Monetary Policy in Low-Inflation Economies

This volume collects the proceedings from a conference on monetary policy in low-inflation economies that was sponsored by the Federal Reserve Bank of Cleveland. The chapters make both theoretical and empirical contributions to that topic, and they fall under two broad themes. The first concerns the argument for low inflation. Several chapters reexamine the issue of inflation's costs and consequences. One advantage of the chapters collected here is that they approach the question from various theoretical perspectives. To motivate money demand, some chapters invoke standard distortions within a New Keynesian framework, one adopts an overlapping generations structure, and one a deep money perspective. The second set of chapters in this volume represents a collection of studies on diverse questions concerning the facts of operating in and transitioning to low-inflation economies. Broadly speaking, they investigate the complications (or the lack thereof) of implementing monetary policy at low rates of trend inflation; threshold effects on the costs of inflation; and the interaction of inflation, financial markets, and intermediation.

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Introduction

We live, we hope, in an era of low inflation. The global fiat-money standard in force today arguably began soon after World War II, notwithstanding the nominally gold-anchored Bretton Woods period. Using Alan Meltzer's (2005) proposed dating scheme, we might roughly divide history after the war into three subperiods: the post-Accord, the Great Inflation, and the Great Moderation episodes, covering, respectively, 1952–1964, 1965–1984, and 1984 onward. The annual rates of inflation in each of these subperiods, measured by the GDP deflator, averaged 1.8 percent in the first episode, 5.8 percent in the second, and 2.5 percent in the third.[1]

If we exclude from the latter episode the 1985–1991 period—which in retrospect has the appearance of a transition phase—the episode's annual rate of inflation falls to 2.2 percent. Perhaps more importantly, the volatility of inflation fell dramatically relative to the Great Inflation period, to a level even lower than that realized over the post-Accord episode.[2]

This inflation profile is, as most know, not unique to the United States. Summarizing research presented at a 2005 autumn meeting of central bank economists sponsored by the Bank of International Settlements, Will Melick and Gabriele Galati (2006) note that during the Great Moderation "the mean rate of inflation has often been judged to have fallen by the order of 10 percentage points" in industrialized countries, "while declines have been of the order of 20 to 30 percentage points for developing countries." The observation about disinflation in developing countries is also the theme of Paul Wachtel and Iikka Korhonen's contribution to this volume.

[1] We choose to make the comparison in terms of the chain-weighted GDP deflator rather than a measure of consumer prices because the GDP deflator is methodologically consistent over time (unlike the Consumer Price Index) and is available for the entire post-WWII period (unlike the chain-weighted Personal Consumption Expenditure index).

[2] The standard deviations of annual inflation were 0.86 from 1952–1964, 2.3 from 1965–1984, and 0.75 from 1985–2007 (or 0.58 from 1992–2007).

Though the rates of inflation are similar in the periods before and after the Great Inflation, there are several reasons that the attainment of relatively low and stable inflation has been scrutinized more closely now than in the earlier era. First, in the "don't know what you got 'till it's gone" category, the experience of the Great Inflation made abundantly clear the fact that price stability cannot be taken for granted. Second, the emergence and subsequent conquest of accelerating inflation highlighted the fact that, despite the undeniable influence of factors outside the control of monetary authorities, the long-run pace of price-level growth is, in the end, a policy *choice*. Third, the combination of advances in theory and empirical methodology with a great (if unhappy) natural experiment has provided the opportunity to productively revisit long-standing questions about inflation's costs and consequences.

