

Economic Crises and Income Inequality

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Abstract

Financial crises are common in market economies. While the initial impact of a crisis is harmful for an economy, recent research suggests that risky behavior of investors - one of the main causes of crises - can have long-run positive impacts for an economy through increased investment during non-crisis times. On average, the long-run positive effect of this investment has been found to be greater than the initial decreases in wealth during a crisis; rare crises are in fact beneficial to economies. However, this positive effect is not necessarily equal for all groups within a nation. This paper explores how rare, systemic economic crises affect inequality within nations. Rare crises are found to significantly increase inequality, even when controlling for the income level of nations. Crises lead to an increase in the income share of the top 20% of people in a nation, while they have a negative effect on the share of income of the lowest 40% large enough to suggest that the poor receive no, or even negative, benefit from the positive effects of investment growth. This differential effect is found to be partly due to a quick return of financial profits and a decrease in the growth rate of employment after a crisis.

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1 Introduction

System wide financial crises include banking panics, stock market crashes, the bursting of financial bubbles and currency crises. Each of these have an immediate unambiguously negative impact on economies as a whole, leading to decreased credit availability and decreased or negative economic growth for some short-term period. The likelihood of experiencing such a crisis increases as investors engage in more risky investment behavior. Ramey and Ramey (1995), Fatas and Mihov (2003) and Imbs (2004) find a negative relationship between economic growth and variance of credit growth, though Imbs (2004) finds that sector level volatility increases growth. Recently, Ranciere et al. (2008) found evidence that rare crises have a positive effect on economic growth. For the last 40 years, nations that engage in low - but not too low - levels of risk, and thus experience occasional systemic financial crises, have also experienced more long-run growth.

Ranciere et al. cite Thailand and India as prime examples of the effect that different levels of risk can have on an economy. Thailand, which has a set of financial institutions that encourage more risky investments than India, has experienced significantly greater growth, despite a severe financial crisis in 1997. This difference is noted in figure 1. Ranciere et al. estimate that the difference in risk taking between nations explains one-third of the income growth difference between these two nations. The more moderate path of India appears to have harmed the country economically.

Risk taking leads to crises and so, while distinct phenomena, both are closely related and cannot be easily separated empirically. Skewness captures both the negative effect of a crisis (decreased capital availability) and the potentially positive benefits from the risk taking that led to the crisis. It is not possible to fully separate out the effect of crisis and risk. Nor would we want to; the two are closely linked. It is meaningless to use a false dichotomy between growth and crises¹.

¹Arbache and Page (2007) employ such a dichotomy by estimating what economic growth African coun-

A priori, we would not expect a financial crisis to affect all individuals within an economy equally. The majority of people lose during a crisis, though some may lose more than others or suffer different long-run effects. Likewise, we would not expect the benefits from risk taking to necessarily be equal across all groups. If these differences in effects are concentrated across different economic groupings, it is likely that even a rare financial crisis - and the risk taking that leads to such a crisis - will increase inequality across economic groups.

During a financial crisis, both jobs and profit decrease in an economy. For instance, Reinhart and Rogoff (2009) find that national unemployment rates rise after a crisis for over four years on average. Figure 2 shows the effects of the 1997 Thai economic crisis, the United States recession in 1990 and the Mexican crisis in 1994 on unemployment and industrial value added, a measure of the value an economy has added to inputs in the industrial sectors. During each of these crises, unemployment increased and industrial value added decreased substantially².

After each of the crises, these indicators returned to relatively normal levels, though at different rates. Thailand is the most pronounced example. The growth rate of industrial value added returned to precrisis levels within two years, while unemployment continued to be unusually high for at least five years. As value added is shared between the owners of capital, as profit, and laborers, as wages, the decrease in employment means that profit has increased at the expense of wages. The profits of businesses thus returned to normal or even higher growth levels after the crises in Thailand, while employment lagged.

Research on the inequality effects of financial crises has for the most part focused on case studies and descriptive statistics (e.g. Atinc and Walton (1998), Cunningham and Mal-

tries could have achieved without crises, but with the same growth level during non-crisis periods. This is obviously a suspect calculation, given that the nations studied would probably not have enjoyed the same level of growth without the risk taking that led to the crisis.

²Interestingly, this decrease is not necessarily true for workers wages. Campbell and Kamlani (1997) and Bewley (2002) discuss reasons why wages stay rigid during crises in the United States. While wage rigidity could theoretically decrease inequality, the aggregate effect could be to worsen inequality if unemployment is high enough.

oney (2000), Lokshin and Ravallion (2000), Lustig (2000) and Diwan (2002)). Of the more informative studies, Robilliard et al. (2001) look at the microlevel inequality effects of the Indonesian crisis, where inequality increased 67% in the three years after the 1997 financial crisis. The authors present evidence that at least half of the change is due to the crisis. Lopez-Acevedo and Salinas (2005) look at Mexico, where inequality has been increasing significantly through increasing financial income of the richest percentiles, though nonwage salary increased significantly after the 1994 financial crisis, exacerbating the difference between rich and poor. Halac and Schmukler (2003) discuss the effect of crises on financial transfers in Latin America and find that crises have the tendency to increase transfers to the rich, and thus inequality.

Baldacci et al. (2002) look at changes in poverty headcount ratios, Gini coefficients and income shares before and after crises using cross-country data. They find crises have a significant effect on these indicators, though their empirical specifications are not well identified and they have very small sample sizes. Most recently, a report from the ILO (2008) discusses how world inequality has been increasing and will likely become worse after the recent financial crisis originating in the United States. In addition to connecting the broader Asian economic crisis to inequality, the ILO report presents the first cross-country regressions for the effect of financial crisis on inequality.

This paper further explores the effect of financial crisis on inequality and the mechanisms behind this effect using a measure of crises developed by Ranciere et al. (2008) - skewness of real credit growth, which captures rare crises, often considered an integral part of healthy economies. A one unit increase in skewness is found to increase the Gini Coefficient by two percentage points, an increase of an average 5% from the sample mean of 40.8, even when controlling for the income level of a nation. Ranciere et al. (2008) find that a one unit increase in skewness, approximately the difference between Thailand and India, increases economic growth by 0.32%. To continue the comparison between India and Thailand, risk explains

20% of the difference in Gini Coefficients. While nations may be missing income growth by curbing the kinds of risk taking that lead to financial crises, they are also avoiding the increases in inequality that come with it.

This increase in inequality does not a priori mean that the poor do not benefit from risk taking. The increased capital availability in the economy may increase the income of poor individuals, though the increase would be lower than those with higher income. In order to determine if the poor do benefit, the effect of crises on income share by quintile is estimated. The results suggest that the share of income for the poorest two quintiles is negatively affected by risk. The size of this effect suggests that the poorest individuals are in fact hurt by risk taking.

