CHAPTER 5

How Should Emerging Market and Low-Income Country Central Banks Respond to Commodity Price Shocks?

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INTRODUCTION

Over the last two decades, inflation targeting (IT)—in either an explicit or an implicit form—has become the monetary policy framework of choice for most advanced economies. A number of emerging market central banks have also adopted frameworks in which their priority is to maintain inflation at a target level or within a specified range. Many others have been moving toward such a system, and central banks in many low-income countries are considering the suitability of such monetary frameworks in their own institutional settings.

IT has a good track record of delivering price stability and anchoring inflation expectations. This has proven valuable in emerging markets, where high inflation is especially pernicious, as it hits the poor hard. Similar considerations are relevant for LICs. Even as its popularity has spread, however, IT has come under sharp attack in the aftermath of the global financial crisis. Central bankers in advanced economies are being pilloried for focusing too much on price stability, ignoring asset market bubbles, and failing to prevent the worst crisis seen for a generation. Many emerging markets and LICs have weathered the crisis relatively well, but those central banks among the group that target inflation also face pressure to abandon that framework. Critics argue that targeting inflation could be damaging in these economies if it means disregarding sharp exchange rate fluctuations and boom-bust cycles in equity and housing markets.

It has been argued that a narrow version of IT could pose risks if it implies that potential asset bubbles are ignored by central banks. The emerging consensus appears to be that the IT framework has delivered price stability and should be retained but that central banks should use prudential regulation and other policy tools to counteract asset price bubbles (Committee on International Economic

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and Policy Reform and others, 2011). Whether or not IT is the chosen framework, central banks around the world view low and stable inflation as a primary, if not dominant, objective of monetary policy.

Even in this narrow context, academic work is only now beginning to grapple with the particular challenges facing emerging markets and LICs. For instance, the question of what price index an inflation-targeting central bank should target is based on very different considerations in low- and middle-income countries relative to advanced economies. In the former group, food expenditures account for nearly half of total household expenditures, and a large proportion of the population works in a cash economy with little access to the formal financial system. Prices for most goods and services do tend to have some rigidity, so the relative flexibility of food prices has important implications for optimal monetary policy frameworks in economies in which food expenditures constitute a large share of the average household's consumption basket.

In this chapter, we address the question of how emerging market and LIC central banks should deal with the volatility of food prices or, more broadly, commodity prices. The key characteristic of commodity prices that is relevant from a monetary policy perspective is that these prices tend to be volatile and not sticky. In the subsequent discussion, we will focus on food prices, although the analytical arguments are relevant for prices of fuel and other commodities for final consumption.

Based on our earlier research (Anand and Prasad, 2010), which we summarize in this chapter, we argue that it is untenable for central banks in low- and middle-income countries to target just core inflation excluding food and energy prices, which is a strong implication of classical theoretical models. Intuitively, this is because food price increases feed through into broader wage pressures and inflationary expectations if food is a significant share of overall consumption expenditures. More generally, our research has demonstrated that the classical result of core IT relies heavily on the assumption of complete markets. When a significant share of the population in an economy is credit constrained, then monetary policy can improve welfare by targeting headline, rather than core, inflation.

In this chapter, we do not deal with a broader set of questions about the right level of inflation that should be targeted in emerging markets or the trade-offs between higher inflation and stronger exchange rates in dealing with pressures for real exchange rate appreciation (Blanchard, Dell'Ariccia, and Mauro, 2010). Those are important strategic issues that are beyond the scope of this research.

LITERATURE REVIEW

In the literature, the choice of price index has been guided by the idea that inflation is a monetary phenomenon. For instance, Wynne (1999) argues that core inflation (excluding food, energy, and other volatile components from headline CPI) is the most appropriate measure of inflation. The logic is that fluctuations in food and energy prices represent supply shocks and are nonmonetary in nature. Because these shocks are transitory and volatile and do not reflect changes in the underlying rate of inflation, they should not be a part of the IT price index (Mishkin, 2007, 2008).

