ANNALS OF ECONOMICS AND FINANCE **3**, 85–101 (2002)

Inflation, Growth, and Income Distribution: A Cross-Country Study

Hongyi Li

Department of Decision Sciences & Managerial Economics
Chinese University of Hong Kong
Shatin, NT, Hong Kong

and

Heng-fu Zou*

Guanghua School of Management, Peking University
Institute for Advanced Study, Wuhan University
The World Bank, Washington DC, 20433,USA

This short paper uses a newly compiled cross-country panel data on income distribution to explore the impact of inflation on income distribution and economic growth. We have found that inflation (1) worsens income distribution; (2) increases the income share of the rich; (3) has a negative but insignificant effect on the income shares of the poor and the middle class; and (4) reduces the rate of economic growth. © 2002 Peking University Press

Key Words: Inflation; Income distribution; Growth.
JEL Classification Numbers: D3, E3, O4.

1. INTRODUCTION

Despite an enormous literature on the impact of inflation on welfare, employment, output, and economic growth (see survey studies by Driffill, et al., 1990, and McCallum, 1990), there are very few empirical studies that explore the effect of inflation on income distribution in an international setting. Of course, casual observations suggest large variations in income inequality and inflation rates across regions and countries in the world. The few empirical studies on the consequences of inflation on income and wealth

* Project support by the National Natural Science Foundation of China

1529-7373/2002
Copyright © 2002 by Peking University Press
All rights of reproduction in any form reserved.

distribution have focused disproportionally on the United States and to a lesser degree the United Kingdom (see Laidler and Parkin, 1975, Fischer and Modigliani, 1978, and Fischer, 1981). But from an international perspective, high and volatile inflation has mostly occurred in Latin America, Africa, Eastern Europe, and a few Asian countries. At the same time, on the average, many developing countries in Latin America, Asia, and Africa also have much more unequal income and wealth distribution than in most developed countries (see Table 1 of summary statistics on inflation and the Gini coefficient). Hence the main task of this paper is to see how inflation and income inequality relate to each other across developing and developed economies and over a relatively long time horizon.

Our study is also motivated by two more reasons. First, cross-country empirics on income distribution and its relation to growth have recently received considerable attention (see Alesina and Rodrik, 1994, Persson and Tabellini, 1994, Li, Squire, and Zou, 1998, among many others). Benabou (1996) has provided a comprehensive survey. But, to our best knowledge, most cross-country empirical studies do not explicitly consider inflation as a determinant of income inequality. Furthermore, recent empirical studies mainly focus on how income inequality affects growth, investment, and savings, whereas how income distribution itself is determined is largely ignored. Empirical case studies on the United States and the United Kingdom have suggested some ambiguous effects of inflation on income inequality (e.g., for early evidence see Laidler and Parkin, 1975, Fischer and Modigliani, 1978). However, Cardoso, et al. (1995) have identified inflation and unemployment as determinants of inequality in Brazil during the 1980s. We intend to provide a systematic, cross-country analysis on how inflation affects income distribution, especially the income shares of the poor, the rich, and the middle class. Hopefully we can find a clearer picture.

Second, while panel data on inflation are excellent, data on income distribution are rather limited in terms of country sample and time period. Hampered by the data problem, most studies on income distribution have been forced to work with few observations on income distribution at different times and with different definitions of the Gini coefficients of income. The World Bank has recently compiled a large data set covering 77 countries from 1949 to 1994 (Deininger and Squire, 1996; Li and Zou, 1998), which makes it possible to examine the relationship between inflation and income distribution with sufficient country sample and enough time length.

We organize our paper as follows. In section 2, we discuss how inflation affects income distribution through different channels as identified by existing theoretical and empirical studies. We emphasize the direct impact of inflation tax on nominal wage income and pension income. We also pay attention to the debtor-creditor relationships in altering income and wealth redistribution during inflation. Finally, we recognize the well-

known ambiguity of inflation on growth (the Tobin portfolio shift effect and the Sidrauski supernuetrality of money). In this sense, growth is itself endogenous, and we will treat as such in this paper.

In section 3, we first present some statistical analysis on income distribution (measured by the Gini coefficient of household income) and inflation. Then we proceed to a systematic regression analysis on the effects of inflation on the Gini coefficients; the income shares of the rich, the poor, and the middle class, and economic growth, while controlling other typical explanatory variables identified in recent empirics on income distribution and growth. We summarize our main findings in section 4.

