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Reinhart, Carmen and Reinhart, Vincent

Harvard University

February 2015

Online at <https://mpra.ub.uni-muenchen.de/64488/>

MPRA Paper No. 64488, posted 21 May 2015 09:38 UTC

February 2, 2015

**Financial Crises, Development, and Growth: A Long-term Perspective\***

Carmen M. Reinhart and Vincent R. Reinhart

*Abstract*

Observed over long periods, the upward path of the output of most economies occasionally takes jagged steps down. More often than not, these events are associated with a variety of crises, including systemic banking stresses, exchange rate crashes, a burst of inflation, and a restructuring or default on sovereign debt. Using a large panel of countries over a long period, we document that crises are typically associated with lower medium term growth. That may be a direct causal channel, a reverse channel, or the influence of some other factors on both growth and finance. But they tend to go together. Given that the forces for convergence of income across countries are estimated to be slow, going off track around a crisis will likely have long-lived consequences for relative economic development.

*JEL* G01, N20, O4, O5

\*This paper was prepared for the World Bank's Annual Bank Conference on Development Economics (ABCDE) 2014, and is forthcoming in the *World Bank Economic Review*.

## **I. Introduction**

Observed over long periods, the upward path of the output of most economies occasionally takes jagged steps down. More often than not, these events are associated with crises, including systemic banking stresses, a large adjustment in the exchange rate, a burst of inflation, and a rewriting of sovereign debt contracts. The shadow of these events on economic growth also tends to be long, producing the regularity in most time series across the world that the intensity of a variety of crises and GDP growth are negatively related and the effect long lived. This paper is about this association.

The issue resonates now because so many economies recently went through significant crises and recessions and have struggled with slow growth subsequently. The truth is that the association between crises and economic growth is a feature of the long sweep of history, which is one of the messages of Reinhart and Rogoff (2009). Our update to the dataset underlying that work allows us to document the negative link between elevated incidence of crises and economic growth across 66 countries over the past 1-1/2 centuries.

We intend to be careful throughout in not asserting a causal relationship between crises and growth. A crisis might undermine economic prospects by destroying financial wealth and impeding intermediation (as is the first of the possibilities underlying the link discussed in Reinhart and Reinhart, 2010). Or, a significant downward revision to the prospects for economic growth might lead households and firms to realize they have overborrowed, triggering trauma in finance (as is laid out in Buttiliogne, et al., 2014). As another possibility, a haphazard national approach to the rule of law and other inadequacies in the political and regulatory infrastructure might jointly slow growth and raise the probability of crises (as is the message of Acemoglu, et al., 2003).

Ours is a more practical observation. How to spur growth is the first-order mystery of the economic development literature. How to know that growth has been spurred in real time is a daunting challenge for time-series econometrics. But we do know that a variety of crises and slow economic growth go hand-in-hand, implying that a government that attracts financial crises of any sort in a repeated manner invites disappointing economic outcomes. This might be because financial crises are a direct and major menace to economic activity. Even if they are not, they are at least the canary-in-the-coal-mine for signaling a risk to economic growth.

This especially matters for economic development because, as of yet to our knowledge, the other forces at work moving an economy along a growth trajectory appear to have only modest effects. Barro (2014) writes about the “iron law” of convergence observed across empirical growth models. Whether assessed conditionally (the association augmented by other variables) or unconditionally (the association taken in isolation), only about 2 percent of the gap between the level of a laggard economy from the advanced norm is worked off each year. Put this in perspective to the result in Reinhart and Reinhart (2010). Ten years after the fifteen worst financial crises of the second half of the 20<sup>th</sup> century, the median level of GDP per capita was 15 percent below the level predicted from the trend of the ten years prior to the crisis. If convergence is only 2 percent per year of the level difference, this slow force of adjustment implies that output makes up only two-thirds of the gap relative to its previous trend one-half century after the perturbation.

High stakes, indeed, and suggestive that an important focus of governmental attention in the development process should be building the legal and regulatory infrastructure of finance and delivering steady macroeconomic policies in a manner that avoids crisis. Those efforts, as well as avoiding the direct harm of crises, are conducive to growth in the long run.

The next section provides an abbreviated review of the literature and sketches the channels of transmission flowing back and forth between financial crises and economic growth. This includes work by Fischer (1993) and Bruno and Easterly (1995) highlighting the link between problematic policy choices (especially high inflation) and slower economic growth. Another strand of work, begun by Ramey and Ramey (1995), delineates deleterious effects of the volatility of real growth to mean growth. The next step is to note that financial crises tend to elevate volatility, forging the link between crises and growth examined for Latin American economies by Edwards (2007) and for Asian ones by Barro (2001) and more broadly by Cerra and Saxena (2008) and Reinhart and Rogoff (2009).

Section III updates to 2014 the crisis chronology first provided in Reinhart and Rogoff (2009). It reviews the six main varieties of financial dysfunction: banking crises, currency crashes, currency conversions, default on external debt, default on domestic debt, and high inflation. In the six years since publication, the world has provided additional observations in wide number and variety.

This extended dataset is used in Section IV to characterize the relationship between a variety of crises and economic growth at both the individual country level and for regional groupings. We mostly rely on five- and ten-year averages of the data to establish the broad association between the intensity of financial crises and real GDP growth. And, indeed, the two are negatively related across countries and regions and over the broad sweep of time in a manner that seems robust. Another feature of the data is that crises are clustered across countries and persistent over time. Perhaps, then, it should not be a surprise that global economic growth has recently been and is projected to continue to be subpar.

Another aspect of the current conjuncture that is worrisome is examined in Section V. Major central banks are providing policy accommodation in unprecedented degrees when measured by the lowness of their policy rates and the scale and scope of their balance sheets (in a manner mapped out by Bernanke and Reinhart, 2004). Low interest rates at financial centers are exactly the mechanism identified in Reinhart and Reinhart (2009) tending to boost capital inflow “bonanzas” around the world. (By their definition, a capital inflow bonanza occurs whenever a country has elevated capital inflows compared to its own history.) Essentially, investors in financial centers are more likely to seek higher returns abroad when those at home are depressed. This matters because Reinhart and Reinhart also show that capital inflow bonanzas are good predictors of subsequent financial distress, including banking and currency crises and sovereign defaults. With major central banks keeping rates pinned to their zero lower bound and ballooning their balance sheets, capital inflows are currently elevated.

The concluding section repeats the advice woven throughout the paper. Avoiding crises is central to successful economic development. The advice for researchers is to try to understand why.

## **II. Channels of Transmission**

Two questions focus our attention in reviewing the literature on various financial crises and economy growth. How might the two be linked? And what evidence has been put forward that they are linked?

As to the first question, economic theory offers many reasons why there would be a complicated back-and-forth connection between crises and economic growth. In principle,

observation an association between two variables invites one of three possibilities. The one causes the other. The other causes the one. Or some other force causes both.

A standard New Keynesian model would predict that a crisis produces an economic slowdown (as discussed in Reinhart and Reinhart, 2010). Most of the financial crises we tally destroy financial wealth, either through stopping payment with default, lowering equity values in the fire sale attendant to a banking crisis, reducing the real value of assets via unexpected inflation, or revaluing upward external liabilities with an exchange rate collapse. Add to this the possibilities that a banking crisis impedes intermediation in the manner discussed by Bernanke (1983) and leads to a “sudden stop” of external funding, as in Calvo (1998). All these influences cumulate to an adverse aggregate demand shock that slows economic activity if there is not sufficient policy offset. Policy offset matters because in these sorts of models an aggregate demand shock can always be blunted, abstracting from recognition lags. Monetary policy, however, might be constrained by the zero lower bound to nominal interest rates if little inflation is expected and fiscal policy might be hamstrung if there is a legacy of an outstanding large public debt. The result is economic contraction followed by slow growth for some time associated with underinvestment in physical and human capital.

As another possibility, current and expected future supply might influence demand and the probability of a financial crisis. In particular, as described in Buttiliogne et al. (2014), expectations of future growth determine the slope of the trajectory of future income. The net present value of that path determines the capacity of households, firms, and the government to borrow. If that path rotates down on the realization growth ambitions were too ambitious, the reaction in financial markets might be jarring. The appreciation that economic performance will be poorer becomes the spark of financial crisis. As for precedent, consider that over-optimism

on technological improvements such as the diving bell, the steam engine, the radio, and the Internet gave way to the reality of limits to growth, market correction, and economic contraction.

The third possibility is that this overstates the importance of macroeconomic dynamics. Instead, we might observe poor structural policies jointly impeding growth and raising the chance of financial crisis. Bad policies beget bad outcomes. The most forceful example of this line of argument is Acemoglu et al. (2003). They argue that the colonial past casts a long shadow. In that darkness, those economies have been unable to build the edifice of commerce, finance, and regulation to support growth. They are also more subject to extraction of private resources by those in power. Crises and slow growth are twinned because the government makes it so.

Notice there may be substantial overlap in these forces in any particular economy, indeed to the point of introducing a vicious circle that produces a development trap. An incomplete financial architecture makes it more likely the existing capital markets swing with a wide amplitude to any news on future aggregate supply. An adverse swing destroys wealth and sets in motion contraction for all the conventional Keynesian reasons. But recession and financial crisis brings out the worst in the elite, leading them to use their influence to get a bigger share of a shrinking economic pie. The worsening of the rule of law and undercutting of property rights tilts the growth profile down and further raises its amplitude for the next mood swing in markets.

Understanding of the association between financial crises and economic growth evolved over the years. First, there was attention paid to the negative effects of inflation and other poor policies on economic expansion. In cross-sectional and panel regressions, Fischer (1993) found that inflation, large budget deficits, and distorted foreign exchange markets impaired growth. Moreover, some of his evidence suggested that causation ran from policies to income, not the



other way around. Bruno and Easterly (1995) isolated the investigation to the effect of high inflation—above 40 percent—on economic growth. They hold that an episode of high inflation takes a considerable toll on activity, but, if reversed, produces an equally large snapback. Put in our terms, inflation crises and economic growth are negatively related. As with Fischer, they also find that wide parallel exchange market premiums have predicted power for ill economic outcomes. This line of inquiry was ultimately subsumed by work on empirical growth models that significantly expanded the search for potential determinants. Summaries of this work include Easterly and Levine (2001) and more recently Barro (2014).

