words, economic integration acts as a crisis buffer by mitigating the adverse effects of crises on output growth.

We also examine how growth relates to consumption volatility and government size. We

[10] Because the System GMM uses lags to overcome issues of endogeneity, the crisis dummies may not be appropriate (see, Cavallo and Cavallo, 2010). Hence, we prefer the composite crisis index.

find that, while both of these variables carry the expected signs, neither of them are significant at conventional levels and their inclusion does not alter our basic findings. Hence, we can state that our results remain robust when we account for other important correlates of growth.

### 4.4.2 Sub-samples

As an additional robustness check, we re-estimate our baseline results for various sub-samples to test their stability. Firstly, there could be parameter heterogeneity across the conditional growth distribution, so that countries in the higher growth quantiles may respond differently to both crises and economic integration than do countries whose growth rates are in the lower quantiles. To explore this, the first two columns of Table 7 are based on quantile regressions where we report both the $25^{th}$ quantile (low growth) and the $75^{th}$ quantile of the growth distribution (high growth). Interestingly, we find that high growth performers tend to benefit significantly from openness while poor performers do not as much. In addition, the coefficient of openness for the high growth group is more than twice as large as that for the low growth group. The results suggest that the adverse impact of crises on output growth is significantly different from zero for both groups, but the magnitude is slightly larger in the higher growth distribution. More importantly, the coefficient of the interaction term is positive and significant for both groups, albeit only marginally so for the high growth group. Hence, our baseline results remain unchanged.

The negative link between crises and growth that we have found so far could be due to the presence of resource-rich countries since these may be more prone to crises but also more integrated with the rest of the world. Hence, we examine whether our central findings survive if we focus on resource-poor economies only. As a proxy for resources, we use the share of oil

rents in GDP. The estimated regression (column [3]) is largely in line with our previous findings insofar as it points to the tendency of openness to lessen the adverse effects of crises.

As previously emphasised by a number of studies (see, for example, Loayza and Ranciere, 2006), one of the most important transmission channels between crises and output growth is the financial system. Accordingly, it could be that our results are driven by countries with more developed financial systems. The regression results reported in column [4] are based on a sub-sample of countries with relatively poor financial systems. Again, the interaction term between crises and openness is positive and significant, implying that openness tends to lessen the disruptive effects of crisis on output growth, even in the absence of sophisticated financial systems. We also examine whether our findings are true for those countries with greater restrictions on trade. This sample of 'closed' economies is selected based on levels of tariffs (column[5]). As the results show, the baseline results remain unchanged.

As a number of studies indicate (see, for example, Esaka, 2010), the exchange rate regime of a country may influence the relationship between crises and output. As a final exercise, therefore, we divide our sample countries into two groups, based on the prevailing exchange rate regime. In column [6], we show the results for countries with 'semi flexible' regimes (i.e. those with either crawling/managed floated or pure floated) and find that this does not alter our baseline results significantly. When we conduct similar exercise for those with 'fixed/pegged' exchange rates, we find that, while crisis is negative and significant, both openness and the interaction term lose their significance.

In sum, we find that financial crises are associated with output losses in our sample of countries. However, this negative effect decreases with the level of openness. Our results also suggest that economic integration, perhaps by relaxing credit constraints, helps economies to

overcome the adverse effects of financial crises on economic performance. The beneficial effects of openness on growth in Africa is in line with the findings of Bruckner and Lederman (2012) and Chang and Mendy (2012).

With respect to financial openness, Fowowe (2008) shows that there is a significant and robust positive relationship between economic growth and financial liberalisation policies in his sample of Sub-Saharan African countries. Similarly, Ahmed (2011) provides evidence that financial integration has had a positive (albeit not statistically significant) direct impact on output growth in Africa. However, he finds that financial openness in Africa has had a positive and robust effect on African financial markets and thereby indirectly benefitted their growth performance. Lastly, the SGMM diagnostics are satisfactory throughout the sensitivity analysis.

## 5 The main findings in a broader context

Our first main result is that international economic integration has been beneficial to our sample of African countries. This is in line with long held view in economics that increased international trade can propel countries to a high-growth trajectory. Standard trade theory, for example, postulates that trade openness is associated with static gains as it provides greater scope for the accumulation of human and physical capital. In particular, openness can facilitate economies to allocate their resources more efficiently by providing market platforms which allow economies of scale and division of labour to take place – increasing total factor productivity. Moreover, endogenous growth theories (e.g. Romer, 1994) predict that opening up trade enables countries to acquire new technologies, skills, knowledge and various other positive externalities which can bring about dynamic gains resulting in higher economic growth.