2. THE CONSEQUENCES OF INFLATION ON INCOME DISTRIBUTION AND GROWTH

The redistributive role of inflation through its effect on wages has been widely recognized in the literature. Since David Hume, it has been believed that wages lag behind inflation. When inflation is taking place, price rises tend to run ahead of increases in money wages. Therefore inflation leads to a shift of income away from wage earners, and toward profits. On this ground, inflation is claimed to increase income inequality because it hurts the poor relatively more than the rich (see earlier surveys by Laidler and Parkin , 1975, and Fischer and Modigliani, 1978). But empirical studies on the United States seem to suggest that inflation has not generated major impact on the distribution of income. More surprisingly, according to Bach and Stephenson (1974), and Blinder and Esaki (1978), inflation has redistributed income to the lower-income quintiles and toward labor income. In this sense, inflation may even improve income distribution. On the other hand, the study by Cardoso, et al. (1995) provides some evidence on how inflation eroded the poor's income in Brazil during the 1980s. Similar empirical evidence has obtained for Russia, Poland, and China, three countries that experienced significant and rapid inflation during their transition to market economy.

Another main channel of redistribution of income and wealth through inflation is the debtor-creditor hypothesis. The redistribution is from nominal creditors to nominal debtors if interest rates on assets are denominated in terms of money without fully adjusted to the inflation rate. As summarized by Laidler and Parkin (1975), the losers from inflation appear to concentrate on the rich and the poor, because the middle-income group, having more nominal debt than those at either extreme of the wealth distribution, are less affected. But there is evidence that, in adjusting to inflation, the rich react more quickly than the poor. "The evidence on these matters is, however, overwhelmingly based on United States data and it is not clear to what extent one may generalize from it to other economies" (Laidler and

Parkin, 1975, p.789). The cross-country examination here addresses this point.

Inflation also affects income distribution also through its effect on economic growth. Since the 1960s many models have been produced to show that inflation can increase capital accumulation (the Tobin-Sidrauski portfolio shift model), or reduce capital accumulation (see Fischer, 1981), or does not affect capital accumulation (the Sidrauski superneutrality model). Empirically, there is equally conflicting evidence; see Bruno and Easterly (1996), and Clark (1997) for recent studies.

3. EMPIRICAL ANALYSIS

In general, theoretical discussions and some empirical evidence suggest a mixed picture about the effect of inflation on income distribution and economic growth. Here we turn to empirical evidence on the basis of the new data set by Deininger and Squire (1996). We will first offer some data analysis on income distribution and inflation across countries. Then we extend the regressions to include more variables in recent growth empirics (see Levine and Renelt, 1992) and conduct a sensitivity analysis to examine the relationship between inflation and income inequality and the relationship between inflation and growth.

3.1. Data description

We use data averaged over 5-year periods in our empirical analysis, as is done in other empirical studies; see Li, Squire, and Zou (1998); Li and Zou (1998); Li, Xu, and Zou (2000); and Li, Xie, and Zou (2000). Although for most of the variables we have yearly observations, our data on Gini coefficients are more limited – many countries have less than 10 observations, whereas only a few countries have more than 20 observations.[1] By using a 5-year average we obtain a more balanced data set. Because our aggregate measures of inequality are relatively stable over time, 5-year averages will not result in much loss of information. However, for other variables 5-year averages will reduce the short-run fluctuations and allow us to focus on the structural or long-run relationships that are of interest to us. The time period covered is from 1950 to 1992. For summary statistics on the inflation rate, the Gini coefficient, and the growth rate, see Table 1.

The inflation data are from the International Financial Statistics of the International Monetary Fund (IMF). For the full sample the average infla-

[1]The countries (by the World Bank and IMF three-letter country code) included in the analysis are: AUS, BEL, BGD, BGR, BRA, CAN, CHL, COL, CRI, CSK, DEU, DNK, DOM, ESP, FIN, FRA, GBR, HKG, HND, HUN, IDN, IND, IRN, ITA, JAM, JPN, KOR, LKA, MEX, MYS, NLD, NOR, NZL, PAK, PAN, PHL, POL, PRT, SGP, SWE, THA, TTO, TUN, USA, VEN and YUG.

TABLE 1.

Summary Statistics of Inflation Rate, Gini Coefficient and Growth Rate

	MEAN	STD. DEV.	MAXIMUM	MINIMUM
INFLATION RATE				
Full sample	16.449	43.275	514.208	0.026
Democracy sample	9.002	7.254	39.302	0.689
Non-democracy sample	25.315	62.835	514.208	0.486
High income sample	7.023	4.207	22.760	0.689
Low and middle income sample	23.518	56.176	514.208	0.026
OECD sample	7.086	4.380	22.760	0.689
Asian sample	12.523	35.959	338.675	0.250
Latin American sample	32.344	73.873	514.208	0.486
GINI COEFFICIENT				
Full sample	39.653	9.409	61.880	19.965
Democracy sample	36.759	7.629	54.500	23.380
Non-democracy sample	42.570	10.256	60.183	20.970
High income sample	33.966	5.212	49.000	23.380
Low and middle income sample	43.918	9.608	61.880	19.965
OECD sample	33.342	4.772	49.000	23.380
Asian sample	40.190	5.873	52.000	28.376
Latin American sample	50.571	5.139	61.880	41.545
GROWTH RATE				
Full sample	2.609	2.976	13.734	−8.061
Democracy sample	2.087	2.274	13.734	−4.719
Non-democracy sample	3.295	3.376	12.351	−4.793
High income sample	3.015	2.737	13.734	−5.449
Low and middle income sample	2.305	3.117	9.139	−8.061
OECD sample	2.517	2.467	13.734	−5.449
Asian sample	3.809	2.992	12.351	−4.793
Latin American sample	1.652	2.968	9.119	−4.719