Previous researchers have used models with price and/or wage stickiness to show that the choice of the core price index is consistent with a welfare maximization objective. Existing models have looked at complete market settings in which price stickiness is the only source of distortion (besides monopoly power). Infrequent price adjustments cause markups to fluctuate and also distort relative prices. To restore the flexible price equilibrium, central banks should try to minimize these fluctuations by targeting sticky prices (Goodfriend and King, 1997, 2001). Using a variant of a New Keynesian model, Aoki (2001) has shown that under complete markets, targeting inflation in the sticky price sector leads to welfare maximization and macroeconomic stability. Targeting core inflation is equivalent to stabilizing the aggregate output gap, as output and inflation move in the same direction under complete markets.

However, recent research has shown that food inflation and core inflation have very different features in advanced and developing economies. Walsh (2011) found that the behavior of the two inflation indices differs in three key respects when one compares advanced with developing economies:

1. The difference between long-run average food and nonfood inflation, which tends to be small in advanced economies, can be quite large in poor countries;
2. Food price shocks are much more persistent in developing economies than advanced economies; and
3. Although the second-round effects of high food inflation are generally small and quickly reversed in rich countries, in poorer countries they are often not reversed and can have a significant impact on nonfood prices.

Similar results have been reported by Mishra and Roy (2011) using Indian data.

Moreover, appropriateness of the core price index in standard models relies heavily on the assumption that markets are complete (allowing households to fully insure against idiosyncratic risks) so that the central bank only needs to tackle the distortions created by price stickiness. However, there is compelling evidence that not all agents in the economy may be able to smooth their consumption (Campbell and Mankiw, 1989, 1990, 1991). This observation is also consistent with the findings of a number of studies rejecting the permanent-income hypothesis. It has been shown that in the presence of credit-constrained consumers, policymakers' welfare objectives are altered and the Taylor rule becomes too weak a criterion for stability (Amato and Laubach, 2003; Gali, Lopez-Salido, and Valles, 2004).

SOME BASIC FACTS

There are some key features of emerging markets and LICs that a model needs to contain to be relevant for this group of economies. These include a high share of food expenditures in total consumption expenditures of the average household, low price and income elasticities of the demand for food, and financial frictions.

TABLE 5.1

Share of Food Expenditure in Total Household Expenditure			
Emerging markets		**Advanced economies**	
Indonesia	53.0	Japan	14.7
Vietnam	49.8	Germany	11.5
India	48.8	Australia	10.8
China	36.7	Canada	9.3
Russia	33.2	United Kingdom	8.8
Malaysia	28.0	United States	5.7
Average	**41.6**	**Average**	**10.1**

Sources: CEIC; household surveys; U.S. Department of Agriculture, Economic Research Service, International Food Consumption Patterns Dataset; and authors' calculations.

Note: Data for emerging markets are for 2005; for advanced economies, they are for 2006. Expenditure on food includes expenditure on food consumed at home only and does not include expenditure on beverages and tobacco.

Countries with lower per capita income levels typically have a higher share of expenditure on food in total household expenditure. To examine how emerging markets differ from advanced countries, in Table 5.1 we present recent data on shares of food expenditure in total expenditure for selected emerging markets and advanced economies. As expected, expenditure on food constitutes a much larger share of total household expenditure in emerging markets relative to advanced economies. Indeed, Figure 5.1 shows that, for example, food expenditure represents on average less than 5 percent of total household expenditure in the United States but about 70 percent in Tajikistan.