This volume contains both theoretical and empirical contributions to that discussion, and the individual articles are divided along those lines. The theoretical papers of the first four chapters are largely (though not wholly) devoted to the question of optimal inflation. Ultimately, monetary economics is about the study of economies with frictions, and we suggest that the reader think about our collection of theory papers as a study in the types of frictions that motivate a monetary economy and the welfare implications that emerge as different types of frictions are introduced. In fact, we have chosen to order the papers in what we think of as a somewhat natural theoretical progression, from the traditional cash-in-advance, money-in-the-utility-function setups of Freeman, Henriksen, and Kydland and Devereux (albeit with interesting and nontrivial choices over transactions and pricing technologies), to the overlapping generations framework of Azariadis and Lam (in which uninsurable risks are paramount), to the modern search-theoretic paradigm developed by Rocheteau and Wright. Not surprisingly, conclusions about optimal policy turn out to be quite model dependent, in our opinion raising the stakes on establishing a consensus about which frictions really matter.

The four empirical chapters are somewhat more eclectic, taking up a variety of issues associated with monetary policy in—and in the transition to—a low-inflation environment. For purposes of this discussion, we organize the papers around three major themes: Evidence on the complications (or the lack thereof) of implementing monetary policy when rates of trend inflation are low; threshold effects on the costs of inflation; and the interaction of inflation, financial markets, and intermediation.

THE THEORY CHAPTERS

The welfare economics of monetary policy starts with the Friedman rule, the simple proposition that the money supply should be deflated at the rate equal to the rate of time preference. The intuition behind the rule is straightforward: Because the social cost of producing fiat money is essentially zero, individuals will hold the optimal amount of real balances only in the event that the private opportunity cost of holding money is also zero. In an abstract world with a single reference interest rate, this requires that the nominal interest rate reside at its zero lower bound. If the rate of preference is positive, implying that the real interest rate is positive, the central implication of the Friedman rule is that the optimal inflation rate is negative.

Despite the compelling intuition, the Friedman rule seems to clash with reality. Not only do policymakers avoid pursuing a Friedman rule–type policy, they become quite concerned even when inflation rates are at very low, but still positive, levels. The most common explanation for this aversion starts with the so-called New Keynesian framework, which is rapidly taking its place as the workhorse structural framework adopted by (at least the research departments of) most major central banks. The canonical version of this model is most completely explicated in Michael Woodford's (2003) enormously influential *Interest and Prices*. Due to the work of Woodford and many others, it is now well-known that the sticky-price element in this framework implies pursuing a policy that engineers very-near-absolute price stability.

Here, too, the intuition is straightforward: In the face of rigidities in the adjustment of goods prices, deviations in the aggregate price level away from zero generate inefficient changes in underlying firm-specific relative prices. Abstracting from other distortions, such as those emphasized by the Friedman rule or deadweight losses arising from the embedded assumption of imperfect competition in intermediate-goods-producing markets, zero inflation is the right way to go.[3]

That still leaves the question of why most central banks prefer to bound the inflation rate well above zero.[4] Here, too, an answer is often provided within the context of the standard New Keynesian framework. Policy in most variations of this model is implemented by manipulating a short-term interest rate (a characteristic that obviously describes monetary policy in most

[3] Another obvious friction would emanate from inflexible nominal wages. Christiano, Eichenbaum, and Evans (2005) demonstrate that this type of friction is important (among other things) for generating empirically plausible dynamics in New Keynesian models. Erceg, Henderson, and Levin (2000) show that the welfare implications of these models change when nominal wage rigidity is introduced.

[4] See, for example, the charts in Altig (2003).

central banks today). The fact that nominal interest rates cannot fall below zero places a potential constraint on monetary policy operations. The lower the rate of inflation, the more likely it is that an economy will periodically run up against this constraint.

It is not so clear how significant this problem really is. Ben Bernanke, Vincent Reinhart, and Brian Sack (2004), for example, note that targeted asset purchases that change the size and composition of the central bank's balance sheet can be effective even if short-term interest rates are at their zero bound, especially when combined with communications aimed at shaping expectations about the course of future interest rates. Roughly speaking, implementing a stimulative monetary policy simply requires printing plenty of money and convincing the public that you intend to keep at it. This is precisely the route taken by the Bank of Japan when it introduced the so-called quantitative easing policy in 2001. Though not uncontroversial, evidence presented by Bernanke, Reinhart, and Sack and in Mark Spiegel's 2006 review suggests that the approach was successful, at least in the sense of affecting longer-term interest rates.