Similarly, an extensive theoretical literature identifies various direct and indirect channels

through which financial openness can foster higher productivity and improve economic performance. Kose et al. (2009) contend that financial integration can increase capital accumulation by relaxing credit constraints and augmenting domestic resources. In addition, openness to financial flows can promote more efficient capital allocation as a result of increased risk-sharing opportunities which enables firms to undertake more risky but high-return investments (Obstfeld, 1994). As the volume of capital increases, the cost of capital should fall since the domestic economy becomes more liquid (Prasad et al. 2003).

The second main finding of this paper is that crises have been harmful to output growth in African economies, presumably due to their adverse effects on domestic capital formation, labour market, exchange rates, asset prices, aggregate demand, and total factor productivity. As emphasised by, among others, Korinek (2011), crises cause self-reinforcing 'financial amplification' effects in which countries can be caught in a vicious circle of falling prices (exchange rates and asset prices), deteriorating balance sheets and decreasing aggregate demand. More specifically, crises, particularly those that come in the form of capital reversals, sudden stops and currency crises, are associated with sharp falls in the exchange rate and asset prices. This, in turn, deteriorates domestic firms' balance sheets by undermining their collateral value and net worth, further reducing their ability to borrow and invest owing to reduced access to credit. These effects tend to be amplified in environments where there is credit scarcity, high liability dollarization and financial market imperfections. In crisis-hit countries, lack of credit availability reduces aggregate demand by tightening the budget constraints of agents, so decreasing their consumption and investment levels. The tendency of crises to undermine investor confidence can arise, not only from lack of credit availability, but also from increased risk and uncertainty. In addition, in Keynesian settings where prices/wages are downward sticky,

depressed aggregate demand is associated with higher unemployment and output losses (Reinhart and Calvo, 2000). Furceri and Mourougane (2012) highlight that, on the one hand, crises may reduce total factor productivity through their negative impact on innovation and research and development as these tend to be higher in good times. On the other hand, total factor productivity may increase in crisis situations if firms, in an attempt to minimise losses and retain competitiveness, restructure and/or improve their X-efficiency.

Our third and final key result is that openness tends to mitigate the adverse effects of crises in Africa. This is in line with the predictions of standard Mundell-Flemming type models and sticky-price open economy models. Similar findings have been reported elswhere (e.g. Guidotti et al. 2004; Edwards, 2004; Cavallo and Frankel, 2008). But our study is the first to investigate the crisis-openness interaction in the context of African economies.

## 6 Concluding Remarks

In this study, we use a large African sample to analyse comprehensively the relationship between crises and growth. Focusing on four different types of financial crises, we provide evidence showing that external shocks can account for a large fraction of the cross-country variation in output growth over the sample period. The central findings of this study are in line with the theoretical view that crises disrupt economic activity. Our empirical results add to the growing empirical evidence (Cavallo and Cavallo, 2010; Joyce and Nabar, 2009) that crises undermine economic growth.

In line with the existing literature (e.g. Bruckner and Lederman, 2012; Chang and Mendy, 2012), we find a robust positive link between economic openness and growth performance in Africa. Our results can be generalised to measures of financial openness. A

variety of mechanisms could rationalise this result - the most plausible being that financial openness may have had a robust beneficial effect on African financial markets and thus indirectly promoted growth (see, Ahmed, 2011).

In an attempt to identify the specific channels through which crises affact output growth, we test the hypothesis that the level of economic integration in the crisis-hit country might be important. We find that crises have had a more disruptive effect on growth in countries with lower levels of openness. We postulate that openness lessens the adjustment costs associated with external crises. This implies that once an African economy reaches a certain level of financial and economic openness, the negative effects of crises would be minimised, presumably because the country would be in a position to keep the fall in aggregate demand in check.

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**Table 1: Crises, Economic Integration and Growth in Africa**

| | [1] | [2] | [3] | [4] | [5] |
|---|---|---|---|---|---|
| Economic integration | 0.068 | 0.055 | 0.064 | 0.053 | 0.063 |
| | [0.032]** | [0.033]* | [0.033]* | [0.038] | [0.031]** |
| Sudden stop crisis | -1.401 | | | | |
| | [0.370]*** | | | | |
| Currency crisis | | -1.412 | | | |
| | | [0.448]*** | | | |
| Sovereign debt crisis | | | -1.521 | | |
| | | | [0.476]*** | | |
| Twins | | | | -1.588 | |
| | | | | [0.553]*** | |
| Composite crisis index | | | | | -0.816 |
| | | | | | [0.176]*** |
| ***Controls*** | | | | | |
| Log(initial GDP) | -3.745 | -3.952 | -3.450 | -3.672 | -3.493 |
| | [1.075]*** | [1.106]*** | [1.066]*** | [0.973]*** | [1.050]*** |
| Log(1+inflation) | -1.111 | -0.983 | -0.924 | -0.939 | -0.983 |
| | [0.547]** | [0.578]* | [0.532]* | [0.480]* | [0.533]* |
| Investment/GDP | 0.109 | 0.110 | 0.104 | 0.106 | 0.105 |
| | [0.031]*** | [0.031]*** | [0.031]*** | [0.030]*** | [0.030]*** |
| External debt/GDP | -0.011 | -0.011 | -0.009 | -0.009 | -0.009 |
| | [0.005]** | [0.004]** | [0.004]** | [0.006] | [0.005]* |
| Financial depth/GDP | 0.100 | 0.785 | -0.036 | 0.788 | -0.259 |
| | [2.188] | [2.330] | [2.301] | [2.477] | [2.269] |
| Population growth | 2.409 | 2.244 | 2.782 | 2.171 | 1.923 |
| | [2.203] | [2.146] | [2.156] | [2.120] | [2.142] |
| Constant | 2.148 | 4.735 | -3.675 | 3.399 | 5.032 |
| | [22.727] | [22.439] | [22.416] | [20.827] | [22.174] |
| Observations | 229 | 229 | 229 | 229 | 229 |
| $R^2$ | 0.37 | 0.36 | 0.35 | 0.35 | 0.40 |