We present the income elasticity of food and the Slutsky own-price elasticity of food for selected emerging markets and advanced economies in Table 5.2. The income elasticity of food in emerging markets is on average twice that in advanced

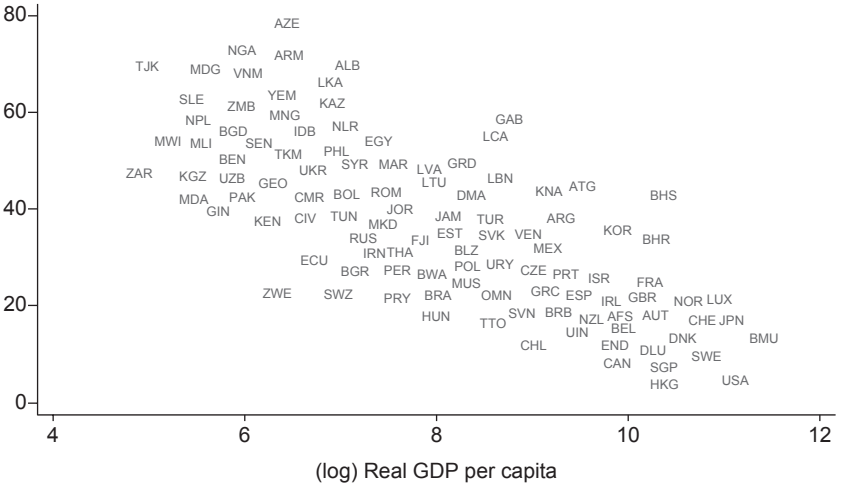

Figure 5.1 Share of Expenditure on Food, 1996 (*Percent of total household expenditure*)

Sources: U.S. Department of Agriculture, Economic Research Service, International Food Consumption Patterns Dataset; and World Bank, *World Development Indicators*.

Note: Expenditure on food includes expenditure on food prepared at home and consumed plus beverages and tobacco.

TABLE 5.2

Income (Expenditure) Elasticity and Slutsky Own-Price Elasticity of Food, 1996

Emerging economies	Income elasticity	Price elasticity	Advanced economies	Income elasticity	Price elasticity
Nigeria	0.79	–0.32	Singapore	0.42	–0.31
Vietnam	0.73	–0.37	New Zealand	0.39	–0.29
Bangladesh	0.73	–0.37	Finland	0.39	–0.29
Pakistan	0.72	–0.38	Sweden	0.36	–0.27
Sri Lanka	0.70	–0.39	Netherlands	0.36	–0.27
Indonesia	0.69	–0.39	France	0.33	–0.25
Philippines	0.66	–0.39	United Kingdom	0.33	–0.25
Peru	0.66	–0.39	Belgium	0.33	–0.25
Thailand	0.65	–0.39	Italy	0.32	–0.24
Venezuela	0.65	–0.39	Norway	0.32	–0.24
Egypt	0.64	–0.39	Germany	0.31	–0.23
Brazil	0.62	–0.39	Australia	0.30	–0.23
Russia	0.62	–0.39	Japan	0.29	–0.22
Turkey	0.61	–0.39	Canada	0.28	–0.22
Mexico	0.59	–0.38	Switzerland	0.26	–0.20
Chile	0.59	–0.38	Denmark	0.25	–0.19
Poland	0.58	–0.38	United States	0.10	–0.08
Average	**0.66**	**–0.38**	**Average**	**0.31**	**–0.22**

Sources: U.S. Department of Agriculture, Economic Research Service, International Food Consumption Patterns Dataset; and World Bank, *World Development Indicators*.

Note: These country-specific income elasticity values represent the estimated percentage change in demand for food if total income increases by 1 percent (keeping real income constant). Food includes food prepared at home and consumed plus beverages and tobacco.

economies. The price elasticity of food is low. As the share of expenditure on food is high in emerging markets, the price elasticity of food is higher in these economies relative to advanced economies. However, the overall value of the price elasticity of food is much lower than what is used in the literature on IT. Low price and income elasticities of the demand for food have considerable significance for the choice of price index.

To examine the extent of credit constraints in emerging markets, in Table 5.3 we present data on the percentage of the adult population with access to formal finance (the share of the population using financial services) in emerging markets and advanced economies. On average, more than half of the population in emerging markets lacks access to the formal financial system.