Ramey and Ramey (1995) approached the issue from another direction. Rather than look for the effects of policy on the path of national output, they examined the moments of the GDP process. In a large sample of countries, they found a negative relationship between mean GDP growth and its volatility. The core question in interpreting this association, however, is whether volatility is directly harmful to growth or do countries with little capacity to absorb shocks have both low and volatile real GDP growth. Hnatkovska and Loayza (2005) extended Ramey and Ramey's work to find that, indeed, the effects are more severe for countries with weak institutions. They also isolate those periods when the time series of GDP growth volatility of an economy is extreme relative to the global experience. Over time and across country, extreme volatility is strongly negatively related to economic growth.

This work is the bridge to the neighborhood this paper inhabits. Identifying extreme periods of GDP volatility is a selection method to define economic crises, much in the manner Bruno and Easterly (1995) can be reinterpreted as selecting out inflation crises from their sample. The empirical strategy is to choose selection criteria for variables such as inflation and the exchange rate, augmented by the policy narrative on the health of the banking system and

sovereign debt repayments, to identify crises. Kaminsky and Reinhart (1999) did this for banking and currency crises to find, among other results, that they are twinned—that their incidence was highly correlated.<sup>1</sup>

The natural next step was to examine the systematic behavior of macroeconomic variables in and out of these crises episodes. Barro (2001) did so to put the Asian crisis of 1997-98 in perspective, finding a significant negative effect on growth in the five-year window after the crisis but none thereafter. This is similar to Reinhart and Reinhart's (2010) conclusion that there was a sizable level lower in GDP per capita after the 15 worst financial crises of the 20<sup>th</sup> century but no growth consequence once far enough passed the crisis. Edwards (2007) considered the behavior of Latin American countries around crises to conclude that weak institutional structures make it likely that the region will fall further down the global league table of GDP per capita.

Reinhart and Rogoff (2009) broadened the search to include more indicators and a much longer history, concluding that the aftermath of a severe financial crisis is considerable on economic activity. Cerra and Saxena (2008), in a shorter but wider sample, find that the output loss appears permanent.

The most rigorous linkage between crisis identification and economic modelling is found in the work of Barro (2006), Barro and Ursua (2008), and Nakamura et al. (2013). On the empirical side, this involved identifying large drops in output, consumption, and equity values over a long and broad sample. On the modelling side, they show that under certain specifications of consumer preferences, even a low probability of very adverse outcomes has profound implications for the equity premium and the risk-free interest rate.<sup>2</sup>

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<sup>1</sup> Valencia and Laeven (2008) extend the sample of banking crises.

<sup>2</sup> For an application of this idea to debt dynamics, see Reinhart et al. (2015).

What follows falls squarely into the Kaminsky-Reinhart research strategy of using a broad collection of information to identify crisis events and then look for the fingerprints of those events on economic outcomes. The central question we ask: Is the effect of a variety of crises on economic growth material enough to matter in the process of economic development?

### **III. Varieties of Crises**

Before we can establish an association between crises and growth, we need an assured definition of crises. That is a familiar terrain to us, and in this section we lay out the varieties of crises and update their identification in times series ending in 2014. The heavy lifting was done in Reinhart and Rogoff (2009) in identifying data sources and specifying six types of crises.

Those six are repeated in Table 1, along with the criteria for determining that an event has been triggered. Essentially, we ask six questions. Have bad shocks occurred in banking? Has the exchange rate collapsed? Has the exchange rate regime changed? Has the contracted value of external sovereign debt been revalued? Has the contracted value of domestic sovereign debt been revalued? And was there a burst of inflation that eroded the real value of nominal claims?

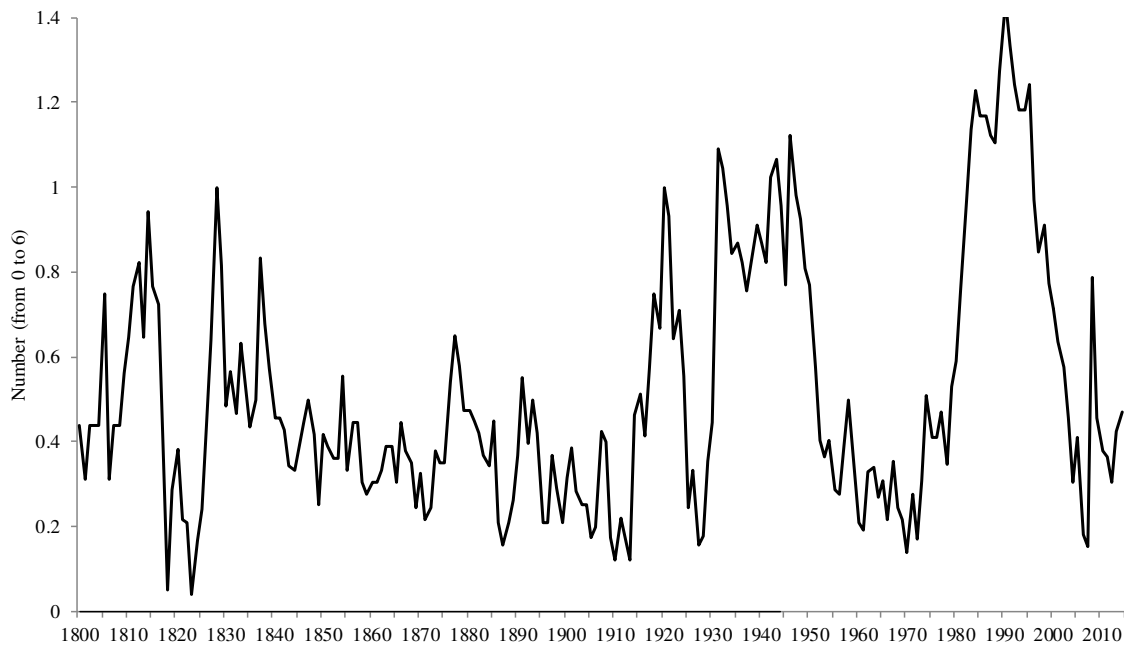
Recognize that this identification requires judgment, including as to how serious financial distress has to be for a banking crisis. Thresholds on defining an inflation or exchange-rate crisis are similarly subject of debate. But Reinhart and Rogoff (2009) and Reinhart (2010) provide clear definitions and we follow those in demarking the data.

Table 1. Six Crises Definitions

Crisis type	Threshold or criteria
Type I: Systemic/severe Type II: Borderline/financial distress/ milder	We mark a banking crisis by two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; and (2) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions.
Currency crashes	An annual depreciation versus the US dollar (or the relevant anchor currency—historically also, the UK pound, the French franc, or the German DM and presently the euro) of <b>15 percent</b> or more
Currency conversions are added as a second variety of a currency crash	A currency reform where a new currency replaces a much-depreciated earlier currency in circulation.
Debt crises: External	A sovereign default is defined as the failure to meet a principal or interest payment on the due date (or within the specified grace period). The episodes also include instances where rescheduled debt is ultimately extinguished in terms less favorable than the original obligation.
Debt crises: Domestic	The definition given above for external debt applies. In addition, domestic debt crises have involved the freezing of bank deposits and or forcible conversions of such deposits from dollars to local currency.
Inflation	An annual inflation rate <b>20 percent</b> or higher by either the year-over-year change or December-to-December (if monthly data is available)

Figure 1 plots the annual average number of crises around the world from 1800 to 2014. A few points of background are required to appreciate this tally. First, as there are six types of crises, the potential range of the chart spans 0 (perfect tranquility) to 6 (all that could go wrong goes wrong). Second, the number of countries varies over time, with colonial empires limiting the count to 16 at the start in 1800. The Latin American independence movement doubled the number by midcentury. Coverage steps up twice more, after the dust clears from World War I and after the African independence movement of the 1960s. Third, the line plotted is unweighted across countries so emerging market economies have an influence on the average disproportionate to their contribution to global GDP.

Figure 1. Variety of Crises, World Aggregate (66 Countries): 1800-2014, Average Number of Crises per Country



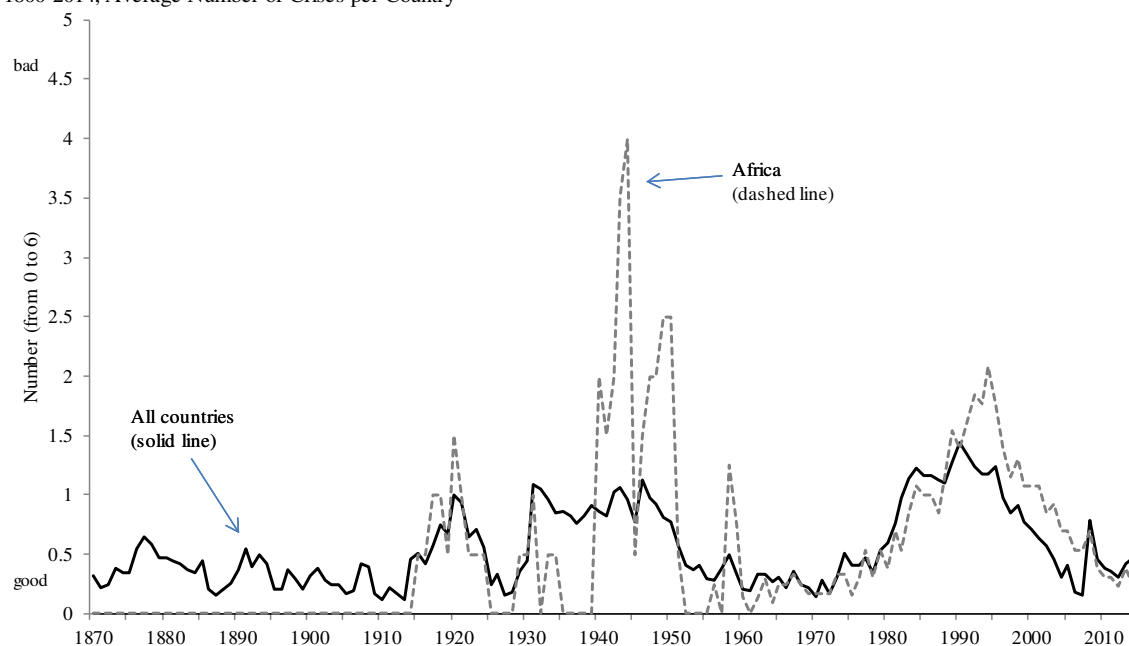
Source: See Reinhart (2010) for references.