Note: The dependent variable is GDP per capita growth. The estimates are based on the fixed-effects estimator with robust standard errors in brackets, *, **, *** indicate significance at 10%, 5% and 1% respectively, time effects included but not reported.

**Table 2: Crises, Economic Integration and Growth in Africa**

| | [1] | [2] | [3] | [4] | [5] |
|---|---|---|---|---|---|
| Economic integration | 0.248 | 0.226 | 0.268 | 0.244 | 0.216 |
| | [0.052]*** | [0.047]*** | [0.062]*** | [0.057]*** | [0.065]*** |
| Sudden stop crisis | -1.478 | | | | |
| | [0.439]*** | | | | |
| Currency crisis | | -1.688 | | | |
| | | [0.507]*** | | | |
| Sovereign debt crisis | | | -1.519 | | |
| | | | [0.540]*** | | |
| Twin crises | | | | -1.528 | |
| | | | | [0.581]*** | |
| Composite crisis index | | | | | -0.999 |
| | | | | | [0.237]*** |
| ***Controls*** | | | | | |
| Log(initial GDP) | -3.159 | -2.395 | -4.293 | -3.153 | -2.44 |
| | [1.344]** | [0.973]** | [1.227]*** | [1.411]** | [1.073]** |
| Log(1+inflation) | -1.425 | -0.820 | -1.536 | -1.210 | -1.084 |
| | [0.768]* | [0.709] | [0.924]* | [0.735] | [0.639]* |
| Investment/GDP | 0.123 | 0.147 | 0.071 | 0.117 | 0.126 |
| | [0.073]* | [0.065]** | [0.084] | [0.080] | [0.076]* |
| External debt/GDP | -0.014 | -0.011 | -0.017 | -0.014 | -0.009 |
| | [0.011] | [0.008] | [0.008]** | [0.007]** | [0.011] |
| Financial Depth/GDP | 4.674 | 2.465 | 7.115 | 5.223 | 3.557 |
| | [3.336] | [2.856] | [3.218]** | [3.753] | [3.291] |
| Population growth | 0.337 | 0.495 | 0.003 | 0.468 | 0.490 |
| | [0.659] | [0.612] | [0.835] | [0.668] | [0.525] |
| Constant | 8.924 | 1.931 | 18.558 | 6.851 | 3.427 |
| | [12.755] | [11.022] | [13.752] | [13.516] | [9.807] |
| Observations | 229 | 229 | 229 | 229 | 229 |
| # Instruments | 32 | 32 | 32 | 32 | 32 |
| # Countries | 37 | 37 | 37 | 37 | 37 |
| Hansen test | 0.620 | 0.621 | 0.537 | 0.595 | 0.595 |
| Diff Hansen test | 0.739 | 0.508 | 0.684 | 0.487 | 0.537 |
| AR (1) test | 0.008 | 0.005 | 0.010 | 0.005 | 0.005 |
| AR (2) test | 0.894 | 0.808 | 0.895 | 0.771 | 0.771 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