Low price and income elasticities of food and low income levels make the welfare of agents in emerging markets more sensitive to fluctuations in food prices. These features imply that agents may factor in food price inflation while bargaining over wages. Through this channel, food price inflation feeds into inflation expectations. Thus, in emerging markets, even inflation-expectation-targeting central banks have to be concerned about food price inflation. When markets are not complete and agents differ in their ability to smooth consumption, their welfare depends on the nature of idiosyncratic shocks. Thus, the presence of credit-constrained consumers who are unable to use financial markets to intertemporally smooth consumption in response to shocks also has implications for monetary policy.

TABLE 5.3

Composite Measure of Access to Financial Services in Emerging Markets, 2008

Emerging economies	Percent with access	Advanced economies	Percent with access
Argentina	28	Belgium	97
Brazil	43	Canada	96
China	42	Denmark	99
Egypt	41	France	96
India	48	Germany	97
Indonesia	40	Luxembourg	99
Malaysia	60	Netherlands	100
Mexico	25	Singapore	98
Nigeria	15	Spain	95
Philippines	26	Sweden	99
South Africa	46	United States	91
Thailand	59	United Kingdom	91
Average	**40**	**Average**	**97**

Source: World Bank (2008).

Note: The composite indicator measures the percentage of the adult population with access to an account with a financial intermediary.

THE MODEL

In this section, we sketch the main details of a model that we use to investigate the welfare implications of different monetary policy rules and then briefly discuss the key results (for more details, see Anand and Prasad, 2010). Our model builds upon a large literature that has developed and analyzed dynamic sticky price models (Woodford, 1996; Rotemberg and Woodford, 1997, 1999; Clarida, Gali, and Gertler, 1999; Aoki, 2001). The model is rendered more realistic by incorporating two features that are relevant to all economies but are particularly important for emerging markets—a fraction of consumers who are credit constrained and a subsistence level of food consumption.

The model has two sectors and two goods—one type of flexible price good (i.e., food), whose prices adjust instantaneously, and a continuum of monopolistically produced sticky price goods (i.e., nonfood), whose prices adjust sluggishly. In the subsequent discussion, we interchangeably use the term *food sector* for the flexible price sector and the term *nonfood sector* for the sticky price sector.

The economy is populated by a continuum of $1 + \lambda$ infinitely lived households, where $\lambda > 0$ is the continuum of households in the flexible price sector (food sector). Each household owns a firm and produces one good. Households provide labor to the firms in their respective sector (we assume that labor is immobile across sectors) and consume both the flexible price good (food) and all of the differentiated sticky price goods (nonfood). The representative consumer, i, is indexed by f (flexible price sector) and s (sticky price sector). Household i maximizes the discounted stream of utility

$$E_0 \sum_{t=0}^{\infty} \beta^t [u(C_t^i, N_t^i)], \tag{5.1}$$

where $\beta \in (0,1)$ is the discount factor. The utility function takes the form

$$u(C_t^i, N_t^i) = \frac{(C_t^i)^{1-\sigma}}{1-\sigma} - \varphi_n \frac{(N_t^i)^{1+\psi}}{1+\psi}, \tag{5.2}$$

where the argument C_t^i is the composite consumption index of household *i* in period *t*. C_t^i includes the flexible price good and the entire continuum of the differentiated goods. It is defined as

$$C_t^i = \left[\gamma^{\frac{1}{\eta}} \left(C_{f,t}^i - C^* \right)^{1-\frac{1}{\eta}} + (1-\gamma)^{\frac{1}{\eta}} (C_{s,t}^i)^{1-\frac{1}{\eta}} \right]^{\frac{1}{1-\frac{1}{\eta}}}, \tag{5.3}$$

where

$$C_{s,t}^i = \left[\int_0^1 c_t^i(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}}. \tag{5.4}$$

The elasticity of substitution between the flexible price and sticky price goods is given by $\eta \in [0,\infty]$, and $\gamma \in [0,1]$ is the weight on food in the consumption index. The parameter $\theta > 1$ is the elasticity of substitution between any two differentiated goods, N_t^i is the aggregate labor supplied by household *i* in period *t*, and σ is the risk aversion factor (inverse of elasticity of intertemporal substitution). The parameter ψ is the inverse of Frisch elasticity, and φ_n is a scaling factor.

