INFLATIONARY PRESSURES IN SOUTH ASIA

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The similarities yet differences across South Asian countries, and their differential response to recent food and oil price shocks, provides a useful opportunity to better understand the structure of inflation in these economies. Analysis of the internal goods market and external balance of payments equilibrium and evidence on demand and supply shocks suggests that output is largely demand determined but inefficiencies on the supply side perpetuate inflation. Pro-cyclical policy amplifies the negative impact of supply shocks on output. Inflation surges are reduced at high output cost while propagation mechanisms and well-intentioned administrative interventions turn relative price shocks into chronic cost-push inflation. The analysis brings out the importance of food prices for the inflationary process. It is necessary to protect the poor from inflation and especially food inflation. But this must be done effectively. The paper concludes with an analysis of effective short- and long-run policy options.

JEL Classification: E31, E52, O11.

Key words: Inflation, South Asia, food price policy, demand and supply shocks.

I. INTRODUCTION

Countries in South Asia have common features that affect macroeconomic policy choices, outcomes and stability. These include high population density, low per capita incomes, a large share of population in agriculture and relatively high

saving ratios.[1] Also, food comprises a large part of the average consumption basket and the economies depend on oil imports, making these countries vulnerable to terms of trade and other supply shocks.

The region initiated liberalizing reforms in the 1990s. The reforms brought on shocks to the economies but, over time, they created greater diversity and deeper markets that paved the way for reduced volatility. Controls may repress volatility, but they create a fragile situation. Effective liberalization, however, is gradual. The smaller South Asian countries, Bhutan, Nepal and Maldives, are more strongly affected by external shocks as they tend to be more open with less market development and capital account controls, and more burdened with government and international debt.

Similar features should lead to convergence in macroeconomic policies, but differing political systems are a potential factor causing divergence. Low per capita income democracies have a tendency to set short-term populist policies and face persistent and chronic inflation, while governments not so dependent on popular vote can allow higher inflation and volatility. These differential responses, under similar basic conditions and shocks, are used in this paper to understand causes of inflation and suggest better policy design.

Spikes in food and fuel prices prior to the global financial and economic crisis resulted in high inflation rates in most countries in Asia and the Pacific. With the onset of the crisis itself, inflationary pressure subsided sharply in all subregions of Asia and the Pacific except South Asia. Major economies of South Asia, such as India and Pakistan, experienced double-digit inflation rates. Food prices grew at even higher rates. Given the high incidence of poverty in the region, high food and overall inflation rates disproportionately impact the poor. Moreover, a sustained rise in food prices tends to raise wages and ultimately boost inflation.

To identify the underlying causes of high inflation, both food and overall, in countries of South Asia, mainly India, Pakistan, Bangladesh, Sri Lanka, Nepal and Maldives, and possible policy responses, potential causative factors are classified into the generic categories of demand and supply. The former includes domestic and external demand, monetary and fiscal policies. The latter includes sectoral price shocks and capacity constraints. Government interventions, which may moderate a price spike but raise costs over time, aggravate supply shocks so that a relative price change turns into inflation. Government policies for agriculture and speculative behaviour affect food inflation, and are also examined. The policies

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[1]   There are, of course, variations across countries. In Pakistan and Nepal the savings to GDP ratio struggles to reach 20 per cent while in India it has crossed 30 per cent.

include minimum price support, buffer stock, trade and public distribution schemes. More openness changes the inflationary dynamics.

Does high economic growth in some countries imply that infrastructural and other capacity constraints are contributing to inflationary pressures? Data and analysis suggest the macroeconomic dynamics is such that output is largely demand determined but inefficiencies on the supply side cause inflation. For example, the power shortages that most South Asian countries suffer from are a failure in the provision of public goods. These power shortages lead to higher costs since expensive substitutes have to be used.

The structural features outlined above help explain the patterns identified in the response of select South Asian countries to the severe food and oil price shocks of this decade. The analysis is used to assess the effectiveness of policy responses and interventions, and to suggest alternatives, including some arising from more openness.

