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Skewed Credit and Growth Dynamics Skewed Credit and Growth Dynamics *

Gemma Estrada,♦ Aitor Erce,♣ and Donghyun Park+

Abstract: While a large empirical literature finds that financial development is beneficial for economic growth, recent evidence suggests otherwise. We contribute to this debate by examining the link between credit growth skewness and long-run growth. Earlier literature found that economies that are characterized by negative skewness in private sector credit growth experience faster output growth. We revisit this relationship using a large panel dataset that encompasses both advanced and developing economies and the aftermath of the global financial crisis. While our results reconfirm an association between credit skewness and economic growth, the relationship is more nuanced than previously thought. The beneficial growth effects of negative skewness are evident only prior to 2000. Our findings help explain why credit cycles positively affected economic growth in emerging markets in the past and why advanced economies' growth has been sluggish since the 2008–2009 global financial crisis.

Keywords: credit dynamics, skewness, economic growth

JEL codes: F34, F36, F43, O41

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♦ Corresponding Author, Asian Development Bank, Mandaluyong City, Metro Manila, Philippines. [Email] gestrada@adb.org

♣ Navarra Public University, Pamplona, Spain. [Email] erceaitor@gmail.com

+ Asian Development Bank, Mandaluyong City, Metro Manila, Philippines. [Email] dpark@adb.org

1. Introduction

A large empirical literature shows that financial sector development is positively associated with economic growth.[1] Nevertheless, the 2008–2009 global financial crisis cast doubts about whether finance is necessarily beneficial for growth. Empirically, a growing number of studies find that the beneficial effects are non-monotonic, with some financial configurations delivering worse output outcomes.[2] According to this literature, financial innovation exposes economies to financial crises, which can trigger economic crises. The global financial crisis, which was preceded by a wave of financial innovation related to the United States housing market, is a case in point.

In a widely cited contribution, Ranciere, Tornell, and Westermann (2008) study the role of credit skewness in economic growth to better understand the finance–growth nexus.[3] Credit skewness here refers to the distribution or degree of asymmetry of credit growth of a country within a period or decade. Ranciere, Tornell, and Westermann (2008) use a panel of 58 economies for the period 1960–2000, and show that the growth rate of real credit to the private sector features significant cross-economy differences in skewness. According to their findings, economies characterized by negative skewness in private sector credit growth, which they argue is a proxy for systemic financial risk, experience faster economic growth.[4] The key take-away is that systemic risk-taking mitigates financial bottlenecks and promotes growth in economies with weak institutions, even if it also leads to crises.

The global financial crisis severely disrupted the financial systems of advanced economies and dented global growth momentum. The growth impact was more pronounced and longer-lasting in advanced economies, which were the epicenter of the crisis, putting into question the general validity of the above finding. Against this background, we assess whether the negative relation between credit skewness and output growth remains robust once the global financial crisis is included in the analysis. One possible explanation is that the finance–growth link differs between advanced and developing economies, an issue that was not explored in Ranciere, Tornell, and Westermann (2008). To examine whether this is the case, we put together a new dataset, which encompasses both advanced and developing economies, as well as the post-global financial crisis period. To further our understanding of the link between credit skewness and economic growth, we also test the extent to which the size and sign of credit growth skewness affect economic growth.

Most empirical studies showing positive spillovers from finance to growth analyze the relation with a linear panel data framework. This amounts to assessing the effect of the level of finance on the level of growth. These studies explore the effect of the level of finance on the level of growth, and generally find a significant and positive relationship between the two (King and Levine 1993; Levine and Zervos 1998; Demirgüç–Kunt and Levine 1996; Beck and Levine 2004). In recent years, some authors have shown the existence of nonlinearities in the finance–growth nexus. Arcand et al. (2012) show that, beyond some level, higher levels of private credit can lead, through hysteresis, to lower long-run growth. Other authors point out that financial boom–bust cycles affect growth in a plethora of ways, not all of them well understood. Some papers highlight channels at work during the leveraging phase, while others highlight channels at play during the deleveraging phase.

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[1] Levine (2004) reviews the literature and argues that, despite measurement and econometric difficulties, evidence points to a beneficial effect of finance on growth. Estrada et al. (2010) focus on Asian economies and reach the same conclusion.

[2] This is the so-called "too much finance" literature (see Arcand, Berkes, and Panizza 2012).

[3] Related to this, Adrian et al. (2017) and Popov (2014) argue that where output is more volatile, it is also more skewed.

[4] These authors argue that skewness proxies systemic risk, which works as an incentive to overcome institutional problems. The logic behind this result is that when economies need to circumvent informational asymmetries, such as those due to a lack of institutional development, they can do so by generating systemic risk (boom–bust cycles).

Easterly et al. (2000) empirically show that there is a convex and non-monotonic relationship between financial depth and output growth volatility. Financial deepening smooths consumption and reduces volatility only up to a limit beyond which further financial development implies excessive leverage and thus more risks and instability. Bezemer (2012) argues that financial development has two sides: gross domestic product (GDP)-enhancing and asset-prices enhancing.[5] Aghion et al. (2005) show that, in the presence of borrowing constraints, more financially developed countries suffer less volatility and reach higher output growth. Ranciere et al. (2006) shows that the damaging effect of crises on growth do not overturn the direct beneficial effect of credit. Similarly, Philippon (2012) argues that capital misallocation may be more damaging in more financialized economies. According to these contributions, financial development can be volatile and result in financial crises, affecting both the level and volatility of output growth.

Closest to us, Ranciere, Tornell, and Westermann (2008) draw a parallel between boom–bust cycles and the skewness of the distribution of credit growth, and show that negative credit skewness is associated with stronger economic growth. Relatedly, Ramey and Ramey (1995) studied the link between the average and the volatility of economic growth, giving rise to a large body of literature on the relation between the mean and volatility of output growth distribution. The stylized fact that emerges from this literature is that countries with more volatile growth experience lower average growth. Digging further into the relation among distributional moments, Bekaert and Popov (2012) find a positive relation between the volatility and skewness of growth.[6] Using micro data, Salgado et al. (2015) find a positive relationship between average growth and average skewness.[7]

We find some support for the relation found by Ranciere, Tornell, and Westermann (2008). However, the relation appears to break down for advanced economies, especially in the more recent period. Specifically, in advanced economies negative skewness had a positive effect on economic growth prior to—but not after—the global financial crisis.

We also find some evidence that skewness has a nonlinear relation with economic growth, and that both positive and negative skewness can have a positive effect on economic growth. In addition, motivated by the idea that credit recessions play a cleansing role in financial systems (Bezemer 2012), we also examine whether deleveraging helps determine the relationship between credit dynamics and economic growth, beyond the sign of skewness. We show that economies suffering credit stagnation experience lower output growth than those characterized by credit recessions, and that credit stagnation is the more likely of the two when skewness is positive.

The rest of this paper is organized as follows. In section II, we describe the data used in our empirical analysis. Section III explains our econometric strategy, while section IV reports and discusses our empirical results. Section V concludes our paper.

2. Data

We first build a dataset analogous to that in Ranciere, Tornell, and Westermann (2008), which we will refer to as the "RTW sample." RTW covered a sample of 58 countries and considered three sample periods: 1961-2000, 1971-2000, and 1981-2000. To check for the robustness of the relationship between skewness and growth, we build a larger sample with 80 economies. Our extended sample contains all economies with available data in the World Bank's World Development Indicators (WDI)

[5] According to Bezemer et al. (2014), financial flows were an important element of the Great Moderation.

[6] They argue this is due to the existence of growth miracles and financial meltdowns in advanced economies.

[7] According to Salgado et al. (2015), it is during recessions, when cross-firm growth is lower, that the distribution of growth becomes more negatively skewed. See also Adrian et al. (2013) and Popov (2014).

and the International Monetary Fund's International Financial Statistics (IFS) for the period 1971–2018. Unlike in RTW (2008), we don't cover the period 1961-1970 due to lack of data in one of our control variables, secondary schooling, which is no longer available in the World Bank's WDI database.

Pooling all cross-economy data by decade, we have a total of 127 observations (economy and decade pairs) in the RTW sample for 1971-2000 and 324 observations in the extended sample for 1971-2018. Note that for the RTW sample in 1971-2018, we have 206 observations. Data sources, descriptive statistics, and data summaries by decade are shown in Tables A1, A2, A3, and A4 in the Appendix. As in RTW (2008), our sample excludes economies that suffered wars or large terms-of-trade deteriorations.[8] We remove these two types of events since they are expected to lead to large credit drops. Once these factors are removed, skewness is more likely to capture financial crises, which we examine later in the text.

We calculate skewness of growth in private credit by the banking sector using data from the IFS. Since our sample period is 1971-2018, skewness is calculated for each country and each of the following 10-year periods, except for the last period which covers only 8 years: (i) 1971-1980, (ii) 1981-1990, (iii) 1991-2000, (iv) 2001-2010, and (v) 2011-2018.[9] To compute growth in real bank credit, we deflate nominal credit by Consumer Price Index data from the IFS. Average per capita GDP growth is estimated using WDI data. We include standard controls in growth regressions. These are initial GDP per capita, to account for growth convergence, and initial schooling level (proxied by gross secondary school enrollment), to capture human capital. Both are taken from the WDI.[10]

The variables are estimated for each 10-year non-overlapping period, except the last period (2011–2018). Following RTW (2008), initially we use data until 2000 and compare the results for 1971–2000 versus 2001–2018. Then we examine the entire period 1971–2018.[11] Our initial sample covers 46 economies out of 58 included in RTW (2008). Our expanded sample covers 80 countries.

2.1 Country Sample from Ranciere, Tornell, and Westermann (2008)

Columns (1) and (2) of Table 1 show that the RTW sample contains a greater proportion of observations (i.e., country-decade pair) with positive credit skewness than negative credit skewness. This suggests more observations are dominated by frequent slow credit growth. However, this was more evident in 1971–2000 than in the entire period 1971–2018. Table 1 also shows that in both high-

[8] The severe war cases are Algeria, Republic of Congo, Democratic Republic of Congo, El Salvador, Guatemala, Iran, Nicaragua, Peru, the Philippines, Sierra Leone, South Africa, and Uganda. The source for war episodes is the Heidelberg Institute of International Conflict Research. An economy is classified as having experienced a severe war if the ratio of violent deaths to population is more than 5 per 100,000 for 2 consecutive years. The large terms-of-trade deterioration cases are Algeria, Republic of Congo, Democratic Republic of Congo, Cote d'Ivoire, Ecuador, Egypt, Ghana, Haiti, Iran, Pakistan, Sri Lanka, Nicaragua, Nigeria, Sierra Leone, Syria, Togo, Trinidad and Tobago, Uganda, Venezuela, and Zambia. An economy is classified as having suffered a large terms-of-trade deterioration if its terms-of-trade worsened more than 30% in a single year or experienced an average annual deterioration of more than 25% (or 20%) in 2 (or 3) consecutive years. Other events such as extreme natural disasters may also lead to credit drops. We don't cover them due to data limitations

[9] Skewness is estimated for each country in each period/decade as follows:

$$SK = \frac{\Sigma_{t=1}^{T} (Y_t - \bar{Y})^3 / T}{s^3}$$

where $\bar{Y}$ is the mean credit growth for the entire decade, s is the standard deviation of credit growth, t is each year within a decade with credit growth data, and T is total the number of years within the period on which skewness is calculated. A period with abrupt credit growth declines has a longer left tail (negative skewness).

[10] For Taipei, data are from CEIC.

[11] RTW (2008) covers 1961–2000. We do not cover 1961–1970 due to a lack of gross secondary enrollment data in WDI. Also, we don't cover 17 out of the original 58 economies in RTW (2008) due to missing gross secondary enrolment data. We apply the condition that a given decade is included only if we have data for at least 7 years of credit growth.

income Organisation for Economic Co-operation and Development (OECD) economies and developing economies, there are more decades of positive skewness than negative skewness in the 1971–2000 RTW sample. We find that the gap between the shares of positive skewness and negative skewness is higher among OECD economies. There is a greater tendency for advanced economies to exhibit positive rather than negative skewness.

Following Bulmer (1979), observations are grouped by degree of skewness, whether highly or moderately positive (negative), or approximately symmetric, in columns (3) to (7) of Table 1. We find that around 43% of developing economies in the RTW sample are approximately symmetric, for both 1971–2000 and 1971–2018 (Table 1). We also find that advanced economies have a greater proportion of events with approximately symmetric distributions than developing economies. After breaking down the distributions into degrees of skewness, we observe more events of moderate/high positive skewness than moderate/high negative credit skewness in both advanced and developing economies.