Because food is a necessity, households must consume a minimum amount C^* of food for survival. We assume that all households always have enough income to buy the subsistence level of food. Even though the subsistence-level food consumption does not bind, it plays a vital role by altering the elasticity of substitution between food and nonfood and the marginal utility of food and nonfood consumption.

Households in the flexible price sector (food sector) do not have access to financial markets, and they consume their wage income in each period. So these households are akin to the "rule of thumb" consumers. Each household in the sector owns one firm and produces food by linear technology in labor. Because we are interested in analyzing the effects of sector-specific shocks rather than household-level idiosyncratic shocks, we assume that all the households in the food sector face the same shock.

Households in the sticky price (nonfood) sector can buy one-period nominal bonds and smooth their consumption. Each household owns a firm and provides labor to each firm in the sector. They hold one share in each firm of the sector, where each firm uses a linear technology in labor. We assume that all households in the nonfood sector face an identical shock process.

Firms in the flexible price sector are assumed to be price takers. We follow Calvo (1983) and Woodford (1996) in modeling price stickiness by assuming

that a fraction of firms in the sticky price sector cannot change their price in each period.

We assume that the monetary authority sets the short-term nominal interest (R_t) according to a simple Taylor (1993)–type rule of the following form:

$$\log(R_t / \bar{R}) = \rho_i \log(R_{t-1} / \bar{R}) + \rho_\pi \log(\Pi_t / \bar{\Pi}) + \rho_y \log(Y_t / \bar{Y}), \qquad (5.5)$$

where $\bar{Y}$, $\bar{\Pi}$, and $\bar{R}$ are the steady-state values of output, inflation, and the nominal interest rate, respectively. The term ρ_i represents the central banker's preference for interest rate smoothing; ρ_π and ρ_y are the weights on inflation and output gap assigned by the policymakers. For our policy experiments, we characterize core inflation as the inflation in the sticky price sector, $\Pi_{s,t}$, and headline inflation as the overall inflation, Π_t.

We evaluate our model under the following monetary policy regimes:

1. Strict core IT: The central bank cares only about interest rate smoothing and stabilizing inflation in the sticky price sector.
2. Strict headline IT: The central bank cares only about interest rate smoothing and stabilizing headline inflation.
3. Flexible core IT: The central bank cares about interest rate smoothing and, in addition to stabilizing sticky price inflation, also tries to stabilize output by assigning a weight to the output gap (deviation of output from trend).
4. Flexible headline IT: The central bank cares about interest rate smoothing and, in addition to stabilizing headline inflation, also tries to stabilize output.

In the literature, exclusion of food prices from the price index has been justified on the ground that shocks to food (and energy) prices represent supply shocks. To compare our model with those in the prior literature and also to highlight the role of adverse supply shocks on the choice of price index, we focus on first-order autoregressive (AR(1)) productivity shocks in both the flexible and sticky price sectors.

We follow the setting of Aoki (2001) to study the choice of price index under complete markets. In this setting, all households can completely insure one another against idiosyncratic income risks. It implies that given the same initial wealth, each household will choose an identical consumption sequence.

Welfare Evaluations

We are interested in the choice of policy rule that yields the highest level of lifetime utility within the class of policy rules considered. In particular, we evaluate policy rules according to the value of lifetime utility:

$$V_t^i \equiv E_t \sum_{j=0}^{\infty} \beta^j U(C_{t+j}^i, N_{t+j}^i) \quad \text{for } i = f, s. \qquad (5.6)$$

We compute the total welfare of the economy as a weighted sum of households' welfare, $V_{\text{total}} = \lambda^* V_t^f + V_t^s$ Formally, we compute V_{total} associated with each policy rule and look for a policy rule that yields the highest value of V_{total}.

