

Commentary

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1. INTRODUCTION

Identifying the channels through which inflation affects real economic activity is an undertaking that has never strayed far from the top of the macroeconomic research agenda. Indeed, a large literature has long articulated its presumed costs, ranging from those associated with the very acts of changing prices and economizing on money holdings to the inhibition of long-term contracting (see Driffill, Mizon, and Ulph 1990 and the sources cited therein). It is also well known that these effects are quite difficult to quantify. But progress has been made over the past several years, with one strand of the inflation literature building on the cross-country framework introduced by Barro (1991) and first applied to the study of the finance–growth relationship by King and Levine (1993). The latter piece, like many others that have followed, emphasized the role of financial factors in economic growth, and inflation entered the empirical specifications on the right-hand side as a control variable, if at all.

However, a number of recent studies, of which Boyd, Levine, and Smith (2001) are the most notable, have turned more serious attention to inflation and its potential to reduce the efficiency of financial institutions and markets in directing resources to their best uses. It is this newer literature that John Boyd and Bruce Champ survey and extend in their present contribution. In this commentary, I offer my own views on what has been accomplished to date on this particular front and then look beyond the effects of inflation on financial development to examine its effects on economic growth through the financial sector.

2. INFLATION AND FINANCIAL DEVELOPMENT

Boyd and Champ begin their survey with a useful review of the relevant theory on inflation, growth, and financial market frictions but quickly direct attention to empirics, which is where most of the contributions of the recent literature have been made. They first consider studies that measure the impact of inflation on broad proxies for the extent of financial activity, namely, the ratios of aggregates such as money, stock market capitalization, and value of traded stocks to GDP. Though one may question whether such

measures actually reflect the efficiency with which financial services are delivered or even the intensity of financial intermediation, the limited number of data items that are usually available for cross-country analyses requires such assumptions to be made, and the measures have become widely accepted. When inserted as the dependent variable in a cross-country regression with inflation accompanying the standard explanatory variables from a growth regression on the right-hand side, Boyd, Levine, and Smith (2001) find that inflation is negatively correlated with measures of banking and stock market development when the inflation rate lies beneath a threshold of about 15%, but that the link appears to be severed in higher-inflation environments.

Though this finding is not problematic in and of itself, the interpretation that it usually receives is suspect. Boyd and Champ, for example, assert that the inflation–stock market performance relationship flattens significantly for high values of inflation (above 15%) so that further increases in inflation are not associated with further deterioration in stock market capitalization, total value traded, or turnover. The potential problem lies in giving a time-series interpretation to a cross-sectional finding—in this case, one implying that financial sectors can tolerate ever-higher inflation rates once a given threshold is reached. This all but ignores the observation that countries with high inflation (i.e., above the threshold) have low levels of financial development generally and that there is little relationship between finance and inflation in the higher-inflation subset. In other words, once inflation is so high that financial-sector activity is already seriously dampened, even higher inflation rates are unlikely to cause much further damage.

At the same time, the authors do an admirable job of surveying the progress that has been made to date with this type of specification and extending our understanding by looking at alternative measures of financial market performance on the left-hand side. In particular, the finding that inflation is unrelated to nominal equity returns in low-inflation environments yet positively related in high-inflation ones suggests a lack of response on the part of investors to unanticipated price-level shocks that is reminiscent of the Lucas (1972) “confusion” model. They also find that inflation is negatively related to bank profits, loan–deposit rate spreads, net interest margins, and the amount of value added by banks, all of which represent new evidence that inflation is not only associated with financial repression but also impedes bank performance.

I must point out, however, that the cross-country specification used by the authors and many others whom they cite is rather ad hoc. One could easily argue, for example, that it resembles a long-run money-demand equation more than a model of the supply side of the credit-creation process. After all, agents faced with consistently high-inflation environments economize on

money holdings, and if the banking system is unable to offer an adequate and reliable real return to depositors, they will substitute consumption goods and durables for financial securities, thus lowering even the broadest monetary aggregates. The point here is that the financial development regression, with standard conditioning variables from the typical cross-country growth regression on the right-hand side, does not conform to any particular model of how finance emerges and deepens. On the other hand, the standard cross-country growth regression seems more firmly rooted in the Solow model and thus is better equipped to address questions about how inflation affects the smooth operation of the financial sector under the premise that higher conditional economic growth rates are the ultimate outcome measure.

3. INFLATION, FINANCE, AND ECONOMIC GROWTH

An analysis of how inflation affects growth both directly and through the financial sector is beyond the scope of the Boyd and Champ survey, yet it seems important given that problems of interpretation just described. This section considers aspects of this neglected theme, calling on some of my own work with Paul Wachtel (Rousseau and Wachtel 2001, 2002).

When it comes to inflation and growth, there are two facts that seem well established: First, inflation is bad for growth, with negative and statistically significant coefficients usually appearing on inflation variables when added to the right-hand side of a Barro-type growth regression (Barro 1996). Second, this result is largely the result of the inclusion of high-inflation observations in the sample. Bruno and Easterly (1998), for example, show that the negative relation between inflation and growth vanishes in the baseline growth regression when countries with average inflation rates over 40% are excluded from the analysis. But perhaps the effects of inflation on growth reach beyond the direct ones captured by such regressions.

Table 1 presents the results of four instrumental variables regressions in which the dependent variable is the average growth rate of real GDP per capita averaged over five-year periods from 1960 to 1995 for as many as 84 countries. The explanatory variables are the levels of real income per capita and the secondary school enrollment rate at the start of each five-year period, as well as the inflation rate and ratio of broad money (M3) to GDP averaged across each five-year period. Inflation and the M3/GDP ratio are instrumented by their own initial values and by the initial ratios of international trade (imports plus exports) and government expenditure to GDP.