**Table 3: Growth effects of crises and interaction with economic integration**

| | [1] Sudden stops | [2] Currency | [3] Debt | [4] Twin | [5] Composite |
|---|---|---|---|---|---|
| Economic integration | 0.215 | 0.202 | 0.256 | 0.228 | 0.188 |
| | [0.061]*** | [0.050]*** | [0.067]*** | [0.058]*** | [0.058]*** |
| Sudden stops | -4.191 | | | | |
| | [1.600]*** | | | | |
| Currency crises | | -3.434 | | | |
| | | [1.425]** | | | |
| Sovereign debt crises | | | -5.638 | | |
| | | | [1.613]*** | | |
| Twin crises | | | | -2.970 | |
| | | | | [1.981] | |
| Composite crises index | | | | | -1.899 |
| | | | | | [0.669]*** |
| Integration * crisis | 0.070 | 0.054 | 0.111 | 0.041 | 0.028 |
| | [0.033]** | [0.031]* | [0.049]** | [0.044] | [0.016]* |
| ***Controls*** | | | | | |
| Log(initial GDP) | -3.714 | -2.814 | -4.848 | -3.585 | -3.633 |
| | [1.212]*** | [1.018]*** | [1.379]*** | [1.340]*** | [1.303]*** |
| Log(1+inflation) | -1.390 | -0.531 | -1.884 | -1.176 | -1.304 |
| | [0.778]* | [0.852] | [0.774]** | [0.579]** | [0.681]* |
| Investment/GDP | 0.131 | 0.130 | 0.081 | 0.118 | 0.082 |
| | [0.077]* | [0.071]* | [0.081] | [0.084] | [0.074] |
| External debt/GDP | -0.017 | -0.012 | -0.018 | -0.018 | -0.013 |
| | [0.008]** | [0.007]* | [0.008]** | [0.007]*** | [0.009] |
| Financial Depth/GDP | 5.734 | 4.348 | 7.461 | 5.699 | 6.973 |
| | [2.622]** | [2.741] | [4.878] | [3.511] | [3.105]** |
| Population growth | 0.174 | 0.366 | -0.555 | 0.101 | 0.086 |
| | [0.658] | [0.664] | [1.074] | [0.744] | [0.724] |
| Constant | 14.737 | 5.688 | 28.379 | 13.604 | 16.556 |
| | [11.456] | [11.411] | [16.608]* | [13.450] | [13.753] |
| Observations | 229 | 229 | 229 | 229 | 229 |
| # Instruments | 34 | 34 | 34 | 34 | 34 |
| # Countries | 37 | 37 | 37 | 37 | 37 |
| Hansen test | 0.719 | 0569 | 0.477 | 0.426 | 0.702 |
| Diff Hansen test | 0.801 | 0.752 | 0.536 | 0.488 | 0.680 |
| AR (1) test | 0.005 | 0.003 | 0.011 | 0.004 | 0.004 |
| AR (2) test | 0.893 | 0.790 | 0.876 | 0.497 | 0.826 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

## Table 4: Growth effects of crises and interaction with economic openness

| **Panel A:** | *Crisis type and interaction of economic integration with* | | | | |
|---|---|---|---|---|---|
| **Cross border transactions** | [1] | [2] | [3] | [4] | [5] |
| | Sudden stop | Currency | Debt | Twins | Composite |
| Cross border transactions | 0.070 | 0.044 | 0.113 | 0.107 | 0.074 |
| | [0.053] | [0.034] | [0.045]** | [2.600]** | [0.046] |
| Crisis | -5.359 | -5.747 | -6.642 | -4.363 | -2.198 |
| | [1.972]*** | [1.661]*** | [2.772]** | [2.400]* | [0.722]*** |
| Openness * crisis | 0.075 | 0.090 | 0.107 | 0.0462 | 0.022 |
| | [0.036]** | [0.035]*** | [0.063]* | [1.170] | [0.013]* |
| *Specification tests* | | | | | |
| Observations | 225 | 219 | 219 | 225 | 225 |
| # Instruments/ countries | 34/36 | 34/35 | 34/35 | 34/36 | 34/36 |
| Hansen test | 0.424 | 0.526 | 0.433 | 0.255 | 0.528 |
| Diff Hansen test | 0.628 | 0.655 | 0.643 | 0.285 | 0.605 |
| AR (1) test | 0.001 | 0.001 | 0.003 | 0.001 | 0.001 |
| AR (2) test | 0.866 | 0.680 | 0.854 | 0.437 | 0.861 |
| **Panel B:** | *Crisis type and interaction of economic integration with* | | | | |
| **Trade openness** | [6] | [7] | [8] | [9] | [10] |
| | Sudden stop | Currency | Debt | Twins | Composite |
| Trade openness | 0.052 | 0.052 | 0.066 | 0.059 | 0.042 |
| | [0.021]** | [0.018]*** | [0.022]*** | [0.019]*** | [0.021]** |
| Crisis | -3.223 | -5.296 | -5.779 | -3.499 | -1.971 |
| | [1.518]** | [1.674]*** | [2.874]** | [1.503]** | [0.735]*** |
| Openness * crisis | 0.024 | 0.060 | 0.051 | 0.032 | 0.016 |
| | [0.017] | [0.026]** | [0.039] | [0.019]* | [0.008]** |
| *Specification tests* | | | | | |
| Observations | 253 | 247 | 247 | 253 | 253 |
| # Instruments/ countries | 36/41 | 36/40 | 36/40 | 36/41 | 36/41 |
| Hansen test | 0.151 | 0.179 | 0.228 | 0.215 | 0.165 |
| Diff Hansen test | 0.755 | 0.825 | 0.869 | 0.784 | 0.755 |
| AR (1) test | 0.001 | 0.000 | 0.001 | 0.001 | 0.000 |
| AR (2) test | 0.875 | 0.614 | 0.778 | 0.511 | 0.933 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