To solve the model, we compute the second-order accurate consumer welfare measure with different monetary policy regimes as in Schmitt-Grohe and Uribe (2004). To produce an accurate second-order approximation of the welfare function, we use a second-order approximation to the policy function. The policy function is approximated using the perturbation method by employing a scale parameter for the standard deviations of the exogenous shocks as an argument of the policy function and taking a second-order Taylor expansion with respect to the state variables as well as the scale parameter. We use an approximation algorithm developed by Schmitt-Grohe and Uribe (2004) with suitable modifications.

Strict core IT is regarded as the welfare-maximizing policy rule in the literature. Therefore, we evaluate the welfare gains associated with a particular policy regime by comparing it to the strict core IT rule allocation. To evaluate the welfare implications of a particular policy regime, we calculate the fraction of a consumer's consumption that would make the consumer indifferent between regimes. Let ω be the welfare gain of adopting an alternative policy rule other than strict core IT. We define ω as a fraction of additional strict core IT regime consumption process that would make a household as well off under a regime *a* as under a strict core IT regime.

We study the choice of the optimal price index under two market settings—a complete market and an incomplete market structure characterized by the presence of "rule of thumb" consumers. We compute the welfare gains associated with the four monetary policy regimes defined above.

RESULTS

We now discuss the conditional welfare gains associated with each policy choice. Welfare gains are defined as additional lifetime consumption needed to make the level of welfare under strict core IT identical to that under the evaluated policy. Thus, a positive number indicates that welfare is higher under the alternative policy than under the strict core IT policy. The choice of strict core IT as a benchmark for comparison is motivated by the fact that in the literature it is considered the optimal policy choice for maximizing welfare. We present the results for three alternative policy regimes—strict headline IT, flexible headline IT, and flexible core IT.

Table 5.4 shows the welfare gains from targeting different price indices under complete and incomplete market settings. Under complete markets, the choice of targeting strict core inflation is the best policy. The strict headline IT regime results in a higher volatility of consumption and output compared to core IT. For instance, in response to a negative food productivity shock, the policy response is more aggressive under strict headline IT, which leads to a further decline in output. These results are similar to the ones documented in the existing literature on IT.

TABLE 5.4

Welfare Gains from Alternative IT Rules
(*Percent of strict core IT consumption*)

	Complete markets			Incomplete markets		
	Strict headline targeting	Flexible headline targeting	Flexible core targeting	Strict headline targeting	Flexible headline targeting	Flexible core targeting
Welfare gain	–0.005	–0.011	–0.006	0.271	0.314	0.076

Source: Authors' calculations.

Note: Welfare gains (ω *100) are defined as the percent increase in the strict core inflation-targeting (IT) consumption process necessary to make the level of welfare under strict core IT policy identical to that under the evaluated policy. Thus, a positive number indicates that welfare is higher under the alternative policy than under the strict core IT policy. Targeting policy rules are defined in the text.

Under complete markets, following an increase in inflation, the central bank raises interest rates, reducing aggregate demand (as consumers postpone their consumption following an increase in interest rates) and thus inflation. So, under complete markets, inflation and output move in the same direction, and therefore stabilizing inflation is equivalent to stabilizing output (Aoki, 2001). It also implies that there are no additional welfare gains by adopting flexible IT. Thus, under complete markets, strict core IT is the welfare-maximizing policy choice for the central bank.

However, in the presence of credit-constrained consumers, flexible headline IT appears to be a better policy choice. Aggregate demand responds differently to monetary tightening under the two policy regimes. The central bank is able to reduce aggregate demand by increasing interest rates only when it targets headline inflation. Aggregate demand, instead of going down, goes up if the central bank follows strict core IT. Thus, headline IT (both strict and flexible) outperforms strict core IT. Because in the presence of financial frictions, inflation and output may move in opposite directions in response to interest rate changes, stabilizing output results in welfare gains. Thus, flexible headline IT is the optimal policy choice when markets are not complete.