Reinhart and Rogoff (2009) run through the movements in this series in some detail. The familiar feature is that crises have always been with us. The surprise in updating the crisis count is that the events of 2008-09 do not leap off the page. True, the local peak of about  $\frac{3}{4}$  is an 80<sup>th</sup> percentile event, not all that common, but the past few years did seem especially turbulent. Part of this is a recency bias because the 1830s, the 1930s, and the 1980s were also turbulent. But also recognize that banking crises were clustered in advanced economies. There are twice as many emerging market economies in the later part of the sample. The monetary policy response of the central banks in the major financial centers pulled nominal interest rates to near-record lows. This created a conducive environment for financial markets and government finance in emerging market economies, suppressing the number of crises there. Also note that the final chapter on the banking crises of advanced economies has not been written. We provisionally put the duration of banking crises as long as national GDP had not recovered its prior peak. If GDP

is subsequently revised lower or takes a downward turn sometime soon, historians might extend the spell of banking crises beyond what we penciled in here.

The next five charts track average annual financial crises for five regional subgroups: Africa, Asia, Europe, Latin America, and the “Western Offshoots” of the Old World (Australia, Canada, New Zealand, and the United States).<sup>3</sup> In each, we repeat the track of the world average to give some sense of relative performance. Also, as there are the measures we will mostly on to compare with GDP growth (which is typically not available as far back in time), the sample starts in 1870.

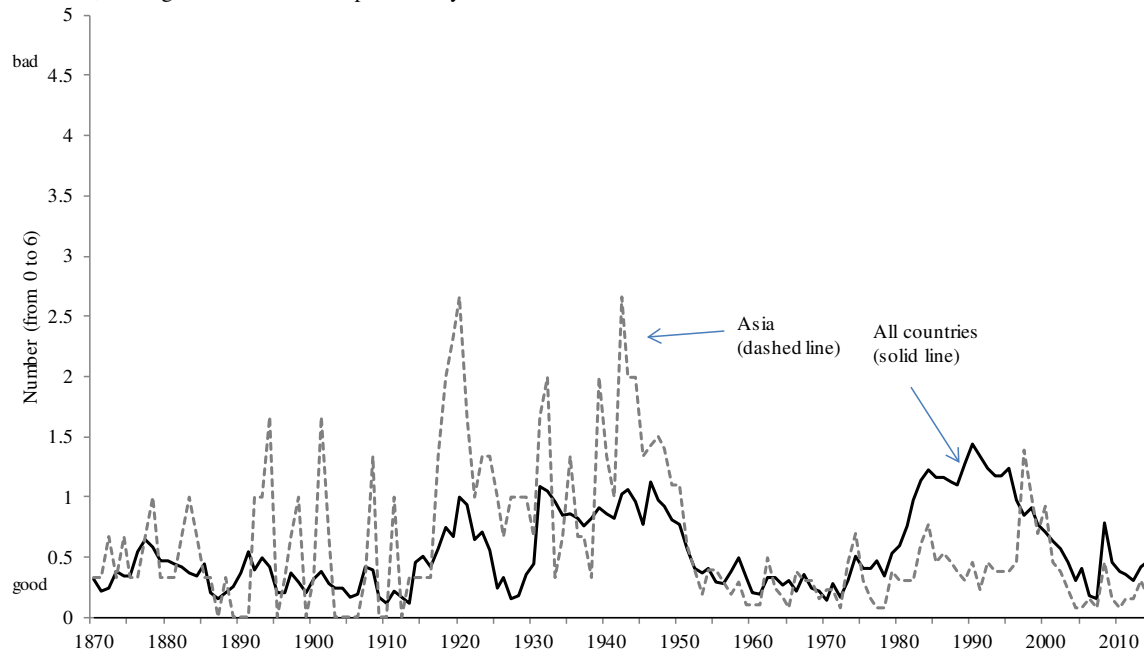
Figure 2. Variety of Crises, Africa (13 countries) and World Aggregate (66 Countries): 1800-2014, Average Number of Crises per Country



Source: See Reinhart (2010) for references.

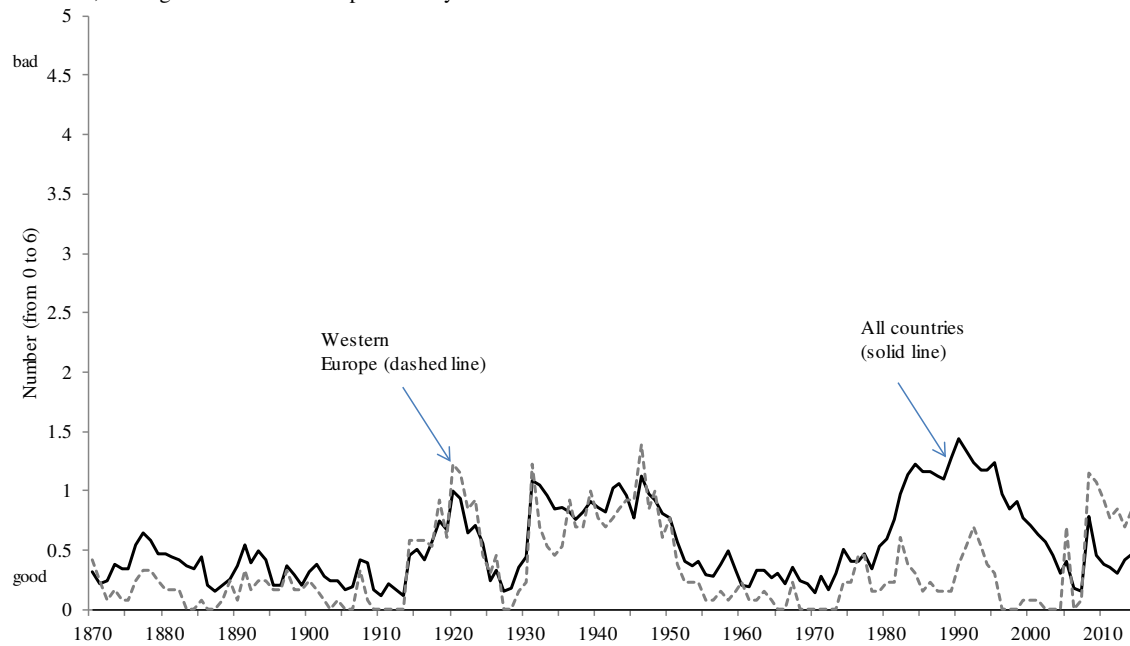
<sup>3</sup> The four economies of Emerging Europe, which round out the sixty-six-country sample, are not shown separately but are included in the world average.

Figure 3. Variety of Crises, Asia (12 countries) and World Aggregate (66 Countries):  
1800-2014, Average Number of Crises per Country



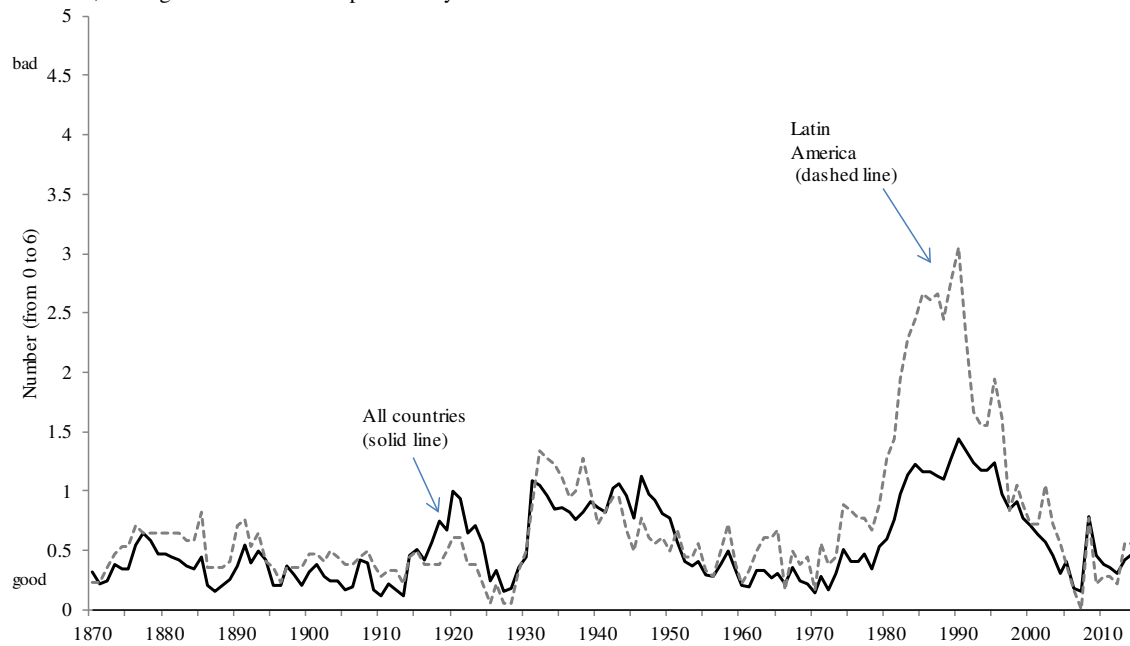
Source: See Reinhart (2010) for references.