Although the Reserve Bank of India has always emphasized the importance of money supply as the cause of inflation, the sustained food inflation has recently spurred some analysis of supply side factors (Gokarn, 2010; Mohanty, 2010). Joshi and Little (1994) have long argued that supply-side responses have been neglected in Indian macroeconomic policy.

The structure of the paper is as follows: Section II presents data on the causes of inflation and draws out some stylized facts from the data. Section III derives an analytical framework. Section IV explores the political economy of food prices. Section V presents evidence supporting the analysis. Section VI draws out policy implications. Section VII concludes the paper.

II. CAUSES OF INFLATION

Relevant macroeconomic data are displayed in tables and figures for 5 South Asian countries.[2] Table 1 gives a comparative macroeconomic picture of the countries and shows how this has changed at ten-year intervals from 1981 to 2009. Apart from nominal gross domestic product (GDP) and reserves, it provides critical balance of payment ratios, long- and short-term interest rates, inflation and changes in exchange rates.

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[2]   The data source is the IFS (IMF). The advantage of using this data set is that the definitions used are consistent for comparative purposes. But there are gaps in the data. The Maldives data are so patchy and erratic they cannot be graphed.

Table 1. Key macroeconomic variables for South Asian countries

	Bangladesh	India	Nepal	Maldives	Pakistan	Sri Lanka
1981						
Nominal GDP	17.9	173.0	2.2	0.05	28.1	4.4
FX reserves	118.8	3 233.8	167.8	0.5	571.3	260.8
Exports/GDP	4.4	5.0	5.9	17.4	10.3	24.6
Net exports/GDP	-10.7	3.6	-10.3	-44.2	-9.8	-17.2
CA/GDP	-5.7	-1.0	-0.9	-40.6	-3.3	-10.1
Inflation	..	13.1	11.1	..	11.9	18.0
Depreciation	16.4	10.1	2.8	0.0	0.0	16.4
Interest rates: Short term	12.0	8.6	12.0	..	9.3	19.0
Interest rates: Long term	12.0	16.5	5.0	6.0	9.4	15.6
1990						
Nominal GDP	29.0	324.9	3.5	0.2	39.3	8.0
FX reserves	423.8	847.0	201.7	17.1	207.4	296.9
Exports/GDP	5.8	5.5	5.0	24.8	14.2	23.8
Net Exports/GDP	-6.7	-1.7	-12.7	-39.1	-4.5	-9.6
CA/GDP	-1.4	-2.2	-8.2	4.6	-4.2	-3.7
Inflation	6.1	9.0	8.2	..	9.1	21.5
Depreciation	7.1	7.9	8.0	5.7	5.7	11.1
Interest rates: Short term	12.0	15.6	11.0	7.0	7.3	21.6
Interest rates: Long term	16.0	16.5	7.9	..	8.1	14.1
2000						
GDP	45.5	467.8	5.3	0.6	71.3	16.3
FX reserves	1 140.0	28 600.6	719.9	92.5	1 150.5	749.4
X/GDP	10.5	9.1	13.1	12.2	12.7	33.2
NX/GDP	-7.9	-2	-15.5	-50.1	-2.6	-5.2
CA/GDP	-0.7	-1	-5.6	-8.2	-0.1	-6.4
Inflation	2.2	4.0	2.5	..	4.4	6.2
Depreciation	6.2	4.4	4.2	0.0	8.4	9.0
Interest rates: Short term	8.6	9.3	7.5	6.8	8.6	17.3
Interest rates: Long term	15.5	12.3	5.3	6.9	4.2[a]	14.0