To examine the mechanics behind this result, we look at the properties of aggregate demand under incomplete markets. In the presence of financial frictions, the consumption choices of different households vary (as opposed to under complete markets, where the consumption choice of each household is identical). While consumption demand of unconstrained households is responsive to interest rates (as they optimize intertemporally), consumption demand of credit-constrained households is independent of interest rate changes (their horizon is static and they consume their entire income each period) and depends only on their current-period wage income. Because only a fraction of aggregate demand is influenced by interest rate changes, a monetary tightening does not automatically result in the decline of aggregate demand. The response of aggregate demand crucially depends on the behavior of credit-constrained households.

Following a negative shock to food productivity, the central bank raises the interest rate, which lowers the demand of unconstrained households (as it is

optimal for them to postpone consumption). However, it has no bearing on the demand of credit-constrained consumers. An increase in the relative price of food following a negative food productivity shock increases the wage income and, therefore, the consumption demand of credit-constrained households. Thus, the demand of the two types of households moves in opposite directions following a negative shock to food productivity.

Which of the two demands dominates is determined by the policy regime. Because core IT ignores food price inflation, the increase in food prices (and therefore the wage income of the food sector households) is higher than the increase under headline IT. This higher wage income translates into higher consumption demand by credit-constrained consumers (as they consume all of their current wage income), which more than compensates for the lower consumption demand of unconstrained consumers. Consequently, aggregate demand rises. By contrast, when the central bank targets headline inflation, price increases in the food sector are much lower, and the rise in income and, therefore, the increase in consumption demand in that sector are not enough to compensate for the decline in the demand of unconstrained consumers. Thus, monetary intervention is effective in achieving its objective of reducing aggregate demand only when the central bank targets flexible headline inflation.

In the presence of financial frictions, relative prices affect aggregate demand in addition to aggregate supply. In other words, the presence of financial frictions implies that managing aggregate demand requires the central bank to choose a policy regime that would limit the rise in wages of credit-constrained consumers (and, therefore, the increase in their demand).

Thus, a key result from the model is that in the presence of financial frictions, targeting core inflation (i.e., inflation in the sticky price sector) may not be optimal. Lack of access to financial markets makes the demand of credit-constrained consumers insensitive to fluctuations in interest rates. Because their demand depends only on real wages, a link is established between aggregate demand and real wages. Thus, in the presence of financial frictions, the relative price of the good produced in the flexible price sector not only affects aggregate supply, but, through its effects on real wages, also influences aggregate demand.

This result is at variance with the prior literature based on complete-markets settings. For instance, in Aoki's (2001) model, relative prices of the flexible price sector only appear as a shift parameter of inflation in the sticky price sector. Under incomplete markets, by contrast, the central bank cannot ignore fluctuations in the price of the good produced in the flexible price sector if it wants to affect aggregate demand. Financial frictions break the comovement of inflation and output (as inflation and output may now move in opposite directions). Stabilizing core inflation is no longer sufficient to stabilize output fluctuations. Thus, in the presence of financial frictions, targeting flexible headline inflation is a better policy choice. In related work, Catão and Chang (2010) show that when food is imported and not easily substitutable, ignoring food prices when setting monetary policy can reduce welfare by leading to more volatile and reduced consumption.

Sensitivity Analysis

Our main result is that in the presence of financial frictions, flexible headline IT is the welfare-maximizing policy choice. This result is robust to changes in key parameters, such as the elasticity of substitution between food and nonfood goods, the inverse of Frisch elasticity, the degree of price stickiness, the elasticity of substitution between different nonfood goods (which determines the markup in the sticky price sector), and the proportion of credit-constrained households in the economy. We also conducted sensitivity analysis with respect to the coefficients of the Taylor rule and for various combinations of the degrees of persistence and volatility of these shocks. Our results hold true across all these different sensitivity tests. Under complete markets, core IT is the best policy choice for most values of the key parameters, whereas under incomplete markets, flexible headline IT continues to dominate other policies.

CONCLUDING THOUGHTS ON MONETARY POLICY IN LOW-INCOME COUNTRIES

In this chapter, we have argued that from a welfare perspective, flexible headline IT is preferable to core IT in economies with imperfect markets and especially those in which food constitutes an important share of overall consumption expenditures of the average household. This result is clearly of considerable relevance to LICs.