Table 1: Shares of Observations of Positive and Negative Skewness, 1971–2018

	Negative skewness	Positive skewness	Highly positive	Moderate positive	Approximate-ly symmetric	Moderate Negative	Highly negative	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
RTW sample (1971–2000)								
Developing economies	41.9	58.1	9.7	22.6	43.6	12.9	11.3	100.0
OECD	33.9	66.2	20.0	15.4	53.9	9.2	1.5	100.0
Total	37.8	62.2	15.0	18.9	48.8	11.0	6.3	100.0
RTW sample (1971–2018)								
Developing economies	47.4	52.6	7.2	22.7	42.3	15.5	12.4	100.0
OECD	45.0	55.1	14.7	11.9	58.7	11.0	3.7	100.0
Total	46.1	53.9	11.2	17.0	51.0	13.1	7.8	100.0
Extended sample (1971–2018)								
Developing economies	44.6	55.5	12.4	23.8	42.6	13.9	7.4	100.0
OECD	47.5	52.5	13.9	13.1	58.2	10.7	4.1	100.0
Total	45.7	54.3	13.0	19.8	48.5	12.7	6.2	100.0

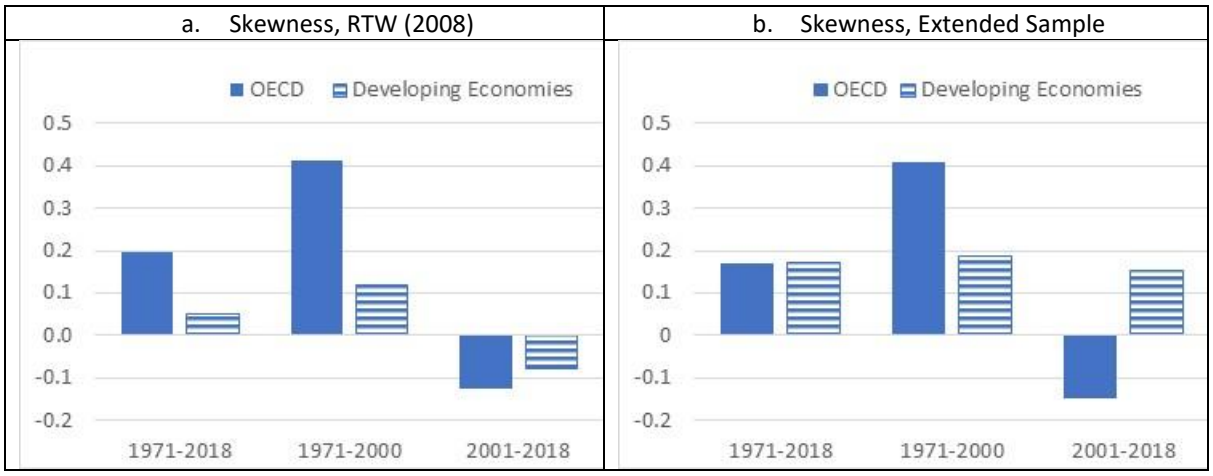
Notes: The degrees of skewness in columns (3) to (7) correspond to the following: (i) highly positive (negative): skewness greater than 1.0 (less than –1.0); (ii) moderately positive (negative): between 0.5 and 1.0 (between –1.0 and –0.5); and (iii) approximately symmetric: between –0.5 and 0.5.
Source: Authors' estimates.

As shown in Figure 1 and Table A2a for the RTW sample, over the period 1971–2018, advanced economies on average had higher credit skewness than developing economies. Advanced economies exhibited lower average real credit growth than developing economies and had more stable credit growth patterns.[12] In the earlier period 1971–2000, advanced economies had slightly higher average credit growth and lower credit growth volatility than developing economies. They also had higher skewness, indicating that they appeared to have had less systemic risk relative to developing economies. However, this pattern reversed in 2001–2018, with advanced economies having lower skewness than developing economies. Mean average credit growth was lower for advanced economies in 2001–2018 compared with 1971–2000. However, volatility, as measured by the coefficient of variation, was higher (1.80 in 2001-2018 vs 0.40 in 1971-2000). In contrast, average

[12] The coefficient of variation of OECD is 1.49 while that of developing economies is 1.79.

credit growth increased in developing economies in 2001-2018, accompanied by less volatility in credit growth as well as higher output growth.

Figure 1: Average Skewness



Notes: OECD = Organisation for Economic Co-operation and Development; RTW = Ranciere, Tornell & Westermann (2008).
Source: Author's estimates.

2.2 Extended Sample

The patterns of the extended sample over the period 1971–2018 somewhat mirror those of the RTW sample. In particular, there are more periods of positive credit skewness than negative credit skewness for the full sample of economies as well as the developing economy and OECD subsamples (Table 1). However, in terms of average credit skewness, Figure 1 shows that advanced economies and developing economies have almost similar mean skewness over the period 1971–2018, unlike in the RTW sample. A similarity between the RTW sample and extended sample is that credit skewness was higher in advanced economies than in developing economies in 1971–2000, but the pattern was reversed in 2001–2018. On average, real credit growth was more than twice higher in developing economies than in advanced economies in 2001-2018 (Table A.2b). Developing economies also showed less volatile credit growth patterns during that period.[13] Developing economies also grew faster in 2001-2018 and experienced more stable economic growth than advanced economies (Table A.3). Economic growth skewness was on average negative for both advanced and developing economies in the entire period of 1971-2018 as well as in the subperiods1971-2000 and 2001-2018. (Table A.3).

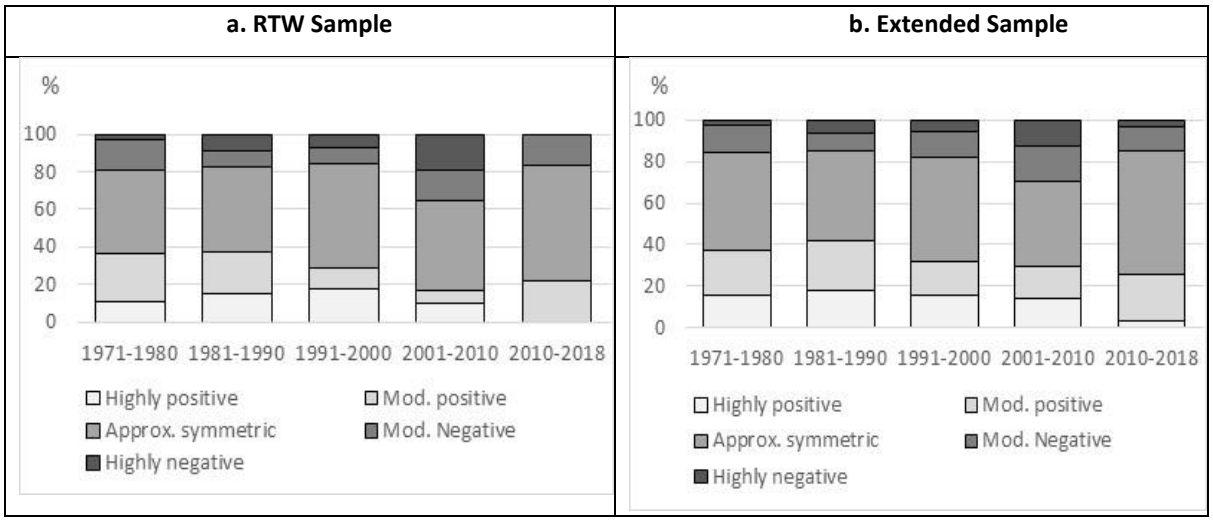
2.3 Trends by Decades

Figure 2 shows the patterns of skewness by decade. In both the RTW and extended samples, the tendency for positive skewness outweighs the tendency for negative skewness across decades. However, this was not evident during 2001–2010, which is the period that includes the global financial crisis. During this decade, the shares of highly negative skewness was more than double that of the decades from 1971 to 2000 in both samples. This is consistent with abrupt credit disruptions during the global financial crisis. In summary, there would have been a greater proportion of positive

[13] In 2001-2018, the coefficient of variation (CV) of credit growth was 1.14 for developing economies and 1.73 for advanced economies. The CV of GDP per capita growth was 1.03 for developing economies and 1.60 for advanced economies.

skewness for the entire period 1971–2018 had it not been for the global financial crisis decade (2001–2010), which led to a relatively sharp jump in the shares of observations with moderately and highly negative skewness.

Figure 2: Shares of Observations with Negative and Positive Skewness



RTW = Ranciere, Tornell, and Westermann (2008).
Source: Author's estimates.

2.4 Credit Skewness and Crises

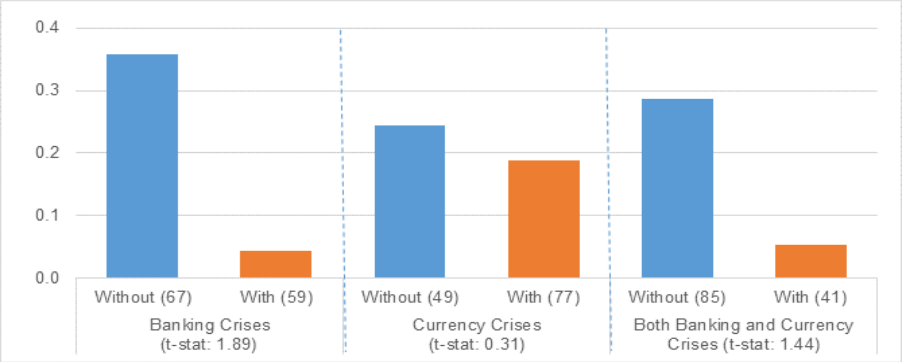
We now examine how closely credit skewness is related to widely known crisis indices, using data from Reinhart and Rogoff (2011) and Laeven and Valencia (2012). We compare mean skewness between decades with crises and decades without crises.

For the Reinhart and Rogoff (2011) bank and currency crisis indices, as shown in Figure 3a, we cover a subsample of 36 economies, comprising 126 economy–decade pairs with data on skewness over the period 1971–2010. This figure indicates that periods with either type of crisis have lower average skewness in credit growth. The gap is most pronounced in periods with bank crises. Based on the t-tests, we find significant differences between mean skewness in decades with bank crises and mean skewness in decades without them. However, there are no significant differences between mean skewness in periods with and without currency crises. Note that mean skewness is positive for periods with banking crises, periods with currency crises, and periods with both types of crises, suggesting that crises are not always captured by negative skewness.

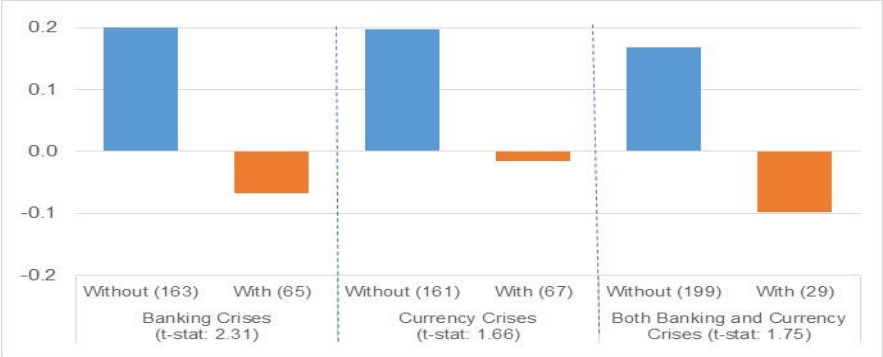
The Laeven and Valencia (2012) dataset allows us to cover more economies, namely 69 economies and 228 economy–decade pairs (Figure 3b). The t-test results show significant differences between mean skewness of observations with and without bank crises. Statistical differences were likewise detected between periods with either bank or currency crises and periods without crises. Unlike our findings for the Reinhart and Rogoff (2011) indices, according to the Laeven and Valencia (2012) dataset, crises periods are clearly characterized by negative skewness. Finally, we compare skewness in normal versus bank crisis decades for OECD and developing economies samples. Among OECD economies, on average, credit skewness is significantly lower during bank crises than during normal times (Figure 4).

Figure 3: Mean Skewness of Credit Growth and Crises, 1971–2010

a. Reinhart and Rogoff (2011) Indices



b. Laeven and Valencia (2012) Indices

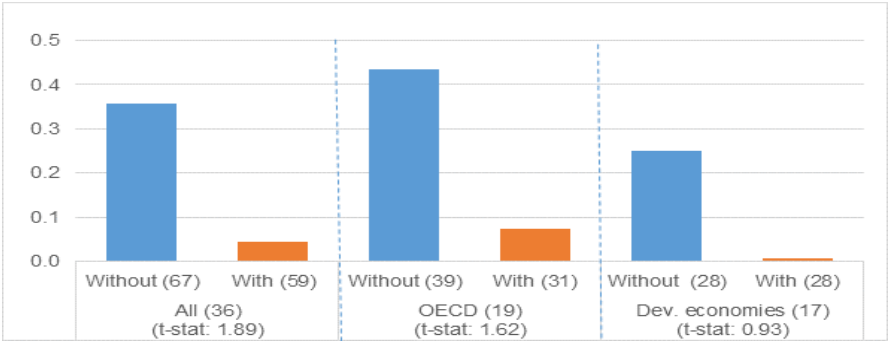


Notes: Data from Reinhart and Rogoff (2011) cover 126 economy–decade pairs and include 59 banking crises, 77 currency crises, and 41 with both banking and currency crises. The Laeven and Valencia (2012) data cover 228 economy–decade pairs and include 65 banking crises, 67 currency crises, and 29 with both banking and currency crises. Number of observations is in parentheses under each bar after the label "Without" or "With".