Figure 4. Variety of Crises, Western Europe (14 countries) and World Aggregate (66 Countries):  
1800-2014, Average Number of Crises per Country



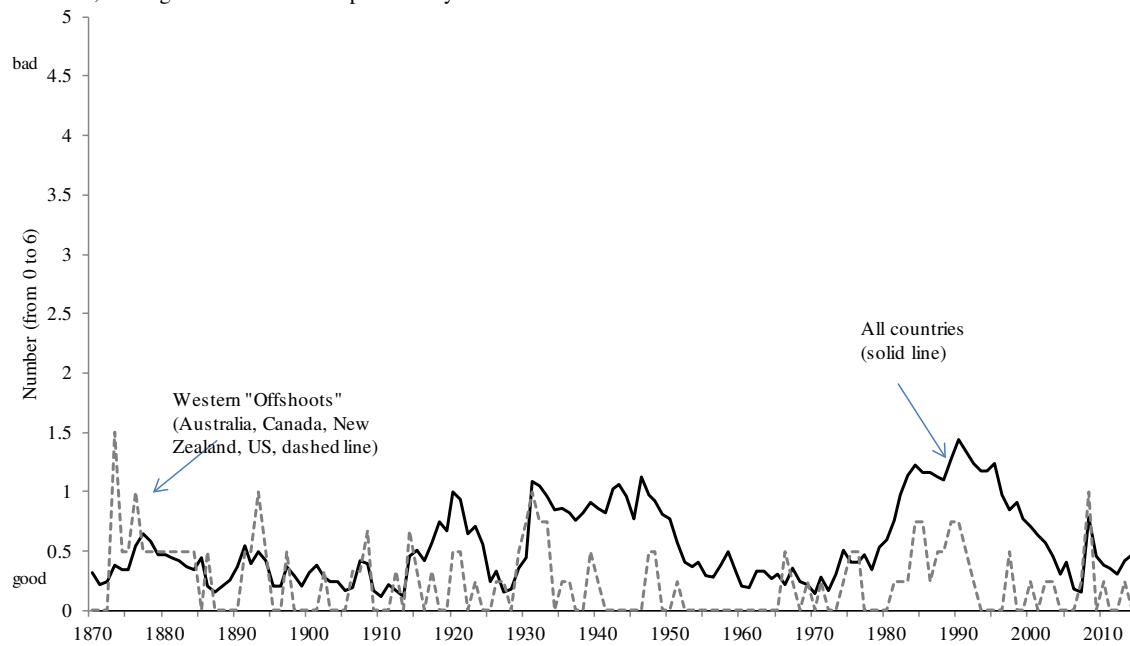
Source: See Reinhart (2010) for references.

Figure 5. Variety of Crises, Latin America (18 countries) and World Aggregate (66 Countries): 1800-2014, Average Number of Crises per Country



Source: See Reinhart (2010) for references.

Figure 6. Variety of Crises, Western "Offshoots" (4 countries) and World Aggregate (66 Countries): 1800-2014, Average Number of Crises per Country



Source: See Reinhart (2010) for references.

Two of the main messages of Reinhart and Rogoff (2009) show through here, and another one becomes clearer with the updated data. First, some regions are systematically more volatile



than others for long stretches. Africa for most of its history, Asia before World War II, and Latin America since the 1970s regularly ran a rockier road than the rest of the world. Second, all regions have crises (although underneath the overall averages their composition varies). Only for a few decades after World War II were crises not recurrent (and that holds more for advanced economies). And third, graduation to tranquility is hard. Just when it is tempting to say crises are history, as in Asia before 1997 and Europe and the Western Offshoots before 2008, they recur.

#### **IV. Crises and Convergence**

Having defined the event, it is incumbent on us to describe how the event matters. To that end, we gathered data on the growth of real GDP per capita for the 66 countries in the sample. Decade averages of the six regional subgroups are provided in Table 2. The sources, familiar from Reinhart and Rogoff (2009), are summarized in the note to the table.

As is evident, economic growth does vary substantially from decade to decade. “Lost” decades do appear, witness the outright declines in GDP per capita in Latin America in the 1980s and Emerging Europe in the 1990s. Rapid economic expansion in Asia is a post-World-War-II phenomenon, and Africa remains a laggard.

Table 2. Average annual real GDP per capita growth  
Decade averages ending in year listed,  
percent

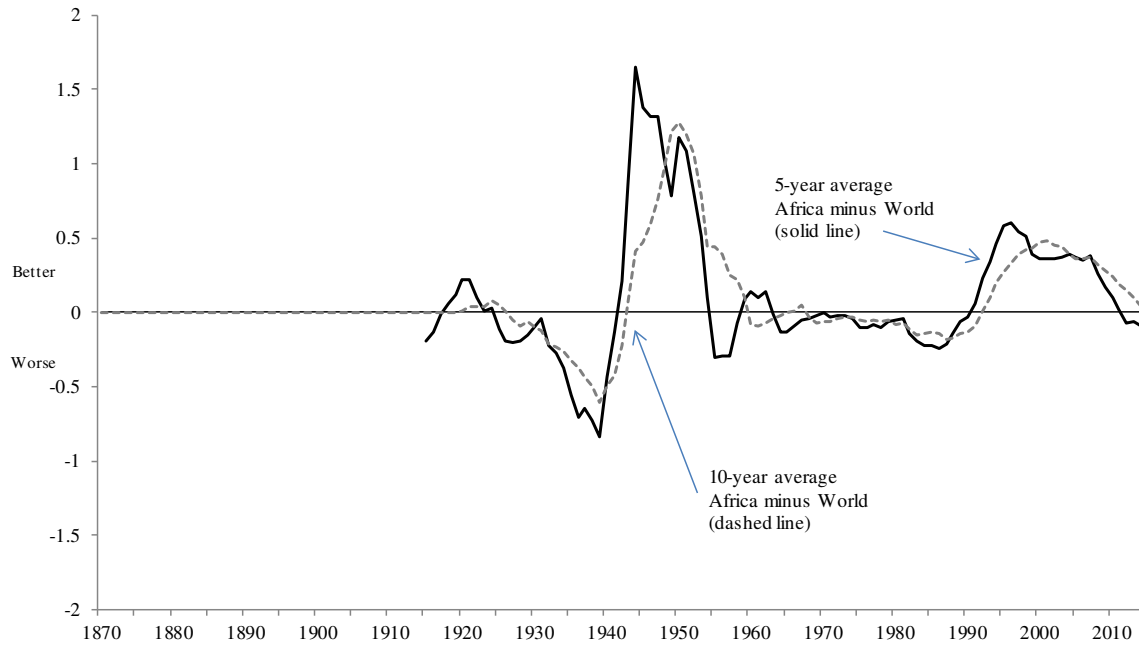
	Africa	Asia	Western Europe	Emerging Europe	Latin America	Western Offshoots	World
1869	.	.	1.2	.	1.9	0.5	1.2
1879	.	.	1.0	.	0.8	2.3	1.1
1889	.	1.2	1.4	.	1.7	1.5	1.4
1899	.	1.8	1.5	.	0.9	0.8	1.3
1909	.	1.4	1.2	.	2.1	2.6	1.7
1919	.	2.8	0.1	.	0.9	0.7	1.0
1929	.	1.6	3.8	.	3.4	1.5	3.0
1939	.	0.7	1.2	2.1	0.7	0.8	1.0
1949	.	-0.6	1.0	0.8	1.9	3.0	1.4
1959	.	3.2	3.9	4.0	1.5	2.2	2.6
1969	2.0	3.6	4.6	3.7	2.4	2.8	3.1
1979	1.9	4.5	3.2	3.2	2.6	2.0	3.0
1989	0.1	3.7	2.1	0.7	-0.6	1.7	1.1
1999	0.4	3.9	1.9	-0.7	1.7	1.7	1.7
2009	2.4	4.5	1.2	3.9	1.9	1.4	2.4
2010 to 2014	1.7	4.5	0.3	2.7	3.0	1.5	2.3

Sources: In most cases, Maddison, *Historical Statistics on the World Economy*, until 1950.

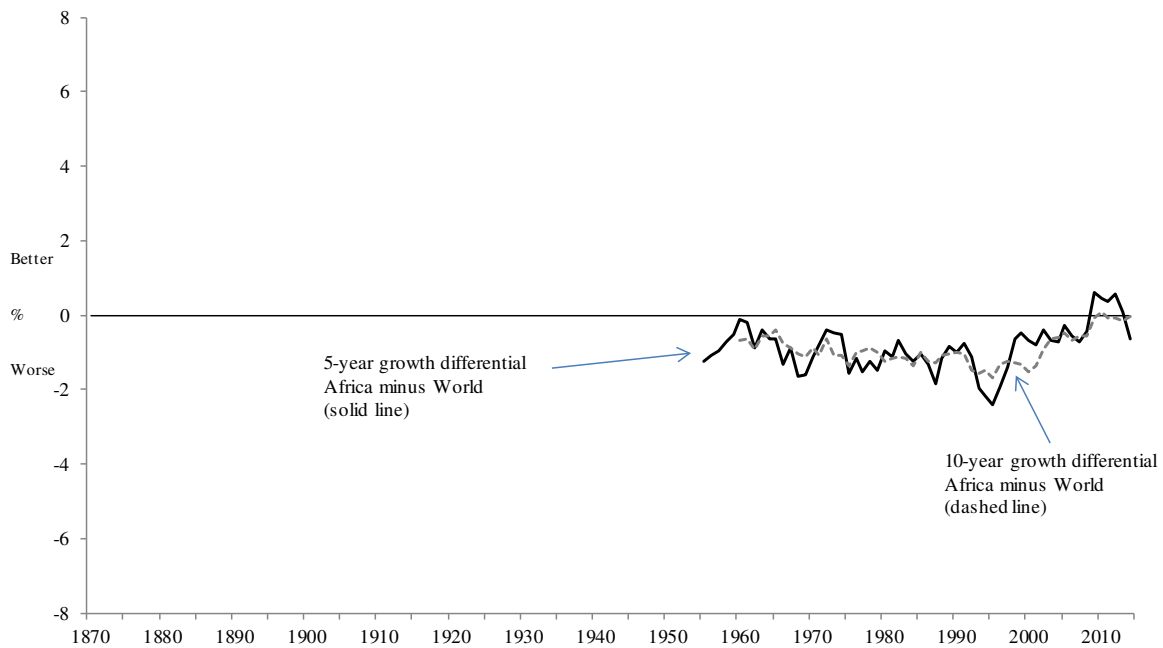
Conference Board, *Total Economy Database*, from 1951 to 2013. International Monetary Fund, *World Economic Outlook* for 2014.

Our goal is to examine if this dispersion of growth outcomes is associated in a systematic fashion with the incidence of crises. The two panels of Figures 7 through 11 start the process for the five regions already shown. The upper panels plot the five- and ten-year moving averages of the incidence of crises in the region relative to the world total as, respectively, the solid and dashed lines. The bottom panels do the same for moving averages of regional GDP relative to world growth.