tion rate is 16.45%. This seems to be too high because some of the countries in the sample experienced very high inflation or even hyperinflation. We have also divided the data into several subsamples, such as the democracy versus nondemocracy samples[2], the high- income versus low- and middle-income samples[3], the OECD sample and regional samples (Asian and Latin American). For the high-income or OECD samples, the average inflation rate is only around 7%. The Latin American sample has the largest average inflation rate at 32.34%.

Compared to other studies, the income inequality data are based on a newly developed data set of Gini coefficients by Deininger and Squire (1996) where several criteria were used to compile the data. First, all observations had to be from national household surveys for expenditure or income; second, the coverage had to be representative of the national population; third, all sources of income and uses of expenditure had to be accounted for, including own-consumption; and finally, each country should have a reasonable number of minimum observations, although this number can be quite small given the situation of Gini coefficients.

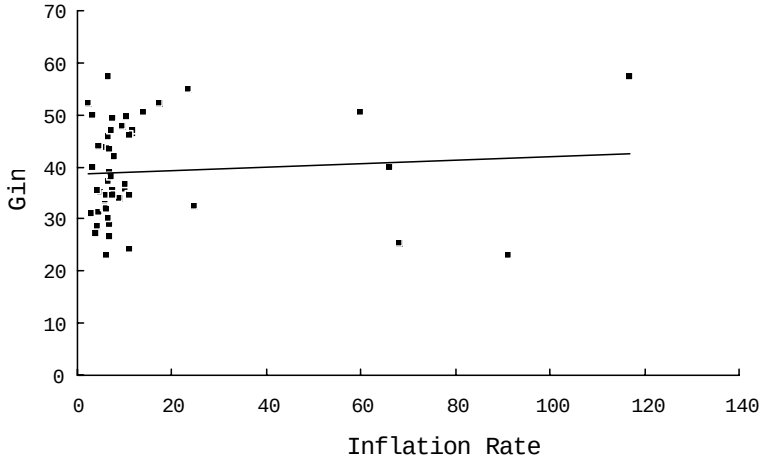
We also note that what is being measured by the Gini coefficient in our sample varies across countries. Inequality can be measured by gross income, net income, or expenditure, and it can be per capita or per household. Because variation in definitions can undermine the international and intertemporal comparability of the data, proper adjustment is necessary. Therefore, we have adjusted the data following a procedure recommended by Deininger and Squire (1996). Specifically, we adjust for differences between income-based and expenditure-based coefficients by systematically increasing the latter by 6.6 points (on a 1 to 100 point scale), this being the average difference observed by Deininger and Squire (1996).

For the full sample the average Gini is 39.65 with a standard deviation of 9.41. The maximum is 61.88, whereas the minimum is 19.97. Roughly speaking, the high- income sample and the OECD sample are very close to each other in their summary statistics. The means and standard deviations are among the smallest. The other samples have relatively large means and standard deviations. In particular, the Latin American sample has an average Gini of 50.57. For detailed documentation of the cross-country comparison of the Gini coefficients over time see Li, Squire and Zou (1998).

[2]The division of democracy and nondemocracy samples is based on a civil liberty index in Barro and Lee (1994). The index ranges from 1 to 7, with 1 for countries with the largest degree of civil liberties. Thus, a country is defined as a democracy if its civil liberty index is smaller or equal to 2, whereas nondemocracy is greater than 2. Note for some countries the index is not available.

[3]The division of high-income vs. low- and middle-income samples is based on the World Development Report classification by the World Bank (various issues).

FIG. 1. Correlation between Income Inequality and Inflation



The growth rate calculation is based on the real per capital GDP (PPP adjusted) in Summers and Heston (1994). The average growth rate of the full sample is 2.61%. The Asian sample has the highest average growth rate of 3.81%, whereas the Latin American sample has the lowest average growth rate of 1.65%.