Table 1. *(continued)*

	Bangladesh	India	Nepal	Maldives	Pakistan	Sri Lanka
2009						
Nominal GDP	89.1	62 311.7	7.9[b]	1.5	155.9	42.0
FX reserves	6 059.8	164 945.0	1 042.6[c]	157.2	6 339.0	2 883.8
Exports/GDP	14.0	12.7	11.4[b]	5.2	11.2	17.5
Net exports/GDP	-9.2	-6.9	-25.9[b]	-60.5	-9.1	-6.0
CA/GDP	3.8	-2.8	-1.7[b]	52.7[d]	-1.1[d]	-0.7
Inflation	5.4	10.9	11.6	4.0	13.6	3.4
Depreciation	0.6	11.3	11.2	0.0	16.1	6.1
Interest rates: Short term	8.2	3.5	6.5	..	12.0	21.2[d]
Interest rates: Long term	14.6	12.2	6.4	6.5	11.7[d]	18.9[d]

Source: IMF, IFS statistics, various issues.

Notes: GDP in USD billions; FX Reserves in SDR millions;

[a] Figures for 1999;

[b] Figures for 2007;

[c] Figures for 2005;

[d] Figures for 2008.

In the region, India is the largest country and its relative size has risen over the years but Sri Lanka has had the highest per capita income. India also has seen the largest inflows and reserve accumulation, but has been the most conservative in that it has had the smallest trade and current account (CA) deficits. Net exports are exports minus imports or the trade surplus. For most the countries of the region, this has normally been negative, resulting in trade deficits. The current account, which includes invisibles, such as remittances and payments for services, has also been in deficit. The smaller countries have had to rely more on exports. Their higher export to GDP ratios have made them more open. But all the countries had higher reserves in the later period.

The countries had similar inflation, exchange and interest rates. Sustained unrest in Sri Lanka pushed up its inflation rates, while in the other countries inflation rarely reached double digits. Exchange rates also varied compensating for the inflation; most countries had some sort of flexible exchange rate regimes in the later years. Interest rates tended to move downwards in the reform period. But since foreign exchange markets were thin, and currencies were not fully convertible, the exchange rates were not fully determined by the market and considerable intervention took place.

Figure 1 shows the growth rates over the period 1980-2010. With the exception of Sri Lanka and the Maldives, the rates fluctuated within a 0-10 per cent range. India and Bangladesh had the steadiest growth rates, with India overtaking most of the other countries in the new century. For all the countries, the late 1980s, early 1990s and late 1990s were periods of relatively low growth. These were also periods of external shocks: oil prices, the Kuwait war and East Asian crisis.

The wholesale price index (WPI) and the consumer price index (CPI) inflation are shown in figures 2 and 3. Indian and Bangladeshi inflation was low and stable compared to the other countries, illustrating the argument that countries with unstable political regimes tend to have greater inflation fluctuations. Inflation rates, in general were capped at 25 per cent, never reaching the heights seen in Latin America. This illustrates the damping effects on inflation of dense low capita income populations vulnerable to inflation. However, on the other hand, inflation rates were almost never negative, implying that chronic inflation pushed up costs and price levels. The price indices and their sub-components reflected the effect of supply shocks.

Figure 4 shows the current account deficits of each country. Most of the countries ran deficits over the period, with only a few registering a balance of payment in surplus intermittently. Again deficits were larger for Sri Lanka, Nepal, and Pakistan, illustrating more volatile policy-making or the impact of political instability. Even so, the deficits in general as a percentage of GDP rarely exceeded ten per cent, and for most countries, the deficits widened in periods of low growth such as in the late 1990s, when they were driven by supply rather than demand shocks.

Figures 5 to 7 graph the components of demand, government revenue expenditure (G), private consumption (C) and gross fixed capital formation (GFCF), as a percentage of GDP at current market prices for each country. The government spending ratio shows the highest fluctuations in Sri Lanka and Pakistan, where notably it had been increasing for the former and falling for the latter in the recent period. India registered one of the highest and most consistent percentages. Among the countries, government spending was the least in Bangladesh. The peak in 1988 is probably an error due to some kind of measurement change causing a break in many Bangladesh macroeconomic series at that time.