Figure 7. Crisis Incidence Index Differentials: Africa (13 countries) minus World (66 countries), 1910 to 2014  
*Unweighted 5-Year and 10-Year averages*

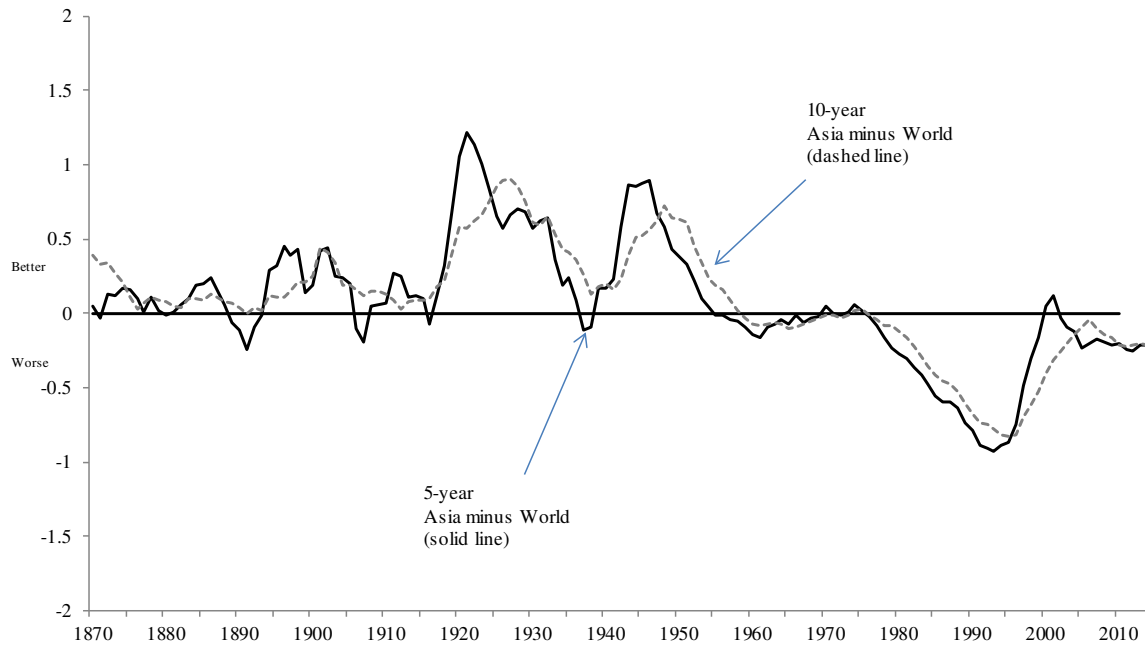


Long-term Growth Differentials: Africa (13 countries) Minus World (66 countries), 1950-2014  
*Unweighted 5-Year and 10-Year average annual growth (percent)*

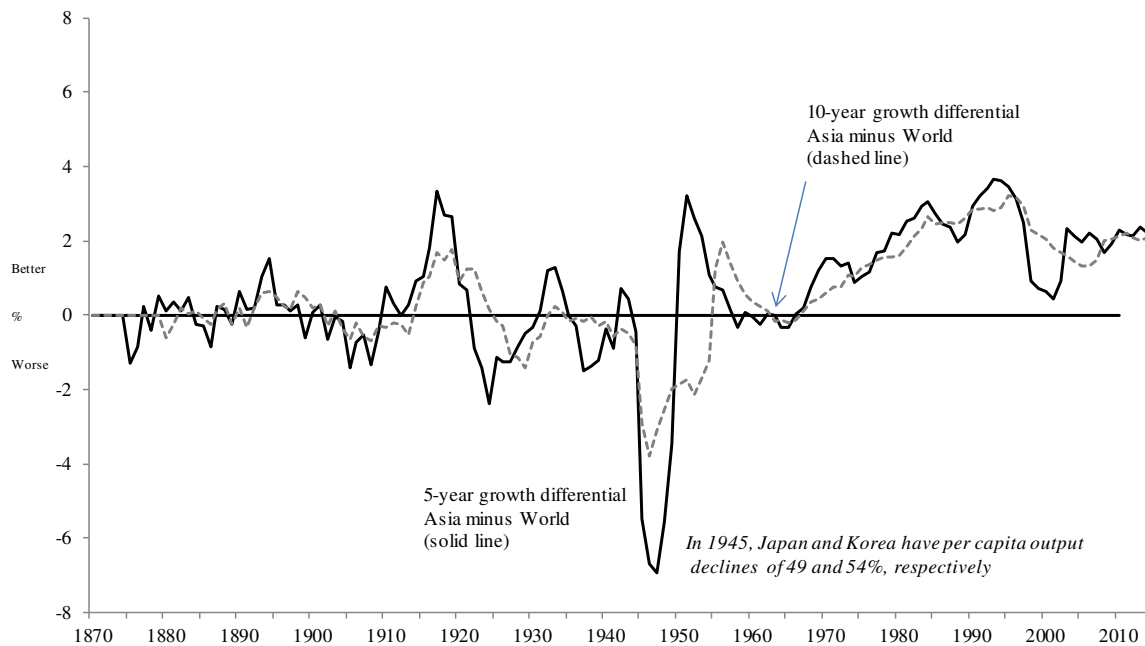


Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

Figure 8. Crisis Incidence Index Differentials: Asia (12 countries) Minus World (66 countries)  
 Unweighted 5-Year and 10-Year averages

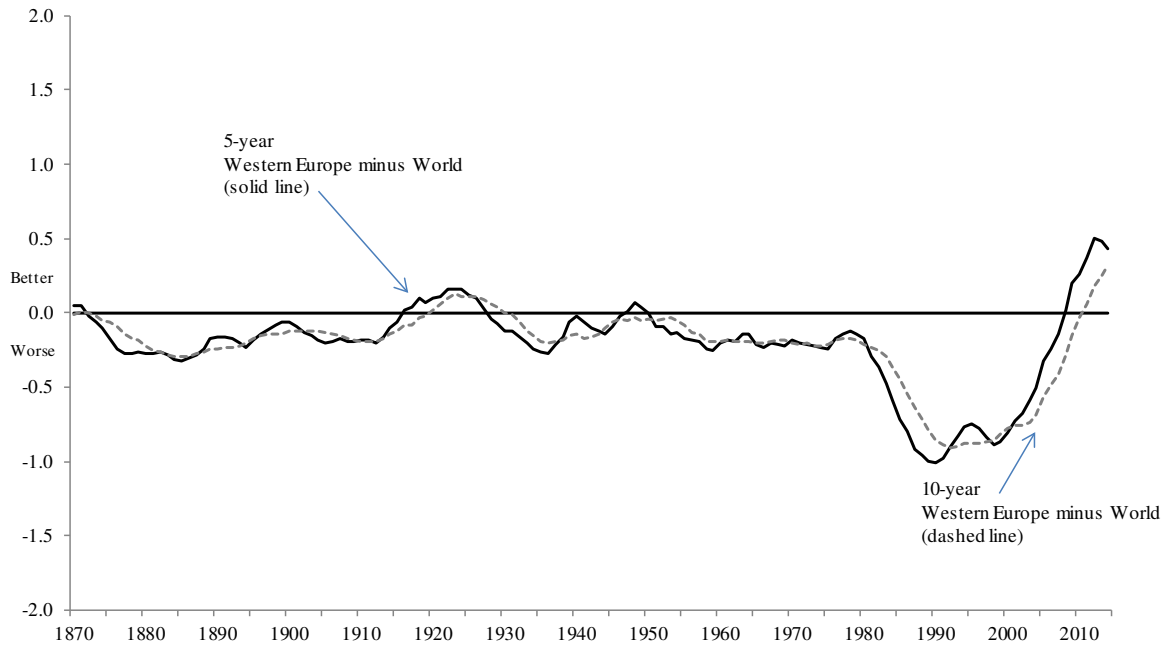


Long-term Growth Differentials: Asia (12 countries) Minus World (66 countries), 1871-2014  
 Unweighted 5-Year and 10-Year average annual growth (percent)

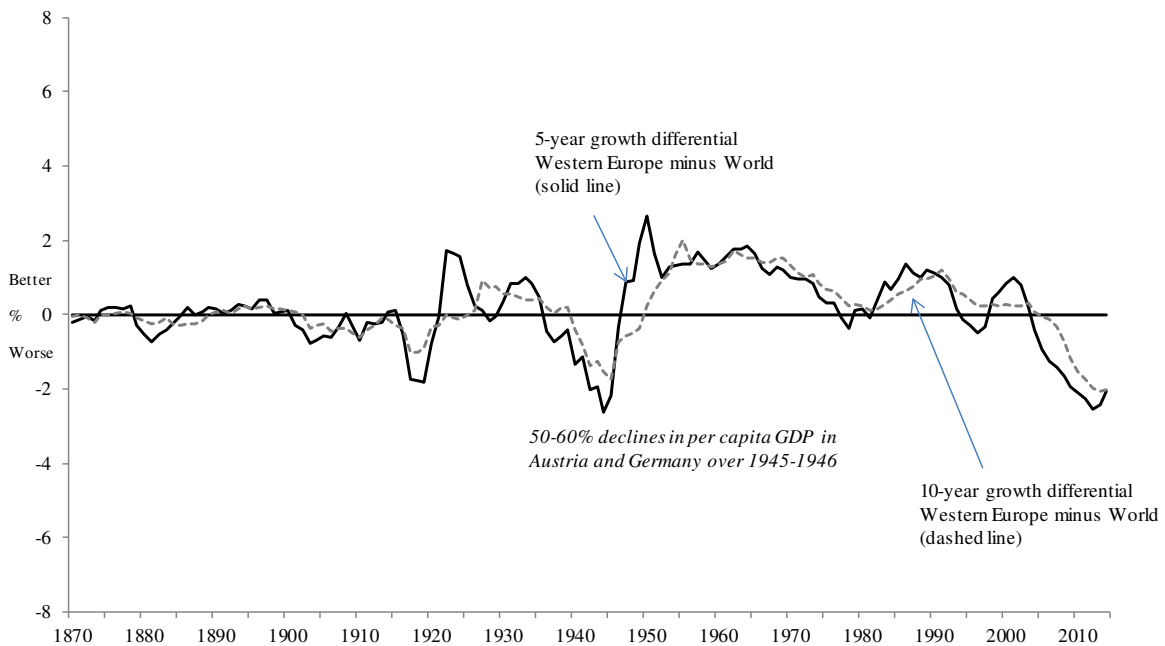


Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

Figure 9. Crisis Incidence Index Differentials: Western Europe (14 countries) Minus World (66 countries), 1870-2014  
*Unweighted 5-Year and 10-Year averages*