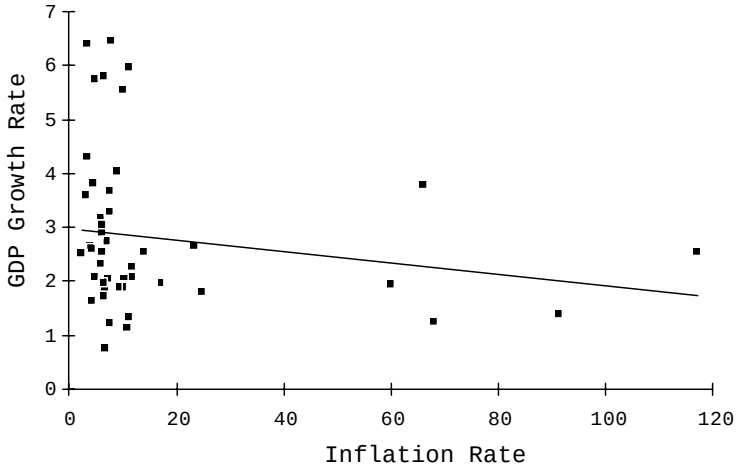
Figure 1 plots the cross-country average Gini against the average inflation rate for the 49 countries. The correlation coefficient is only 0.085. Note that there are five countries with average inflation rate greater than 40%. The correlation is largely affected by these numbers. If we delete these numbers, the correlation is 0.26. Figure 2 plots the cross-country average growth rate against the average inflation rate. The correlation coefficient is -0.17 (or -0.08 deleting countries with inflation rate larger than 40%).

3.2. Empirical Results

In this section we present an extensive analysis of the effects of inflation on income distribution and economic growth. In particular, we want to know about the effects of inflation on the income shares of the rich, the poor, and the middle class.

Following recent empirics on economic growth and income distribution, we consider a list of other control variables in our regression analysis, e.g., the primary years of schooling (PYR), financial development (FNDP, defined as the money supply M2 over GDP), government spending (GSPD, defined as government spending over GDP), population growth rate (PGRW), initial GDP level (INIGDP), the urbanization ratio (URBAN), openness (OPEN, defined as imports over GDP), terms-of-trade shock (TOTSK, defined as the difference of the change in export price and the change in

FIG. 2. Correlation between Growth and Inflation



import price), average arable land (AREA), initial distribution of wealth, or land Gini (LDGINI). These data are mostly obtained through World Bank national accounts, International Financial Statistics of the IMF, and Summers and Heston (1994). The primary years of schooling data are from Nehru et al. (1995).

The reduced form baseline regressions for the relationship between income distribution and inflation and for the relationship between growth and inflation are as follows:

$$\begin{aligned} Gini_{it} &= \alpha_0 + \alpha_1 INFL_{it} + \alpha_2 PYR_{it} + \alpha_3 FNDP_{it} + \alpha_4 GSPD_{it} \\ &+ \alpha_5 PGRW_{it} + \alpha_6 INIGDP_{it} + u_{it} \qquad (1) \\ GRW_{it} &= \beta_0 + \beta_1 INFL_{it} + \beta_2 PYR_{it} + \beta_3 FNDP_{it} + \beta_4 GSPD_{it} \\ &+ \beta_5 PGRW_{it} + \beta_6 INIGDP_{it} + \nu_{it} \qquad (2) \end{aligned}$$

where $Gini$ is the Gini coefficient, GRW is real per capita GDP growth. The country index is $i = 1, 2, \ldots, N$, and the time index is $t = 1, 2, \ldots, T$ (five-year time interval). In the baseline regressions we include PYR, $FNDP$, $GSPD$, $PGRW$, and $INIGDP$ as the right- hand variables.

Furthermore, we consider the income shares of the rich, the poor, and the middle class defined as the top 20%, bottom 20%, and middle 60% of population income by multiplying the income shares of the Gini coefficients of the corresponding population groups with the real per capita GDP. The following set of regressions (3) will be estimated to identify the effects of inflation as well as other variables on the income distribution among the

three income groups:

$$\begin{aligned} & YT20_{it}(\text{or } YB20_{it},\ YM60_{it}) \\ = \ & \beta_0 + \beta_1 INFL_{it} + \beta_2 PYR_{it} + \beta_3 FNDP_{it} \\ + \ & \beta_4 GSPD_{it} + \beta_5 PGRW_{it} + \beta_6 INIGDP_{it} + w_{it} \end{aligned} \tag{3}$$

where $YT20$, $YB20$, and $YM60$ are the income shares of the rich, the poor, and the middle class, respectively.

As noted earlier, the data set is unbalanced due to data availability on Gini coefficients. For some countries there are only four observations or less (in 9 five-year periods). Also some initial variables such as initial GDP and initial wealth distribution (land Gini coefficients) are without time variation. Therefore typical panel data models will not be applied. Our main concern is the endogeneity issue, which is constantly raised in the growth and income distribution literature. The instrumental variables method (IV) will be used to correct for the endogeneity in comparison with the simple OLS estimation results.

