

Inflation, Banking, and Economic Growth

by John H. Boyd and Bruce Champ

By now, everybody knows inflation is bad. Hyperinflations—when inflation rates are extremely high—are the horror stories, but few doubt the harmful effects of inflation rates in the teens either. Over the past several decades, central banks around the world have been pretty successful at dramatically lowering inflation rates. Can we now stop worrying about inflation? Probably not. There is good reason to believe that inflation is harmful even at what one might consider relatively moderate rates—annual rates of perhaps 5 to 10 percent.

The evidence of this claim began to accumulate in the mid-1990s. At the time, most economists believed that, under certain conditions, inflation could be a good thing. Their theories suggested that inflation spurred increases in output. But in 1995, Robert J. Barro published findings that suggested otherwise. He studied many economies and found that, across countries, inflation and economic growth were negatively related—higher inflation was associated with lower economic growth.

Roughly around the same time, other economists were revealing the essential role that financial intermediaries play in economic development. These two discoveries led others to suggest a connection between inflation, financial intermediaries, and economic growth. In particular, they speculated that the way inflation hurt economic growth was by interfering with the role financial intermediaries play in an economy.

Since then, theories have been advanced to explain the connection. These theories suggest that inflation may damage financial markets or impede their smooth

operation. This *Economic Commentary* discusses these theories and presents some new empirical findings that provide further support for them.

■ Theoretical Insights into Inflation

A key insight of the recent theories is that inflation exacerbates so-called frictions in credit markets. In smoothly operating credit markets, banks can easily adjust nominal interest rates when they need to, but frictions create obstacles that make this adjustment difficult. Government ceilings on interest rates are an example of such an obstacle. Obstacles can also arise from the actions of banks themselves, when they respond in the best possible way to the incentives and risks that are created by existing laws, regulations, policies, and economic conditions. Since empirical studies have shown that credit market frictions are more severe in developing countries than developed countries, these frictions may play an important role in explaining the impact inflation has on economic growth in these countries.

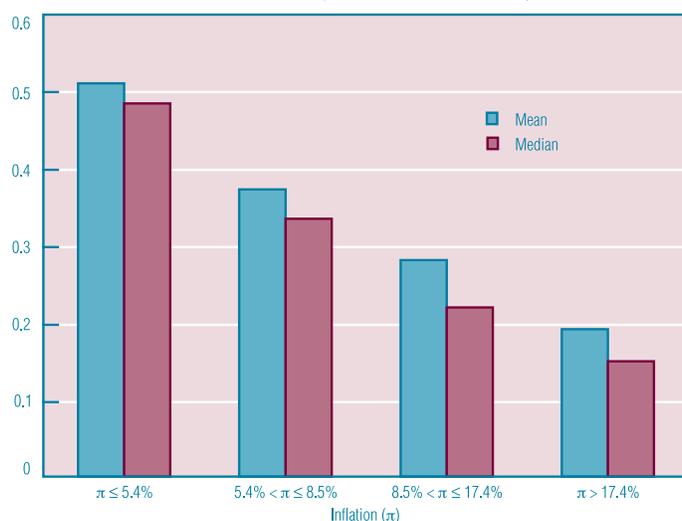
One way inflation might affect economic growth through the banking sector is by reducing the overall amount of credit that is available to businesses. The story goes something like this. Higher inflation can decrease the real rate of return on assets. Lower real rates of return discourage saving but encourage borrowing. At this point, new borrowers entering the market are likely to be of lesser quality and are more likely to default on their loans. Banks may react to the combined effects of lower real returns on their loans and the influx of riskier borrowers by rationing credit. That is, if banks find it difficult to differentiate

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between good and bad borrowers, they may refuse to make loans, or they may at least restrict the quantity of loans made. Simply charging a higher nominal interest rate on loans merely makes the problem worse because it causes low-risk borrowers to exit the market. And in those countries with government-imposed usury laws or interest rate ceilings, increasing the nominal interest rate may not be possible. Whatever the cause, when financial intermediaries ration credit in this way, the result is lower investment in the economy. With lower investment, the present and future productivity of the economy tends to suffer. This, in turn, lowers real economic activity.

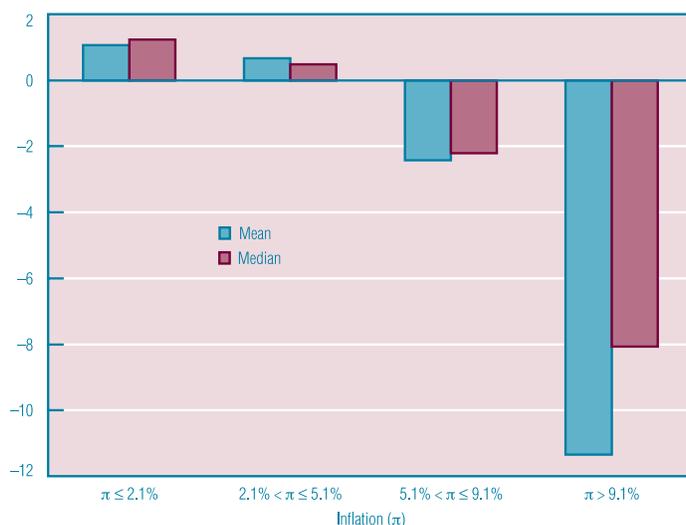
But there is something peculiar about the effect of inflation on the financial sector: It appears to have important thresholds. Only when inflation rises above some critical level does rationing occur. At very low rates of inflation, inflation does not cause credit rationing. This implies that beneath some threshold, higher inflation might actually lead to increased real economic activity. This beneficial outcome can occur only in countries where inflation and nominal