Finally, why this differential effect happens is explored. The experiences of Mexico, Thailand and the United States discussed above appear to be generalizable to the full dataset: the growth rate of employment decreases, while industrial value added increases after a crisis.

This paper proceeds as follows. Section 2 briefly discusses how crises can benefit economies, while two income groups within a nation, which are called here workers and owners, can experience the effects differently. Section 3 describes the empirical model, data, evidence that the causal link does not run from inequality to crises and results of the main regression. Section 4 concludes with a discussion of the findings.

2 How Financial Crises Affect Growth and Inequality

2.1 Growth Benefits

Ranciere et al. (2008) present a rational model of the effect of financial crisis on an economy through the leverage effect of risk taking. In the event of a crisis, taxpayers bailout lenders. This means there is a decrease in capital costs for borrowers, giving them more leverage. This decreases borrowing costs and thus leads to greater investment. This greater investment

leads to greater growth, at least in the short-run.

Risk taking though increases the incidence of financial crisis. In the event of a crisis, credit availability decreases, causing business funds and investment to decrease, thus negatively affecting growth. In addition, extremely high levels of risk taking can increase the volatility of financial markets to a point where, even in the non-crisis periods, there is lower investment³.

The net effect of risk-taking in Ranciere et al. (2008) is then determined by the level of contract enforceability. Too little enforcement of contracts prohibitively increases the cost of lending, even under increased leverage, while high enforcement of contracts eliminates borrowing constraints entirely. Even with contract enforcement, too much risk taking, and so a large high number of financial crisis, can decrease the stability needed for growth during the good times. A mix of some risk and contract enforcement is thus needed to lead to greater internal funds of businesses, and thus economic growth, even in the presence of financial crises.

2.2 Inequality

The right level of risk taking can thus increase internal business funds, though these funds are not a priori equally available to all individuals within an economy. The long-run effects to crises could include, as discussed by ILO (2008), poorer households, who are hardest hit by economic crises, changing their behaviors in response to the crises. For example, when income becomes too scarce, households may decrease education investment for the young, opting instead to put them into the labor force. Households may also increase their indebtedness to cover basic needs or, where this is not feasible, decrease nutrition. Each of these effects is likely to be more pronounced in low-income households than higher income households, thus leading to greater long-run income differences.

³See for example Bernanke (1983) and Pindyck (1991) who present theoretical arguments for the link between volatility and investment, as well as Ramey and Ramey (1995) who find empirical evidence of the link.

Halac and Schmukler (2003) identify four additional channels discussed in the literature that could affect inequality after a crisis. Labor demand can decrease from a slowdown in economic activity; inflation can increase, thus depressing real wages⁴; relative prices may change, such as disproportionate effect of cheap imports, which affects the poor greater than the rich; and public spending may decrease. For the purposes of this paper, I will focus on the first of these channels, labor demand.

Assume there are two groups in an economy, the rich and the poor. The rich derive much of their income from financial profits and so will be referred to here as owners. The poor, or workers, receive the majority of their income from wages. Owners directly benefit from an increase in business funds through profit or dividends, while workers experience the benefit through (possibly delayed) wage effects. In the discussion that follows, the share of benefit going to each party is assumed to be determined by wage determination power⁵.

If the two groups experience the crisis differently, there is an immediate, short-run unequal effect from the crisis. For instance, workers may be laid off from jobs at a faster rate than profit rates decline for owners. Conversely, inequality could decrease during a crisis if the crisis hits those with large financial holdings more than workers. This could happen if owners avoid laying off workers or increase real wages and accept short-term losses, thus increasing their own income losses and affecting workers minimally. This potential short-run effect can be seen in figure 4, which shows the share of income of the top 10% of income earners in the United States from 1970 to 2006 from Piketty and Saez (2003). Crises in the 1970s did not appear to have an effect on the growth of income share, though later crises do appear to have slowed the growth slightly, but not for very long.

In the medium- to long-run, a crisis may also lead to inequality through a change in

⁴As mentioned previously, Campbell and Kamlani (1997) and Bewley (2002) discuss how real wages in fact stay rigid during economic crises in the United States.

⁵Wage as a bargaining outcome is a common model in labor economics. One part of this large literature can be found with McDonald and Solow (1981).

the growth path for workers compared to owners. Two examples where this could happen include a delayed recovery and a differential short-run growth path for workers.

After a crisis, as an economy recovers, renegotiation may need to take place between owners and workers. Businesses have an incentive to keep worker numbers low in general, and this is especially true after a severe decrease in returns, where the desire to recoup losses is greatest. If the crisis caused fewer workers to be employed, it may be easier to keep worker numbers low. Workers may sympathize with the needs of owners or fear losing their current jobs, and so cooperate with owners' desires to increase output while keeping employment (and wages) the same, or at least to grow slowly.

Workers could thus experience a delayed effect from the restart of the economy. After a crisis, owners return to the previous growth rate, while workers experience a delay before returning to the previous growth rate. Over time, this extra delay causes a significant divergence in incomes and long-run income growths.

This delay does not necessarily mean workers are worse off than they would be had there been no risk-taking in the economy. The difference between the potential growth path with less risk and the actual growth path of nations with risk is an empirical question that will be addressed in the next section.

Workers could also experience long-run growth differentials from owners through short-run growth changes. The previous example assumed workers' income eventually returns to pre-crisis growth levels. Increased under- and unemployment could mean workers are forced to accept lower employment and income growth through decreased bargaining power with employers. This effect can be seen in figure 5, which shows the percent of workers in the United States in labor unions. Data on union participation is from OECD (2007) and is very limited, so generalizations are not possible. However, the data suggests that union participation in the United States was largely stable before the 1979 oil crisis, after which it has steadily declined.

Workers could then lose wage determination leverage after each crisis. After a crisis, owners immediately return to the previous growth rate, while workers experience an immediate decrease in income growth. The effect of this change is compounded after each crisis, leading to a large divergence in long-run income growths.

Again, this decrease in short-run growth does not necessarily mean workers are worse off than they would be had there been no risk-taking in the economy. Depending on the potential safe growth path, workers may be better off under risky investment if the alternative means less growth.

The role of institutions is not the same for inequality as it is for growth. Contract enforcement affects the trust lenders have that borrowers will repay, but it does not affect whether workers recover from a crisis in the same way as owners, or equally enjoy the benefits of increased lending. Instead, inequality could potentially be affected by political institutions that affect employment support, such as unemployment insurance, or the power of workers relative to business owners in determining wages, both immediately following a crisis and in the non-crisis periods when economic growth is high.