Source: Author's estimates.

Figure 4: Mean Skewness of Credit Growth in Periods with and without Banking Crises, 1971–2010

a. Reinhart and Rogoff (2011) Indices



b. Laeven and Valencia (2012) Indices

Notes: OECD = Organisation for Economic Co-operation and Development. Data from Reinhart and Rogoff (2011) cover 126 economy–decade pairs and include 59 banking crises, 77 currency crises, and 41 banking and currency crises. The Laeven and Valencia (2012) data cover 228 economy–decade pairs and include 65 banking crises, 67 currency crises, and 29 with both banking and currency crises. Number of observations is in parentheses under each bar after the label "Without" or "With".
Source: Author's estimates.

2.5 Credit Skewness and Economic Growth Patterns

Here we examine associations between skewness of credit growth and average economic growth. Data indicate that periods of negative skewness are associated with higher growth compared with periods of positive skewness. Table 2 shows that during 1971–2000 in the RTW sample, average per capita GDP growth during the periods of negative credit skewness averaged 2.23%, higher than the 1.68% during periods of positive skewness. However, during the period 1971–2018, the gap in growth between periods of negative skewness and positive skewness narrowed for advanced economies. For developing economies, there does not appear to be much difference in the gap for the two sub periods. Results from a formal t-test fail to detect statistical differences in growth between positive and negative skewness in 1971–2000 in developing countries, but detect differences in the OECD sample.

For periods with moderately or highly negative skewness versus periods with moderately or highly positive skewness, the patterns differ from just looking at negative versus positive skewness. For example, in the RTW sample and extended sample in 1971–2018, GDP per capita growth was higher in periods with negative skewness compared to periods with positive skewness in the OECD subsample. However, for the same OECD subsample, GDP per capita growth was lower in periods with moderately or highly negative credit skewness compared to periods with moderately or highly positive

skewness. Thus, the relationship is not robust. In the next section, we discuss our approach to a systematic analysis of the link between negative skewness and economic growth.

Table 2: Average GDP per Capita Growth—Negative versus Positive Credit Skewness, 1971–2018

Economies	Negative Skewness	Positive Skewness	Moderately or Highly Negative Skewness	Moderately or Highly Positive Skewness
RTW sample (1971–2000)				
All	2.23	1.68	1.50	1.68
	(2.19)	(1.79)	(1.83)	(1.68)
Developing economies	1.61	1.12	1.26	1.07
	(2.24)	(2.28)	(2.06)	(2.08)
OECD	2.92	2.18	2.03	2.21
	(1.93)	(0.98)	(1.19)	(1.01)
RTW sample (1971–2018)				
All	2.07	1.68	1.81	1.90
	(1.81)	(1.71)	(1.48)	(1.59)
Developing economies	2.04	1.56	1.93	1.76
	(1.88)	(2.23)	(1.69)	(2.02)
OECD	2.09	1.78	1.62	2.03
	(1.76)	(1.11)	(1.07)	(1.00)
Extended sample (1971–2018)				
All	2.10	1.96	2.09	2.04
	(2.08)	(2.16)	(2.15)	(2.20)
Developing economies	2.08	2.03	2.34	2.03
	(2.29)	(2.57)	(2.46)	(2.57)
OECD	2.15	1.83	1.48	2.06
	(1.70)	(1.12)	(0.97)	(1.02)

OECD = Organization for Economic Co-operation and Development, RTW = Ranciere, Tornell, and Westermann (2008). Note: Figures in parentheses are standard deviations of growth rates. Source: Authors' estimates.
Source: Authors' estimates.

3. Model and Methodology

In this section, we discuss our model and econometric methodology. We first briefly refer to the theoretical discussion in RTW (2008) on the relation between credit skewness and economic growth, and then we add our own extensions of the model.

The RTW model considers an economy where imperfect contract enforceability leads to borrowing constraints. Firms' investment is constrained by their internal funds, which restricts growth. However, when the government commits to provide systemic guarantees,[14] it induces risk-taking by firms. Risk-taking reduces the effective cost of capital and encourages leveraging. Increased leverage leads to higher investment and more future internal funds, which in turn lead to more investment. This is what RTW (2008) refer to as the leverage effect, which enables systemic risk to increase investment and growth in the absence of a crisis. However, systemic risk taking also leads to aggregate financial instability or occasional crises. It is possible for risk-taking to increase long-run

[14] RTW argues that it is important that guarantees are systemic, since if bailouts are granted for every idiosyncratic default, borrowing constraints are absent as lenders would always be repaid by the government.

growth by compensating for the effects of enforceability problems. It is when contract enforceability problems are severe, but not too high (i.e., within some bounds), that makes the effect of leveraging strong. Crisis are considered rare events. As long as a crisis does not occur, internal funds are built up and credit increases, but once a crisis occurs, credit drops abruptly. Thus, the resulting scenario is for growth to be low in the crisis state that rarely occurs, or high in the no-crisis state. Financial crises are linked with higher mean growth only if they are rare and systemic.

To capture rare and systemic crises, RTW (2008) proposes using skewness rather than variance because high variance potentially covers not only rare and abrupt credit changes but also symmetric shocks, whereas skewness specifically catches asymmetric and abnormal patterns or those large, rare, and abrupt credit busts.

Following RTW (2008), we extend a standard growth equation by including the three first moments of the distribution of real credit growth. Our baseline model for studying the link between credit skewness and economic growth is the following panel regression:

$$y_{it} = \beta_{\mu} \cdot \mu_{bc,it} + \beta_{\sigma} \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

where y_{it} stands for average per capita GDP growth, and $\mu_{bc,it}$, $\sigma_{bc,it}$, and $sk_{bc,it}$ represent the mean, standard deviation, and skewness of the growth rate of real credit to the private sector, respectively. We also include a vector of controls X_{it} and period dummies δ_t. The error term is collected in ε_{it}. Our narrow set of controls includes initial per capita GDP and the initial ratio of secondary schooling. We conduct a simple extension of this model by interacting moments of credit growth with time dummy variables to check if credit skewness may have a different effect by decade. We use specifications for periods until 2000 (close to the original RTW sample) versus longer periods and those covering the 2008-2009 global financial crisis. Covering the most recent financial crisis sheds light on whether the RTW model applies in this type of unprecedented crisis. Further, we distinguish between developing and advanced economies. RTW's model does not distinguish between the two but offers some semblance to this. In particular, they assume that growth-enhancing effects are possible in the presence of borrowing constraints due to contract enforceability problems, a feature of most developing economies.

RTW (2008) examined the link between skewness and growth through cross-sectional regressions using ordinary least squares and panel regressions using generalized least squares (GLS). We employ a similar strategy in this paper. We estimate our model by generalized least squares, using 10-year non-overlapping windows, and also apply fixed effects to check for robustness. We run this regression for our two samples. Using the extended sample, we run this regression both for the full sample and separately for advanced and developing economies.

In the rest of this section, we extend our model to capture other potential mechanisms at work. First, in the spirit of Arcand et al. (2012), we test whether negative and positive skewness affect growth differently. Then, following Bezemer (2012), we check whether skewness remains a sufficient statistic of the positive effect of finance on growth if it reflects large credit booms that are not accompanied by a credit bust, but are followed by a period of credit stagnation. We see this as a way to test whether credit busts have a cleansing effect (creative destruction).

3.1 Nonlinearities: Positive versus Negative Skewness

As in RTW (2008), we test whether there is a role for nonlinearities by allowing the effects to differ depending on whether skewness is positive or negative. The underlying idea is that the relation between credit skewness and economic growth may differ depending on whether the skewness is positive or negative. The sign of skewness matters to distinguish which of the two–positive or negative

skewness–drives higher growth. It is also possible that both can accelerate growth. This suggests that a steady credit growth path, evident in economies with positive skewness, could deliver greater economic growth. The new regression is

$$y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it} \qquad (2)$$

where ${sk_{bc,it}}^{POS}$ is defined as the value of credit skewness if it is positive and zero otherwise, and ${sk_{bc,it}}^{NEG}$ is defined similarly for negative skewness.

3.2 Negative Skewness and Credit Busts

RTW (2008) argue that negative skewness is a proxy for systemic risk, which they see as a process of credit-driven creative destruction, leading to higher growth. Here we test this by checking whether it is the presence or absence of an actual drop in credit that determines the strength or weakness of subsequent growth dynamics.[15] To carry out this analysis, we define an indicator that measures the extent of credit deleveraging. We calculate the growth of credit in a full decade. Defining any time period within a decade as t_j, we define cumulative credit growth as follows:

$$CCG_{id} = \sum_{j=1}^{j=10} bc_{it_j}$$

where bc_{it_j} stands for the growth rate of real credit of economy i in year t_j within decade d. Using CCG_{id}, we extend our benchmark regression as follows:

$$y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it} \qquad (3)$$

where $\mu_{bc,it}$, $\sigma_{bc,it}$, and $sk_{bc,it}$ represent the mean, standard deviation, and skewness of the growth rate of credit, and X_{it} contains the controls. The new elements are cumulative credit growth and its interaction with credit skewness. These regressions reveal whether the relation between skewness and growth depends on cumulative credit growth through the sign of ${\beta_{sk}}^{CCG}$. If this coefficient is negative, a credit decline may be less damaging when skewness is positive.

3.3 Nonlinearities and Credit Deleveraging

Finally, we combine the two previous exercises to study how actual credit accumulation or reduction affects the relation between skewness and growth differently when skewness is positive versus when it is negative. Using CCG_{id}, ${sk_{bc,it}}^{NEG}$, and ${sk_{bc,it}}^{POS}$, we define the following model:

$$y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} +$$
$$+ {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it} \qquad (4)$$

where $\mu_{bc,it}$ and $\sigma_{bc,it}$ represent the mean and standard deviation. As in Equation (2), credit growth skewness is separated into positive and negative values, and X_{it} contains additional controls. Basically, we are separating our economy–decade observations in two groups—negative vs positive skewness—and allow the effect within each group to depend on the credit change within the decade, captured by coefficients ${\alpha_{sk}}^{NEG}$ and ${\alpha_{sk}}^{POS}$:

[15] Similarly, Caballero et al. (2008) and Philippon (2012) argue that after crises, the economy needs to undergo a period of credit deleveraging, during which balance sheets clear and credit stocks falls, before economic activity can pick up again.

$$\frac{\partial y_{it}}{\partial sk_{bc,it}{}^{POS}} = \beta_{sk}{}^{POS} + \alpha_{sk}{}^{POS} \cdot CCG_{id} \quad (5)$$

For any given level of positive (negative) skewness, whether a reduction in real credit leads to higher or lower growth depends on the sign of $\alpha_{sk}{}^{POS}$ ($\alpha_{sk}{}^{NEG}$). If $\alpha_{sk}{}^{POS} < 0$, then for any given level of positive skewness, its effect is stronger whenever there has been credit deleveraging in the period.

4. Empirical Results

As a first step, we estimate equation (1) using the RTW sample for both the full sample, and the OECD and non-OECD subsamples. We also estimate the model using the following time sub-samples: 1971–2000 (closest to RTW 2008); 2001–2018; and 1971–2018. The results are in Table 3.

4.1 RTW Sample

Results in Table 3 show that credit and economic growth are positively linked, which is consistent with much of the literature on the finance–growth nexus (King and Levine 1993). We also find that higher credit growth variance (volatility) associates with lower economic growth.

- Table 3 also shows a significant and negative link between credit growth skewness and economic growth in the full sample.
- This relationship also holds, after controlling for both the mean and variance of credit growth, in 1971–2000 (column 1) and 2001–2018 (column 2).
- For specifications covering the earlier period between 1971 and 2000, the coefficient is –0.26 for the full sample in column 1, which suggests that a one-unit decrease in skewness (from 0 to –1) is associated with a 0.26% increase in economic growth.
- The association between growth and skewness during 1971-2000 is significant in advanced economies (column 4) but not in developing economies (column 7).
- For the full sample, in the specifications covering a longer time period, 1971–2018, the coefficient becomes insignificant (column 3), suggesting that the correlation between systemic risk and growth is not robust for the longer time period.
- For advanced economies, the relationship between skewness and growth is negative and significant prior to—but not after—2000, as shown in columns 4 and 5, respectively.