The consumption ratios for most countries remained steady between 60 and 80 per cent. However, the ratios for India fell as the country's GFCF convincingly overtook other countries in the recent period. Bangladesh's GFCF also rose steadily from the being the lowest to the second highest, while for the

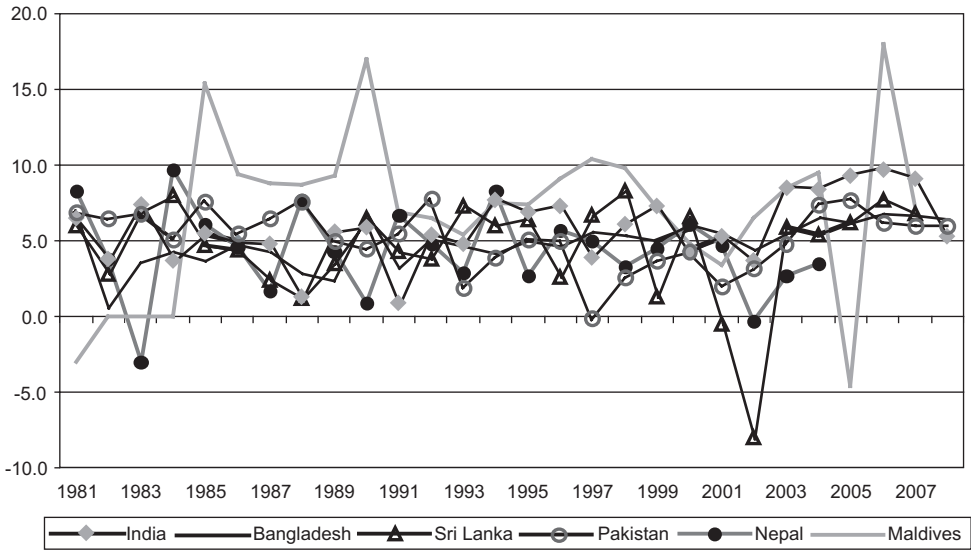**Figure 1. GDP growth rates (constant prices)**
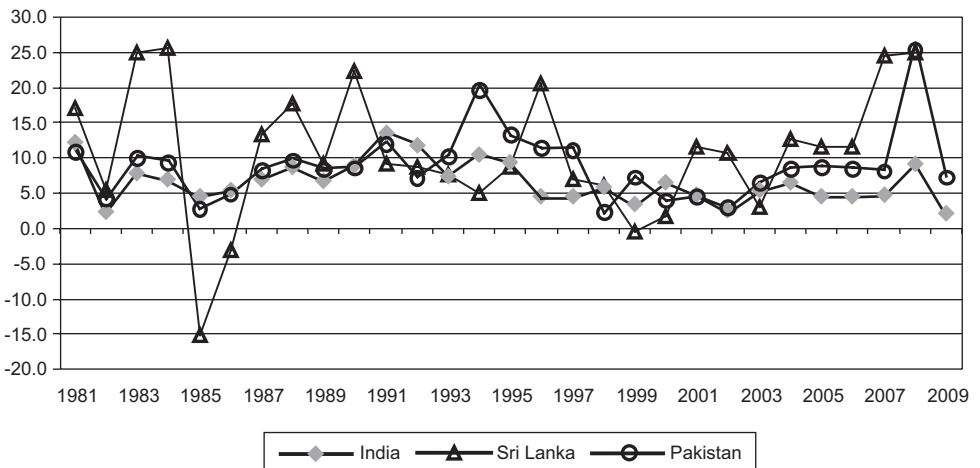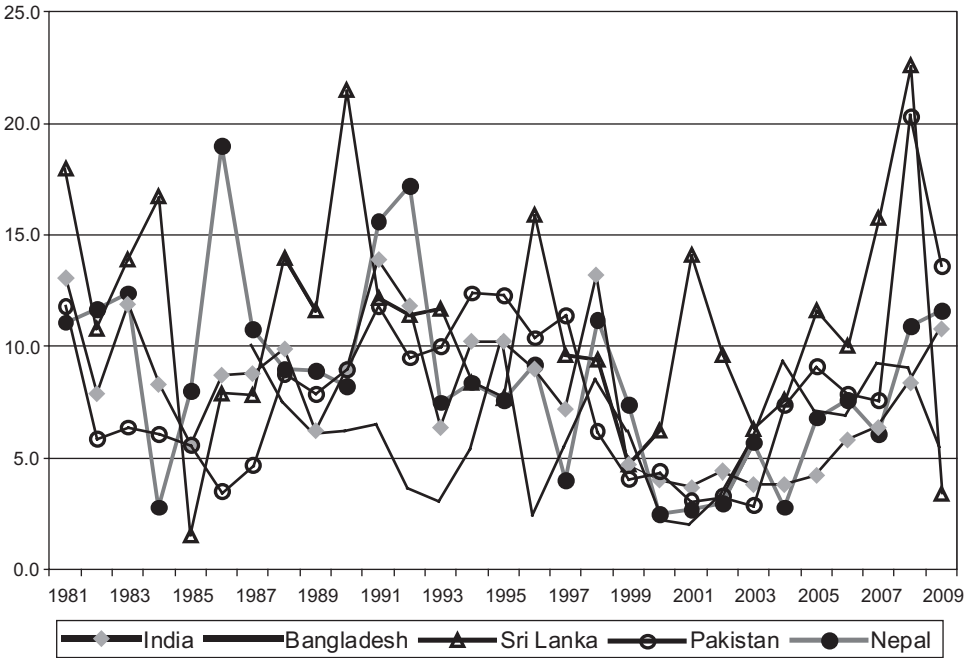