FIGURE 1 COMMERCIAL BANK LENDING TO PRIVATE SECTOR/GDP (BY INFLATION QUARTILE, 1980–95)



SOURCE: Thorsten Beck, Asli Demirguc-Kunt, and Ross Levine. 1999. “A New Database on Financial Development and Structure.” Policy Research Working Paper Series 2146, World Bank.

FIGURE 2 REAL BANK NET INTEREST MARGIN (BY INFLATION QUARTILE, 1995–99)



SOURCE: Asli Demirguc-Kunt, Luc Laeven, and Ross Levine. 2003. “Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation.” *Journal of Money, Credit, and Banking*, vol., 36, pp. S593–623.

interest rates are both low. That is because when interest rates are so low that loans pay only marginally higher interest than holding cash (which, of course, pays nothing), banks have little incentive to make loans. But a small amount of inflation in such an environment allows banks to raise nominal interest rates. At this point, the real return on loans dominates the return on currency, encouraging banks to lend

more. This results in higher investment and the increased economic activity that goes along with it.

The insights we have been discussing about the connection between inflation, banking, and the economy are theoretical. But the theories have several testable hypotheses. We consider two of them. First, as inflation increases beyond some point, bank lending should decrease. Second, inflation should lower

real returns on assets. To test these hypotheses empirically, we looked at data for around 100 countries (full details of the study appear in Boyd and Champ 2003). For each country, we averaged data on a number of economic variables across various time periods in the 1980s and 1990s. Averaging across a long time horizon gives us some notion of the long-run effects of inflation. Incidentally, the time period we looked at is not one of particularly high worldwide inflation: The median inflation rate was around 8 percent across all our samples. Prior studies looked at episodes in which average inflation was considerably higher, but they yielded similar results to ours.

■ The Impact of Inflation on Bank Lending

Several economists have found that countries with high inflation rates have inefficiently small banking sectors and equity markets. This effect suggests that inflation reduces bank lending to the private sector, which is consistent with the view that a sufficiently high rate of inflation induces banks to ration credit.

This finding also holds for the data we examined. Figure 1 shows one measure of bank lending in an economy—total bank lending to the private sector as a ratio to GDP. For this analysis, the sample period is 1980–95. The median inflation rate is 8.5 percent, with inflation rates ranging from 0.8 percent to 85.9 percent.

We break the cross-country data into quartiles. The first quartile includes those countries with average inflation in the lowest 25 percent of the sample. The fourth quartile includes those countries with the highest inflation averages. In figure 1, we present the median and mean values of the banking sector size measure for each of the inflation quartiles. Below each quartile group, the range of the inflation rate for each of the quartiles is listed. For example, the lowest inflation quartile covers inflation rates less than 5.4 percent, and the highest inflation quartile contains countries with inflation rates in excess of 17.4 percent.

We see that the amount of bank lending declines with inflation. Moreover, inflation affects bank lending even at relatively low inflation rates—the median ratio of bank lending to GDP in the second quartile is 10 percent smaller

than in the first quartile, and the median inflation rate in the second quartile is only 6.6 percent. Many people might be surprised that such a “small” rate of inflation could cause such a fall in credit. At the highest inflation quartile, the effect is dramatic, with the ratio of bank lending to GDP only 15 percent.

Although suggestive, such a simple graph does not take into account other factors that can affect the size of the banking sector. However, after controlling for other variables (in a multivariate statistical analysis), we still find a statistically significant negative relationship between inflation and banking sector size. In fact, at the median inflation rate, a one percentage point increase in inflation is associated with a one percentage point decline in the ratio of bank lending to GDP. Other studies have found similar effects of inflation on alternative measures of banking sector size, such as the ratio of total bank assets to GDP or the ratio of the liquid liabilities of the financial sector to GDP.

■ **The Impact of Inflation on Asset Returns and Bank Profitability**

Recall that the theory we have been discussing holds that inflation in sufficiently high doses kicks off a chain of events that ultimately leads to stunted economic growth. The chain begins when high inflation lowers the real return on assets. We uncover substantial evidence for this effect in the data, but not complete support. We find that inflation is negatively associated with real money market rates, real treasury bill rates, and real time-deposit rates; that is, as inflation increases, the real rate of return on these instruments falls. The one example where we don't find what we might expect is with nominal interest rates on bank loans. We would expect banks to adjust their nominal rates to account for inflation. (One might not expect nominal rates to rise one for one with inflation over a short period of time, since banks might not be immediately aware that inflation has stepped up, but over longer periods, it should be evident.) We find no significant statistical relationship between inflation and the real bank loan rate. However, as we detail later, inflation does appear to have a negative impact on bank profitability measures.