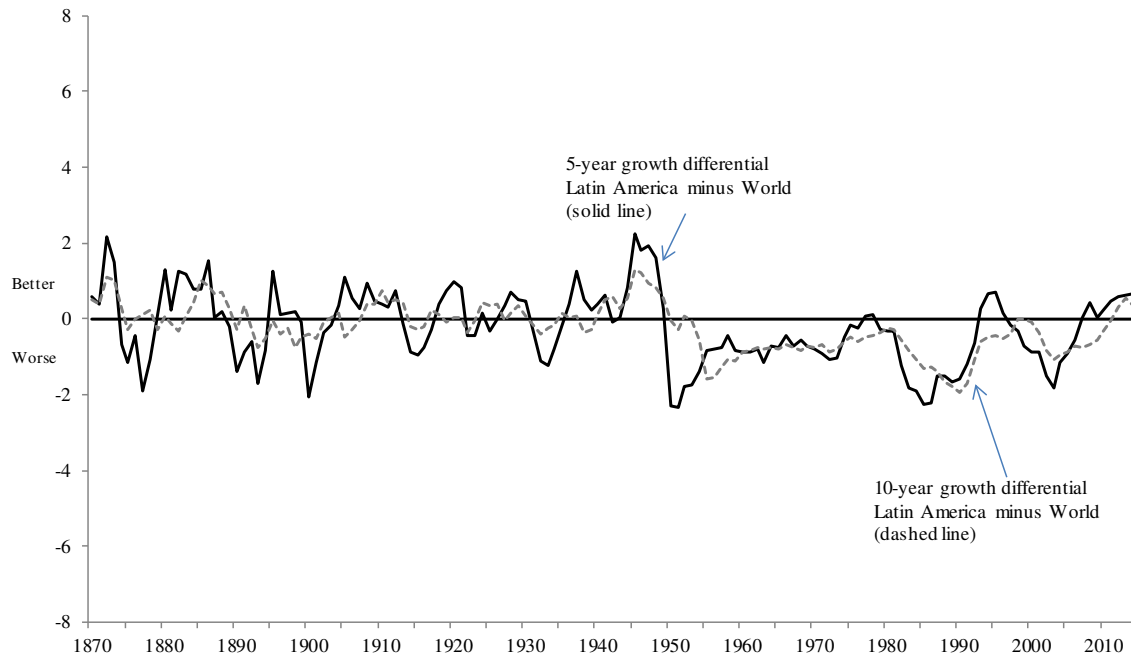


Long-term Growth Differentials Western Europe (14 countries) Minus World (66 countries), 1870-2014  
*Unweighted 5-Year and 10-Year average annual growth (percent)*

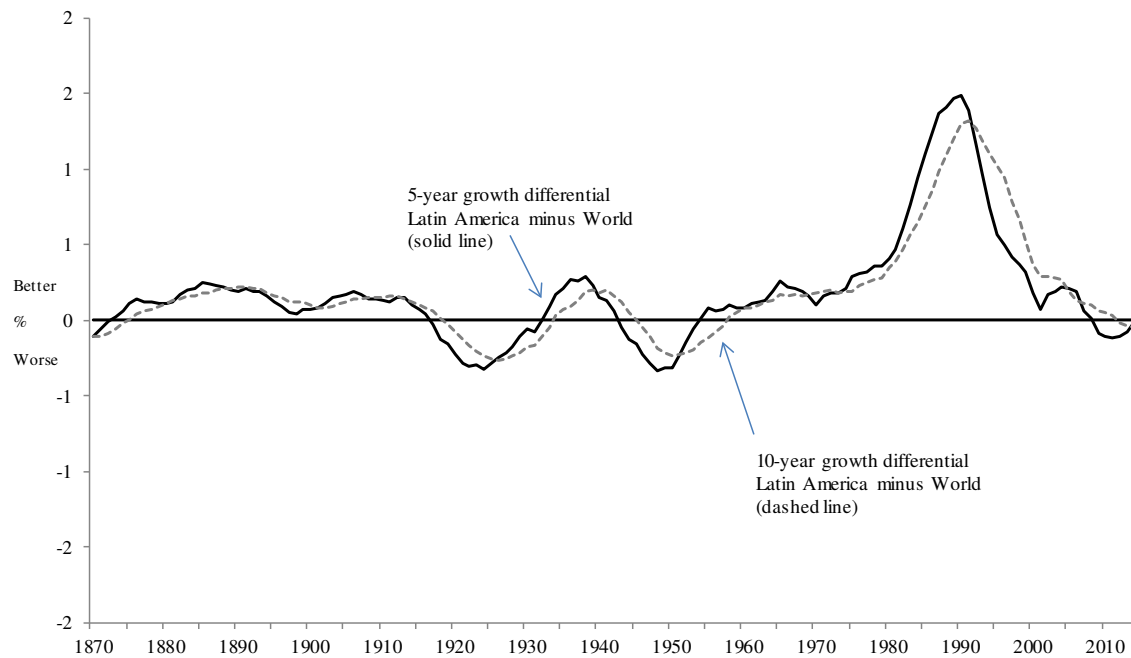


Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

Figure 10. Crisis Incidence Index Differentials: Latin America (18 countries) Minus World (66 countries), 1870-2014  
 Unweighted 5-Year and 10-Year averages

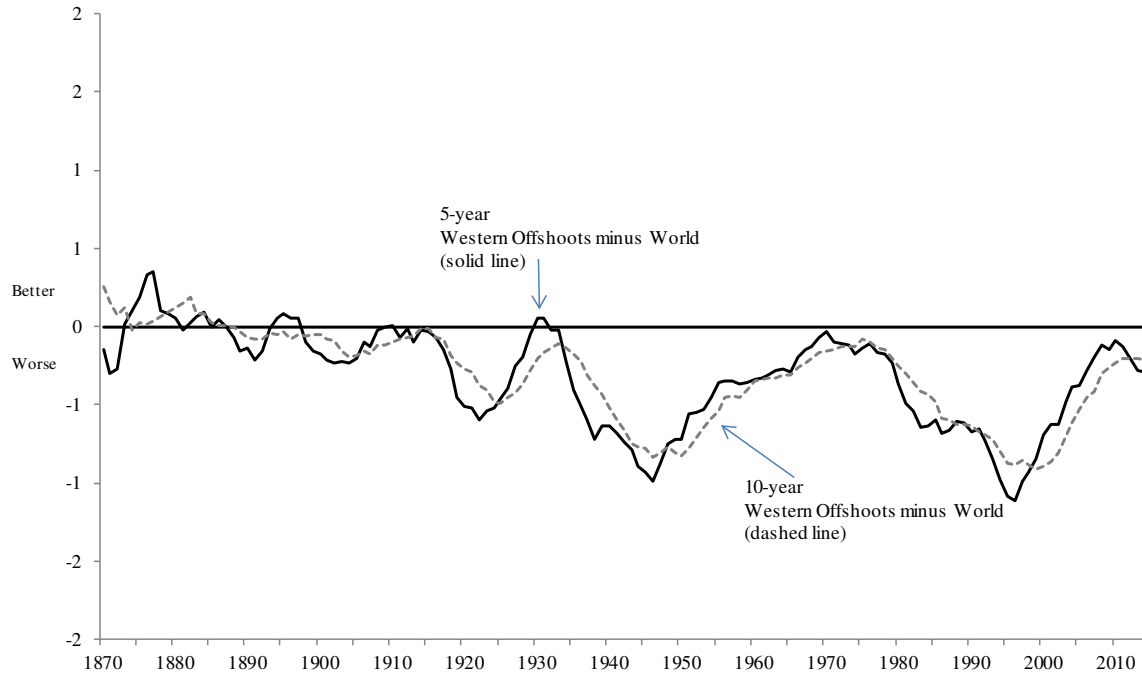


Long-term Growth Differentials Latin America (18 countries) Minus World (66 countries), 1870-2014  
 Unweighted 5-Year and 10-Year average annual growth (percent)

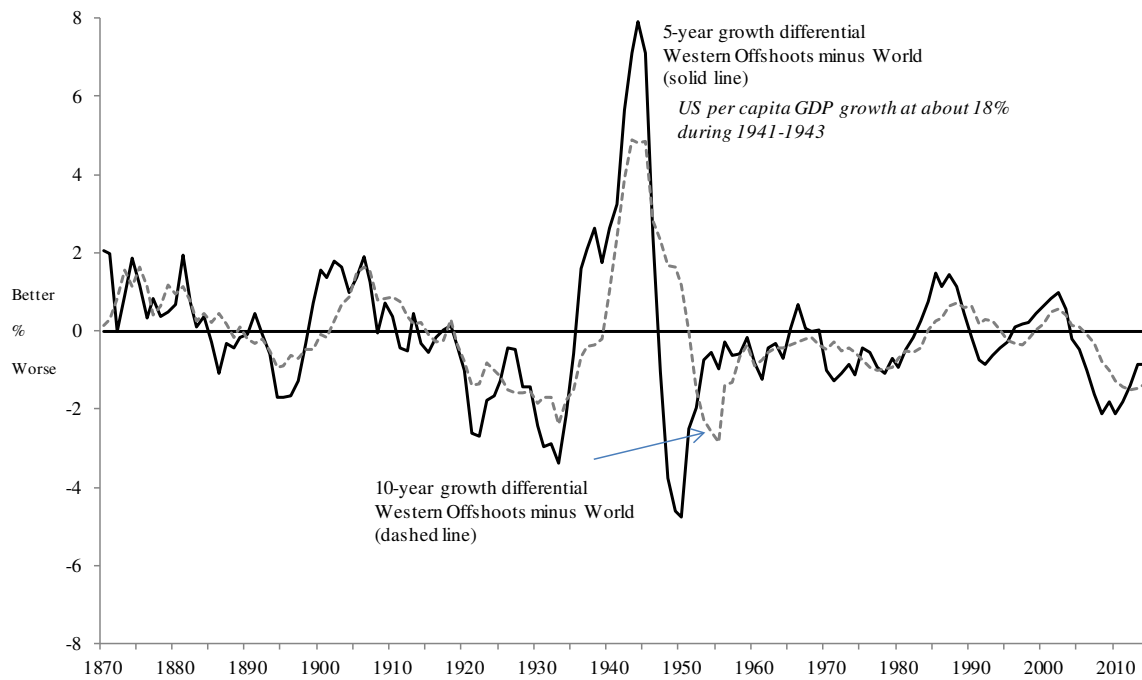


Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

Figure 11. Crisis Incidence Index Differentials: Western Offshoots (Australia, Canada, New Zealand and US) Minus World (66 countries), 1870-2014, *Unweighted 5-Year and 10-Year averages*



Long-term Growth Differentials Western Offshoots (4 countries) Minus World (66 countries), 1870-2014  
*Unweighted 5-Year and 10-Year average annual growth (percent)*



Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

Evident in the broad sweep of data is that Africa and Latin America have delivered subpar growth while still being risky, that Asia ran up several decades of relatively crisis-free expansion, and advanced economies have become riskier places.