Figure 2. WPI inflation

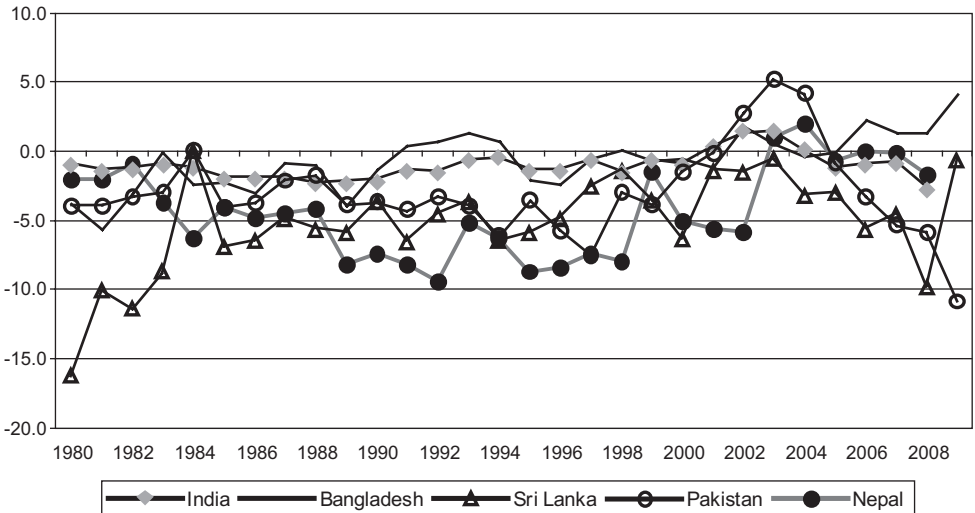**Figure 3. CPI inflation**
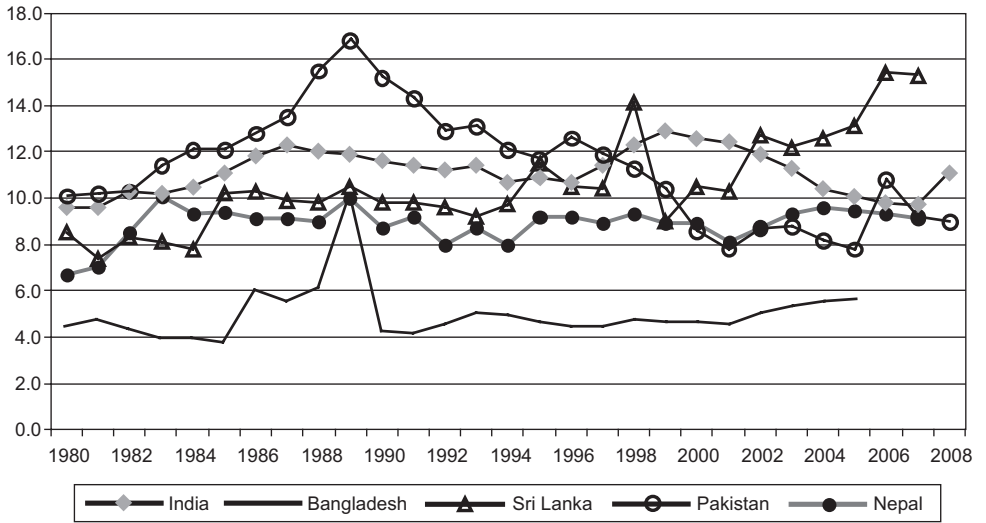