Beyond providing a frame of reference for the welfare results collected in this volume, there are other obvious points to be made by the foregoing discussion. First, there is a nontrivial policy discussion to be had because the context of monetary policy begins with the belief that the relevant environment is not described by a friction-free Arrow-Debreu economy. Second, the nature of the best policy *potentially* depends on the details of how that environment deviates from the Arrow-Debreu benchmark. Depending on the nature of the distortion, a deviation from the Friedman rule may or may not be optimal.

It is in this light that the theoretical papers in this volume are best viewed. The first three papers in our theory section invoke "standard-type" monetary (and nonmonetary) distortions. Freeman, Henriksen, and Kydland (FHK) and Devereux introduce money via transactions-costs technologies, both contributing to the literature on familiar monetary environments by endogenizing key elements in their models. FHK enrich this environment by adding an endogenous cash/credit decision, but do not otherwise stray far from the money demand model pioneered by Robert Lucas and Nancy Stokey (1987). In a similar vein, Devereux extends an otherwise standard New Keynesian model by giving firms access to a costly flexible-price technology.

While FHK and Devereux operate in the general universe of transactions-based money demand, Azariadis and Lam motivate money demand through an overlapping generations structure. This alternative approach provides an opportunity to examine the robustness of results on the determinacy of

monetary equilibrium under Taylor-rule operating procedures, an issue well-traveled within the more standard New Keynesian framework. Nonetheless, while the motivation for holding money is quite different from New Keynesian models—and from FHK and Devereux—the Azariadis and Lam analysis still invokes a fairly traditional monetary environment (albeit with the welfare question complicated by adding incomplete intragenerational risk-sharing and strategic interactions between monetary and fiscal authorities to the usual inefficiencies created by nonzero nominal rates).

As the theoretical structures of these three papers represent variations on traditional money-demand themes, it does turn out that the policy implications are fairly familiar as well. In FHK, agents would rather use inside money because it bears interest, but the existence of a transactions cost to doing so means that outside money (cash) is used in equilibrium. We know from past research—Cooley and Hansen (1991) being a prominent example—that deviations from the Friedman rule have somewhat limited welfare effects in models in which the inflation tax is the primary source of distortions. As John Coleman points out in his comments, given this result, it would be surprising if the FHK model actually generated large welfare costs of inflation: Households can simply use cash, so giving them the option to transact in alternative assets seems unlikely to make the welfare problems worse than in similar models in which the choice sets are more limited.

Both Coleman and Tony Yates make note of the fact that the quantitative results in FHK imply that the welfare cost of 400% inflation is about the same as 10% inflation. This, of course, is driven by the endogeneity of the transactions technology, which allows consumers to pay a fixed cost to adopt the credit technology, and thus avoid the inflation tax. This rather striking implication actually conforms to at least some other evidence on the cross-regime costs of inflation, a point we will return to below in our discussion of the Boyd-Champ and Wachtel-Korhonen contributions.

Just as the FHK model generates normative results that are similar to its no-price-friction predecessors, the Devereux sticky-price model generates normative results that are similar to those of the New Keynesian tradition. As Devereux proceeds from the vantage of a small open economy, there are really two issues in play. First, what is the nature of the optimal policy rule given the type of pricing friction studied? Second, what is the optimal exchange rate regime with sticky prices?

