

A Model of Inflation and Macroeconomic Stability

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The experiences with pegged rates and McKinnon's caution about 'bad pegs' on the one hand and the unviability of a pure floating exchange rate regime for a country like Ghana mean that the appropriate regime must be a managed (dirty) float or crawling peg. Determining the 'optimal' rate of crawl (δ) in any period of time is a complex undertaking especially in the case of an economy that is subject to frequent exogenous shocks including of terms of trade (TOT) and food harvests.

For now, it is assumed that the monetary authorities control or choose δ . It is further assumed that the chosen δ is 'credible and known to private agents'. And the demand for real money balance (λ) is taken to be a monotonic decreasing function of the expected rate of inflation (π^e) i.e. $\lambda(\pi^e) < 0$. Under rational expectations hypothesis $\pi^e = \pi$.

The proceeds of the inflation tax $\pi \lambda(\pi)$ — tax base $\lambda(\pi)$ and rate of tax π — are assumed to form a non-monotonic concave function of π , in (e, π) space in accordance with the inflation-tax Laffer curve mechanism of Dornbusch and Fisher (1993). This implies that, any given level of the real exchange rate (e) that is consistent with stationary equilibrium could correspond equally to a low or a high rate of inflation, depending on the side of the curve on which the equilibrium is located *vis-à-vis* the inflation-tax minimizing rate of inflation $\pi^{\max} = \operatorname{argmax} \pi \lambda(\pi)$.

Hence, knowledge of the equilibrium real exchange rate provides very little information on the macroeconomic situation. For example, starting from an equilibrium (e, π^*) , real depreciation of the exchange rate would cause an acceleration in the rate of inflation while real appreciation cause a deceleration. This captures the fact that a real depreciation would raise the real value of trade-related taxes — which are significant in government revenues, and hence, *ceteris paribus* the deficit decreases — meaning that

private agents must reduce their real money balances.

Now whether the chosen rate of crawl is high or low, private agents know rationally that any deviation of that rate from the (expected) rate of inflation would imply real appreciation or depreciation of the currency. For example, if $\delta < \pi^e$ this would entail real appreciation, widening fiscal deficit and an increase in the rate of money creation, unless there is a rise in the inflation tax to compensate. Sooner or later the inflation tax would prove inadequate because of the concavity of the inflation tax Laffer curve. Then real cash balances would start to grow, as the real deficit widens and this can happen only if private agents are prepared to absorb higher real money balances i.e. only if they expect the rate of inflation to decelerate (since $\lambda' < 0$). Under rational expectations, this means that the actual rate of inflation will respond to a deviation above the rate of crawl by going down as the real exchange rate appreciates. Hence, some oscillation in the rate of inflation and in the real exchange rate would follow from this mechanism.

The difference between the two cases — low rate and high rate of crawl — derives from the elasticity of demand for real cash balances with respect to the expected rate of inflation. If the economy is at $\pi < \pi^{\max}$ then the gradual fall in inflation would entail a destabilizing fall in the inflation tax (in the space $\pi < \pi^{\max}$, the inflation tax rises with inflation), resulting in a further fall in the expected rate of inflation leading agents to absorb a further increase in the fiscal deficit. This deviation-amplifying force could, therefore work as a disciplining device, as agents are not prepared to embark on such an explosive path.

When the economy is operating in the space $\pi > \pi^{\max}$ of the Laffer curve, the gradual fall in expected inflation increases the inflation tax proceeds, thus providing a stabilizing force. Agents would rationally predict convergence to a finite equilibrium whatever the initial deviation $|\delta - \pi|$. Hence expected deviations would be self-fulfilling in this case. It can also be shown from the properties of the model that in the high crawl high inflation case, we have a continuum of RE equilibria.

The real world translation of a continuum of RE equilibria is the prediction of high volatility of the variables involved. As the economy is not anchored to a unique equilibrium trajectory by the fundamentals, it can be buffeted away by any random shocks affecting agents' expectations. Consequently, the volatility of the inflation rate and of the real exchange rate will be higher when the chosen rate of crawl is above some inflation threshold (π^{\max}) than when it is below it.

Conversely, the analytical results suggest that an excessive volatility of the rate of inflation and the real exchange rate could be corrected by sufficiently

lowering the rate of crawl.

The threshold π^{\max} is determined by the parameters of the demand for money function. Adam, Ndulu and Sowa (1996) suggests on the basis of estimates for Kenya, Ghana and Tanzania, that π^{\max} for SSA economies would be in the 15-20% range. More recent work on the Tanzanian economy by Randa (1999) "Economic Reform and the Stability of the Demand for Money in Tanzania ", *Journal of African Economies*, Vol. 8:307-344 yields a figure of 44%. Nonetheless the Adam et al range appears more credible given the Bruno-Easterly finding that 40% annual rate of inflation appears to be the threshold to hyperinflation.

In the past, governments in low-income countries have relied heavily on inflation tax (seignorage) revenue to finance public expenditure. Although a government would be ill advised to pursue a medium-term inflation target that is inconsistent with a chosen aggregate growth rate, it may nonetheless have an incentive to seek to pursue higher inflation in the short-run in order to finance higher public expenditure. Three key empirical findings suggest that the scope to raise revenue from this source, however, is quite limited, even in the short run.