As there is no data measuring these political institutions, this issue will be partially explored by interacting real credit growth with a dummy variable for whether the country has high wealth. While an imperfect proxy, countries with very high incomes do generally have greater safety nets for workers, and so a crisis could affect the poor less severely. This also means that they have lower inequality in general (high income countries have an average Gini coefficient of 34, while other countries average a Gini of 46). This interaction must thus be interpreted cautiously as there is a high level of endogeneity between it and the dependent variable.

Finally, there is the possibility that the causal chain between inequality and financial crises may lead in the opposite direction. Carpenter (2004) and Benmelech and Moskowitz (2007) present evidence that economic elites are able to control the political process in order

to decrease levels of financial regulation. If elites have more control over the political system in countries with greater inequality, and so are able to get less regulation passed, the direction of causation could be that inequality could lead to an increase in crises. If this causal chain is true, an estimate of the effect of financial crises on inequality will be biased. While it is a potentiality, the dichotomy between more and less equal nations is false. A simple Granger causality test, discussed in section 3.3, suggests the causal link from inequality to skewness is very weak at best and so does not likely bias the results obtained. It is thus likely that elites, no matter the level of inequality, have the political power to affect regulation standards.

3 Empirical Analysis

If a financial crisis affects workers more heavily than owners, or if workers do not benefit from increased investment during non-crisis periods, the effect will be observable through changes in inequality within nations. This section estimates the differential effect of systemic crisis through the Gini Coefficient and quintile shares, along with exploring a potential mechanism for inequality, employment versus industrial value added growth.

3.1 Empirical Model

The following model is estimated to determine the distributional effects of risk taking:

$$Y_{it} = \alpha + \beta_1 \mu_{git} + \beta_2 \sigma_{git} + \beta_3 sk_{git} + \delta X_{it} + \gamma_t + \epsilon_{it} \quad (1)$$

where t is the decade, i is country identifier, μ_{git} , σ_{git} and sk_{git} are the mean, standard deviation⁶ and skewness of the real credit growth rate, X is a matrix of control variables, γ is a time period dummy and ϵ is the error term. The dependent variable, Y , is the

⁶Including the mean and standard deviation of real credit growth is standard when using skewness and does not affect the significance of the results, though including them does often decrease the size of the point estimate on skewness.

Gini Coefficient for a nation, income by quintile share, industrial value added growth or unemployment growth, depending on the specification used.

A number of control variables are included that may be significant for the rate of inequality within a country. Inflation rate is included to control for nations with high levels of price changes and so may not be able take advantage of the benefits from increased investment. Population growth, while not giving information about how population changes across income groups, may still affect how money is disbursed within nations. Life expectancy is a mean for a country and so likewise does not give information across income groups, though a lower life expectancy likely affects the poor greater than the rich, who often have very good access to health care. Finally, a measure of openness to trade, discussed below, is included to control for the effect of trade liberalization on inequality. These variables may not be exogenous to inequality, and so interpretations should be done cautiously.

As the data is a time series and there is a significant difference in the variances of the Gini coefficients and skewness across countries, to estimate equation 1 a generalized least squares panel data regression with heteroscedastic standard errors is used to control for country trends, which minimizes the effect of omitted variables, and different variances. Decade dummies are included to control for world-wide time trend effects in addition to country time controls standard in panel data estimation.

3.2 Data

A financial crisis results in a significant decrease in real credit growth. Rare occurrences of such a crisis will cause the distribution of credit growth to skew to the left. Figure 3 presents two different theoretical distributions of real credit growth with equal mean and variance but with different skewness. Real credit growth with zero skewness is symmetrically distributed around the mean, while skewness eliminates the symmetry. Mean and variance have not changed, but the distribution has “shifted to the left” due to negative skewness from very

rare low values. Nations that have a negative skewness, such as Thailand, have experienced severe decreases in real credit growth on rare occasions. Low skewness nations, such as India, have experienced less severe shifts in real credit growth.

This measure of crisis is preferable to an indice of crisis, which captures a slightly different measure than skewness in that it misses the important question of rareness. Too many crises are likely bad for an economy, while none means that an economy is very risk averse. The goal here is to capture the effect of rare crises, which are emblematic of many modern economies and considered an integral part of economies that engage in healthy amounts of risk. All other things equal, an increase in risk taking will increase the likelihood there is a crisis. Skewness is thus simultaneously a measure of risk taking and rare crises, and, as discussed previously, it is not possible to fully separate out the effect of crisis versus risk⁷.

All data is aggregated by decade in order to observe the effects of mean, standard deviation and skewness of real credit growth. Real credit growth and inflation rate are from the original calculations of Ranciere et al. (2008) from IMF International Financial Statistics line 22 and central banks' publications. The authors have kindly shared their data.

Data on Gini Coefficients is from Deininger and Squire (1996), who collected the largest database of Gini Coefficients going back to the 1960s for many nations from different sources. Not all sources are as good as others, and so only values deemed by Deininger and Squire to be of very good quality are used. Those values that are of good quality are then averaged by decade. This leads to a smaller sample than originally observed by Ranciere et al. Table 1 presents the countries in the dataset, along with the Gini Coefficient values used by decade. Because of missing data, the new dataset is not balanced⁸.

⁷An index measure of crisis has also been explored. Crisis measures by Caprio and Klingebiel (1996) and Demirci-Kunt and Detragiache (1998), depending on specification, produce inconsistent results. A consensus measure by Ranciere et al. (2008), which combines these and other indices and ensures the coded beginning of a crisis is measured when it actually begins having macroeconomic consequences, produces results of similar size to skewness. Crisis measures though are not preferred here as they do not capture rarity or severity of crisis, nor recovery after a crisis, as well as skewness measures.

⁸In addition, using a separate data set of inequality discussed by Galbraith and Kum (2004) and Galbraith

Additional data on income share by quintile, unemployment growth rate, industrial value added growth rate, GDP growth per capita, initial GDP per capita, life expectancy at birth and population growth are all taken from the World Bank World Development Indicators. Openness to trade, from calculations by Ranciere et al., is the residual from regressing the dependent variable log ratio of exports and imports to GDP (both in 1995 US\$), on the independent variables log of area and population, along with dummies for oil exporting and for landlocked countries (from unpublished appendix to Ranciere et al. (2008)). The greater the value, the greater the relative openness to trade. Each of these variables has been averaged by decade.

Due to limitations of available data there is not a sufficient sample size for the 1960s and so the results presented here are limited to the three decades of the 1970s, 1980s and 1990s⁹. The effect of rare crises on inequality is estimated using two sample time periods, 1970 to 2000 and 1980 to 2000, in order to maximize the sample size while determining the relative robustness of the results to time periods used¹⁰.