## Table 5: Growth effects of crises and interaction with financial openness

| **Panel A:** | *Crisis type and interaction of economic integration with* | | | | |
|---|---|---|---|---|---|
| **Financial openness** | [1] | [2] | [3] | [4] | [5] |
| | Sudden stop | Currency | Debt | Twins | Composite |
| Financial openness | 0.038 | 0.046 | 0.033 | 0.051 | 0.044 |
| | [0.023] | [0.023]** | [0.018]* | [0.019]*** | [0.014]*** |
| Crisis | -6.160 | -2.323 | -4.206 | -1.579 | -1.835 |
| | [2.649]** | [1.638] | [1.307]*** | [1.327] | [0.570]*** |
| Openness* crisis | 0.033 | 0.007 | 0.017 | 0.002 | 0.007 |
| | [0.019]* | [0.010] | [0.012] | [0.007] | [0.002]*** |
| *Specification tests* | | | | | |
| Observations | 168 | 168 | 168 | 168 | 168 |
| # Instruments/ countries | 32/32 | 32/32 | 32/32 | 32/32 | 32/32 |
| Hansen test | 0.447 | 0.701 | 0.778 | 0.886 | 0.784 |
| Diff Hansen test | 0.259 | 0.743 | 0.782 | 0.739 | 0.579 |
| AR (1) test | 0.002 | 0.005 | 0.003 | 0.007 | 0.003 |
| AR (2) test | 0.987 | 0.709 | 0.441 | 0.417 | 0.890 |
| **Panel B:** | *Crisis type and interaction of economic integration with* | | | | |
| **FDI liabilities** | [6] | [7] | [8] | [9] | [10] |
| | Sudden stop | Currency | Debt | Twins | Composite |
| FDI liabilities | 0.288 | 0.277 | 0.272 | 0.261 | 0.239 |
| | [0.103]*** | [0.137]** | [0.140]* | [0.113]** | [0.128]* |
| Crisis | -2.255 | -2.050 | -2.761 | -2.227 | -1.089 |
| | [0.704]*** | [0.743]*** | [0.789]*** | [0.884]** | [0.299]*** |
| Openness * crisis | 0.358 | 0.210 | 0.420 | 0.316 | 0.172 |
| | [0.132]*** | [0.170] | [0.312] | [0.185]* | [0.083]** |
| *Specification tests* | | | | | |
| Observations | 253 | 247 | 247 | 253 | 253 |
| # Instruments/ countries | 36/41 | 36/40 | 36/40 | 36/41 | 36/41 |
| Hansen test | 0.281 | 0.138 | 0.172 | 0.202 | 0.183 |
| Diff Hansen test | 0.125 | 0.062 | 0.144 | 0.107 | 0.079 |
| AR (1) test | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 |
| AR (2) test | 0.831 | 0.837 | 0.801 | 0.381 | 0.741 |
| **Panel C:** | *Crisis type and interaction of economic integration with* | | | | |
| **Capital account openness** | [11] | [12] | [13] | [14] | [15] |
| | Sudden stop | Currency | Debt | Twins | Composite |
| Capital account openness | 0.361 | -0.079 | 0.178 | 0.158 | 0.158 |
| | [0.263] | [0.412] | [0.403] | [0.436] | [0.323] |
| Crisis | -2.007 | -1.784 | -3.005 | -2.106 | -1.093 |
| | [0.489]*** | [0.473]*** | [1.647]* | [0.819]** | [0.162]*** |
| Openness * crisis | 0.603 | 1.429 | -0.908 | 0.669 | 0.346 |
| | [0.357]* | [0.539]*** | [1.558] | [0.559] | [0.189]* |
| *Specification tests* | | | | | |
| Observations | 249 | 243 | 243 | 249 | 249 |
| # Instruments/ countries | 34/41 | 34/40 | 34/40 | 34/41 | 34/41 |
| Hansen test | 0.354 | 0.374 | 0.416 | 0.280 | 0.286 |
| Diff Hansen test | 0.267 | 0.498 | 0.480 | 0.263 | 0.172 |
| AR (1) test | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 |
| AR (2) test | 0.666 | 0.981 | 0.752 | 0.389 | 0.791 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