For our full sample, we find a significant and negative link between credit growth skewness and economic growth. This suggests that the tendency to have more episodes of relatively high credit growth (i.e., credit booms) with rare episodes of low or even negative credit growth (to the extent that it leads to financial crises or credit busts) is linked to higher economic growth. Our results suggest that, beyond the effect of high average credit growth, rare instances of credit busts can have beneficial effects on economic growth. However, the above result is not evident for the full period 1971-2018, nor for advanced economies beyond 2000. We extend our analysis below to examine this issue further.

4.2 Extended Sample

Next, we estimate equation (1) for our larger sample, with the results shown in Table 4. We find that credit skewness is no longer significant (column 1). To understand why results change when we expand the sample, we conduct a number of alternative analyses. First, we examine whether credit skewness may have a different effect by decade. We do this by introducing interaction variables between skewness and decade dummy variables, with the results shown in columns 2, 4, and 6 of

Table 4. We only find a significant and negative effect of skewness for the 1970s for developing economies (column 6). For advanced economies, a significant and positive correlation between skewness and credit growth is found for 2001-2010 (column 4).

Next, we re-estimate equation (2), which allows for different effects from negative and positive skewness. The results are shown in columns 7 (full sample), 10 (OECD), and 13 (developing economies) in Table 4. For the full sample and developing economies we observe a negative correlation between negative skewness and economic growth. Next, we examine the interaction between skewness and credit dynamics, as specified in equation (3). In columns 8, 11, and 14 of Table 4, cumulative credit growth and its interaction with credit skewness is insignificant.

Finally, we re-estimate equation (4) to look at nonlinearities and credit deleveraging. We find that the interaction between negative skewness and total credit is insignificant in the full sample, as shown in column 9 of Table 4. However, positive skewness interacted with credit growth is significant in developing economies (column 15), but not in advanced economies (column 12). Again, this implies that for any given level of positive skewness, its effect is stronger when there has been credit deleveraging. A possible reason why negative skewness is not significant for advanced economies is that they are characterized by positive skewness, which implies fewer instances of credit booms and busts but also a slower path of growth. On the other hand, developing economies are subject to more destructive credit busts, which in exchange may unleash economic dynamism. These results imply that the growth benefits from negative skewness outweigh the risks. Still, we find that positive skewness has a positive coefficient for the full sample and developing economy subsample, which suggests that having stable credit growth also benefits developing economies. The negative and significant interaction between positive skewness and credit change means that positive skewness can foster growth if it coincides with a credit decline. In advanced economies, stable and steady credit growth (usually characterized by positive skewness) may be more beneficial than credit booms.

To check for robustness, in Appendix Table A5 we include fixed effects. In the baseline equation, using the full sample, credit skewness remains insignificant (column 1). By decade, we do not find any significant coefficient for period dummies and skewness. This applies to the full sample, as well as the OECD and developing economy subsamples.

Table 3: Skewness and Growth (Dependent Variable—Real GDP per Capita Growth, Panel GLS), RTW Sample

	Full Sample			OECD			Developing Economies		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1971–2000	**2001–2018**	**1971–2018**	**1971–2000**	**2001–2018**	**1971–2018**	**1971–2000**	**2001–2018**	**1971–2018**
Credit growth mean ($\mu_{bc,it}$)	0.142***	0.044***	0.121***	0.086***	0.011	0.051***	0.163***	0.059**	0.122***
	(0.011)	(0.015)	(0.014)	(0.019)	(0.014)	(0.015)	(0.025)	(0.026)	(0.021)
Credit growth SD ($\sigma_{bc,it}$)	-0.045***	-0.002	-0.039***	-0.027***	0.015	-0.011	-0.045**	-0.055***	-0.037**
	(0.007)	(0.008)	(0.008)	(0.010)	(0.011)	(0.007)	(0.020)	(0.020)	(0.018)
Credit growth SKW ($sk_{bc,it}$)	-0.255***	-0.118*	-0.125	-0.214*	0.057	-0.034	-0.248	-0.112	-0.197
	(0.088)	(0.068)	(0.084)	(0.110)	(0.062)	(0.075)	(0.185)	(0.152)	(0.168)
Initial income per capita	0.012	-0.536***	-0.157	-1.178***	-0.610***	-0.789***	0.509*	0.095	0.299
	(0.120)	(0.084)	(0.114)	(0.244)	(0.143)	(0.202)	(0.289)	(0.265)	(0.253)
Initial schooling	0.012**	0.011***	0.009*	0.013*	-0.002	0.006	-0.005	0.006	0.005
	(0.005)	(0.004)	(0.005)	(0.007)	(0.003)	(0.004)	(0.012)	(0.009)	(0.011)
Time dummy, 1971–1980			0.914***			0.686***			0.075
			(0.227)			(0.225)			(0.658)
Time dummy, 1981–1990	-0.736***		0.279	-0.138		0.527***	-0.966**		-1.098**
	(0.130)		(0.210)	(0.181)		(0.201)	(0.477)		(0.557)
Time dummy, 1991–2000	-0.558***		0.348*	-0.306		0.481***	-0.291		-0.486
	(0.122)		(0.204)	(0.203)		(0.171)	(0.479)		(0.558)
Time dummy, 2001–2010		-0.372***	-0.327		-0.249**	-0.320*		-0.025	-0.165
		(0.100)	(0.204)		(0.108)	(0.171)		(0.203)	(0.475)
Constant	1.091	5.725***	1.940**	12.936***	7.757***	8.834***	-2.284	1.474	-0.699
	(0.874)	(0.585)	(0.798)	(2.245)	(1.486)	(2.087)	(2.009)	(1.641)	(1.525)
Observations	127	79	206	65	44	109	62	35	97
Number of economies	46	42	46	23	23	23	23	19	23

RTW = Ranciere, Tornell, and Westermann (2008), SD = standard deviation, SKW = skewness. Notes: Standard errors in parentheses. *** = p<0.01, ** - p<0.05, and * = p<0.1.

Note: The results refer to Equation (1) in this study: $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$

Source: Authors' estimates.

Table 4: Skewness and Growth of Extended Sample, 1971–2018 (panel GLS)

	Full Sample		OECD sample		Developing Economies	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Baseline	Time Interactions	Baseline	Time Interactions	Baseline	Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.135***	0.130***	0.052***	0.069	0.122***	0.166***
	(0.011)	(0.029)	(0.014)	(0.045)	(0.012)	(0.043)
Credit growth SD ($\sigma_{bc,it}$)	-0.055***	0.098**	-0.008	0.155	-0.062***	0.079
	(0.007)	(0.040)	(0.007)	(0.103)	(0.010)	(0.049)
Credit growth SKW ($sk_{bc,it}$)	-0.055	-0.139	-0.092	-0.245	-0.072	0.186
	(0.076)	(0.249)	(0.066)	(0.232)	(0.102)	(0.310)
Credit gr. mean x 1971–1980		-0.054		0.002		0.002
		(0.043)		(0.056)		(0.066)
Credit gr. mean x 1981–1990		0.056		0.146**		0.090
		(0.039)		(0.063)		(0.055)
Credit gr. mean x 1991–2000		-0.029		-0.004		-0.091*
		(0.035)		(0.054)		(0.047)
Credit gr. mean x 2001–2010		-0.027		-0.051		-0.077
		(0.035)		(0.054)		(0.050)
Credit gr. SD x 1971–1980		-0.153***		-0.254**		-0.124**
		(0.045)		(0.107)		(0.057)
Credit gr. SD x 1981–1990		-0.194***		-0.291***		-0.105*
		(0.043)		(0.107)		(0.063)
Credit gr. SD x 1991–2000		-0.146***		-0.153		-0.145***
		(0.040)		(0.104)		(0.051)
Credit gr. SD x 2001–2010		-0.088**		-0.125		-0.107*
		(0.044)		(0.104)		(0.057)
Credit gr. SKW x 1971–1980		0.005		0.433		-0.920*
		(0.326)		(0.319)		(0.527)
Credit gr. SKW x 1981–1990		0.175		0.123		0.009
		(0.318)		(0.306)		(0.418)
Credit gr. SKW x 1991–2000		0.258		-0.130		0.047
		(0.304)		(0.306)		(0.366)
Credit gr. SKW x 2001–2010		0.080		0.427*		-0.514
		(0.275)		(0.250)		(0.377)
Number of obs./eco.	324/80	324/80	122/77	122/77	202/53	202/53

Table 4 (cont'd.)

Variables	Full Sample			OECD Sample			Developing Economies		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.134***	0.088**	0.088**	0.052***	-0.066	-0.043	0.122***	0.174***	0.135***
	(0.011)	(0.034)	(0.036)	(0.014)	(0.041)	(0.034)	(0.012)	(0.047)	(0.044)
Credit growth SD ($\sigma_{bc,it}$)	-0.058***	-0.047***	-0.045***	-0.008	0.011	0.005	-0.067***	-0.070***	-0.050***
	(0.008)	(0.010)	(0.010)	(0.007)	(0.009)	(0.008)	(0.010)	(0.014)	(0.013)
Credit growth SKW ($sk_{bc,it}$)		-0.029			0.023			0.024	
		(0.095)			(0.092)			(0.131)	
Positive SKW ($sk_{bc,it}^{POS}$)	0.117		0.349*	-0.084		0.057	0.361**		1.093***
	(0.125)		(0.188)	(0.109)		(0.166)	(0.164)		(0.271)
Negative SKW ($sk_{bc,it}^{NEG}$)	-0.275*		-0.209	-0.099		0.181	-0.736***		-0.962***
	(0.157)		(0.191)	(0.120)		(0.170)	(0.216)		(0.256)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		-0.000			-0.002			-0.001	
		(0.001)			(0.001)			(0.001)	
Credit Δ (CCG_{id})		0.006	0.006		0.015***	0.010**		-0.006	0.005
		(0.004)	(0.005)		(0.005)	(0.004)		(0.005)	(0.006)
Positive SKW x credit Δ ($sk_{bc,it}^{POS} \cdot CCG_{id}$)			-0.003			-0.001			-0.010***
			(0.002)			(0.002)			(0.003)
Negative SKW x credit Δ ($sk_{bc,it}^{NEG} \cdot CCG_{id}$)			0.000			-0.006			0.003
			(0.004)			(0.005)			(0.004)
Number of obs./eco.	324/80	324/80	324/80	122/27	122/27	122/27	202/53	202/53	202/53

eco. = economies, GLS = generalized least squares, gr. = growth, obs. = observations, OECD = Organization for Economic Co-operation and Development, SD = standard deviation, SKW = skewness, Δ = change.

Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, and initial schooling are not reported here. Columns (1) ,(3), and (5) refer to Equation (1): $y_{it} = \beta_{\mu} \cdot \mu_{bc,it} + \beta_{\sigma} \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_{\mu} \cdot \mu_{bc,it} + \beta_{\sigma} \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_{\mu} \cdot \mu_{bc,it} + \beta_{\sigma} \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_{\mu} \cdot \mu_{bc,it} + \beta_{\sigma} \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.

Source: Authors' estimates.

In summary, as shown in both the GLS and fixed effects estimations, we find that the relationship between negative skewness and economic growth is insignificant in the overall sample. The negative relationship between skewness of credit growth and economic growth only appears robust on a narrow set of countries (i.e., RTW sample) and prior to 2000. Using either the RTW or extended sample, the relationship between credit skewness and economic growth is insignificant. Therefore, it is difficult to establish that countries that have experienced high rapid growth at the expense of occasional financial crises (or few episodes of low or even negative credit growth) demonstrate faster growth.

As we have shown in our baseline results in Table 3, for advanced economies, the relationship between skewness and growth is negative and significant prior to—but not after—2000. The RTW (2008) model assumes that systemic risk-taking is not a growth strategy that can be pursued forever. An economy that becomes rich must move toward a safer path. They add that given decreasing returns, there is no systemic risk if an economy is rich enough. Since borrowing constraints cease to exist as the economy becomes rich, the leverage effects (via higher growth) from risk-taking disappear. The experience of advanced economies during the 2008-2009 global financial crisis indicates that such systemic risks could still emanate from rich economies.

Our conjecture is the shift in the quality of credit that occurred immediately before or around 2000 explains why the relationship between negative skewness of credit growth and overall economic growth bogged down after that period. Various types of financial configurations flourished during those periods, especially among advanced economies. Bezemer et al. (2014) found that since the 1990s, credit growth was largely due to the increase in credit to real estate and other asset markets, rather than credit to nonfinancial businesses. This was an unprecedented shift in the composition of credit, with detrimental implications for economic growth. Added to this were the rapid financial liberalization efforts in many countries during the 1990s, occurring even before the necessary legal and regulatory institutions were put in place (Rousseau and Wachtel 2011).