The impact of inflation on real rates is most evident at the extreme. The economies in our highest-inflation quartile experienced real money market rates and real treasury bill rates of around zero percent on average during the time period studied. The real time deposit rate for the high-inflation countries was approximately –3 percent. Negative real interest rates provide little incentive for saving, as savers actually lose purchasing power.

Perhaps most importantly, we find that inflation has a dramatic negative impact on the profitability of banks. Various measures of bank profitability—net interest margins, net profits, rate of return on equity, and value added by the banking sector—all decline in real terms as inflation rises, after controlling for other variables. Figure 2 plots banks' real net interest margins against the inflation quartiles to give one example. (The real net interest margin is a measure of the inflation-adjusted spread between a bank's lending rate and its cost of obtaining funds.) We see that even at fairly modest inflation rates of between 5.1 percent and 9.1 percent, the real net interest margin turns negative. Such low real rates of return suggest that the incentives to expand bank operations simply are not as strong as inflation rises.

■ **Inflation Is Still a Threat**

The world has seen a dramatic decline in inflation rates in recent decades. But if these theories are correct, and inflation affects economic growth by adversely affecting credit markets and credit institutions, concerns about inflation may still be warranted, especially in some countries. That is because theories predict that inflation above some moderate amount can harm the banking sector, and in turn, economic growth.

Our empirical work lends support to the theories. We find that the size and profitability of the banking sector both are negatively associated with inflation. Further support comes from survey data, which seem consistent with the notion that banks may ration credit as inflation rises. In 1999, the World Business Environment Survey polled 5,000 firms in 49 countries about problems they encountered in obtaining external financing. Economists who studied these data found that as inflation grew, firms found it more difficult to obtain external funding.

Another of the theories' predictions raises a different concern. The theories predict that the variability of rates of returns on assets may increase as inflation rises. Such volatility may increase the probability of banking crises, which can have a long-lasting negative impact on real economic activity. We also find strong support for this prediction in our data. We find that higher inflation is associated with greater volatility of returns on a wide variety of assets and on returns for banks themselves.

Many interesting questions remain. Perhaps the most pressing is the question of the exact rate at which inflation becomes destructive. The theories suggest that at extremely low rates, inflation is actually beneficial and can lead to expanded economic activity. However, at some critical point, fortunes reverse and further inflation begins to adversely affect the banking sector, investment, and real economic activity. Although our results suggest that the critical point lies at a fairly modest inflation rate, somewhere around 5 percent, more research is needed to pin down the exact point. What sort of effect, for example, will an increase in the inflation rate from 2 percent to 3 percent have on the performance of the banking sector? Such rates of inflation are relevant since they are in the realm of inflation targets in many countries.

For countries with inflation rates above 5 percent or 10 percent, the results here are strongly suggestive. A reduction in inflation should have a favorable impact on the country's financial system. By stimulating investment activity, such a reduction in inflation should have a beneficial impact on real economic activity.

■ **Recommended Reading**

Robert J. Barro. 1995. “Inflation and Economic Growth.” *Bank of England Quarterly Bulletin*, pp. 166–76.

For more on the theory of inflation and credit markets, see:

Costas Azariadis, and Bruce D. Smith. 1996. “Private Information, Money, and Growth: Indeterminacy, Fluctuations, and the Mundell-Tobin Effect.” *Journal of Economic Growth*, vol. 1, pp. 309–32.

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Sangmok Choi, John H. Boyd, and Bruce D. Smith. 1996. "Inflation, Financial Markets and Capital Formation." Federal Reserve Bank of St. Louis *Review*, vol. 78, pp. 9–35.

John H. Boyd, and Bruce D. Smith. 1998. "Capital Market Imperfections in a Monetary Growth Model." *Economic Theory*, vol. 11, pp. 241–73.

Bruce D. Smith. 2002. "Taking Intermediation Seriously?" Unpublished manuscript.

For an analysis of the World Business Environment Survey see:

Thorsten Beck, Asli Demirguc-Kunt, and Ross Levine. 2003. "Bank Supervision and Corporate Finance." Unpublished manuscript, the World Bank.

For full details on the study described in this Commentary see:

John H. Boyd, and Bruce Champ. 2003. "Inflation and Financial Market Performance: What Have We Learned in the Last Ten Years?" Federal Reserve Bank of Cleveland, working paper no. 03-17.

For studies that uncovered the key role that financial intermediaries appear to play in economic development:

Robert G. King, and Ross Levine. 1993a. "Finance and Growth: Schumpeter Might Be Right." *Quarterly Journal of Economics*, vol. 108, pp. 717–37.

Robert G. King, and Ross Levine. 1993b. "Finance, Entrepreneurship, and Growth: Theory and Evidence." *Journal of Monetary Economics*, vol. 32, pp. 513–42.

For studies that have found effects of inflation on alternative measures of banking sector size:

John H. Boyd, Ross Levine, and Bruce D. Smith. 2001. "The Impact of Inflation on Financial Market Performance." *Journal of Monetary Economics*, vol. 47, pp. 221–48.

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