We will perform detailed sensitivity analysis to examine whether the baseline regression results are robust to the inclusion of extra variables typically considered in the empirical studies on growth and income distribution. Finally, we provide estimation results of subsamples to account for the issue of parameter heteroskedasticity. The full sample estimation assumes that the parameters are homoskedastic for all countries. However, due to significant differences in social, political, cultural, and economic structures, it will be reasonable to allow for parameter heteroskedasticity by subsample estimation. Next, we turn to the discussion of the empirical results.

The estimation results of regression (1) describing the relationship between income distribution and inflation are reported in Table 2. In the baseline regression by OLS, the estimated coefficient of inflation is 0.019 and the t-value is very close to the 5% significance level. The estimated coefficients of PYR, FNDP, and GSPD are all negative and significant.[4] Population growth has a positive and significant coefficient. Finally, the initial GDP level is positive, although insignificant. Note the dependent variable is the Gini coefficient, hence an increase in the inflation rate or population growth will increase income inequality, whereas an increase in human capital stocks, financial development, and government spending will reduce income inequality.

The instrumental variables (IV) estimation results are very close to the baseline OLS results. In the sensitivity regressions (A)-(E), the inclusion of sensitivity variables (TOTSK, OPEN, AREA, URBAN and LDGINI)

[4]The t-value will be used to test the significance of coefficients at a 5% level if not specified.

does not seem to change the results of the baseline regression variables. Only URBAN and LDGINI have significant coefficients. An increase in urbanization or inequality in initial wealth distribution results in higher income inequality. Finally, in regression (F) time period dummy variables are included.[5] Again, the baseline variables mostly remain the same. See the results in Table 2 for further details.

The estimation results of baseline regression (2) describing the relationship between economic growth and inflation are reported in Table 3. In the baseline regression by OLS, the estimated coefficient of inflation rate is -0.01 with a significant t-value. The estimated coefficients of GSPD, PGRW, and INIGDP are all negative and significant. Government spending and population growth hurt growth. In particular, high initial income level is associated with slower growth. PYR has a positive coefficient and FNDP has a negative coefficient, but both coefficients are insignificant.

The results of the baseline regression variables are fairly robust to instrumental variables (IV) estimation and sensitivity tests. In the sensitivity regressions, only LDGINI has a significant coefficient. Thus an increase in inequality in initial wealth distribution will result in lower growth. Finally, in regression (F) the estimated results for baseline variables mostly remain the same.

Tables 4-6 summarize the estimation results regarding the effects of inflation on the three population groups' income. In Table 4, inflation has a positive and significant coefficient in the rich's income regression, whereas in Tables 5 and 6, this coefficient is negative for the poor and for the middle class, although insignificant. These results seem to indicate that the rich can hedge their income against inflation, while the poor and the middle class will be hurt by inflation. It is also interesting to note that the t-value of the inflation coefficient in the poor's income regression (-1.076) is more negative than that in the middle class' income regression (-0.18). The poor seem to be hurt most severely by inflation. This cross-country finding is consistent with the Brazilian case study by Cardoso et al (1995), but it stands in sharp contrast to the results in Bach and Stephenson (1974), and Blinder and Esaki (1978).

Financial development benefits all the three income groups, although judging from the significance level of the t-values, the poor's income will improve less compared to those of the rich and the middle class. On the other hand, government spending hurts all the three groups. But this time the rich will be affected more than the poor. It is also very interesting to note that population growth has little effect on the income of the rich, however, income will be significantly reduced for the poor. Finally, a high

[5]There are a total of nine five-year periods. Since the number of observations for the first five periods is small, time dummy variables are not used.

TABLE 2.

Income Distribution and Inflation

Dependent Variable: Gini

Ind. Var.	Base Reg.	IV	A	B	C	D	E	F
CNST	45.629	46.323	44.866	44.023	44.841	43.399	38.187	45.481
	(14.557)	(12.025)	(13.215)	(13.483)	(13.644)	(13.276)	(11.024)	(14.510)
INFL	0.019	0.033	0.019	0.020	0.019	0.015	0.012	0.016
	(1.980)	(3.104)	(1.979)	(2.076)	(1.960)	(1.588)	(1.349)	(1.662)
PYR	−0.961	−0.975	−0.909	−0.706	−0.527	−1.151	−0.757	−1.099
	(−2.768)	(−2.346)	(−2.542)	(−1.900)	(−1.362)	(−3.242)	(−2.111)	(−3.165)
FNDP	−5.643	−7.137	−5.241	−5.856	−6.015	−6.276	−4.192	−7.116
	(−2.282)	(−2.447)	(−2.014)	(−2.356)	(−2.387)	(−2.542)	(−1.655)	(−2.841)
GSPD	−0.329	−0.309	−0.316	−0.282	−0.304	−0.278	−0.276	−0.359
	(−4.791)	(−4.164)	(−4.315)	(−3.946)	(−4.197)	(−3.861)	(−3.533)	(−5.216)
PGRW	4.368	4.256	4.466	4.318	4.257	4.413	4.035	4.463
	(6.426)	(5.107)	(6.269)	(6.298)	(5.783)	(6.543)	(6.001)	(6.603)
INIGDP	−0.200	−0.203	−0.207	−0.313	−0.297	−0.437	−0.410	−0.095
	(−0.980)	(−0.929)	(−0.992)	(−1.396)	(−1.182)	(−1.906)	(−1.975)	(−0.463)
TOTSK			0.108					
			(0.052)					
OPEN				0.018				
				(0.956)				
AREA					−0.123			
					(−1.417)			
URBAN						0.059		
						(2.201)		
LDGINI							0.106	
							(4.509)	
YDM6								1.063
								(0.909)
YDM7								1.539
								(1.302)
YDM8								3.103
								(2.480)
YDM9								3.082
								(2.256)
NOB	232	211	223	228	221	232	217	232
F	50.07		38.35	38.30	34.80	44.34	51.45	31.47
R^2	0.572		0.555	0.549	0.534	0.581	0.633	0.587