As for relative movements of the upper and lower panels, Table 3 provides the simple correlations between the crises and growth differentials, along with the associated t-tests of difference relative to zero. Where available, correlations are provided for the pairwise five- and ten-year moving averages for the periods from 1874 to 2014 and 1955 to 2014. A high relative incidence of crises is associated with slower economic growth at the medium- and longer-term frequency at a statistically significant level, with the exception of Africa. The negative association is most sizable for Asia, but it is large elsewhere.



Table 3. Correlation of growth and crisis differentials for regional aggregates  
*Five- and ten-year moving averages relative to the world aggregate*

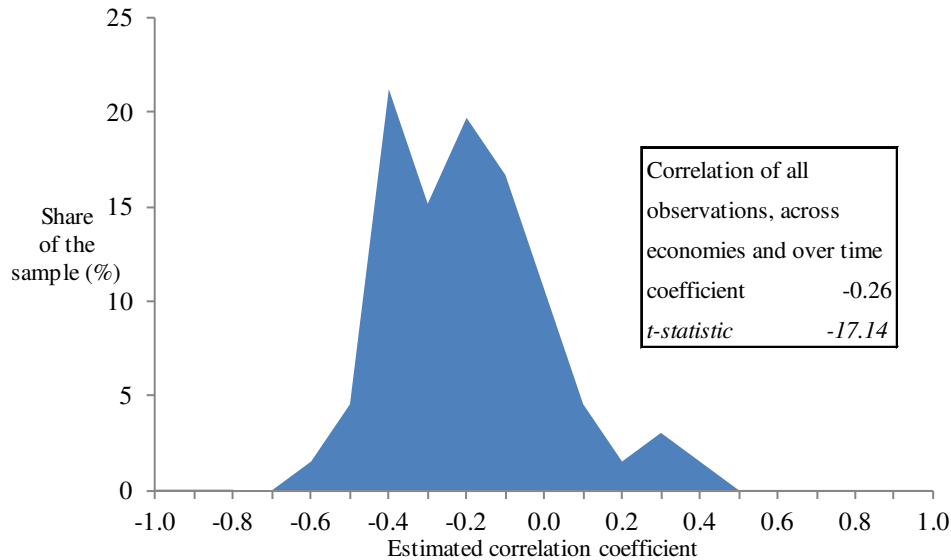
		Africa*	Asia	Western Europe	Emerging Europe	Latin America	Western Offshoots
<b>Five-year/five-year</b>							
1955 to 2014	<i>correlation</i>	-0.06	-0.77	-0.48	-0.62	-0.48	-0.55
	<i>number of observations</i>	50	60	60	60	60	60
	<i>t-test</i>	-0.44	-9.26	-4.16	-6.08	-4.20	-4.95
1874 to 2014	<i>correlation</i>		-0.61	-0.34	-0.41	-0.36	-0.25
	<i>number of observations</i>		140	140	140	140	140
	<i>t-test</i>		-9.09	-4.19	-5.31	-4.53	-3.06
<b>Ten-year/ten-year</b>							
1955 to 2014	<i>correlation</i>	0.13	-0.77	-0.21	-0.57	-0.36	-0.53
	<i>number of observations</i>	50	60	60	60	60	60
	<i>t-test</i>	0.93	-9.25	-1.61	-5.33	-2.90	-4.79
1874 to 2014	<i>correlation</i>		-0.77	-0.29	-0.43	-0.50	-0.22
	<i>number of observations</i>		140	140	140	140	140
	<i>t-test</i>		-14.20	-3.54	-5.64	-6.69	-2.66

\* 1965 to 2010

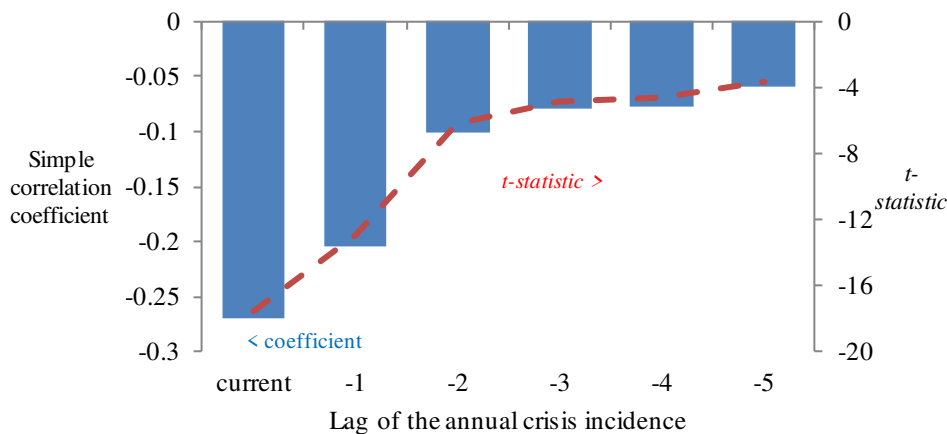
Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

This inverse relationship between the growth of GDP per capita and crises incidence also holds in the annual, unsmoothed, observations. The inset to Figure 12 provides the correlation between real GDP per capita growth and the incidence of crises across 66 countries in the post-World-War-II era. Across all countries in the sample, the correlation is about -0.25, and statistically significantly so. The histogram reports along the vertical axis the frequency observed of the correlation coefficients measures along the horizontal axis. Fully 87 percent of the economies in the sample individually had negative correlation coefficients between growth and crises.

Figure 12. Simple correlations between the growth of real GDP per capita and crisis incidence, annually  
Country-by-country across 66 countries, 1951 to 2014



Current GDP growth to current and lagged crisis incidence, 1955 to 2014



Sources: See Reinhart (2010) for varieties of crises. See notes to Table 2 for GDP per capita.

The contemporaneous correlation of about one-quarter belies how tightly growth and crises are knit. The bottom panel shows the correlation from 1955 to 2014 of real GDP growth to the current and lagged readings of the incidence of financial crises. The association is strongly negative long after the event, the left axis, and statistically significantly so, the right

axis. But the result also accords with the finding in Barro (2001) that the link between growth and crises weakens after about five years and Cerra and Saxena (2008) that the level effect is permanent.

Simple correlation coefficients, whether on annual or long moving averages of the data, do not convey the cumulative relationship over long periods, although the fact that the association is negative over multiple lags offers the possibility the effect adds up. The two panels of Figure 13 below fill this gap by examining the extent recent economic outcomes are related to a country's legacy of financial crises. The upper panel looks at (the logarithm of) GDP per capita, measured in US dollars, in 2014 as assessed by the IMF in the *World Economic Outlook* (10/2014). The lower panel looks at annual average inflation from 2010 to 2014, also from the same source. The horizontal axis measures the frequency of crises on average over a country's existence, or 1800 for nations of longer vintage. As there are six different varieties of crises, the raw count is divided by six times the years of existence.<sup>4</sup>

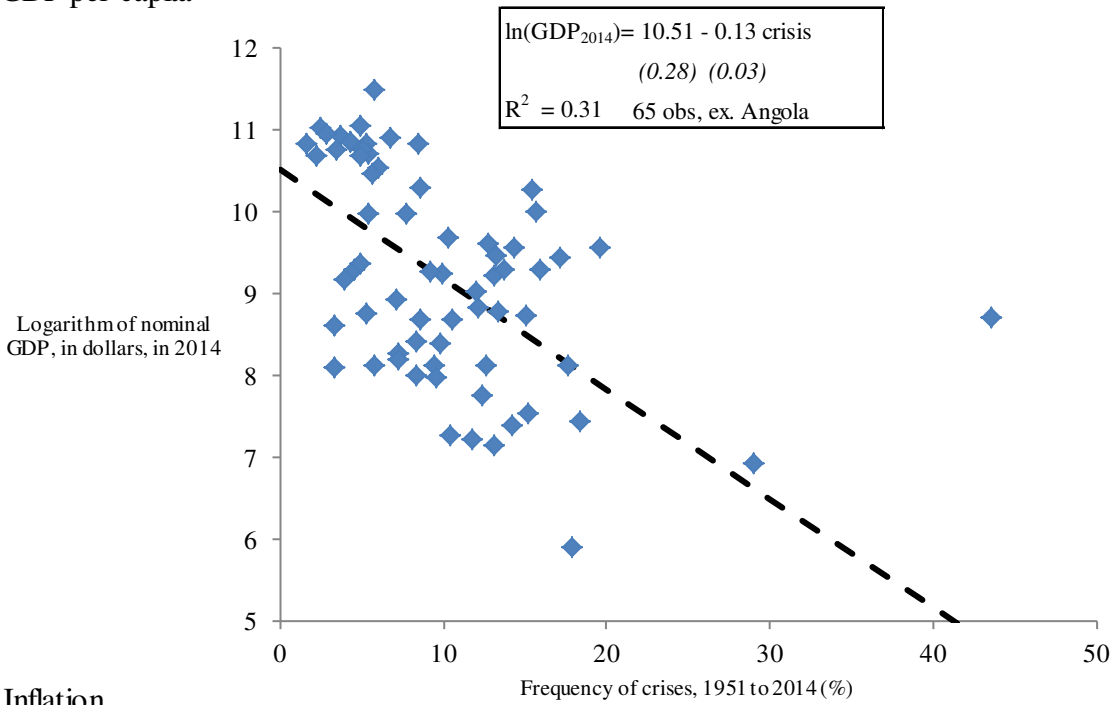
As is evident, countries with a checkered legacy of crises are lower in the ranking of GDP per capita. The inset box reports a regression of GDP on crisis frequency for 65 countries (omitting the outlier, Angola). The statistically significant coefficient of -0.13 implies that moving from around the sample average of a 10 percent probability of one of the six crises per year to 20 percent is associated with GDP per capita that is 13 percent lower. A similar doubling of crisis incidence accompanies a 1-3/4 percentage point higher inflation rate in recent years. The former result suggests that the negative correlation between economic growth and crisis incidence over time and across countries and regions cumulates to send an important message about levels. We did not address inflation dynamics in the same manner, but from a