Summary statistics are presented in table 2. For the entire sample, skewness is very close to 0 on average, as is openness to trade.

Table 3 summarizes real credit growth distributions by year and by region. Mean real credit growth declined significantly from 1971 to 1981, except in East Asia, where average credit growth increased. Sub-Saharan Africa experienced a significant decrease in average credit growth after 1981, while the standard deviation has been in the double digits, along with Latin America.

(2009), which expands the data from Deininger and Squire (1996) to include more years has also been explored. The results from both datasets are of similar in size and significance, and so only the results from the more commonly used data of Deininger and Squire are presented.

⁹The results when including the 1960s are similar in sign and magnitude, though including the 1960s increases the sample size by only 22 data points, less than half the number of countries in the sample, and so is omitted.

¹⁰Limiting the sample time period to 1970 to 1990 does not significantly change the results. Given the limited data, these results are omitted.

Average real credit growth skewness was positive for most regions in the 1970s, lead by South Asia. Sub-Saharan Africa experienced negative skewness in the 1980, then decreasing further in 1990s. The two regions with the highest economic growth in the late 1990s, East Asia and Sub-Saharan Africa, both have significant negative skewness during this period.

3.3 Does Inequality Cause Crises?

As mentioned above, the causal direction could be that inequality leads to crises, thus biasing any results obtained. To test for this possible problem, a simple Granger causality test, first discussed by Granger (1969), is estimated. If values of time series X provide statistically significant information about future values of time series Y, X is said to Granger-cause Y. This can be tested by looking at the significance of the coefficient on lagged values of inequality (Y) with skewness (X) as the dependent variable.

The following panel data regressions were run:

$$X_{i,t} = \xi_0 + \xi_1 X_{i,t-1} + \xi_2 Y_{i,t-1} + \xi_3 Z_{i,t} + \epsilon_1 \quad (2)$$

$$\Delta X_{i,t} = \psi_0 + \psi_1 \Delta X_{i,t-1} + \psi_2 \Delta Y_{i,t-1} + \psi_3 \Delta Z_{i,t} + \epsilon_2 \quad (3)$$

where i is the country, t is the decade, Δ is the difference between variables in t and t-1, Z is a matrix of time effects and other controls and ϵ is the error term. Neither ξ_2 nor ψ_2 are found to be significant, suggesting that inequality does not Granger cause skewness (results not shown). As the data is limited to only three time periods (decades), the results are not conclusive. Additionally, Granger causality does not imply true causality. The results suggest though that the causal link from inequality to skewness is weak at best.

3.4 Results

To test if the effect of crises on GDP growth are consistent within the smaller sample used here, table 4 recreates tables 2 and 3 of Ranciere et al. (2008) for the sample periods 1970 to 2000 and 1980 to 2000. Columns 1 and 3 present the simple regression framework and columns 2 and 4 explore the importance of institutions by interacting real credit growth with a measure of medium contract enforceability. The results are broadly consistent with the interpretation that rare crises increase GDP and that growth is stronger in countries with a medium level of contract enforceability¹¹. The control variables are also of similar sign to the findings of Ranciere et al. (2008), with the exception of initial secondary schooling, which here is found to negatively affect income growth in the non-interaction regressions, though by a very small amount.

The results for within country inequality are presented in table 5 for the same sample time periods as table 4. Columns 1,2,4 and 5 explore the effect of crises on inequality, while columns 3 and 6 include an interaction between real credit growth and a dummy for if the country is high income. Inflation is not associated with inequality, while both initial secondary schooling and openness to trade are negatively associated with inequality, suggesting that inequality may decrease as education and trade increases. Higher population growth and life expectancy increase with inequality. As these variables are averages for nations, they could be picking up the unequal distribution of health care and fertility rates. Mean and standard deviation of real credit growth have small and not consistently significant effects on inequality.

Skewness of real credit growth shows a significant point estimate impact from risk taking between 1.4 and 2.8, depending on time period and controls, while the coefficient on the interaction of skewness of credit growth and high income dummy is not significant. As the

¹¹As skewness is a negative measure, the effect of an increase in skewness is the opposite of the sign of the coefficient estimate. Thus, a negative coefficient estimate means crises are positively associated with a dependent variable.

average Gini Coefficient in the sample is 40.8, a one unit increase in skewness - slightly more than a 1 standard deviation change - leads to a 3%-7% increase in the Gini coefficient. This result confirms the hypothesis that the effect of rare crises, and the risk-taking that leads to them, is not equal across income groups within nations, nor is it confirmed to only lower income nations. Risk, while increasing a nation's growth rate, leads to greater inequality.

The effect of crises on inequality can be better understood through the results of table 6, where share of income by quintile group are the dependent variables. Consistent with the findings on inequality in table 5, for the bottom 20 and second 20 percentiles (columns 1 and 2), risk has a significant negative effect on income share, decreasing income share by approximately 0.25 percentage points. Only for the top 20 percentile (column 5) does risk show a significant positive effect, with an increase of 0.64 percentage points.

The control variables are likewise consistent with interpretations of the results in table 4. Inflation, life expectancy and population growth are negatively associated with share of income for lower income groups and positive for the top 20%. Mean real credit growth decreases the income share of all groups except for the top 20%, for whom it increases share, while standard deviation also helps share of income for top income earners.

Table 7 explores the mechanisms discussed in section 2.2 behind the differential growth effect of crises. Columns 1 and 2 look at the effect of economic crises on growth of industrial value added, while columns 3 and 4 look at unemployment growth rates. For all specifications, skewness is negatively associated with the dependent variables. Systemic crises contribute to the growth of industrial value added, while increasing unemployment growth. The post-crisis conditions of Mexico, Thailand and the United States discussed earlier appear generalizable to a larger set of nations.

4 Discussion

As data is aggregated at the decade level, the results obtained in this paper are medium- to long-term effects from crises. The results are all consistent with the hypothesis that crises increase inequality.

Data on income share is limited. The results in table 6 are only for the 1990s and a limited number of countries, and so may not be easily generalizable. The effect on the bottom two quintiles is strikingly similar in size - though of opposite sign - to the results of Ranciere et al. (2008), who found a positive effect of crises on GDP growth of 0.32 percentage points. This effect is clearly not shared by all members of an economy evenly. If the per capita GDP of nations with systemic crises increases by 0.32%, while the bottom share of individuals receives a smaller share of total income by 0.25%, the net effect on the poor is a decrease in total per capita income. While there is not sufficient data to connect actual income growth to quintiles, this is strongly suggestive that risk taking only has a significant positive effect on the top quintiles, and has a negative effect on the poor. It appears that only the richest groups in an economy benefit from risk, while the poor would benefit from a safer path.