TABLE 3.

Economic Growth and Inflation

Dependent Variable: GDP growth rate

Ind. Var.	Base Reg.	IV	A	B	C	D	E	F
CNST	6.953	6.702	7.531	6.727	6.868	7.134	9.417	7.356
	(5.643)	(4.002)	(5.668)	(5.303)	(5.291)	(5.513)	(6.912)	(6.494)
INFL	−0.010	−0.009	−0.010	−0.009	−0.009	−0.009	−0.008	−0.007
	(−2.436)	(−1.990)	(−2.416)	(−2.317)	(−2.270)	(−2.337)	(−1.968)	(−1.905)
PYR	−0.082	−0.137	−0.073	−0.094	−0.012	−0.069	−0.198	0.041
	(−0.631)	(−0.717)	(−0.534)	(−0.680)	(−0.085)	(−0.519)	(−1.479)	(0.342)
FNDP	0.737	0.838	0.342	0.705	0.861	0.801	−0.111	1.958
	(0.762)	(0.685)	(0.337)	(0.712)	(0.868)	(0.819)	(−0.109)	(2.157)
GSPD	−0.119	−0.105	−0.135	−0.115	−0.112	−0.124	−0.115	−0.093
	(−4.318)	(−3.286)	(−4.613)	(−3.975)	(−3.826)	(−4.224)	(−3.620)	(−3.638)
PGRW	−0.557	−0.518	−0.606	−0.542	−0.655	−0.557	−0.483	−0.702
	(−2.138)	(−1.452)	(−2.219)	(−2.064)	(−2.335)	(−2.135)	(−1.831)	(−2.942)
INIGDP	−0.322	−0.332	−0.353	−0.306	−0.397	−0.303	−0.239	−0.436
	(−4.112)	(−3.459)	(−4.378)	(−3.594)	(−4.251)	(−3.401)	(−2.980)	(−5.964)
TOTSK			−0.236					
			(−0.283)					
OPEN				0.005				
				(0.697)				
AREA					0.026			
					(0.761)			
URBAN						−0.005		
						(−0.464)		
LDGINI							−0.034	
							(−3.752)	
YDM6								−1.250
								(−2.910)
YDM7								−2.988
								(−6.883)
YDM8								−1.809
								(−4.019)
YDM9								−2.472
								(−5.365)
NOB	280	240	258	276	266	280	262	280
F	7.53		6.78	6.47	6.61	6.47	6.99	11.39
R^2	0.142		0.159	0.145	0.152	0.143	0.161	0.297

TABLE 4.

Top 20% Population's Income and Inflation

Dependent Variable: Top 20% population's income

Ind. Var.	Base Reg.	IV	A	B	C	D	E	F
CNST	0.501	0.395	0.528	−0.006	0.404	−0.105	0.363	0.025
	(1.126)	(0.752)	(1.138)	(−0.013)	(0.849)	(−0.231)	(0.755)	(0.065)
INFL	0.311	0.292	0.311	0.373	0.323	0.195	0.316	0.179
	(2.306)	(2.221)	(2.259)	(2.855)	(2.347)	(1.467)	(2.414)	(1.554)
PYR	0.046	0.073	0.044	0.047	0.066	0.003	0.063	0.016
	(0.961)	(1.297)	(0.897)	(0.921)	(1.216)	(0.066)	(1.272)	(0.403)
FNDP	1.688	1.884	1.668	1.477	1.752	1.574	1.582	1.231
	(4.905)	(4.660)	(4.703)	(4.373)	(4.917)	(4.743)	(4.385)	(4.166)
GSPD	−0.044	−0.051	−0.045	−0.033	−0.040	−0.029	−0.042	−0.048
	(−4.480)	(−4.845)	(−4.381)	(−3.291)	(−3.761)	(−2.870)	(−3.844)	(−5.808)
PGRW	0.039	0.086	0.043	0.074	0.023	0.056	0.023	0.132
	(0.424)	(0.784)	(0.454)	(0.841)	(0.235)	(0.640)	(0.251)	(1.693)
INIGDP	0.468	0.472	0.469	0.490	0.446	0.413	0.467	0.504
	(17.801)	(16.800)	(17.449)	(17.063)	(13.720)	(14.233)	(17.048)	(22.358)
TOTSK			0.008					
			(0.027)					
OPEN				0.010				
				(4.277)				
AREA					0.008			
					(0.739)			
URBAN						0.014		
						(3.953)		
LDGINI							0.001	
							(0.404)	
YDM6								0.631
								(4.649)
YDM7								0.908
								(6.494)
YDM8								0.991
								(7.017)
YDM9								1.091
								(7.014)
NOB	183	166	178	179	175	183	170	183
F	151.85		123.23	140.43	121.89	143.21	133.71	136.1
R^2	0.838		0.835	0.852	0.836	0.851	0.852	0.888