Table 1. Cross-Country IV Growth Regressions, 1960–95

	Dependent variable: Per capita real GDP growth (percent)			
	(1)	(2)	(3)	$i < 500\%$
Log initial real per capita GDP	-0.133 (-1.1)	-0.219 (-1.7)	-0.259 (-2.0)	-0.244 (-1.9)
Log initial secondary school enrollment rate	1.026 (5.1)	0.832 (3.9)	0.907 (4.0)	0.848 (3.9)
Inflation rate	-0.004 (-2.4)		-0.003 (-2.5)	0.004 (0.7)
M3 (percent of GDP)		0.025 (4.6)	0.023 (4.2)	0.025 (4.6)
Adjusted R^2 (Number of observations)	.169 (517)	.231 (479)	.221 (479)	.219 (479)

Note: T statistics appear in parentheses beneath the coefficient estimates. Instruments include initial values of the ratios of M3, international trade, and government expenditures to GDP, with initial values taken as the first observation in each five-year period. Dummy variables for five-year periods are included in all regressions but are not reported.

Table 2. Cross-Country IV Growth Regressions by Inflation Rate, 1960–95

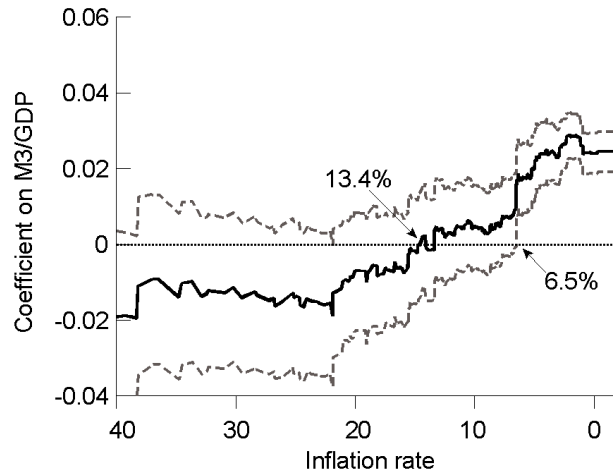
	Dependent variable: Per capita real GDP growth (percent)	
	$i < 8.3\%$	$i > 8.3\%$
Log initial real per capita GDP	-0.389 (-2.3)	-0.114 (-0.6)
Log initial secondary school enrollment rate	1.023 (3.7)	0.796 (2.3)
M3 (percent of GDP)	0.033 (5.3)	0.005 (0.5)
Adjusted R^2 (Number of observations)	.305 (240)	.160 (239)

Note: T statistics appear in parentheses beneath the coefficient estimates. Instruments include initial values of the ratios of M3, international trade, and government expenditures to GDP, with initial values taken as the first observation in each five-year period. Dummy variables for five-year periods are included in all regressions but are not reported.

An important commonality in all four regressions is the positive and significant correlation between financial depth (i.e., M3/GDP) and conditional growth rates, regardless of whether inflation enters the specification. The coefficients on inflation reflect the usual finding that any negative relationship to growth is driven by high inflation observations. In this case, the fourth column of the table indicates that it even vanishes when only hyperinflationary events (average five-year annual inflation of more than 500%) are excluded. All of this seems to suggest that inflation does not hamper the operation of the finance–growth nexus at all and that even moderate to high inflation rates do not inhibit growth!

But, as Boyd and Champ suggest with their financial development regressions, this cannot be the end of the story. Table 2 presents the same regressions as table 1, this time excluding inflation as an explicit explanatory and splitting the sample at the median five-year average inflation rate of about 8.3%. Now financial development is a statistically significant growth determinant for the low-inflation subset and not for the higher-inflation one, once again suggesting that the relationship between finance and growth is severed in higher inflation environments.

Just how high must inflation be for this severance to occur? Figure 1 shows the evolution of the coefficients on the M3/GDP ratio for the same specification reported in table 2, but now starting with the 50 highest inflation observations in the sample only and then rolling in additional observations one at a time. In other words, the final point on the solid line represents the coefficient on M3/GDP from a growth regression with all of the observations included. The dotted lines are two-standard-error bands around the coefficient estimates. Note that the solid line crosses the horizontal zero line as the observation with an inflation rate of 13.4% is added to the sample and that the lower two-standard-error band crosses the same horizontal line at 6.5%. This implies that the threshold at which inflation matters for growth by disrupting the smooth operation of finance is likely to lie somewhere between 6.5% and 13.4%, which is consistent with but a bit lower than the threshold found by Boyd, Levine, and Smith for the inflation–finance link.

Figure 1. Observations Ordered by Decreasing Inflation

Note: Evolution of coefficients on the M3/GDP ratio in growth regressions as the sample increases, 1960–95.

At this point, a few summary comments are appropriate. First, it seems that the negative effects of inflation on growth in cross-country samples are driven by a few extreme observations. But more important, the ability of given level of financial development to affect growth seems linked to the inflation rate when inflation rates are not too high. This suggests that finance cannot operate smoothly in promoting growth even in moderately high-inflation environments and that the negative effects of inflation on the finance–growth nexus rise quickly even at low inflation rates. On the other hand, the effects of inflation on growth, if confined to their traditional roles in the inflation literature, are probably quite small, at least under nonhyperinflationary circumstances. This suggests that Boyd and Champ continue to be on the right track in seeking to determine the conditions under which inflation affects finance at low inflation rates; this seems to be where relatively small fluctuations in inflation can have relatively large effects on financial development. We have accomplished much in the past 10 years on this front, as the survey suggests, but the results all point to there being much left to be learned. I look forward to the authors' next contribution to our common cause.

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