## Table 6: Sensitivity analysis: Additional controls

| | [1] | [2] | [3] | [4] | [5] | [6] | [7] |
|---|---|---|---|---|---|---|---|
| | Regime collapse | Polity | Political rights | Reserve holdings | Terms of Trade | Government size | Consumption volatility |
| Economic integration | 0.188 [0.051]*** | 0.182 [0.066]*** | 0.118 [0.068]* | 0.046 [0.076] | 0.116 [0.103] | 0.110 [0.066]* | 0.171 [0.062]*** |
| Composite crisis index | -2.061 [0.642]*** | -1.857 [0.586]*** | -2.118 [0.631]*** | -1.933 [0.651]*** | -2.255 [0.865]*** | -1.927 [0.624]*** | -1.841 [0.643]*** |
| Openness * composite index | 0.030 [0.015]* | 0.025 [0.012]** | 0.035 [0.015]** | 0.031 [0.014]** | 0.037 [0.020]* | 0.028 [0.015]* | 0.027 [0.015]* |
| ***Controls*** | | | | | | | |
| Log(initial GDP) | -3.669 [1.354]*** | -2.399 [1.309]* | -2.230 [1.131]** | -2.215 [0.950]** | -2.449 [1.376]* | -2.379 [1.184]** | -2.922 [1.359]** |
| Log(1+inflation) | -1.217 [0.628]* | -1.030 [0.545]* | -0.828 [0.660] | -0.513 [0.585] | -1.086 [0.435]** | -0.808 [0.659] | -1.187 [0.651]* |
| Population growth | 0.007 [0.783] | 0.771 [0.635] | 0.110 [0.055]** | -0.537 [0.508] | -0.314 [0.767] | 0.148 [0.073]** | 0.379 [0.710] |
| Investment/GDP | 0.077 [0.074] | 0.071 [0.051] | 0.526 [0.517] | 0.107 [0.060]* | 0.030 [0.096] | -0.098 [0.454] | 0.107 [0.059]* |
| External debt/GDP | -0.016 [0.009]* | -0.012 [0.008] | -0.013 [0.007]* | -0.001 [0.007] | -0.016 [0.007]** | -0.013 [0.006]* | -0.011 [0.008] |
| Financial depth/GDP | 6.873 [3.306]** | 2.482 [4.738] | 4.735 [2.484]* | 1.094 [4.102] | 5.782 [3.724] | 3.598 [1.828]** | 5.393 [2.346]** |
| Additional control | -0.004 [0.009] | 0.127 [0.446] | -0.076 [0.394] | 1.243 [0.494]** | 0.007 [0.010] | -0.132 [0.084] | -0.000 [0.000] |
| Constant | 17.799 [14.916] | 2.873 [11.908] | 5.887 [8.528] | 9.691 [9.298] | 16.282 [12.867] | 13.809 [9.735] | 9.627 [13.372] |
| Observations | 229 | 223 | 229 | 229 | 193 | 226 | 229 |
| # Instruments | 36 | 36 | 36 | 36 | 34 | 36 | 36 |
| # Countries | 37 | 36 | 37 | 37 | 37 | 36 | 36 |
| Hansen test | 0.588 | 0.349 | 0.610 | 0.251 | 0.877 | 0.447 | 0.728 |
| Diff Hansen test | 0.647 | 0.480 | 0.590 | 0.657 | 0.895 | 0.590 | 0.697 |
| AR (1) test | 0.004 | 0.004 | 0.003 | 0.003 | 0.001 | 0.003 | 0.004 |
| AR (2) test | 0.940 | 0.867 | 0.768 | 0.721 | 0.707 | 0.540 | 0.665 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