To the first question, given the availability of a price-flexibility technology, firms will choose greater price flexibility as the variability of demand shocks increases. As is often the case in New Keynesian models, there is a strategic complementarity in individual firms' choices because the demand for a firm that does not change its price is more volatile the more other firms change

their prices. It is fairly easy, then, to see how the addition of an endogenous price-flexibility decision contributes to the possibility of multiple equilibria. This characteristic of the price-flexibility technology reinforcing the properties of standard exogenous-price-stickiness models carries over to the optimal policy results. Adopting price-flexibility is costly, so the optimal monetary policy is one that minimizes price flexibility. Once prices are inflexible, it is best to minimize the volatility in relative prices associated with the fact that some prices can adjust and others can't. Thus, in Devereux's model, price stability is optimal, as in standard sticky-price models.

To the second question, Devereux finds that when exchange rates are fixed, firms will choose fixed-price policy and, hence, will avoid the cost of adopting flexibility. The prescription is thus for fixed prices generally, and the policy regimes that support those choices.

Like FHK and Devereux, Azariadis and Lam uncover the power of old results in a familiar setting. Where FHK embark from a price-flexible neoclassical platform and Devereux from the New Keynesian, Azariadis and Lam appropriate the overlapping-generations structure in the tradition of Sargent and Wallace (1981). In fact, the starting point of Azariadis and Lam's analysis is Sargent and Wallace's indeterminacy result, famously known as the "unpleasant monetarist arithmetic." As is well-known, this kind of economic structure has both high-interest-rate and low-interest-rate equilibria, the former being efficient and the latter inefficient. It is precisely a low-inflation environment that is consistent with low nominal interest rates and hence efficient outcomes.

What is novel in Azariadis and Lam's analysis is the closing of the overlapping-generations model with the monetary policy characterized by the Taylor rule. The familiar result from standard New Keynesian models that policymakers ought to respond to lagged inflation with a coefficient of greater than one[5] emerges here with the added consequence that the rule also steers the economy to the efficient low-interest-rate equilibrium.

How low is the "low" of the low-inflation environment in Azariadis and Lam's model? Once again, the answer is that it depends. Concerns about the zero nominal-interest-rate bound and risk-sharing considerations move the answer away from the Friedman rule. (In Azariadis and Lam, the inflation tax is the only tax mechanism available to finance transfers from high-income to low-income households.) That does not, however, justify the conclusion that real-world central banks are optimally bounding inflation at strictly positive levels. Azariadis and Lam raise the stakes by introducing strategic

[5] See, for example, Carlstrom and Fuerst (2001).

interactions between fiscal and monetary authorities, showing that even a benevolent and independent central bank may choose inflation rates that are too high if it is forced to deal with less-than-benevolent (essentially meaning impatient) fiscal policymakers.

Each of the three papers we have discussed represents useful and interesting variations on some familiar themes in models with particular types of frictions—fixed costs of credit in FHK, sticky prices in Devereux, impediments to intergenerational trade in Azariadis and Lam. The essence of the analysis by Guillaume Rocheteau and Randy Wright is that the optimal policy discussion should start in an environment in which the key frictions are those that give rise to the existence of money as a unique asset that is willingly held in positive quantities in equilibrium. In the tradition of the new "deep money" literature,[6] Rocheteau and Wright assume that periods exist in which trade is characterized by anonymity and the lack of a double coincidence of wants, which implies that some sort of asset is needed to facilitate trade during these periods.

In such an environment it is reasonable to suspect that the nature of trading technologies will loom large in the determination of what monetary policy ought to be. And this is exactly where Rocheteau and Wright go, focusing on trading frictions and three alternative pricing mechanisms: bargaining (standard search equilibrium), competitive price-taking, and price posting or directed search, called competitive search equilibrium by Rocheteau and Wright. The basic model has search externalities—that is, the property that the probability of matches is an increasing function of aggregate search intensity. This property makes the frequency of trade endogenous.

On the welfare question, the pricing structure matters. If prices are determined by bargaining or by competitive price-taking, social welfare may be increased by deviating from the Friedman rule. The rationale for this will be familiar to those schooled in this literature: Although inflation always distorts the level of production away from what is optimal, inflation may improve the frequency of trades, and, as a result, increase social welfare. Less well-known from previous research is the result that if prices are determined by a competitive search mechanism, the Friedman rule is, in fact, optimal.