- i. The process of adjustment and liberalization has been accompanied by a significant reduction in real money demand — the tax base for seignorage revenue. Moreover, real money balances are unlikely to rise more than proportionately with post-stabilization real income growth
- ii. More importantly, the same liberalization processes mean that the private capacity to switch away from domestic assets in the face of higher than anticipated inflation, even in the short run, has substantially increased. The more rapidly the private sector can respond to higher than anticipated inflation, the smaller will be the short-run revenue again. Thus, not only is the long-run "seignorage-maximizing" rate of inflation likely to be quite close to the rate that would maximize growth, but the revenue gains to raising inflation even in the short-run are likely to be limited.
- iii. The costs are commensurately higher: the empirical evidence on inflation and growth suggests that there is a strong convexity in the inflation-growth trade-off around the 'kink'. Thus in the neighborhood of the kink — growth-maximizing rate of inflation estimated at about 8% — 'inflation surprises' are more costly in terms of growth than they at higher levels of inflation (Ghosh and Phillips, 1998).

The Target Inflation Rate

It is clear from the above discussion that the target rate of inflation is fundamental to the macroeconomic framework. Three issues need to be kept firmly in mind:

- The relationship between inflation and aggregate economic growth over the medium-term;
- The dynamics of disinflation; how quickly should or can the disinflation goal — assuming it is good for growth — be pursued? and
- What distributional biases if any characterize the inflation/growth trade-off; are there points on the trade-off where lower aggregate growth is compensated for by higher growth amongst the poor.

The Ghosh and Phillips (1998) paper concludes that the consensus (deriving from cross-country data) on the nature of the trade-off is strong and robust. At low rates of inflation — and perhaps reflecting the fact that the scope for efficient relative price and real wage adjustment could be severely limited in those ranges — higher inflation is associated with higher growth. Above about 8% (a range of 5% to 10% is estimated for developing countries and 3% for developed) and certainly by the time inflation reaches double digits, the relationship is negative: higher inflation is associated with lower growth, but at a reducing rate. The convexity in the relationship — the proportional reduction in the average growth rate is greater for an increase in inflation from 10% to 20% say, than an increase from 70% to 80% — implies that the inflation growth trade-off is at its most severe in the region of chronic moderate inflation of between 10% and 35% per annum (see Appendix Table in Discussion Paper 4).

On the speed of adjustment, the robust econometric evidence is based on a large cross-country sample and actual experience in individual countries will vary around the average. The evidence suggests that when the initial inflation is much above 10%, even severe disinflations — halving the rate within one year — do not have a negative effect on output growth.

The question as to whether there is a systematic pro- or anti-poor bias associated with inflation and its trade-off with growth has been less rigorously examined in the literature. There is nonetheless a consensus that higher inflation is at least as costly to the poor as it is to other sections of the population, reflecting mainly the lesser ability of the poor to protect their factor incomes and asset portfolios from the effects of inflation. What is less clear is the effect of disinflation on the poor.

Dollar and Kray (March 2000), for example, find the elimination of hyperinflation "super pro-poor" in the sense that the poor benefit twice over from disinflation: once from its positive impact on average growth and secondly because disinflation appears, on average, to increase the income share of the lowest quintile at the expense of the middle classes. This result, however, is

specific to the mechanism of disinflation and the definition of the poor. Clearly, those reliant on non-indexed wages and nominal assets stand to gain most (in the medium-term) from a reduction in inflation. Frequently, such people are the poorest in society but not necessarily so. There are research findings, for example, which claim that since the poor typically have negligible cash holdings, disinflation effects are weak (although they still stand to gain from the effects of disinflation on growth) and at best, neutral.

In the context of the shift from ESAF to PRGFs, with the concomitant emphasis on ownership, it becomes necessary to consider the determinants of prudent recourse to domestic credit and also what happens if this recourse exceeds prudent levels. From the consolidated balance sheet of the banking system,

$$\Delta M = \Delta NFA + \Delta DC_g + \Delta DC_p$$

The increase in money supply (ΔM) is equal to the sum of the increase in international reserves (ΔNFA) held by the banking system and in domestic credit to government (ΔDC_g) and to the private sector including SOEs (ΔDC_p).

The scope for government prudently to finance its deficit from domestic credit expansion depends not only on the non-inflationary increase (in response to money demand growth), but also on any requirement to rebuild foreign exchange reserves and to increase the credit available to the private sector.

If the government does not observe the above implied restrictions there must be one or more of three consequences:

- Foreign exchange reserves may deviate from the intended path: in the limit, they will run down to a level from which further decline is infeasible; (check position at the end of December 2000);
- Private sector may be crowded out from access to domestic credit, either by high interest rates or quite commonly through pre-emption and direction of credit — the phenomenon of financial repression (the stock of payment arrears may attract less than market rates of interest);
- Money supply may expand at a faster rate, inducing inflation. Private agents then need to increase their nominal money holdings to maintain the same level of purchasing power. On account of the Laffer-curve assumption (see CEPA Discussion Paper 3 (b)) at high rates of inflation – beyond 20 percent per annum – the demand for real money balances reduces enough for revenue from the inflation tax to fall.

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