Figure 4. CAD/GDP (%)
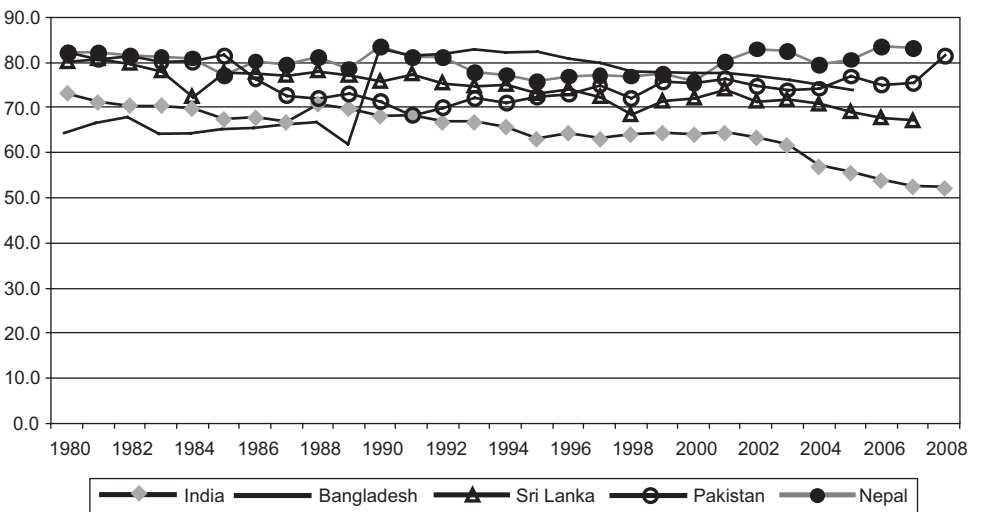
Figure 5. G/GDP (%)