With these theoretical observations as a foundation, Rocheteau and Wright proceed with a quantitative exercise to gauge the magnitude of inflation costs when policy deviates from its best steady-state setting. In the competitive search equilibrium, the welfare costs of, say, going from 0 to 10% inflation are

[6] Any list of seminal works in this literature would include Kiyotaki and Wright (1989, 1993), Trejos and Wright (1995), Shi (1997), and Lagos and Wright (2005).

not very big. They are, in fact, very close to Robert Lucas's (2000) well-known calculations derived from approximating the area under a quantified money demand curve.

When the economy is characterized by either bargaining or competitive price-taking—that is, when deviations from the Friedman rule are optimal—the costs to (high) inflation can be much higher. This is especially true of bargaining. The costs in the competitive price-taking environment are lower, but still higher than the Lucas benchmark. Apparently, the distortions that drive the optimal policy away from the Friedman rule are substantial enough that additional distortions created by inflation are not second-order.

A point made in the commentary by Jim Bullard is worth emphasizing. In all cases, Rocheteau and Wright calibrate their models to a standard-looking money demand curve. Despite the similarity of the reduced forms, welfare costs are very strongly related to the nature of the underlying structures that generate those reduced forms. This is an old lesson, but it is exactly why examining the frictions that generate monetary nonneutrality is so important. And why research like that represented in the first four papers of this volume drive the discussion forward.

THE EMPIRICAL CHAPTERS

The distinction between the theory papers and the empirical papers in this volume is a bit artificial. With the exception of the Azariadis and Lam article, each of the other contributions we have labeled "theory" have quantitative analysis at their center. But where the contributions to the foregoing section share a thematic core in theoretical propositions about the welfare effects of inflation, the papers we have grouped into the empirical section of the volume represent a collection of studies on diverse questions concerning the facts of operating in and transitioning to low-inflation economies.

That does not mean that there are no common threads among the group we are calling the "empirical papers." We want to highlight three major themes: Evidence on the complications (or the lack thereof) of implementing monetary policy at low rates of trend inflation; threshold effects on the costs of inflation; and the interaction of inflation, financial markets, and intermediation.

Implementing Monetary Policy in Low-Inflation Environments

Both the Bordo-Lane-Redish and von Hagen-Hofmann papers deal with the complicating factors facing policymakers when trend inflation is low. As noted in the discussion of the Azariadis-Lam paper, the dangers of the zero-nominal-interest-rate bound is a common theme in discussions of optimal monetary policy within the framework of the standard New Keynesian macroeconomic

model. This theme, as noted, carries over into Azariadis and Lam's analysis, despite the fact that aspects of their overlapping-generations framework is, in many ways, quite different from the standard model.

But are theoretical complications alone sufficient to consistently drive the actions of central bankers? In particular, are problems that might arise in theory the main source of most modern central bankers' strong predilection to bound the average rate of inflation away from zero? We would claim that the answer is no. The tipping point apparently derives from the much-analyzed, and much-feared, example of Japan, whose troubles through a good part of the 1990s are often attributed to restrictions on monetary policy responses resulting from low nominal rates, themselves attributed in part to the belief that the Bank of Japan would not tolerate rates of inflation much above zero.[7]

Enter Bordo, Lane, and Redish, who warn that focusing on examples like Japan obscures the fact that deflation is not uniformly associated with bad times. Their primary reference is to the period from 1880 to 1914, when many countries were experiencing modest deflation coupled with strong productivity growth and economic expansion. Essentially, the evidence from this period confirms that productivity-driven deflation is not a bad thing. The key insight of Bordo, Lane, and Redish was summarized this way in the 2001 Annual Report of the Federal Reserve Bank of Cleveland:

> The key is the real interest rate: In good times, the productivity of capital is rising and the demand for funds to finance consumption and investment is high. In bad times, the opposite is true. Accordingly, real interest rates tend to rise during good times and fall during bad times. To the extent that zero nominal interest rates… represent the real dangers of deflation, the problems are most likely to occur in times of economic distress.
>
> Deflation alone—even anticipated deflation—does not necessarily imply zero nominal interest rates…provided the real interest rate is sufficiently positive (the normal state of affairs).