## Table 7: Sensitivity analysis – sub-samples

| | [1] | [2] | [3] | [4] | [5] | [6] | [7] |
|---|---|---|---|---|---|---|---|
| | 25th quantile | 75th quantile | Resource poor | Weak finance | Closed economies | S-Flex ER regime | Fixed ER regimes |
| Economic integration | 0.024 | 0.054 | 0.064 | 0.044 | 0.093 | 0.067 | 0.087 |
| | [0.022] | [0.026]** | [0.048] | [0.077] | [0.041]** | [0.044] | [0.065] |
| Composite crisis | -1.278 | -1.464 | -2.637 | -2.953 | -2.982 | -2.150 | -2.029 |
| index | [0.347]*** | [0.423]*** | [0.722]*** | [0.745]*** | [0.675]*** | [0.930]** | [1.156]* |
| Openness*composite | 0.020 | 0.021 | 0.038 | 0.056 | 0.046 | 0.034 | 0.027 |
| index | [0.009]** | [0.011]* | [0.016]** | [0.019]*** | [0.020]** | [0.018]* | [0.031] |
| ***Controls*** | | | | | | | |
| Log(initial GDP) | -0.406 | -1.194 | -1.688 | -3.349 | -2.139 | 2.774 | 0.016 |
| | [0.264] | [0.218]*** | [1.338] | [1.216]*** | [0.730]*** | [2.725] | [1.809] |
| Log(1+ inflation) | 0.481 | 0.025 | -0.456 | -1.660 | -0.424 | -0.376 | -0.580 |
| | [0.288]* | [0.327] | [0.412] | [0.351]*** | [0.653] | [1.650] | [1.078] |
| Investment/GDP | 0.045 | 0.098 | 0.076 | 0.092 | 0.080 | 0.172 | 0.118 |
| | [0.023]** | [0.023]*** | [0.087] | [0.092] | [0.049] | [0.049]*** | [0.079] |
| External debt/GDP | -0.011 | -0.015 | -0.009 | -0.011 | -0.018 | -0.003 | -0.005 |
| | [0.002]*** | [0.003]*** | [0.009] | [0.007] | [0.007]** | [0.008] | [0.017] |
| Financial depth/GDP | 2.541 | 2.233 | 3.028 | -5.027 | 0.458 | -9.426 | -9.805 |
| | [1.054]** | [1.229]* | [4.825] | [6.550] | [5.097] | [8.387] | [9.714] |
| Population growth | -0.152 | -0.172 | -0.473 | -0.307 | -0.164 | 2.522 | -0.118 |
| | [0.142] | [0.157] | [0.723] | [0.597] | [0.363] | [1.531]* | [0.786] |
| Constant | 1.485 | 8.215 | 13.564 | 27.579 | 13.412 | -40.174 | 1.813 |
| | [2.338] | [2.562]*** | [12.670] | [10.209] | [4.851] | [32.280] | [14.330] |
| Observations | 229 | 229 | 162 | 113 | 136 | 90 | 124 |
| # Instruments | | | 24 | 24 | 34 | 24 | 24 |
| # Countries | | | 30 | 27 | 33 | 22 | 28 |
| Hansen test | | | 0.532 | 0.850 | 0.714 | 0.625 | 0.304 |
| Diff Hansen test | | | 0.795 | 0.734 | 0.647 | 0.625 | 0.328 |
| AR (1) test | | | 0.004 | 0.009 | 0.005 | 0.025 | 0.029 |
| AR (2) test | | | 0.302 | 0.585 | 0.861 | 0.727 | 0.429 |

Note: Dependent variable is GDP per capita growth. The estimates are based on the two-step System-GMM estimator with Windmeijer finite sample correction. AR(1) and AR(2) are respectively Arellano-Bond's 1st and 2nd autocorrelation tests. The Hansen J-statistic reports the p-values for the null of instrument validity. The Diff-in-Hansen reports the p-values for the validity of the additional moment restriction for the System GMM. Time fixed effects included but not reported. *, **, *** denote significance at 10, 5 and 1%, respectively.