In the discussion in section 2.2, it was hypothesized that inequality may arise from delays between profit and employment growth, that crises could lead to differential growth rates for profit and employment or a possible combination of both. From these results it is not clear what the immediate effect of a crisis is on income groups, though certainly some kind of decrease in employment opportunities is responsible for the differential. Unemployment growth is, of course, only one mechanism that affects workers. The results are not conclusive for the total impact of income from a crisis on the poor, but do suggest one important mechanism.

These results have important policy implications for nations deciding on the level of risk taking they are willing to accept. High levels of risk are obviously economically dangerous

for nations, while some risk, which leads to rare crises, can increase economic growth, but only for some. The lowest 40% of income groups lose from risk, and so would prefer there not be risk-taking, while the top 20% benefit greatly from it.

The interactions between real credit growth and income level are included to partially explore if higher income nations, who have greater levels of social security for lower income individuals, are able to avoid the inequality problems that arise from crises. The results suggest that they have not been able to avoid these problems. The results, though, do not mean that future risk will be bad for nations, only that previous experiments by nations on level of risk have had negative effects on the poor. There may be ways to minimize, or even eliminate, the costs to the poor from crises. For instance, an insurance system for workers in the event of a crisis could be developed to lessen the effect on household decisions away from schooling toward short-term economic gains of labor.

That inequality happens, at least in part, through differential effects on profit and employment suggests that governments may wish to seek ways to increase employment opportunities after a crisis in order to decrease the detrimental effect. For example, government works projects increase worker incomes, while simultaneously decreasing labor supply, thus giving more leverage to workers for wage determination in the labor market. It is also possible that countries with greater worker ownership of businesses, or greater worker power through labor unions, may be able to close the gap on differences in profit versus wage effects after a crisis, leading to a decrease in the delay to unemployment or a minimization of the growth change.

In addition to offering a detailed and generalizable look at the inequality effects of systemic risk taking, these results contribute to the the literature on trade liberalization and growth. Trade liberalization and economic growth have been positively associated with economic growth (e.g. Acemoglu et al. (2003), Henry (2002), Kaminsky and Reinhart (1999), Kaminsky and Schmukler (2002), Klein (2005) and Obstfeld (1994)) with some evidence,

counter to what is found here, that trade leads to greater inequality (e.g. Perry and Olarreaga (2006), Hanson and Harrison (1999), Beyer et al. (1999) and Mishra and Kumar (2005)). Nations that are more open to trade are also more open to risk taking, and so are more susceptible to financial crisis. Risk taking by the financial sector may thus be an important mechanism for the inequality effects of trade openness.

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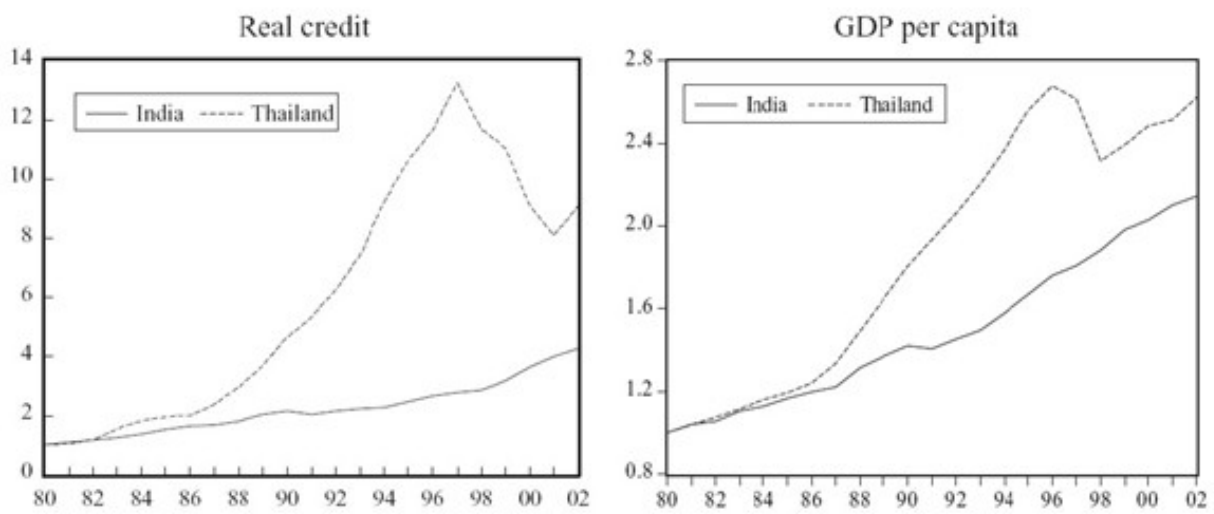
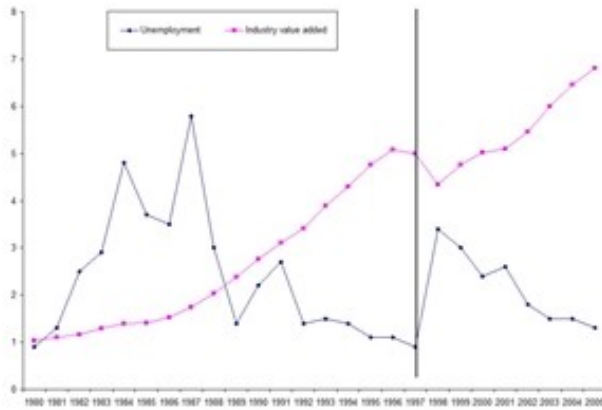
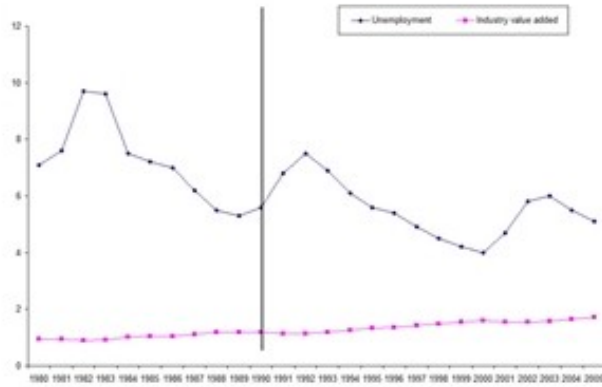


Figure 1: Real credit and GDP growth paths for India and Thailand from Ranciere et al. (2008). Both indicators are normalized to 1 in 1980.