Thus, concerns that center on the zero-nominal-interest-rate bound are really concerns about episodic complications. Jürgen von Hagen and Boris Hofmann, on the other hand, suggest a more persistent and general problem with low-inflation environments: The possibility that the quality of inflation indicators may deteriorate as economies settle into low and, importantly, stable inflation regimes.

[7] See, for example, McCallum (2001).

Von Hagen and Hofmann articulate a sort of corollary to "Goodhart's law." Goodhart's law, familiar to most, is the notion that policy instruments lose their informational content exactly when policy is successful. If a central bank succeeds in adjusting the monetary thermostat to control the inflation temperature, it will appear that changes in policy have no impact on prices, even if it is the only thing influencing actual inflationary outcomes. The von Hagen-Hofmann corollary is that, as short-run noise in monetary policy declines, short-run fluctuations in the price level will be increasingly dominated by transitory nonmonetary influences on the price level. Though trend growth in the money supply remains the only determinant of trend inflation, the higher variance of transitory noise will make it increasingly difficult to detect the money-inflation connection in high-frequency data.

Von Hagen and Hofmann usefully put their argument in contemporaneous terms by making use of the equivalence between changes in money growth and changes in short-term interest rates characteristic of the New Keynesian framework. Although there has been a near-complete rhetorical replacement of monetary indicators with Taylor rule concepts such as the output gap, the von Hagen-Hofmann corollary applies with equal force to the latter.[8]

But there is an important distinction between the two types of indicators: Whereas money growth and output gaps are equivalent indicators at high frequencies in the simplest types of New Keynesian models, that equivalence does not hold at low frequencies: In the long run, the output gap is zero. Von Hagen and Hofmann conclude that, in the absence of reliable high-frequency-indicator variables for inflation, a central bank should shift its focus to reliable indicators of the long-term trend in inflation.

The happy news is that the data suggest the long-term relationship between money and inflation is a durable one. Von Hagen and Hofmann show a simple version of this relationship for the period from 1960 to 1990 in their figure 1. As an exercise, you can extend their cross-country plot of M2 growth and inflation to the period after 1990 and you will find that even though the positive relationship has weakened somewhat, it is still there.

Threshold Effects on the Costs of Inflation

One of the intriguing results in the paper by Freeman, Henriksen, and Kydland is the discovery of significant "threshold effects." As noted above, their exper-

[8] In many quantitatively successful formulations of the New Keynesian model—the work of Frank Smets and Raf Wouters (2002) is a prime example—these transitory influences are often "mark-up shocks," essentially residuals in pricing equations outside of the output-gap features of the model.

iments indicate that the welfare costs of 10% inflation are not significantly different than the costs associated with 400% inflation. In other words, by the time an economy gets to the low double digits, most of inflation's damage has been done.

The interplay of inflation and its costs in FHK derives from certain properties of the banking system, the technology for accessing credit in particular. Though the credit market mechanism in FHK is specific and relatively simple, the threshold effects it generates are reflective of a broader set of empirical observations that connect inflation and financial-market phenomena more generally. John Boyd and Bruce Champ revisit this evidence, quoting from prior work by Boyd, Ross Levine, and Bruce Smith (2001):

> [T]here appears to be some evidence of a threshold in the empirical relationship between inflation and financial activity. At moderate inflation rates, there is a strong negative association between inflation and financial development. For countries whose inflation is above some critical level, the estimated intercept of the bank development relation is much lower than it is for countries below the threshold. Moreover, in economies with rates of inflation exceeding this threshold, the partial correlation between inflation and financial activity essentially disappears. (237)

The estimated threshold in Boyd, Levine, and Smith is a surprisingly low 15%. In his comments on the paper, Peter Rousseau suggests that the threshold may be even lower, in the range of about 7% to 14%.