Figure 6. C/GDP (%)
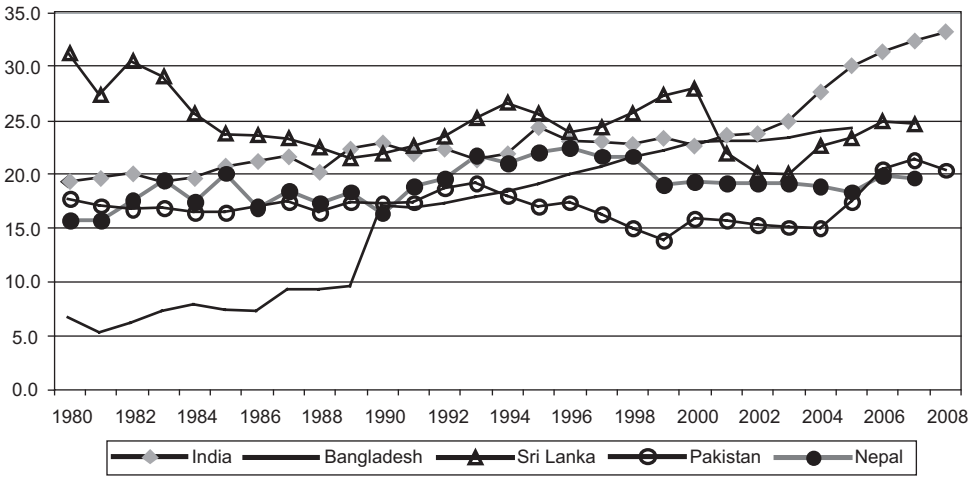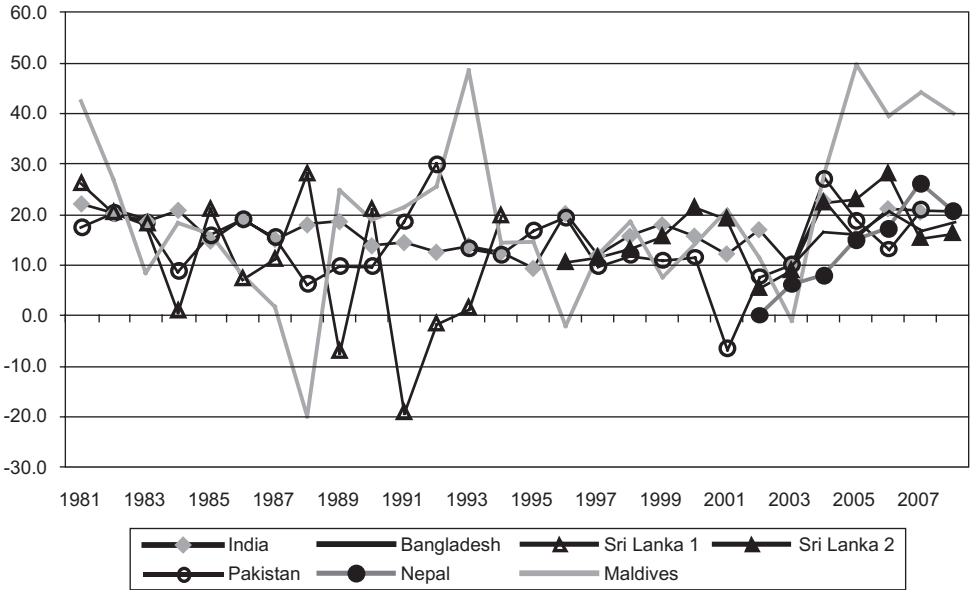
Figure 7. GFCF/GDP (%)


Figure 8. Credit growth rates

other three countries, the rates fluctuated in a 5-10 per cent band. Among the demand components, consumption ratios and GFCF held steady, G showed restrained fluctuations. Output levels and growth rates fluctuated, and demand components largely fluctuated synchronously. So demand categories might not have been major independent sources of shocks.

Figure 8 shows that with the exception of Maldives, credit growth rates never exceeded 30 per cent. Pakistan, Sri Lanka and Maldives experienced periods of negative credit growth. In general, this is a relatively good record for emerging markets as it indicates there was stability in the financial systems which, in turn, prevented large credit fuelled demand booms.

The major source of volatility, therefore, must have been on the supply side. The components of the WPI are used as a proxy for supply shocks. Figure 9 shows the primary articles (PA), fuel, power, light and lubricants (FPLL), and manufacturing (MFG) components of the monthly WPI of India for the period 2006-2009. The large volatility of the first two components is evident while the pass through of international oil shocks, through a complex administered price system, drove FPLL inflation.