(a) Thailand

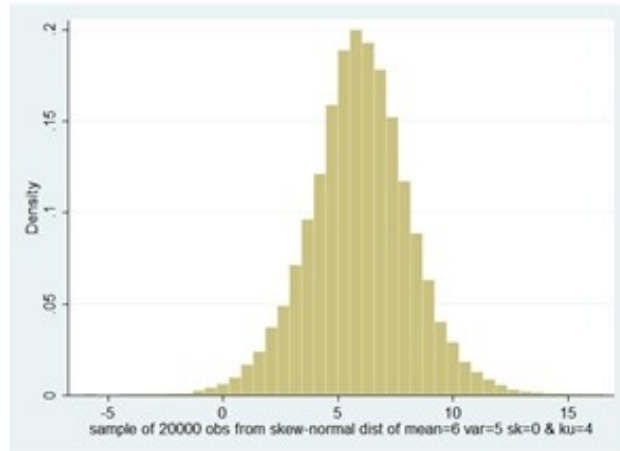


(b) United States

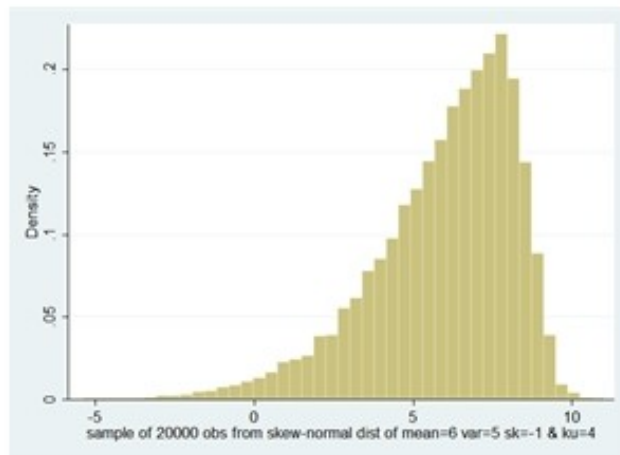


(c) Mexico

Figure 2: Industrial value added and unemployment for Thailand, United States and Mexico. Industrial value added is normalized to 1 in 1980. The vertical line is year of major economic crisis. Data is from the World Bank Development Indicators.



(a) Skewness=0



(b) Skewness=-1

Figure 3: The top histogram has a symmetric normal distribution. The bottom histogram is the same distribution with negative skewness.

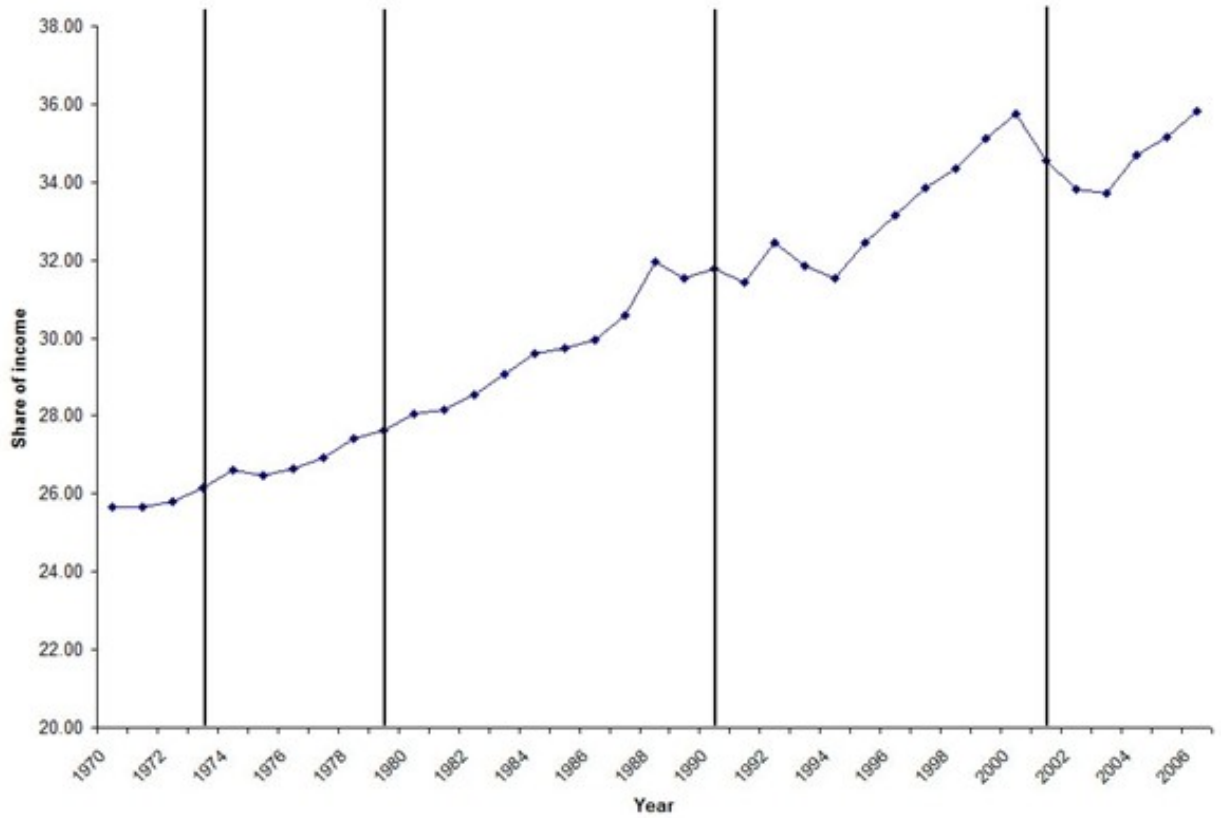


Figure 4: The percentage share of income for the top 10% of individuals in the United States. The vertical lines represent different financial crises.