Related to that, we have found that the effects of skewness vary by time periods. Credit skewness occurring during earlier decades or periods with lower financial development was seen as facilitating growth, but was no longer the case since the 2000s. As shown in Figure 2, during 2001–2010, the period that includes the global financial crisis, the extent of credit skewness was markedly different from the rest of the periods: the shares of episodes with highly negative skewness were more than double that of the decades from 1971 to 2000 in both developing and advanced economies subsamples.

4.3 Extensions of the RTW Sample

In this section, we go back to the RTW sample and examine whether the impact of skewness has a different effect by decade and whether nonlinearities are present in a smaller sample. In Table A6, we find that for the OECD subsample negative skewness was associated with higher growth in the 1990s relative to the base period, the 1970s (column 4). For the developing economy subsample, negative skewness is found to be growth-promoting but not in 1991-2000 (column 6).

Accounting for differential effects of positive and negative skewness, columns 7, 10 and 13 in Table A6 show a direct association between negative skewness and growth for the full sample, and both the OECD and developing economy subsamples. For developing economies, this holds true even after controlling for credit dynamics (column 15).

Applying fixed effects to the RTW sample for 1971–2000, Table A7 shows that both positive and negative skewness are linked to higher growth (columns 7 and 9 for the full sample, column 10

for advanced countries, and columns 13 and 15 for developing countries). In Table A8 we extended the time period of the RTW sample to 2018, and find that positive skewness was linked to higher growth in 1971-1980 and 2001-2010 for advanced economies. For developing economies, negative skewness was linked to growth in the 1970s. Moreover, both positive and negative skewness are found to be associated with higher growth for developing economies (column 15). The impact of positive skewness is even greater when there is credit deleveraging as shown by the negative coefficient of positive skewness interacted with cumulative credit growth. This also applies to negative skewness in which the coefficient of its interaction with cumulative credit growth is positive.

Results for the fixed effects in Table A9 also show that negative skewness has a significant effect for developing economies in the 1970s (column 6). For advanced countries, positive skewness is good for growth only when it is accompanied by an increase in credit, while negative skewness is associated with higher growth if there is a reduction in credit growth (column 12).

5. Conclusions

While a large empirical literature finds that deeper financial systems can be beneficial for growth, evidence also shows that financial systems can be a major source of instability that can seriously harm economic growth. A good example is the 2008-2009 global financial crisis that paralyzed the global financial system and wrought havoc on the world economy. This paper contributes to the long-running debate on the finance–growth relationship by revisiting the link between skewness in real credit growth and long-run economic growth. In an influential study, Ranciere, Tornell, and Westermann (2008) showed that economies that are characterized by negative skewness in private sector credit growth tend to experience faster output growth. They argue that negative skewness is a proxy for systemic risk-taking, which helps economies with weak institutions to overcome institutional problems and achieve faster growth.

In this paper, we empirically reexamine whether this relationship still holds after we account for the global financial crisis. Our results show that while more credit is associated with higher economic growth, more frequent credit shocks can be bad for economic growth. We find that prior to 2000 financial crises, as measured by credit skewness, are positively associated with growth, but after 2000 this relationship weakened. The weakening was largely driven by advanced economies. This, in turn, could reflect differences between the types and sources of financial risks that materialized before 2000 versus those that materialized during the global financial crisis. Financial crises in the past often emanated in developing economies and their effects were largely confined to those economies. In contrast, the global financial crisis broke out in advanced economies and its effects were felt across the world. For developing economies, we do find a negative link between skewness and growth in some decades. This may imply that they have been subject to credit busts, which allowed for cleansing and creative destruction, and, more broadly, greater economic dynamism. The somewhat weak relationship between negative skewness and growth may be influenced by two caveats. One is that crises need not always imply negative skewness. Another is that negative skewness can capture credit growth busts, stagnation or deceleration, which likely have different effects on growth.

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Appendix

Table A1: Data Description and Sources

Data, 1970–2018	Definition	Source
Private credit growth	Calculated from IFS data that refer to claims on the private sector from a survey of other depository corporations, which excludes the central bank; other financial corporations, insurance corporations, and pension funds; other financial intermediaries; and financial auxiliaries To get real private credit, data are deflated by end-of-year Consumer Price Index data from IFS.	International Financial Statistics (IFS)
GDP per capita growth	Calculated from GDP per capita (constant 2005 dollars)	World Bank's WDI
Initial income	GDP per capita (constant 2005 dollars) at the start of the decade	World Bank's WDI
Initial schooling	School enrollment, secondary (% gross), which refers to the ratio of total secondary enrollment to the population of the age group	World Bank's WDI

GDP = gross domestic product, WDI = World Development Indicators. Source: Authors' compilation.
Source: Authors.

Table A2a: Descriptive Statistics, RTW Sample (46 economies)

	1971-2018					1971-2000					2001-2018				
Variables	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
All															
Real GDPPC growth	206	1.855	1.765	-3.037	8.369	127	1.875	1.957	-3.037	8.369	79	1.823	1.412	-1.673	5.668
Mean real credit growth	206	6.568	6.780	-6.619	42.905	127	7.174	7.278	-4.489	42.905	79	5.593	5.803	-6.619	26.667
SD of real credit growth	206	10.812	10.972	0.745	97.774	127	12.959	12.397	2.010	97.774	79	7.361	6.970	0.745	40.394
SKW of real credit growth	206	0.126	0.855	-2.396	2.640	127	0.270	0.847	-1.757	2.628	79	-0.105	0.821	-2.396	2.640
Initial GDP per capita (ln)	206	9.002	1.538	5.725	11.382	127	8.749	1.510	5.725	11.072	79	9.407	1.503	5.973	11.382
Initial schooling	206	69.937	35.301	1.012	156.862	127	58.735	32.890	1.012	118.266	79	87.946	31.542	6.592	156.862
OECD															
Real GDPPC growth	109	1.918	1.442	-1.673	8.369	65	2.416	1.423	0.125	8.369	44	1.183	1.135	-1.673	5.668
Mean real credit growth	109	5.923	6.936	-6.619	42.905	65	7.632	7.407	-4.222	42.905	44	3.399	5.313	-6.619	18.845
SD of real credit growth	109	8.833	12.869	0.745	97.774	65	10.679	15.248	2.010	97.774	44	6.107	7.558	0.745	40.394
SKW of real credit growth	109	0.195	0.898	-2.396	2.640	65	0.414	0.852	-1.019	2.628	44	-0.127	0.876	-2.396	2.640
Initial GDP per capita (ln)	109	10.219	0.620	7.572	11.382	65	10.002	0.631	7.572	11.072	44	10.538	0.444	9.151	11.382
Initial schooling	109	94.556	19.703	37.587	156.862	65	85.058	16.133	37.587	118.266	44	108.586	15.805	85.522	156.862
Developing Economies															
Real GDPPC growth	97	1.785	2.073	-3.037	6.729	62	1.309	2.270	-3.037	6.729	35	2.628	1.323	0.019	5.372
Mean real credit growth	97	7.292	6.561	-4.489	26.827	62	6.693	7.169	-4.489	26.827	35	8.352	5.244	-2.263	26.667
SD of real credit growth	97	13.036	7.831	2.241	47.289	62	15.351	7.883	5.324	47.289	35	8.936	5.882	2.241	25.181
SKW of real credit growth	97	0.049	0.802	-1.757	2.078	62	0.119	0.822	-1.757	2.078	35	-0.077	0.758	-1.597	1.316
Initial GDP per capita (ln)	97	7.634	1.023	5.725	9.392	62	7.436	0.931	5.725	8.989	35	7.986	1.096	5.973	9.392
Initial schooling	97	42.274	27.621	1.012	101.199	62	31.138	21.188	1.012	81.280	35	61.999	26.871	6.592	101.199

GDPPC = gross domestic product per capita, Obs. = observations, OECD = Organisation for Economic Co-operation and Development, SD = standard deviation, SKW = skewness.
Source: Authors' estimates.

Table A2b: Descriptive Statistics, Extended Sample (80 economies)

	1971-2018					1971-2000					2001-2018				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
All															
Real GDPPC growth	324	2.024	2.119	-7.313	10.514	186	1.868	2.185	-7.313	8.965	138	2.233	2.014	-1.673	10.514
Mean real credit growth	324	7.319	8.163	-13.633	78.074	186	7.514	8.709	-13.633	78.074	138	7.056	7.387	-6.619	34.445
SD of real credit growth	324	12.180	14.167	0.745	165.574	186	14.648	17.183	1.289	165.574	138	8.854	7.418	0.745	40.394
SKW of real credit growth	324	0.171	0.838	-2.396	2.640	186	0.270	0.835	-1.811	2.628	138	0.039	0.827	-2.396	2.640
Initial GDP per capita (ln)	324	8.689	1.583	5.101	11.561	186	8.482	1.566	5.101	11.072	138	8.967	1.569	5.435	11.561
Initial schooling	324	67.276	34.205	1.012	156.862	186	56.262	32.540	1.012	118.266	138	82.121	30.691	6.592	156.862
OECD															
Real GDPPC growth	122	1.978	1.427	-1.673	8.369	70	2.465	1.403	0.125	8.369	52	1.323	1.185	-1.673	5.668
Mean real credit growth	122	5.845	6.626	-6.619	41.234	70	7.546	7.121	-4.222	41.234	52	3.556	5.122	-6.619	18.845
SD of real credit growth	122	8.754	12.310	0.745	97.774	70	10.677	14.772	1.289	97.774	52	6.165	7.237	0.745	40.394
SKW of real credit growth	122	0.171	0.888	-2.396	2.640	70	0.408	0.854	-1.019	2.628	52	-0.147	0.840	-2.396	2.640
Initial GDP per capita (ln)	122	10.205	0.655	7.492	11.561	70	9.987	0.650	7.492	11.072	52	10.497	0.542	9.051	11.561
Initial schooling	122	93.991	19.521	37.587	156.862	70	84.387	16.706	37.587	118.266	52	106.920	15.148	85.522	156.862
Developing Economies															
Real GDPPC growth	202	2.051	2.446	-7.313	10.514	116	1.508	2.480	-7.313	8.965	86	2.784	2.209	-1.317	10.514
Mean real credit growth	202	8.209	8.862	-13.633	78.074	116	7.495	9.570	-13.633	78.074	86	9.172	7.758	-6.161	34.445
SD of real credit growth	202	14.250	14.827	2.027	165.574	116	17.044	18.129	2.458	165.574	86	10.480	7.084	2.027	32.082
SKW of real credit growth	202	0.171	0.808	-1.879	2.347	116	0.187	0.816	-1.811	2.347	86	0.151	0.803	-1.879	2.173
Initial GDP per capita (ln)	202	7.773	1.237	5.101	10.864	116	7.574	1.217	5.101	10.298	86	8.041	1.221	5.435	10.864
Initial schooling	202	51.141	30.918	1.012	111.513	116	39.290	27.638	1.012	111.015	86	67.127	27.872	6.592	111.513

GDPPC = gross domestic product per capita, Obs. = observations, OECD = Organisation for Economic Co-operation and Development, SD = standard deviation, SKW = skewness.
Source: Authors' estimates.