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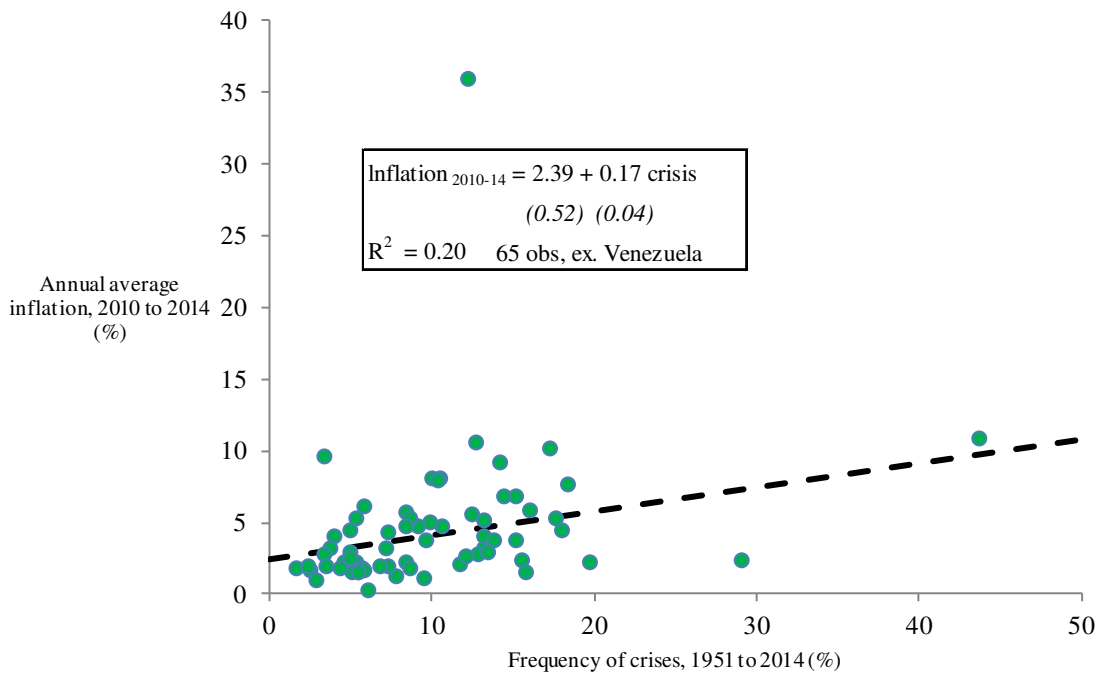
<sup>4</sup> This way, a country that had every type of crisis in every year of its existence would have a crisis frequency of 100 percent.

development perspective, the occurrence of higher inflation should be taken as a red flag that warns about a higher crisis risk.

Figure 13: Predicting recent economic outcomes with prior crisis incidence  
 GDP per capita



Inflation



Sources: See Reinhart (2010) for varieties of crises. GDP per capita (US\$) and inflation from the IMF, *World Economic Outlook* (10/2014).

Again, we are only dealing with an association, but to quantify that association one of the variables had to be placed on the right-hand-side of a regression, just as it was placed along the horizontal axis of a chart. Whatever that arbitrary decision, it may be that crises impede growth or slower growth breeds crises. Whatever the channel, the frequent appearance of financial crises is paired with a lack of income convergence.

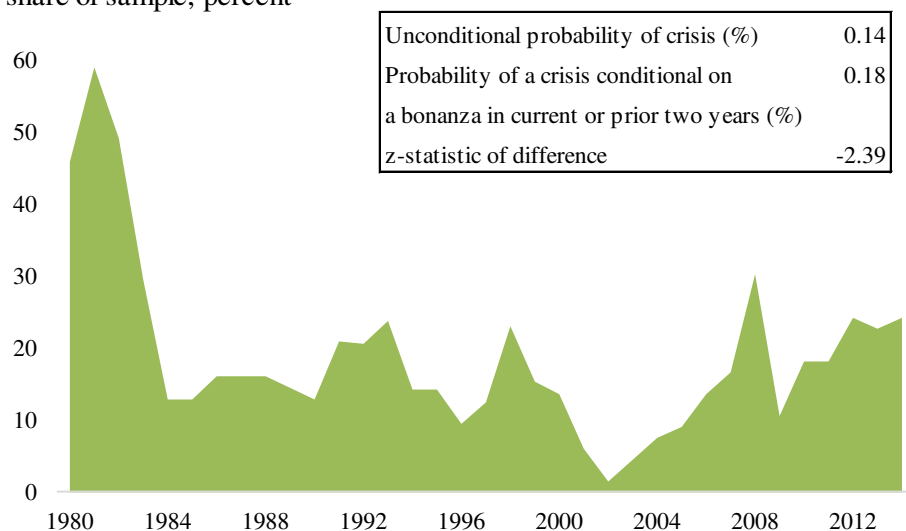
## **V. The External Risks to Convergence**

If financial crises directly threaten, or even indicate a threat, to economic convergence, then a pattern of late should give anyone pause. Policy interest rates are understandably low in major financial centers, making it is important also to understand how that poses risks to economies not as far along in the development process. A repeated pattern in the modern era of global finance is that, when interest rates in major financial centers are low, foreign investors are attracted to emerging markets. Capital flows into small and shallow local markets, leading the exchange rate to appreciate, asset prices to rally, government budgets to improve, and local leaders to congratulate themselves as the rightful recipients of capital. In such an environment, structural weaknesses remain unaddressed, or even worsened, as local institutions stretch to move up a notch among the global competition.

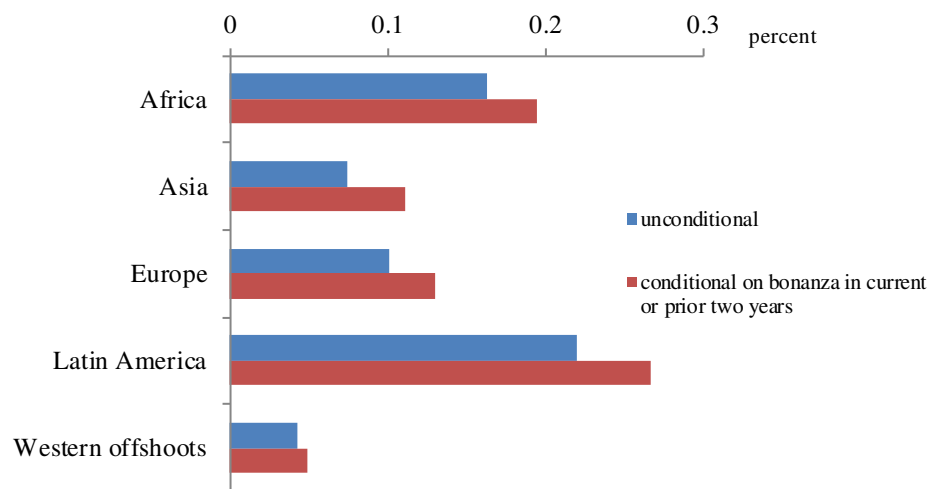
Reinhart and Reinhart (2009) provide a simple identification scheme to assess periods of elevated external risks. Employing a variety of datasets, they select periods when an economy receives elevated capital inflows relative to its own history. Given the paucity of data, they use the mirror to capital account surpluses, current account deficits. Mechanically, the idea is to highlight any year as a capital account bonanza when the current account deficit relative to

nominal GDP is in the lower 20<sup>th</sup> percentile of experience.<sup>5</sup> The shaded area of Figure 14 updates this calculation using the short times series (1980 to 2014) available in the IMF World Economic Outlook (10/2014).

Figure 14. Capital inflow bonanzas and varieties of crises  
share of sample, percent



Probabilities of varieties of crises, by region



Source: Bonanzas, see Reinhart and Reinhart (2010) updated using IMF, *World Economic Outlook* (10/14).

Varieties of Crises, see Reinhart (2010) updated from various sources.

<sup>5</sup> Of course, large-scale reserve accumulation as practiced by some important economies muddies this relationship.

As is evident, there have been four prior peaks in capital inflows in the past 35 years. All came before a pickup in financial crises worldwide. The Latin American debt crisis came first, early in the sample, as many countries in that region defaulted and suffered attendant financial dysfunction. Then followed the Mexican crisis of 1994-95 and the Asian crisis of 1997-98. The most recent peak in capital inflows presaged the subprime crisis of 2008-09. As shown in the inset, across 66 countries and 35 years of data, the observed unconditional probability of having one of the six possible crises is 13.5 percent in a given year. Limiting the observations to years in which a country is currently having or had in the prior two years a capital inflow bonanza raises the conditional probability of having a financial crisis to 18.4 percent. That difference is statistically significant using the z-test described in Reinhart and Reinhart (2009). Indeed, in about two-thirds of the countries, the probability of a crisis around the dates of a capital inflow bonanza is higher than for the entire sample.

The bottom panel shows the unconditional and conditional probabilities of the six possible crises across five regions of the world. In all cases, knowing that a country had at least one of the varieties of crises in a moving three-year window of data sharpens the understanding of a chance of crisis. The largest differences are among emerging market economies, consistent with the view that understanding crisis dynamics is important in the development process.

The likely reason for this link is that a heavy inflow period can persist, potentially lulling policymakers and investors to the view that the bonanza is permanent, rather than temporary. Episodes end, more often than not, in an abrupt reversal. When flows reverse, asset prices give back their gains, often forcing painful adjustments on the economy. A bonanza is not to be confused with a blessing.



## **VI. Conclusion**

Policymakers must appreciate that a variety of crises are typically associated with slower economic growth. That may be a direct causal channel, a reverse channel, or the influence of some other factors on both growth and finance. But they go together. The influence of other forces for convergence of income across countries that economists have thus far identified appear weak, so going off track around a financial crisis will likely have long-lived consequences.

Some of the seeds of crisis are scattered on the financial landscape by official action, including erratic fiscal policies, a disregard for the rule of law and property rights, and lax discipline of monetary policy. But some are beyond the control of policy. The sentiment of investors seems to swing in a wide arc, for instance, and the pace of technological progress is haphazard. Developments on world financial markets obviously fall into the latter camp. However, when considering alternatives along the development path, policymakers should appreciate “the mixed blessing” of capital inflows, as in the title of Reinhart and Reinhart (2008) and consider the menu of policy choices there.

Policymakers in emerging markets cannot stop external waves, but they are not completely powerless as to how much of their force washes ashore.

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