TABLE 5.

Bottom 20% Population's Income and Inflation

Dependent Variable: Bottom 20% population's income

Ind. Var.	Base Reg.	IV	A	B	C	D	E	F
CNST	0.324	0.330	0.337	0.265	0.283	0.208	0.401	0.288
	(3.443)	(2.828)	(3.441)	(2.684)	(2.899)	(2.147)	(3.750)	(3.045)
INFL	−0.031	−0.030	−0.030	−0.024	−0.026	−0.053	−0.019	−0.045
	(−1.076)	(−1.011)	(−1.046)	(−0.823)	(−0.907)	(−1.869)	(−0.663)	(−1.569)
PYR	0.003	0.004	0.002	0.003	0.004	−0.005	0.001	0.000
	(0.307)	(0.310)	(0.219)	(0.308)	(0.346)	(−0.507)	(0.076)	(0.016)
FNDP	0.143	0.181	0.141	0.116	0.177	0.121	0.122	0.100
	(1.964)	(2.019)	(1.880)	(1.561)	(2.428)	(1.712)	(1.515)	(1.364)
GSPD	−0.003	−0.003	−0.003	−0.001	−0.001	0.000	−0.002	−0.003
	(−1.257)	(−1.267)	(−1.292)	(−0.594)	(−0.634)	(0.109)	(−0.935)	(−1.515)
PGRW	−0.132	−0.141	−0.135	−0.128	−0.129	−0.128	−0.127	−0.124
	(−6.812)	(−5.774)	(−6.779)	(−6.587)	(−6.344)	(−6.845)	(−6.276)	(−6.452)
INIGDP	0.064	0.063	0.063	0.066	0.059	0.053	0.066	0.067
	(11.416)	(10.037)	(11.171)	(10.480)	(8.910)	(8.548)	(10.782)	(12.014)
TOTSK			−0.005					
			(−0.086)					
OPEN				0.001				
				(2.325)				
AREA					0.003			
					(1.258)			
URBAN						0.003		
						(3.555)		
LDGINI							−0.001	
							(−1.851)	
YDM6								0.048
								(1.427)
YDM7								0.071
								(2.065)
YDM8								0.101
								(2.906)
YDM9								0.099
								(2.588)
NOB	183	166	178	179	175	183	170	183
F	179.93		95.48	102.49	99.11	109.57	96.16	74.76
R^2	0.801		0.797	0.808	0.806	0.814	0.806	0.813

TABLE 6.

Middle 60% Population's Income and Inflation

Dependent Variable: Middle 60% population's income

Ind. Var.	Base Reg.	IV	A	B	C	D	E	F
CNST	0.733	0.960	0.789	0.140	0.469	0.459	1.407	0.279
	(1.321)	(1.456)	(1.366)	(0.245)	(0.829)	(0.781)	(2.287)	(0.545)
INFL	−0.030	−0.064	−0.036	0.029	0.003	−0.083	0.075	−0.165
	(−0.180)	(−0.388)	(−0.212)	(0.177)	(0.018)	(−0.481)	(0.446)	(−1.068)
PYR	0.093	0.084	0.089	0.130	0.131	0.074	0.082	0.063
	(1.555)	(1.193)	(1.440)	(2.001)	(2.014)	(1.200)	(1.299)	(1.159)
FNDP	1.821	1.955	1.789	1.677	2.053	1.769	1.757	1.349
	(4.241)	(3.850)	(4.048)	(3.906)	(4.835)	(4.117)	(3.800)	(3.408)
GSPD	−0.029	−0.037	−0.031	−0.014	−0.016	−0.022	−0.032	−0.033
	(−2.355)	(−2.791)	(−2.401)	(−1.116)	(−1.270)	(−1.683)	(−2.260)	(−3.007)
PGRW	−0.442	−0.494	−0.444	−0.420	−0.490	−0.435	−0.379	−0.353
	(−3.885)	(−3.589)	(−3.767)	(−3.731)	(−4.162)	(−3.821)	(−3.245)	(−3.392)
INIGDP	0.640	0.649	0.642	0.639	0.572	0.614	0.657	0.674
	(19.480)	(18.380)	(19.166)	(17.501)	(14.771)	(16.366)	(18.717)	(22.357)
TOTSK			−0.207					
			(−0.576)					
OPEN				0.009				
				(2.875)				
AREA					0.035			
					(2.584)			
URBAN						0.006		
						(1.380)		
LDGINI							−0.012	
							(−2.940)	
YDM6								0.633
								(3.482)
YDM7								0.841
								(4.492)
YDM8								1.017
								(5.373)
YDM9								1.149
								(5.515)
NOB	183	166	178	179	175	183	170	183
F	229.57		185.59	204.97	203.00	196.06	196.45	173.83
R^2	0.887		0.884	0.894	0.895	0.888	0.895	0.910