Table A3: Descriptive Statistics on Skewness and SD of GDP per Capita Growth

	1971-2018					1971-2000					2001-2018				
	Obs.	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Ranciere, Tornell, and Westermann (2008)															
All															
Real GDPPC growth	206	1.855	1.765	-3.037	8.369	127	1.875	1.957	-3.037	8.369	79	1.823	1.412	-1.673	5.668
SKW of GDPPC growth	206	-0.428	0.752	-2.453	1.964	127	-0.369	0.778	-2.453	1.964	79	-0.523	0.702	-1.987	1.439
SD of GDPPC growth	206	2.748	1.580	0.348	9.449	127	3.098	1.640	0.596	9.449	79	2.186	1.301	0.348	7.144
OECD															
Real GDPPC growth	109	1.918	1.442	-1.673	8.369	65	2.416	1.423	0.125	8.369	44	1.183	1.135	-1.673	5.668
SKW of GDPPC growth	109	-0.535	0.670	-1.987	1.439	65	-0.477	0.617	-1.969	0.698	44	-0.620	0.741	-1.987	1.439
SD of GDPPC growth	109	2.264	1.314	0.348	7.741	65	2.392	1.302	0.596	7.741	44	2.074	1.325	0.348	7.144
Developing Economies															
Real GDPPC growth	97	1.785	2.073	-3.037	6.729	62	1.309	2.270	-3.037	6.729	35	2.628	1.323	0.019	5.372
SKW of GDPPC growth	97	-0.308	0.821	-2.453	1.964	62	-0.255	0.908	-2.453	1.964	35	-0.401	0.641	-1.572	0.821
SD of GDPPC growth	97	3.293	1.679	0.422	9.449	62	3.838	1.641	1.759	9.449	35	2.327	1.276	0.422	5.506
Extended Sample															
All															
Real GDPPC growth	324	2.024	2.119	-7.313	10.514	186	1.868	2.185	-7.313	8.965	138	2.233	2.014	-1.673	10.514
SKW of GDPPC growth	324	-0.389	0.777	-2.453	2.051	186	-0.362	0.757	-2.453	1.964	138	-0.424	0.803	-1.987	2.051
SD of GDPPC growth	324	3.096	1.976	0.268	14.032	186	3.480	1.991	0.618	14.032	138	2.578	1.838	0.268	12.984
OECD															
Real GDPPC growth	122	1.978	1.427	-1.673	8.369	70	2.465	1.403	0.125	8.369	52	1.323	1.185	-1.673	5.668
SKW of GDPPC growth	122	-0.542	0.705	-2.203	1.623	70	-0.512	0.651	-2.203	0.698	52	-0.582	0.776	-1.987	1.623
SD of GDPPC growth	122	2.287	1.269	0.348	7.607	70	2.414	1.266	0.618	7.607	52	2.117	1.265	0.348	7.144
Developing Economies															
Real GDPPC growth	202	2.051	2.446	-7.313	10.514	116	1.508	2.480	-7.313	8.965	86	2.784	2.209	-1.317	10.514
SKW of GDPPC growth	202	-0.296	0.804	-2.453	2.051	116	-0.272	0.804	-2.453	1.964	86	-0.329	0.808	-1.971	2.051
SD of GDPPC growth	202	3.584	2.160	0.268	14.032	116	4.123	2.075	0.754	14.032	86	2.857	2.068	0.268	12.984

GDPPC = gross domestic product per capita, Obs. = observations, OECD = Organisation for Economic Co-operation and Development, SD = standard deviation, SKW = skewness.
Source: Authors' estimates.

Table A4: Credit Skewness and Economic Growth—Extended Sample

	Economy		Credit Skewness					Mean GDP per Capita Growth				
			1971–1980	1981–1990	1991–2000	2001–2010	2011-2018	1971–1980	1981–1990	1991–2000	2001–2010	2011-2018
1	Armenia				0.941	0.371	-0.048			4.898	8.302	3.928
2	Austria	*	-0.264	0.157	0.252	1.373	0.245	3.435	2.054	1.667	1.118	0.825
3	Bahamas, The		0.115	0.789	0.425			1.580	1.060	0.615		
4	Barbados			-0.413	-0.102	0.634			0.601	0.784	0.639	
5	Belgium	*	-0.797	0.630	2.028	-0.273	-0.796	3.123	1.881	1.545	1.126	0.815
6	Botswana	*		-0.483	0.144	-0.574			6.729	2.317	2.109	
7	Bulgaria				-0.217	-0.471	-0.752			-0.999	5.359	3.020
8	Burkina Faso	*	0.770	0.147	1.344	-1.039	0.825	1.320	0.903	2.426	2.803	2.646
9	Burundi			-0.645	-0.112	0.824	0.741		1.673	-3.584	0.217	-1.317
10	Cameroon		-0.562	0.545	-1.051	-0.137	-0.376	3.517	0.151	-1.585	1.152	1.937
11	Canada	*	-0.409	1.275	0.950	1.945		2.509	1.382	1.545	2.616	
12	Chad				-0.759	-0.548	0.563			-1.121	6.580	-1.182
13	Chile	*	0.533	0.148	0.382	-0.401	-0.037	1.276	1.373	4.623	3.072	2.067
14	China				-0.865	1.542	0.210			8.856	9.455	6.747
15	Colombia				-0.075	0.820	0.167			0.848	2.647	2.430
16	Costa Rica	*	0.088	0.481	-0.779	-0.071	-0.218	2.912	-0.281	2.340	2.769	2.490
17	Cyprus			2.347	0.354	2.173	-1.879		4.744	2.437	1.362	0.193
18	Czech Republic				0.269	-0.726	-0.061			2.634	2.910	2.043
19	Denmark	*	0.902	0.853	2.628	-0.382	-0.495	1.749	2.031	2.256	0.385	1.205
20	Dominica				-0.674	-0.181	0.009			2.119	2.222	-0.499
21	Dominican Republic	*	1.953	-0.023		-1.300	0.319	4.337	0.280		3.157	4.077
22	Fiji		0.190	0.577	-0.763	0.213	0.126	2.824	-0.004	1.249	0.967	3.402
23	Finland	*	-0.410	1.068	0.337	-0.503	0.264	3.340	2.682	1.212	1.291	0.616
24	France	*	2.254	-0.500	-0.338	-0.042	-0.025	2.963	1.907	1.029	0.518	0.914
25	Gambia, The	*	0.009	-1.175	0.511			1.612	-0.499	0.023		
26	Germany				0.988	-1.016	-0.041			1.393	0.839	1.676
27	Greece	*	1.955	-0.618	0.645	-1.964	0.432	3.573	0.125	1.651	1.223	-1.673
28	Honduras	*	-0.484	-1.167	1.139			1.938	-0.182	0.293		

			Credit Skewness					Mean GDP per Capita Growth				
	Economy		1971–1980	1981–1990	1991–2000	2001–2010	2011-2018	1971–1980	1981–1990	1991–2000	2001–2010	2011-2018
29	Hong Kong SAR, China				-0.307	1.751	-0.173			2.320	3.466	2.165
30	Iceland	*		-0.231	1.200	0.364	-0.046		1.597	1.713	1.384	2.270
31	India	*	0.546	-0.608	0.542	-0.408	0.802	0.657	3.180	3.522	4.961	5.372
32	Indonesia	*		0.802	-1.757	0.187	0.857		3.272	2.273	3.761	3.956
33	Ireland	*		0.145	1.466	-0.815	-0.264		3.266	5.373	0.711	5.668
34	Israel	*		-0.040	0.009	0.207	-0.112		1.859	2.539	1.011	1.551
35	Italy	*	0.198	-0.161	0.097	-0.357	0.221	3.257	2.322	1.377	-0.309	-0.198
36	Jamaica	*		-0.398	-0.072	-1.417	0.490		1.513	0.839	0.097	0.395
37	Japan	*	0.568	0.849	0.411	-2.396	-0.892	3.240	3.871	1.022	0.540	1.142
38	Jordan	*		-0.507	0.183	0.875			-2.085	1.387	2.623	
39	Kenya	*	-0.500	0.482	-0.340	1.316		3.968	0.304	-1.127	1.494	
40	Korea, Rep.	*	-0.416	-0.295	-0.118	-0.007	-0.680	7.185	8.369	5.957	4.040	2.452
41	Luxembourg		1.447	-0.105		0.014	-0.928	1.844	4.357		1.144	0.665
42	Macao SAR, China				0.875	0.239	0.342			0.451	8.410	1.442
43	Madagascar	*	0.786	0.306	-0.389			-1.815	-2.347	-1.379		
44	Malawi	*		0.905	0.172	0.979	0.383		-1.908	1.682	1.984	0.934
45	Malaysia	*	0.216	-1.204	0.994	-1.073	-0.196	5.490	3.131	4.347	2.548	3.664
46	Mali				-0.689	0.864	0.570			1.401	2.466	1.144
47	Malta		0.696	1.034	0.654			8.965	2.708	4.012		
48	Mauritius			0.826	-0.606	1.371	-1.230		4.929	3.976	3.455	3.490
49	Mexico	*	-1.811	0.442	-0.149	-0.264	-0.214	3.724	-0.286	1.721	0.019	1.440
50	Mongolia				0.517	0.272	1.027			0.118	5.017	5.821
51	Morocco				1.977	0.932	1.565			1.355	3.627	2.107
52	Myanmar		-0.291	1.510	-0.114	-0.575	0.554	2.274	-0.613	5.683	10.514	5.928
53	Nepal			-0.372	0.773	-0.347	0.599		2.320	2.509	2.633	4.030
54	Netherlands	*	0.315	1.586	0.256	0.050	0.574	2.104	1.653	2.100	0.859	0.961
55	New Zealand	*	1.760	2.550	-0.344	-0.423		1.075	1.205	1.563	1.381	
56	Niger	*	0.563	0.481	0.048	0.484	-0.604	-1.580	-3.037	-1.811	1.001	1.833
57	Norway	*	-0.481	0.515	-0.304	-0.469	0.047	4.083	2.165	3.044	0.714	0.615
58	Pakistan		-0.535	0.091	0.285			1.631	2.879	1.071		
59	Panama	*		-1.039	-0.500	-1.597	0.707		-0.865	3.020	3.861	4.683

			Credit Skewness					Mean GDP per Capita Growth				
	Economy		1971–1980	1981–1990	1991–2000	2001–2010	2011-2018	1971–1980	1981–1990	1991–2000	2001–2010	2011-2018
60	Papua New Guinea	*	0.973	-0.957	1.219			-1.575	-1.314	1.650		
61	Paraguay	*	0.167	1.477	0.358	-0.326	-0.545	6.019	1.180	0.064	1.989	2.638
62	Poland				-0.401	0.952	-0.253			3.602	3.905	3.517
63	Portugal	*	-0.669	0.010	-0.258	-0.257	0.015	3.453	2.980	2.392	0.370	0.826
64	Rwanda		-0.078	-0.404	-0.366			2.085	-1.456	-0.768		
65	Senegal	*	1.106	0.575	-1.260	0.762	0.184	-1.023	-0.432	0.399	1.380	2.367
66	Seychelles		-0.072	0.789	-0.134	-0.510	0.778	4.762	2.089	2.608	0.986	3.605
67	Solomon Islands				-0.367	0.303	-0.234			-0.360	0.296	1.736
68	Spain	*	0.199	0.185	0.471	-0.023	-0.495	1.903	2.531	1.826	0.439	0.945
69	St. Lucia			1.226	0.858	0.750	-0.278		6.053	1.018	0.847	0.981
70	Suriname		-0.555	-0.014	0.911	1.914	0.262	2.161	-1.188	-0.609	3.658	-0.233
71	Sweden	*	-0.657	0.684	-0.747	2.640	0.500	1.612	1.877	1.734	1.625	1.139
72	Switzerland	*		1.376	0.344	0.045	0.873		1.589	0.524	0.955	0.532
73	Thailand	*	0.381	-0.185	-0.567	-0.566	0.705	4.129	5.785	3.230	3.838	2.838
74	Tonga				1.091	1.138	-0.235			2.529	0.802	2.011
75	Tunisia				1.381	0.735	0.681			2.995	3.220	0.779
76	Turkey	*	-0.088	0.913	-0.059	-0.981	-0.034	1.667	3.064	1.955	2.590	4.312
77	Ukraine				1.292	-0.959	-0.444			-7.313	4.892	0.580
78	United Kingdom	*	0.900	2.399	0.271	-0.994	0.080	1.988	2.719	2.177	1.003	1.175
79	United States	*	-0.156	-0.187	-1.019	-2.030	-0.282	2.086	2.321	2.154	0.803	1.350
80	Uruguay	*	2.151	0.767	2.078	-0.617	-0.513	2.601	-0.671	2.691	2.868	2.475

GDP = gross domestic product. * Refers to economies from the Ranciere, Tornell, and Westermann (2008) sample. China, Colombia, Germany, Morocco, and Tunisia are also part of the RTW (2008) sample but are not included in the regressions of that subsample here because of limited data in 1971-2000.
Source: Authors' estimates.