This is, of course, only one of the many challenges facing monetary policy officials in emerging markets and LICs. In these economies, the situation is complicated by the fact that globalization has made them more exposed to external shocks as their rising openness to trade and financial flow creates wider channels for cross-country spillovers of shocks. These very forces have also increased the burden on monetary policy. It is much harder now for a central bank to use instruments such as interest changes to attain domestic objectives; the large magnitudes and rapidly shifting patterns of global capital flows can create many difficulties in managing monetary policy, especially in economies with shallow financial systems. And yet, monetary policy has become even more important as a first line of defense against external shocks as it can be far more nimble than other macroeconomic policy tools.

This has generated a rich debate about monetary policy in a number of dimensions—what the right framework is for monetary policy, what the scope of a central bank's objectives ought to be, and the optimal degree of central bank independence (see Hammond, Kanbur, and Prasad, 2009; Prasad, 2010). Even as clarity about optimal monetary frameworks has dimmed, a remarkable outcome of the crisis is that there has been a convergence in the nature of the debates about central banking in economies at very different stages of economic and institutional development. Central banks in virtually every country—advanced, emerging market, or low income—are contemplating the challenges of managing multiple mandates without erosion of their operational independence.

Such tensions are heightened in emerging markets and LICs, where central banks have traditionally been responsible for a broad array of social and economic goals in addition to price and financial stability. For instance, the mantra that a stable and transparent monetary policy focused mainly on one objective is best in the long term comes up against the harsh practical reality that surges in capital inflows and the resulting exchange rate appreciation can have permanent pernicious consequences for export market shares and can hurt the central bank's legitimacy. As a result, ancillary objectives such as exchange rate management already complicate the conduct of monetary policy in these economies. Instruments such as capital controls have limited effectiveness and create problems of their own.

An additional problem is that in many low- and middle-income countries, central banks are among the most well managed and trusted public institutions, which makes it tempting to give them more responsibility. But this could make them less effective at the one thing they have proven to be good at—controlling inflation. The real conundrum is that a narrower set of objectives could also result in central bank independence being threatened if it looks as if the central bank is not concerned about other objectives such as growth and employment.

If a central bank does take on multiple mandates, it can create unrealistic expectations about what the institution can and cannot do with the tools at its disposal. Indeed, there is a temptation to ascribe omnipotence to monetary policy, a mandate that some emerging market central bankers take on as a matter of compulsion rather than choice. But this burden may simply be too much to bear and be doomed to eventual failure, especially in economies with weak institutional structures, limited regulatory capacity, high levels of fiscal deficits, and public debt. Even in the absence of these constraints, monetary policy by itself cannot influence an economy's long-term growth potential or shift the unemployment rate for an extended period.

A more circumscribed view is that monetary policy can best contribute to macroeconomic and financial stability by maintaining low and stable inflation. This framework, if it operates well, defines the limits of monetary policy and provides a clear standard of accountability. The tensions among these varying perspectives feed into the debate about central bank independence.

The concept of central bank independence is a complex one, however. The conventional notion is that an independent central bank with a narrow but well-defined objective, such as maintaining low and stable inflation, has the best chance of being effective and transparent, making it less subject to political interference. Even central banks that have a clearly defined single objective in the form of an inflation target only have operational dependence to achieve that target. The government determines the target itself and the consequences of missing it. Indeed, but for the involvement of the government in setting it, the target would lack broader public legitimacy.

Even such a narrow objective could be difficult to deliver upon if the government runs profligate fiscal policy, racking up large budget deficits. Furthermore, if central banks are made responsible for financial market stability and avoidance

of asset price bubbles, they will need to be given more instruments. There is, however, a deep tension between central banks having multiple objectives and the operational independence needed to achieve the inflation target. Broader objectives invariably mean more political interference and reduced credibility in maintaining low inflation.

In short, central banks in emerging markets and LICs face a challenging landscape, and a great deal of analytical work is needed to guide the choice of optimal monetary frameworks in these economies.

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