initial income level is positively related to income for all the three groups. For the detailed estimation results of IV and sensitivity regressions, see Tables 4-6.

4. CONCLUSIONS

This short paper uses a newly compiled cross-country panel data on income distribution to explore the impact of inflation on income distribution and growth. We have found that inflation (1) worsens income distribution; (2) increases the income share of the rich; (3) has a negative but insignificant effect on the income shares of the poor and the middle class; and (4) reduces the rate of economic growth.

REFERENCES

Alesina, A. and D. Rodrik, 1994, Distributive politics and economic growth. *Quarterly Journal of Economics* **109**, 465-90.

Bach, G. and J. Stephenson, 1974, Inflation and the redistribution of wealth. *The Review of Economics and Statistics* **56**, 1-13.

Barro, R. J. and J.-W. Lee, 1994, Data set for a panel of 138 countries.

Benabou, R., 1996, Inequality and growth. *NBER Macroeconomics Annual*.

Blinder, A. and H. Esaki, 1978, Macroeconomic activity and income distribution in the postwar United States. *The Review of Economics Studies* **60**.

Bruno, M. and W. Easterly, 1996, Inflation and growth: In search of a stable relationship. *Federal Reserve Bank of St. Louis Review* **78**, 139-146.

Cardoso, E., Paes de Barro, R., and A. Urani, 1995, Inflation and unemployment as determinants of inequality in Brazil: The 1980s, in Reform, Recovery, and Growth: Latin America and the Middle East, edited by R. Dornbush and S. Edwards. University of Chicago Press.

Clark, T., 1997, Cross-country evidence on long-run growth and inflation. *Economic Inquiry* **35**, 70-81.

Deininger, K. and L. Squire, 1996, Measuring income inequality: A new data base. *The World Bank Economic Review* **10**, 565-591.

Driffill, J., G. Mizon, and A. Ulph, 1990, Costs of inflation, in Handbook of Monetary Economics, vol.2, edited by B. Friedman and F. Hahn, North-Holland.

Fischer, S., 1981, Towards an understanding of the costs of inflation: II. *Carnegie-Rochester Conference Series on Public Policy* **15**, 5-41.

Fischer, S. and F. Modigliani, 1978, Towards an understanding of the real effects and costs of inflation. *Weltwirtschaftliches Archiv* **114**, 810-833.

International Monetary Fund, International Financial Statistics, various issues.

Laidler, D. and M. Parkin, 1975, Inflation: A survey. *Economic Journal* **85**, 741- 809.

Levine, R. and D. Renelt, 1992, A sensitivity analysis of cross-country growth regressions. *American Economic Review* **82**, 942-963.

Li, H., L. Squire, and H. Zou, 1998, Explaining international and intertemporal variations in income inequality. *Economic Journal* **108**, 26-43.

Li, H. and H. Zou, 1998, Income inequality is not harmful for growth: Theory and evidence. *Review of Development Economics* **2**, 318-334.

Li, H., L. Xu, and H. Zou, 2000, Corruption, Income Distribution, and Growth. *Economics and Politics* **12**, 155-182.

Li, H., D. Xie, and H. Zou, 2000, On the Dynamics of Income Distribution. *Canadian Journal of Economics* **33**, 937-961.

McCallum, B., 1990, Inflation: Theory and evidence, in Handbook of Monetary Economics, vol.2, edited by B. Friedman and F. Hahn, North-Holland.

Nehru, V., E. Swanson, and A. Debey, 1995, A new database on human capital stock in developing and industrial countries: Sources, methodology, and results. *Journal of Development Economics* **46**, 379-401.

Persson, T. and G. Tabellini, 1994, Is inequality harmful for growth? *American Economic Review* **84**, 600-21.

Summers, R. and A. Heston, 1994, Penn world table (Mark 5.6).

World Bank, World Tables, various issues.