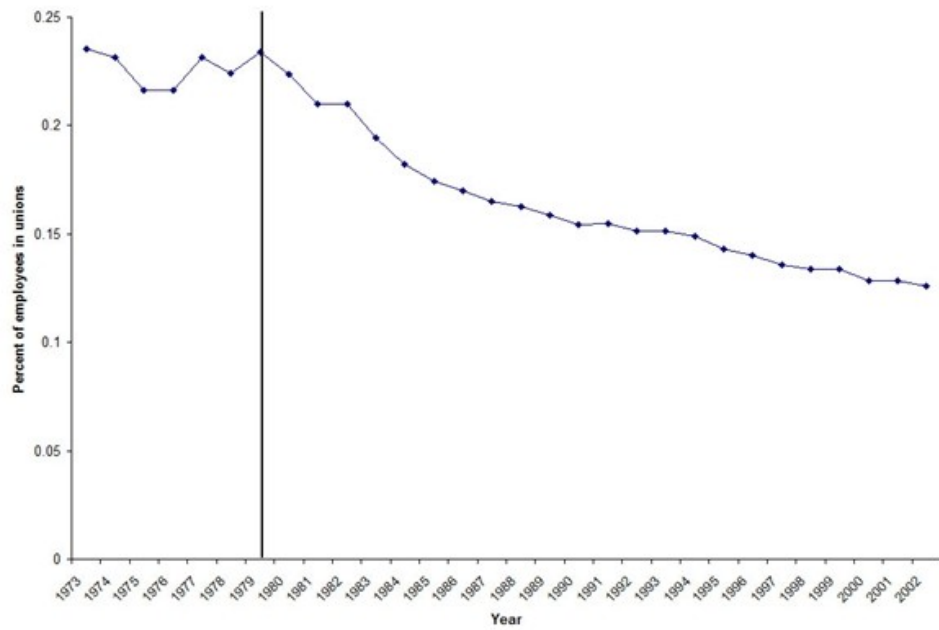


Figure 5: The percent of employees in unions in the United States. The vertical line is the 1979 oil crisis.

Table 1: Nations originally included in Ranciere et al. (2008), with Gini Coefficient by decade from Deininger and Squire (1996).

country	1970s	1980s	1990s	country	1970s	1980s	1990s
Argentina	41.11	42	47.59	Japan	36.9	34.3	35
Australia	32.02	39.96	41.72	Jordan		40.8	40.66
Austria	29.3	31.4		Kenya	70		54.39
Bangladesh	36	39	28.27	Korea, Rep.	36.01	38.63	33.64
Belgium				Madagascar		48.9	
Bolivia			42.04	Malawi		56.7	62
Botswana	57.4			Malaysia	50	51	48.35
Brazil	57.61	55.42	59.6	Mexico	57.7	50.58	50.31
Burkina Faso			39	Morocco	49		39.2
Canada	33.99	30.6	35.08	Netherlands	28.6	26.66	29.38
Chile	46	53.21	57.88	New Zealand	30.05	34.79	40.21
China		32	36.2	Niger			36.1
Colombia	52.3	54.5	51.32	Norway	37.48	30.57	33.31
Costa Rica	44.4	47.49	46.07	Panama	57	47.47	56.47
Denmark		30.99	33.2	Papua New Guinea			
Dominican Republic	45.5		50.46	Paraguay		45.1	39.8
Finland	27	32.04	26.11	Portugal	40.58	36.8	35.63
France	44	34.85		Senegal	43		54.12
Gambia, The			39	Singapore	41	40.69	39
Germany	30.62	30.59		Spain	37.11	26.79	25.91
Greece	44.92	33.29		Sweden		32.54	32.44
Honduras	61.88		50	Switzerland			
Iceland				Thailand	42.63	43.1	48.8
India	31.85	31.49	32.53	Tunisia	44	43	40.24
Indonesia	30.7	33.73	33.09	Turkey	51		
Ireland				United Kingdom	25.7	25.4	32.4
Israel	30.87	29.19	32.46	United States	34.3	35.62	37.94
Italy	41	33.12	32.19	Uruguay	41.81	42.55	42.36
Jamaica	41.27		41.11	Zimbabwe	62.3		56.83

Table 2: Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini Coefficient	128	40.79828	9.685505	25.4	70
Unemployment growth rate	85	0.0249263	0.0856297	-0.1944444	0.2282298
Industrial value added	161	4.28499	4.264758	-4.594422	28.68377
Lowest 20% share of income	40	5.331494	1.87883	2.495	10.58
Second 20% share of income	40	9.56085	2.326097	5.7275	14.73906
Third 20% share of income	40	14.1063	2.142969	9.713053	18.20098
Fourth 20% share of income	40	20.94404	1.598353	16.02806	23.57
Highest 20% share of income	40	50.05482	7.507012	35.65	65.05945
Real credit growth - mean	173	6.380312	5.753616	-7.292217	25.36983
Real credit growth - standard deviation	173	11.31104	8.135108	1.63654	48.92224
Real credit growth - skewness	173	0.0592806	0.8212362	-2.029791	2.553789
Initial secondary schooling	174	53.36963	31.79447	1.119163	119.5085
Inflation rate	173	14.62869	22.96592	0.6520647	170.6994
Openness to trade	174	0.067911	0.4572055	-1.314967	1.323436
Life expectancy at birth	174	65.18977	10.64125	36.76	78.84
Population growth	174	1.666418	1.06371	0.0331287	4.328077

Table 3: Real credit growth distributions by decade and region.

		1970s	1980s	1990s
Real credit growth - mean	East Asia	8.845	12.292	5.723
	Europe	5.361	5.969	5.291
	Latin America	8.971	1.551	9.447
	Middle East	12.131	5.119	8.958
	North America	7.034	3.645	4.457
	South Asia	17.327	10.017	7.053
	Sub-Saharan Africa	8.204	0.343	0.493
	World	8.137	5.197	5.837
Real credit growth - standard deviation	East Asia	9.957	9.042	8.938
	Europe	7.934	6.779	8.555
	Latin America	16.190	20.572	13.244
	Middle East	8.757	8.607	7.010
	North America	4.823	6.461	4.389
	South Asia	13.574	7.851	8.192
	Sub-Saharan Africa	14.825	13.369	19.632
	World	11.371	11.435	11.128
Real credit growth - skewness	East Asia	0.217	0.061	-0.483
	Europe	-0.005	0.481	0.336
	Latin America	-0.101	-0.084	0.018
	Middle East	0.147	-0.455	0.737
	North America	-0.312	0.171	-0.307
	South Asia	0.529	0.122	1.168
	Sub-Saharan Africa	0.244	-0.237	-0.495
	World	0.066	0.083	0.029
Gini Coefficient	East Asia	37.414	38.689	39.557
	Europe	36.443	31.157	31.174
	Latin America	49.689	48.702	48.847
	Middle East	41.290	37.663	38.140
	North America	34.145	33.110	36.510
	South Asia	33.925	35.245	30.400
	Sub-Saharan Africa	58.175	52.800	48.777

Table 4: Panel data generalized least squares regression results for GDP growth per capita as the dependent variable, adapted from Ranciere et al. (2008).