These threshold effects may shed light on one of the observations made by Paul Wachtel and Iikka Korhonen in their study of disinflations in transition countries:

> …stabilization programs usually take hold very quickly. […] after an initial burst, the pace of disinflation slows down. A stabilization program brings inflation below 60% in about a year (the median for successful stabilizations is 13 months). The median time for inflation to fall from 60% to 30% is about four months. However, further progress in inflation reduction takes more time. The median time for inflation to fall from 30% to 15% is eight months, and from 15% to 7.5%, one year. The initial disinflation experiences are almost all rapid. Stabilization programs always bring inflation below 60% in about two years or less. Further progress is sometimes delayed.

Typically, the discussion on a threshold effect is framed in terms of the low incremental welfare losses once some critical level of the inflation rate is breached. As we discussed earlier, in FHK this appears to be occurring

because high inflation induces agents to simply pay the fixed costs that allow them to skirt the resulting welfare losses. To the econometrician not privy to the structural model, this would look exactly like the adoption of an institutional structure (in the form of more active credit markets) that serves to keep the marginal cost of inflation low. But the argument is symmetric. If there is a range over which the marginal cost of higher inflation is low, it stands to reason that the marginal cost of lower inflation may well be lower over that range as well. Once certain thresholds are hit, however, regimes truly change in the sense that the necessary institutional arrangements and transaction practices fundamentally change. Progress near these "tipping points" will almost certainly be more painful and protracted. It may not be surprising, then, to see cases where early progress on reducing inflation is rapid to a point but "delayed" beyond that point.

The Interaction of Inflation, Financial Markets, and Intermediation

The Boyd and Champ paper itself is all about how inflation interacts with the form and functioning of financial intermediation, which they view as a critical component of the engine of growth. The storyline is straightforward: Inflation reduces the vibrancy and depth of financial markets. Financial intermediaries, banks especially, can at best imperfectly adjust to the impediments that inflation presents. As a consequence, the returns to real capital are reduced (contra Goodfriend's comments on Azariadis and Lam). And to top it all off, the bad stuff kicks in at relatively low rates of inflation (per the aforementioned threshold effects).

Boyd and Champ's review of and contribution to the evidence suggest that these are in fact powerful ill effects. On an encouraging note, Werner Hermann points to the power of competitive pressures in financial markets to also set things right. Commenting on Wachtel and Korhonen, Hermann suggests:

> One additional reason why inflationary policies became less attractive in transition countries, which Wachtel and Korhonen do not mention, might have to do with the increasing threat of currency substitution. In the Commonwealth of Independent States, financing government expenditures by expanding the money supply was attractive during the first stage of transition because there were no inflation expectations, no established tax collection mechanism, no tradition of paying explicit taxes, and thus tax collection was extremely costly. An excess supply of money, of course, led to inflation. People adapted quickly and began to monitor the exchange rate of the domestic currency carefully.

> *Soon the U.S. dollar became not only a stable store of value and tacit unit of account, but indeed the only commonly accepted means of payment for larger transactions, such as the sale of second-hand cars, even among residents. As more and more people tried to substitute dollars for domestic currency, inflationary policies became less attractive.* [emphasis added]

This focus on competitive pressure is of a piece with the theme that runs through this volume. The study of inflation and its effects can scarcely proceed without a serious accounting of the institutional settings that shape the technologies available for transacting and intermediating funds (including, Rocheteau and Wright emphasize, the market structures in which these activities take place). This may well be the next frontier in the quest to really understand the economic consequences of inflation, high and low.

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