Table A5: Skewness and Growth of Extended Sample, 1971–2018 (fixed effects)

	Full Sample		**OECD sample**		**Developing Economies**	
Variables	(1) Baseline	(2) Time Interactions	(3) Baseline	(4) Time Interactions	(5) Baseline	(6) Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.072***	0.095**	0.019	0.028	0.067***	0.144***
	(0.014)	(0.039)	(0.026)	(0.083)	(0.013)	(0.036)
Credit growth SD ($\sigma_{bc,it}$)	-0.053***	0.099*	-0.015	0.415**	-0.055***	0.004
	(0.016)	(0.057)	(0.016)	(0.151)	(0.017)	(0.077)
Credit growth SKW ($sk_{bc,it}$)	0.115	0.090	0.149	-0.222	-0.098	0.167
	(0.118)	(0.302)	(0.134)	(0.465)	(0.172)	(0.358)
Credit gr. mean x 1971–1980		-0.135**		-0.032		-0.124*
		(0.062)		(0.114)		(0.072)
Credit gr. mean x 1981–1990		0.020		0.137		-0.032
		(0.066)		(0.095)		(0.072)
Credit gr. mean x 1991–2000		-0.078		0.076		-0.132***
		(0.050)		(0.101)		(0.043)
Credit gr. mean x 2001–2010		-0.013		0.017		-0.095
		(0.064)		(0.062)		(0.074)
Credit gr. SD x 1971–1980		-0.100		-0.458***		-0.006
		(0.068)		(0.147)		(0.086)
Credit gr. SD x 1981–1990		-0.161**		-0.489***		-0.012
		(0.077)		(0.151)		(0.111)
Credit gr. SD x 1991–2000		-0.138**		-0.428**		-0.045
		(0.056)		(0.158)		(0.078)
Credit gr. SD x 2001–2010		-0.065		-0.415**		0.041
		(0.069)		(0.161)		(0.096)
Credit gr. SKW x 1971–1980		-0.262		0.577		-0.759
		(0.483)		(0.643)		(0.617)
Credit gr. SKW x 1981–1990		-0.044		-0.004		-0.293
		(0.377)		(0.521)		(0.546)
Credit gr. SKW x 1991–2000		0.327		-0.049		0.082
		(0.395)		(0.591)		(0.438)
Credit gr. SKW x 2001–2010		-0.223		0.431		-0.560
		(0.344)		(0.425)		(0.460)
R-squared	0.362	0.453	0.494	0.656	0.431	0.505
Number of obs./eco.	324/80	324/80	122/27	122/27	202/53	202/53

Table A5. (cont'd.)

Variables	Full Sample			OECD Sample			Developing Economies		
	(7) Positive or Negative SKW	(8) SKW and Credit Δ	(9) Positive or Negative SKW and Credit Δ	(10) Positive or Negative SKW	(11) SKW and Credit Δ	(12) Positive or Negative SKW and Credit Δ	(13) Positive or Negative SKW	(14) SKW and Credit Δ	(15) Positive or Negative SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.072***	0.072	0.085	0.017	-0.046	-0.043	0.068***	0.113*	0.132**
	(0.014)	(0.062)	(0.058)	(0.026)	(0.092)	(0.087)	(0.013)	(0.063)	(0.063)
Credit growth SD ($\sigma_{bc,it}$)	-0.057***	-0.054***	-0.065***	-0.018	-0.010	-0.015	-0.056***	-0.062***	-0.076***
	(0.017)	(0.018)	(0.018)	(0.019)	(0.017)	(0.015)	(0.018)	(0.020)	(0.020)
Credit growth SKW ($sk_{bc,it}$)		0.100			0.080			-0.012	
		(0.186)			(0.150)			(0.235)	
Positive SKW ($sk_{bc,it}{}^{POS}$)	0.333		0.251	0.282		-0.057	0.090		0.302
	(0.227)		(0.383)	(0.279)		(0.281)	(0.295)		(0.505)
Negative SKW ($sk_{bc,it}{}^{NEG}$)	-0.185		-0.091	-0.030		0.277*	-0.341		-0.344
	(0.193)		(0.188)	(0.180)		(0.158)	(0.248)		(0.250)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		0.000			0.002			-0.002	
		(0.002)			(0.002)			(0.002)	
Credit Δ (CCG_{id})		-0.000	-0.004		0.009	0.004		-0.005	-0.008
		(0.007)	(0.007)		(0.011)	(0.010)		(0.007)	(0.009)
Positive SKW x credit Δ ($sk_{bc,it}{}^{POS} \cdot CCG_{id}$)			0.002			0.005			-0.001
			(0.004)			(0.003)			(0.005)
Negative SKW x credit Δ ($sk_{bc,it}{}^{NEG} \cdot CCG_{id}$)			-0.005			-0.006			-0.006
			(0.004)			(0.004)			(0.005)
R-squared	0.367	0.362	0.348	0.497	0.507	0.511	0.433	0.435	0.408
Number of obs./eco.	324/80	324/80	324/80	122/27	122/27	122/27	202/53	202/53	202/53

eco. = economies, obs. = observations, gr. = growth, OECD = Organization for Economic Co-operation and Development, SD = standard deviation, SKW = skewness, Δ = change. Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, initial schooling, interactions between mean of credit growth and time dummy variables, and interactions between standard deviation of credit growth and time dummy variables are not reported. Columns (1) ,(3), and (5) refer to Equation (1): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of

moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk}{}^{POS} \cdot sk_{bc,it}{}^{POS} + \beta_{sk}{}^{NEG} \cdot sk_{bc,it}{}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \beta_{sk}{}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \beta_{sk}{}^{POS} \cdot sk_{bc,it}{}^{POS} + \alpha_{sk}{}^{POS} \cdot sk_{bc,it}{}^{POS} \cdot CCG_{id} + \beta_{sk}{}^{NEG} \cdot sk_{bc,it}{}^{NEG} + \alpha_{sk}{}^{NEG} \cdot sk_{bc,it}{}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.
Source: Authors' estimates.

Table A6: Skewness and Growth—RTW Sample, 1971–2000 (panel GLS)

	All		OECD		Developing Economies	
	(1) Baseline	(2) Time Interactions	(3) Baseline	(4) Time Interactions	(5) Baseline	(6) Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.142***	0.117***	0.086***	0.075**	0.163***	0.263***
	(0.011)	(0.033)	(0.019)	(0.030)	(0.025)	(0.056)
Credit growth SD ($\sigma_{bc,it}$)	-0.045***	-0.048**	-0.027***	-0.103***	-0.045**	-0.042*
	(0.007)	(0.023)	(0.010)	(0.030)	(0.020)	(0.025)
Credit growth SKW ($sk_{bc,it}$)	-0.255***	-0.439**	-0.214*	0.230	-0.248	-1.357***
	(0.088)	(0.197)	(0.110)	(0.207)	(0.185)	(0.374)
Credit gr. mean x 1981–1990		0.050		0.132**		-0.036
		(0.043)		(0.052)		(0.067)
Credit gr. mean x 1991–2000		-0.009		-0.018		-0.156**
		(0.042)		(0.045)		(0.070)
Credit gr. SD x 1981–1990		-0.032		-0.037		0.011
		(0.028)		(0.040)		(0.055)
Credit gr. SD x 1991–2000		0.026		0.108***		0.045
		(0.025)		(0.032)		(0.047)
Credit gr. SKW x 1981–1990		0.217		-0.159		1.318**
		(0.279)		(0.257)		(0.519)
Credit gr. SKW x 1991–2000		0.321		-0.662**		1.700***
		(0.284)		(0.309)		(0.437)
Number of obs./eco.	127/46	127/46	65/23	65/23	62/23	62/23

Table A6. (cont'd.)

	All			OECD			Developing Economies		
	(7) Positive or Negative SKW	(8) SKW and Credit Δ	(9) Positive or Negative SKW and Credit Δ	(10) Pos/Neg SKW	(11) SKW and Credit Δ	(12) Pos/Neg SKW and Credit Δ	(13) Pos/ Neg SKW	(14) SKW and Credit Δ	(15) Pos/Neg SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.140***	0.097*	0.093	0.075***	-0.092	-0.116*	0.157***	0.386***	0.316***
	(0.013)	(0.054)	(0.058)	(0.019)	(0.065)	(0.067)	(0.024)	(0.085)	(0.089)
Credit growth SD ($\sigma_{bc,it}$)	-0.045***	-0.036***	-0.035***	-0.033***	0.003	0.009	-0.056***	-0.062**	-0.046*
	(0.008)	(0.011)	(0.011)	(0.010)	(0.013)	(0.012)	(0.020)	(0.026)	(0.027)
Credit growth SKW ($sk_{bc,it}$)		-0.307***			-0.236			-0.223	
		(0.115)			(0.149)			(0.220)	
Positive SKW (${sk_{bc,it}}^{POS}$)	-0.164		-0.277	0.044		-0.344*	0.100		0.528
	(0.136)		(0.228)	(0.153)		(0.187)	(0.259)		(0.582)
Negative SKW (${sk_{bc,it}}^{NEG}$)	-0.372*		-0.367	-0.754***		0.874*	-0.787**		-0.841**
	(0.209)		(0.255)	(0.236)		(0.468)	(0.333)		(0.383)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		0.000			-0.000			0.000	
		(0.001)			(0.002)			(0.003)	
Credit Δ (CCG_{id})		0.005	0.006		0.023***	0.018**		-0.028***	-0.014
		(0.006)	(0.007)		(0.008)	(0.007)		(0.010)	(0.012)
Positive SKW x credit Δ			0.000			0.003			-0.008
(${sk_{bc,it}}^{POS} \cdot CCG_{id}$)			(0.002)			(0.002)			(0.006)
Negative SKW x credit Δ			0.001			-0.045***			0.007
(${sk_{bc,it}}^{NEG} \cdot CCG_{id}$)			(0.005)			(0.012)			(0.007)
Number of obs./eco.	127/46	127/46	127/46	65/23	65/23	65/23	62/23	62/23	62/23

eco. = economies, GLS = generalized least squares, gr. = growth, obs. = observations, OECD = Organisation for Economic Cooperation and Development, SD = standard deviation, RTW = Ranciere, Tornell, and Westermann (2008), SKW = skewness, Δ = change. Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, initial schooling, interactions between mean of credit growth and time dummy variables, and interactions between standard deviation of credit growth and time dummy variables are not reported here. Columns (1) , (3), and (5) refer to Equation (1): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.
Source: Authors' estimates.

Table A7: Skewness and Growth of RTW Sample, 1971–2000 (fixed effects)

	All		OECD		Developing Economies	
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	Time Interactions	Time Interactions	Baseline	Baseline	Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.076***	-0.041	0.061**	-0.011	0.070*	0.007
	(0.022)	(0.047)	(0.022)	(0.052)	(0.037)	(0.103)
Credit growth SD ($\sigma_{bc,it}$)	-0.033**	0.022	-0.029	-0.013	-0.026	0.025
	(0.015)	(0.031)	(0.017)	(0.041)	(0.031)	(0.042)
Credit growth SKW ($sk_{bc,it}$)	0.075	-0.089	0.253	0.368*	-0.066	-0.352
	(0.162)	(0.235)	(0.226)	(0.208)	(0.204)	(0.368)
Credit gr. mean x 1981–1990		0.161***		0.156*		0.074
		(0.057)		(0.085)		(0.097)
Credit gr. mean x 1991–2000		0.120*		0.138		0.057
		(0.062)		(0.082)		(0.124)
Credit gr. SD x 1981–1990		-0.090***		-0.047		-0.069
		(0.030)		(0.045)		(0.048)
Credit gr. SD x 1991–2000		-0.042		0.000		-0.041
		(0.033)		(0.039)		(0.073)
Credit gr. SKW x 1981–1990		0.216		-0.372		0.193
		(0.319)		(0.351)		(0.453)
Credit gr. SKW x 1991–2000		0.150		-0.825*		0.658
		(0.403)		(0.447)		(0.528)
R-squared	0.446	0.530	0.409	0.588	0.573	0.613
Number of obs./eco.	127/46	127/46	65/23	65/23	62/23	62/23

Table A7. (cont'd.)

	All			OECD			Developing Economies		
	(7) Positive or Negative SKW	(8) SKW and Credit Δ	(9) Positive or Negative SKW and Credit Δ	(10) Pos/Neg SKW	(11) SKW and Credit Δ	(12) Pos/Neg SKW and Credit Δ	(13) Pos/ Neg SKW	(14) SKW and Credit Δ	(15) Pos/Neg SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.079***	-0.033	-0.020	0.056**	-0.237**	-0.212*	0.073**	0.012	0.023
	(0.019)	(0.096)	(0.085)	(0.020)	(0.105)	(0.103)	(0.034)	(0.137)	(0.120)
Credit growth SD ($\sigma_{bc,it}$)	-0.047***	-0.021	-0.029	-0.034*	0.018	0.013	-0.042	-0.018	-0.028
	(0.017)	(0.022)	(0.022)	(0.018)	(0.016)	(0.017)	(0.030)	(0.034)	(0.035)
Credit growth SKW ($sk_{bc,it}$)		-0.082			0.016			-0.072	
		(0.195)			(0.165)			(0.239)	
Positive SKW (${sk_{bc,it}}^{POS}$)	0.574**		0.565	0.591*		0.325	0.456		0.722
	(0.246)		(0.344)	(0.315)		(0.289)	(0.357)		(0.451)
Negative SKW (${sk_{bc,it}}^{NEG}$)	-0.696**		-0.682**	-0.757*		0.075	-0.621**		-0.726**
	(0.259)		(0.270)	(0.420)		(0.641)	(0.287)		(0.337)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		0.002			0.002			-0.000	
		(0.002)			(0.002)			(0.003)	
Credit Δ (CCG_{id})		0.012	0.012		0.036***	0.031**		0.007	0.009
		(0.010)	(0.010)		(0.012)	(0.013)		(0.015)	(0.014)
Positive SKW x credit Δ (${sk_{bc,it}}^{POS} \cdot CCG_{id}$)			-0.000			0.001			-0.005
			(0.003)			(0.003)			(0.007)
Negative SKW x credit Δ (${sk_{bc,it}}^{NEG} \cdot CCG_{id}$)			-0.002			-0.017			0.000
			(0.006)			(0.014)			(0.008)
R-squared	0.487	0.465	0.498	0.457	0.545	0.571	0.594	0.575	0.603
Number of obs./eco.	127/46	127/46	127/46	65/23	65/23	65/23	62/23	62/23	62/23

eco. = economies, gr. = growth, obs. = observations, SD = standard deviation, RTW = Ranciere, Tornell, and Westermann (2008), SKW = skewness, Δ = change.

Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, initial schooling, interactions between mean of credit growth and time dummy variables, and interactions between standard deviation of credit growth and time dummy variables are not reported here. Columns (1) ,(3), and (5) refer to Equation (1): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.

Source: Authors' estimates.

Table A8: Skewness and Growth of RTW Sample, 1971–2018 (Panel Generalized Least Squares)

	Full Sample		OECD		Developing Economies	
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	Time Interactions	Baseline	Time Interactions	Baseline	Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.121***	0.112***	0.051***	0.065	0.122***	0.099
	(0.014)	(0.032)	(0.015)	(0.049)	(0.021)	(0.070)
Credit growth SD ($\sigma_{bc,it}$)	-0.039***	0.208***	-0.011	0.163	-0.037**	0.100
	(0.008)	(0.060)	(0.007)	(0.105)	(0.018)	(0.086)
Credit growth SKW ($sk_{bc,it}$)	-0.125	-0.319	-0.034	-0.223	-0.197	0.707
	(0.084)	(0.322)	(0.075)	(0.231)	(0.168)	(0.703)
Credit gr. mean x 1971–1980		-0.030		0.019		0.114
		(0.043)		(0.059)		(0.087)
Credit gr. mean x 1981–1990		0.077*		0.141**		0.152*
		(0.043)		(0.067)		(0.080)
Credit gr. mean x 1991–2000		-0.005		0.025		-0.009
		(0.042)		(0.059)		(0.078)
Credit gr. mean x 2001–2010		-0.056		-0.061		-0.051
		(0.043)		(0.057)		(0.085)
Credit gr. SD x 1971–1980		-0.278***		-0.283***		-0.152*
		(0.064)		(0.108)		(0.091)
Credit gr. SD x 1981–1990		-0.299***		-0.306***		-0.090
		(0.062)		(0.108)		(0.101)
Credit gr. SD x 1991–2000		-0.228***		-0.166		-0.075
		(0.061)		(0.105)		(0.094)
Credit gr. SD x 2001–2010		-0.204***		-0.141		-0.137
		(0.063)		(0.106)		(0.099)
Credit gr. SKW x 1971–1980		-0.060		0.523*		-2.311***
		(0.388)		(0.313)		(0.851)
Credit gr. SKW x 1981–1990		0.138		0.265		-0.820
		(0.379)		(0.308)		(0.765)
Credit gr. SKW x 1991–2000		0.183		-0.237		-0.335
		(0.394)		(0.336)		(0.759)
Credit gr. SKW x 2001–2010		0.321		0.413*		-1.066
		(0.333)		(0.242)		(0.772)
Number of obs./economies	206/46	206/46	109/23	109/23	97/23	97/23

Table A8 (cont'd.)

	Full Sample			OECD			Developing Economies		
	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ	Positive or Negative SKW	SKW and Credit Δ	Positive or Negative SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.120***	0.145***	0.210***	0.051***	-0.064	0.046	0.122***	0.375***	0.322***
	(0.014)	(0.042)	(0.041)	(0.015)	(0.045)	(0.050)	(0.021)	(0.073)	(0.068)
Credit growth SD ($\sigma_{bc,it}$)	-0.039***	-0.042***	-0.048***	-0.015*	-0.001	-0.013	-0.043**	-0.062***	-0.044**
	(0.009)	(0.011)	(0.012)	(0.008)	(0.011)	(0.012)	(0.019)	(0.019)	(0.018)
Credit growth SKW ($sk_{bc,it}$)		-0.143			0.050			-0.095	
		(0.108)			(0.099)			(0.194)	
Positive SKW (${sk_{bc,it}}^{POS}$)	-0.087		-0.122	0.043		0.050	0.069		0.860*
	(0.139)		(0.198)	(0.118)		(0.192)	(0.325)		(0.518)
Negative SKW (${sk_{bc,it}}^{NEG}$)	-0.160		-0.183	-0.132		-0.063	-0.457		-0.768**
	(0.172)		(0.222)	(0.136)		(0.213)	(0.323)		(0.328)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		0.000			-0.000			-0.001	
		(0.001)			(0.001)			(0.002)	
Credit change (CCG_{id})		-0.003	-0.009		0.015***	-0.001		-0.029***	-0.014*
		(0.005)	(0.006)		(0.006)	(0.007)		(0.008)	(0.008)
Positive SKW x credit Δ			-0.001			0.000			-0.012**
(${sk_{bc,it}}^{POS} \cdot CCG_{id}$)			(0.002)			(0.002)			(0.005)
Negative SKW x credit Δ			0.005			0.003			0.009*
(${sk_{bc,it}}^{NEG} \cdot CCG_{id}$)			(0.004)			(0.006)			(0.005)
Number of obs./eco.	206/46	206/46	206/46	109/23	109/23	109/23	97/23	97/23	97/23

eco. = economies, gr. = growth, obs. = observations, SD = standard deviation, RTW = Ranciere, Tornell, and Westermann (2008), SKW = skewness, Δ = change.

Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, initial schooling, interactions between mean of credit growth and time dummy variables, and interactions between standard deviation of credit growth and time dummy variables are not reported here. Columns (1) ,(3), and (5) refer to Equation (1): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.

Source: Authors' estimates.

Table A9: Skewness and Growth of RTW Sample, 1971–2018 (fixed effects)

	Full Sample		OECD		Developing Economies	
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	Time Interactions	Baseline	Time Interactions	Baseline	Time Interactions
Credit growth mean ($\mu_{bc,it}$)	0.059***	0.081	0.007	0.046	0.053**	0.141*
	(0.017)	(0.061)	(0.028)	(0.081)	(0.023)	(0.082)
Credit growth SD ($\sigma_{bc,it}$)	-0.031**	0.242***	-0.013	0.434**	-0.004	-0.049
	(0.015)	(0.078)	(0.017)	(0.171)	(0.019)	(0.110)
Credit growth SKW ($sk_{bc,it}$)	0.146	0.231	0.197	-0.422	-0.098	0.446
	(0.119)	(0.495)	(0.157)	(0.514)	(0.135)	(0.641)
Credit gr. mean x 1971–1980		-0.141*		-0.102		-0.055
		(0.077)		(0.122)		(0.094)
Credit gr. mean x 1981–1990		0.032		0.107		-0.024
		(0.076)		(0.096)		(0.095)
Credit gr. mean x 1991–2000		-0.055		0.064		-0.137
		(0.075)		(0.096)		(0.091)
Credit gr. mean x 2001–2010		-0.017		-0.004		-0.103
		(0.064)		(0.059)		(0.097)
Credit gr. SD x 1971–1980		-0.226**		-0.442**		0.051
		(0.085)		(0.166)		(0.113)
Credit gr. SD x 1981–1990		-0.322***		-0.505***		0.022
		(0.073)		(0.171)		(0.111)
Credit gr. SD x 1991–2000		-0.253***		-0.446**		0.073
		(0.082)		(0.178)		(0.114)
Credit gr. SD x 2001–2010		-0.244***		-0.436**		0.042
		(0.082)		(0.182)		(0.115)
Credit gr. SKW x 1971–1980		-0.480		0.708		-1.591**
		(0.670)		(0.671)		(0.689)
Credit gr. SKW x 1981–1990		0.058		0.291		-0.557
		(0.527)		(0.512)		(0.715)
Credit gr. SKW x 1991–2000		-0.048		0.073		-0.134
		(0.599)		(0.645)		(0.786)
Credit gr. SKW x 2001–2010		-0.137		0.570		-0.549
		(0.512)		(0.453)		(0.780)
Number of obs./economies	206/46	206/46	109/23	109/23	97/23	97/23
R-Squared	0.346	0.497	0.496	0.679	0.516	0.604

Table A9 (cont'd.)

	Full Sample			OECD			Developing Economies		
	(7) Positive or Negative SKW	(8) SKW and Credit Δ	(9) Positive or Negative SKW and Credit Δ	(10) Positive or Negative SKW	(11) SKW and Credit Δ	(12) Positive or Negative SKW and Credit Δ	(13) Positive or Negative SKW	(14) SKW and Credit Δ	(15) Positive or Negative SKW and Credit Δ
Credit growth mean ($\mu_{bc,it}$)	0.059***	0.047	0.071	0.006	-0.027	-0.052	0.053**	0.091	0.173*
	(0.016)	(0.058)	(0.054)	(0.027)	(0.082)	(0.085)	(0.023)	(0.106)	(0.091)
Credit growth SD ($\sigma_{bc,it}$)	-0.040**	-0.034*	-0.053***	-0.020	-0.016	-0.015	-0.007	-0.007	-0.068***
	(0.017)	(0.018)	(0.019)	(0.020)	(0.021)	(0.017)	(0.019)	(0.023)	(0.021)
Credit growth SKW ($sk_{bc,it}$)		0.056			0.094			-0.050	
		(0.152)			(0.129)			(0.183)	
Positive SKW (${sk_{bc,it}}^{POS}$)	0.446**		0.207	0.442		0.118	0.023		0.640
	(0.216)		(0.287)	(0.299)		(0.248)	(0.241)		(0.541)
Negative SKW (${sk_{bc,it}}^{NEG}$)	-0.213		-0.062	-0.150		0.245	-0.219		-0.466
	(0.209)		(0.264)	(0.199)		(0.175)	(0.258)		(0.377)
SKW x credit Δ ($sk_{bc,it} \cdot CCG_{id}$)		0.002			0.003			-0.001	
		(0.002)			(0.002)			(0.003)	
Credit Δ (CCG_{id})		0.001	-0.004		0.004	0.003		-0.004	-0.010
		(0.006)	(0.005)		(0.009)	(0.009)		(0.010)	(0.010)
Positive SKW x credit Δ (${sk_{bc,it}}^{POS} \cdot CCG_{id}$)			0.004			0.005*			-0.005
			(0.003)			(0.003)			(0.006)
Negative SKW x credit Δ			-0.002			-0.009*			-0.000
(${sk_{bc,it}}^{NEG} \cdot CCG_{id}$)			(0.004)			(0.004)			(0.005)
Number of obs./economies	0.357	0.350	0.321	0.509	0.507	0.528	0.517	0.518	0.370
R-Squared	206/46	206/46	206/46	109/23	109/23	109/23	97/23	97/23	97/23

eco. = economies, gr. = growth, obs. = observations, SD = standard deviation, RTW = Ranciere, Tornell, and Westermann (2008), SKW = skewness, Δ = change. Notes: Standard errors are in parentheses. *** = p<0.01, ** = p<0. 05, and * = p<0.1. Coefficients of the constant, time dummy variables, initial gross domestic product per capita, initial schooling, interactions between mean of credit growth and time dummy variables, and interactions between standard deviation of credit growth and time dummy variables are not reported here. Columns (1), (3), and (5) refer to Equation (1): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (2), (4), and (6) also refer to Equation (1), but with the inclusion of interaction of moments of credit growth with time dummy variables. Columns (7), (10), and (13) refer to Equation (2): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (8), (11), and (14) refer to Equation (3): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{CCG} \cdot sk_{bc,it} \cdot CCG_{id} + \gamma \cdot CCG_{id} + \theta \cdot X_{it} + \delta_t + \varepsilon_{it}$. Columns (9), (12), and (15) refer to Equation (4): $y_{it} = \beta_\mu \cdot \mu_{bc,it} + \beta_\sigma \cdot \sigma_{bc,it} + \beta_{sk} \cdot sk_{bc,it} + {\beta_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} + {\alpha_{sk}}^{POS} \cdot {sk_{bc,it}}^{POS} \cdot CCG_{id} + {\beta_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} + {\alpha_{sk}}^{NEG} \cdot {sk_{bc,it}}^{NEG} \cdot CCG_{id} + \theta \cdot X_{it} + \delta \cdot CCG_{id} + \delta_t + \varepsilon_{it}$.

Source: Authors' estimates.