	(1) 1981-2000	(2) 1981-2000	(3) 1971-2000	(4) 1971-2000
Real credit growth - mean	0.17 [0.011]***	0.06 [0.024]**	0.16 [0.016]***	0.062 [0.019]***
Real credit growth - standard deviation	-0.052 [0.014]***	-0.034 [0.011]***	-0.057 [0.014]***	-0.021 [0.012]*
Real credit growth - skewness	-0.529 [0.095]***	-0.094 [0.110]	-0.49 [0.107]***	-0.063 [0.086]
Mean credit growth * CE		0.148 [0.032]***		0.121 [0.025]***
Standard deviation of credit growth * CE		0.033 [0.014]**		-0.011 [0.014]
Skewness of credit growth * CE		-0.280 [0.174]*		-0.497 [0.146]***
CE (medium contract enforcability dummy)		-0.385 [0.287]		0.184 [0.257]
Initial secondary schooling	-0.013 [0.004]***	-0.001 [0.006]	-0.01 [0.005]*	-0.005 [0.005]
Inflation rate	-0.003 [0.005]	-0.014 [0.003]***	-0.01 [0.004]**	-0.016 [0.004]***
Openness to trade	0.733 [0.222]***	0.305 [0.175]*	0.277 [0.213]	0.228 [0.135]*
Life expectancy at birth	-0.006 [0.017]	0.001 [0.017]	0.008 [0.014]	0.026 [0.013]**
Population growth	-0.754 [0.122]***	-0.42 [0.116]***	-0.462 [0.113]***	-0.314 [0.088]***
Decade dummy	yes	yes	yes	yes
Observations	84	114	123	166
Number of countries	51	58	52	58

¹Heteroscedastic-robust standard errors in brackets. * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%.

Table 5: Panel data generalized least squares regression results for Gini Coefficient as the dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
	1981-2000	1981-2000	1981-2000	1971-2000	1971-2000	1971-2000
Real credit growth - mean	0.241 [0.075]***	0.101 [0.074]	0.029 [0.133]	0.127 [0.063]**	0.008 [0.060]	0.027 [0.098]
Real credit growth - standard deviation	0.576 [0.048]***	0.132 [0.066]**	0.213 [0.110]*	0.395 [0.058]***	0.094 [0.074]	-0.149 [0.098]
Real credit growth - skewness	-2.753 [0.364]***	-1.964 [0.299]***	-2.215 [0.777]***	-2.168 [0.512]***	-1.365 [0.447]***	-1.673 [0.718]**
Mean credit growth * High income dummy			0.285 [0.152]*			0.104 [0.142]
Standard deviation of credit growth * High income dummy			-0.421 [0.145]***			0.175 [0.141]
Skewness of credit growth * High income dummy			0.182 [0.873]			0.201 [0.922]
High income dummy			-6.185 [2.750]**			-10.235 [2.382]***
Initial secondary schooling		-0.155 [0.019]***	-0.071 [0.015]***		-0.144 [0.023]***	-0.081 [0.026]***
Inflation rate		0.048 [0.033]	0.018 [0.035]		0.044 [0.035]	0.048 [0.040]
Openness to trade		-2.103 [0.844]**	-0.635 [0.811]		-2.259 [0.949]**	-2.07 [0.993]**
Life expectancy at birth		0.251 [0.105]**	0.3 [0.093]***		0.181 [0.086]**	0.282 [0.094]***
Population growth		2.311 [0.528]***	1.477 [0.449]***		3.076 [0.590]***	2.509 [0.646]***
Decade dummy	yes	yes	yes	yes	yes	yes
Observations	84	84	84	123	123	123
Number of countries	51	51	51	52	52	52

¹Heteroscedastic-robust standard errors in brackets. * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%.

Table 6: Generalized least squares regression results for share of income by quintile group as the dependent variable. Data is for 1990s only.

Depended variable	(1) Share of lowest 20 percentile	(2) Share of second 20 percentile	(3) Share of third 20 percentile	(4) Share of fourth 20 percentile	(5) Share of highest 20 percentile
Real credit growth - mean	-0.144 [0.014]***	-0.155 [0.010]***	-0.128 [0.012]***	-0.029 [0.015]*	0.533 [0.061]***
Real credit growth - standard deviation	-0.011 [0.015]	-0.054 [0.012]***	-0.031 [0.012]***	-0.022 [0.008]***	0.188 [0.062]***
Real credit growth - skewness	0.251 [0.083]***	0.215 [0.051]***	0.09 [0.102]	0.045 [0.102]	-0.644 [0.331]*
Initial secondary schooling	0.017 [0.005]***	0.038 [0.005]***	0.029 [0.005]***	0.022 [0.005]***	-0.105 [0.023]***
Inflation rate	-0.024 [0.003]***	-0.027 [0.002]***	-0.032 [0.002]***	-0.023 [0.003]***	0.097 [0.009]***
Openness to trade	0.123 [0.189]	0.458 [0.218]**	-0.088 [0.112]	-0.026 [0.119]	-0.923 [0.827]
Life expectancy at birth	-0.019 [0.025]	-0.062 [0.023]***	-0.008 [0.019]	0.01 [0.019]	0.105 [0.098]
Population growth	-0.638 [0.113]***	-0.723 [0.123]***	-0.458 [0.131]***	-0.115 [0.052]**	1.871 [0.575]***
Observations	40	40	40	40	40
Number of countries	40	40	40	40	40

¹Heteroscedastic-robust standard errors in brackets. * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%.

Table 7: Panel data generalized least squares regression results for industrial value added and unemployment growth as the dependent variables.

	(1)	(2)	(3)	(4)
Dependent variable	Industrial value added growth	Industrial value added growth	Unemployment growth	Unemployment growth
Years	1981-2000	1971-2000	1981-2000	1981-2000
Real credit growth - mean	0.165 [0.025]***	0.179 [0.028]***	-0.001 [0.001]	0 [0.001]
Real credit growth - standard deviation	0.012 [0.015]	0.003 [0.020]	0.001 [0.001]	-0.001 [0.001]
Real credit growth - skewness	-0.629 [0.142]***	-0.646 [0.172]***	-0.022 [0.005]***	-0.031 [0.007]***
Initial secondary schooling	-0.036 [0.007]***	-0.038 [0.009]***		0 [0.000]
Inflation rate	-0.018 [0.008]**	-0.027 [0.009]***		0 [0.000]
Openness to trade	1.483 [0.304]***	1.094 [0.315]***		-0.018 [0.011]*
Life expectancy at birth	0.078 [0.022]***	0.095 [0.025]***		0.003 [0.002]*
Population growth	0.243 [0.165]	0.691 [0.207]***		-0.002 [0.007]
Observations	109	154	83	83
Number of countries	57	57	46	46

¹Heteroscedastic-robust standard errors in brackets. * denotes significant at 10%, ** denotes significant at 5%, *** denotes significant at 1%.