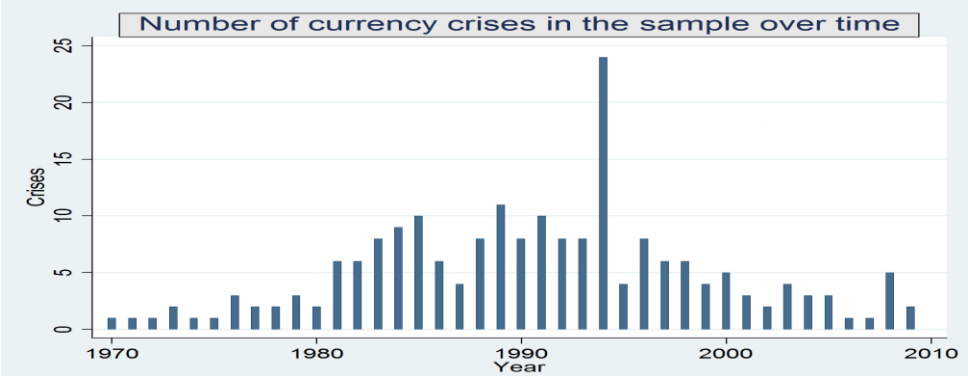


Figure 1


Figure 2

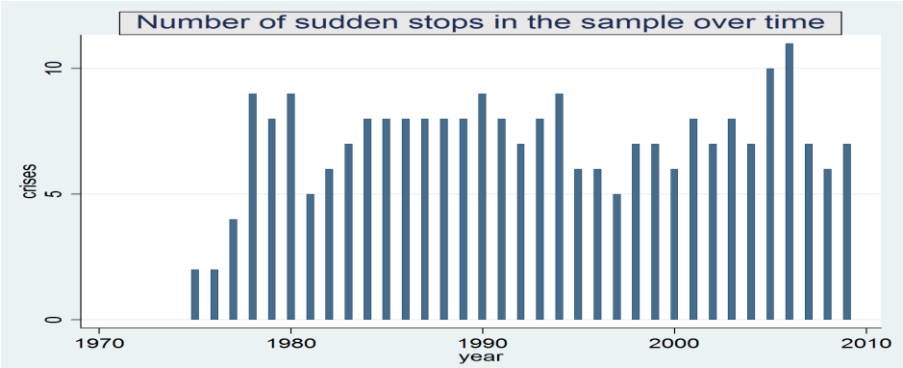


Figure 3

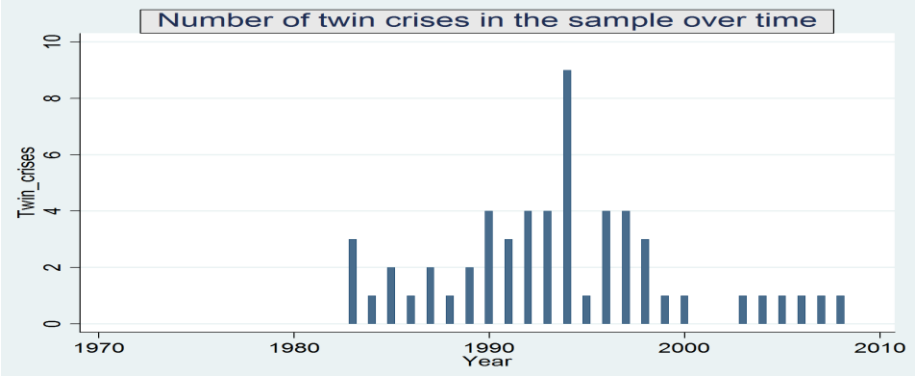


Figure 4

## Appendix

**Table A1. Variable definitions and sources**

| Variable | Obs | Mean | Std. Dev. | Definition and Source |
|---|---|---|---|---|
| Growth | 358 | 1.2 | 4.46 | Real per capita GDP growth rate. World Bank (2011): WDI |
| Initial income (ln) | 354 | 6.19 | 1.00 | First value of real per capita income for each 5-year period. World Bank (2011): WDI |
| Population growth | 384 | 2.51 | 0.05 | World Bank (2011): WDI |
| Sudden stop crisis | 384 | 0.33 | 0.02 | Own calculation based on a modified version of Calvo et al. (2004). See text for description |
| Currency crisis | 376 | 0.33 | 0.02 | Reinhart and Rogoff (2009). See text for description |
| Sovereign debt crisis | 376 | 0.17 | 0.02 | Reinhart and Rogoff (2009). See text for description |
| Twin crisis | 384 | 0.13 | 0.02 | Joint occurrence of banking and currency crises. The data on banking crises is from Laeven and Valencia (2008) |
| Composite crisis index | 38 | 1.05 | 0.06 | Own calculation based on types of crises encountered in a given year, weighted by each country's share in world output. |
| Investment | 340 | 20.95 | 9.78 | Gross capital formation as a % of GDP. World Bank (2011): WDI |
| Debt | 343 | 80.06 | 103.36 | External borrowing as a % of GDP. World Bank (2011): WDI |
| Financial depth | 282 | 0.29 | 0.19 | Captured by Liquid liabilities as a % of GDP. World Bank (2011): WDI |
| Inflation (ln) | 3.58 | 3.06 | 0.69 | Change in CPI. World Bank (2011): WDI |
| Trade openness | 357 | 70.44 | 36.52 | Imports + exports as a % of GDP. World Bank (2011): WDI |
| Economic integration | 328 | 37.62 | 14.54 | Actual flows of trade and investment and their restrictions, expressed as a % of GDP. Dreher (2006, revised 2011) |
| Cross border transaction | 336 | 44.48 | 21.01 | Actual flows of trade, FDI +portfolio + payments to foreigners) as a % of GDP. Dreher (2006, revised 2011) |
| Capital acc. openness | 358 | -0.77 | 0.96 | Chinn-Ito's de jure index (revised 2011) |
| Financial openness | 242 | 106.25 | 60.42 | De facto fin openness. Lane and Milesi-Ferretti (2007, revised 2011). |
| FDI liabilities | 359 | 3.10 | 7.49 | Share of FDI liabilities in GDP. Lane and Milesi-Ferretti (2007, revised 2011) |
| Government size | 343 | 15.89 | 6.78 | Government expenditure as % of GDP. World Bank (2011): WDI |
| Political rights | 377 | 5.14 | 1.59 | The extent of political rights in a country as calculated by Freedom House. Coded from 1-7 (7 being the worst). FH surveys (2011) |
| Regime type | 375 | 19.65 | 33.66 | Ranges from Monarchy, Military, One-party, Multi-party system to full Democracy (higher value), Teorell and Hadenius (2007). |
| Reserves | 366 | 5.07 | 1.88 | FX Reserves minus gold (% GDP). Lane and Milesi-Ferretti (2007, revised 2011) |
| Terms of trade | 275 | 113.38 | 41.67 | Net barter terms of trade index. World Bank (2011): WDI |
| Consumption volality | 384 | -64.14 | 1242.18 | Standard deviation of consumption. Underlying data from PWT 7.0 (2011) |
| Polity | 356 | 2.96 | 1.78 | Executive Constraints (Decision Rules): from (1) Unlimited Authority to (7) Limited Authority. PolityIV dataset (2011) |