Figure 9. Year-on-year inflation rate for Indian monthly series
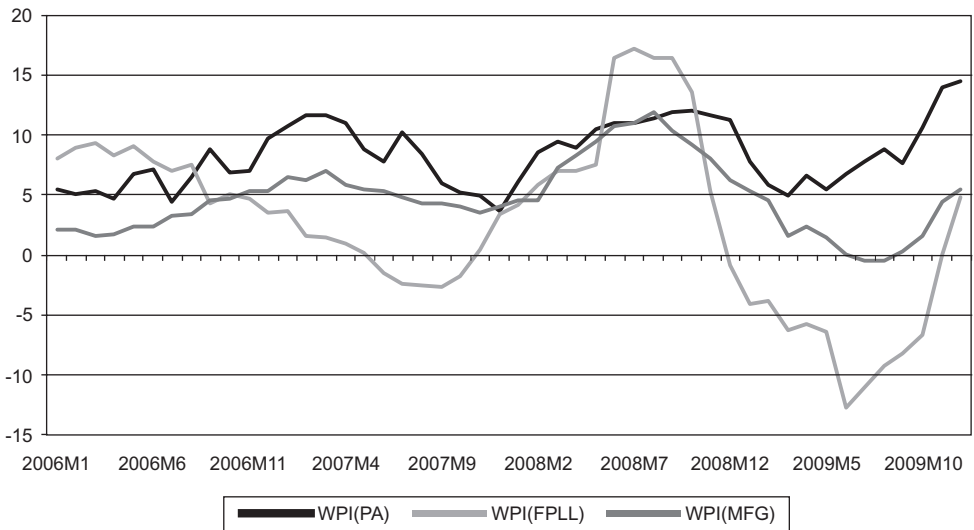
A. Stylized Facts

Some stylized facts can be extracted from the initial data analysis above as well as from results of Goyal (2011) on correlations and volatilities of time series, in which a smooth trend is extracted using the Hodrick Prescott filter.[3] Frequent shocks, and less ability to smooth shocks, imply that output, consumption, investment and growth rates are more volatile than in mature economies. Less financial sector development, lower per capita incomes and low wealth imply that consumption of a large proportion of the population is limited by income. In addition, since the frequent supply shocks are largely temporary, savings adjust rather than consumption. Therefore, the correlation of consumption (C) and investment (I) with output is higher, making ratios of C, and of I to output stable (Figures 6 and 7). C and I vary in response to output variation, but do not drive income volatility.

During the period, net exports, or the trade surplus, was procyclical, meaning output rose with net exports. This could be due to export-driven growth or to a deflationary rise in commodity prices. The latter raises the import bill and reduces output and net exports together. The current account then becomes a source of shocks. This contrasts with standard behaviour in emerging markets in which rising consumption and imports in good times make the current account countercyclical — the deficit rises in good times. Consumption is procyclical and more volatile than in developed countries. In Asia, income shocks affect savings rather than consumption.

Supply side or terms of trade shocks are to be expected in economies that are still agriculture dependent, have severe infrastructure bottlenecks, and are dependent on oil imports.

III.   ANALYSIS

A. Aggregate demand and supply

It is difficult to find unemployment estimates on South Asia but the numbers are believed to be very large. Output in developed countries is regarded as below potential because the crisis left 22 million unemployed. In South Asia, the more than 300 million people living below the poverty line are not meaningfully employed. In India alone, given the youthful demographic profile, 10-12 million are expected to enter the labour force every year. The Planning Commission estimates it would

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[3]   This is commonly used to separate the trend from fluctuations in macroeconomic time series.

take economic growth of 10 per cent per annum together with an employment elasticity of 0.25 to absorb them. Capital, as a produced means of production, is no longer a constraint because of high domestic savings and capital inflows. Therefore, that 10 per cent rate of growth should be regarded as the potential output.

In mature economies, the modern macroeconomic approach focuses on employment (Woodford, 2003). When that approach is followed in emerging markets, the large informal sector is relegated to development economics. However, once a populous emerging market crosses a critical threshold and high catch-up growth is established, higher labour mobility blurs the distinction between formal and informal sectors. A macroeconomics of the aggregate economy becomes both necessary and feasible.[4] Central banks in South Asia, however, define full capacity as the potential output of the small manufacturing sector, even though in India, for example, this accounts for only 25 per cent of the output and 5 per cent of the employment. The economy is considered to be supply constrained, but figure 10 defines more precisely the way in which the economy is really supply constrained and better captures the macroeconomic structure of an economy in transition.

Figure 10. Aggregate demand and supply

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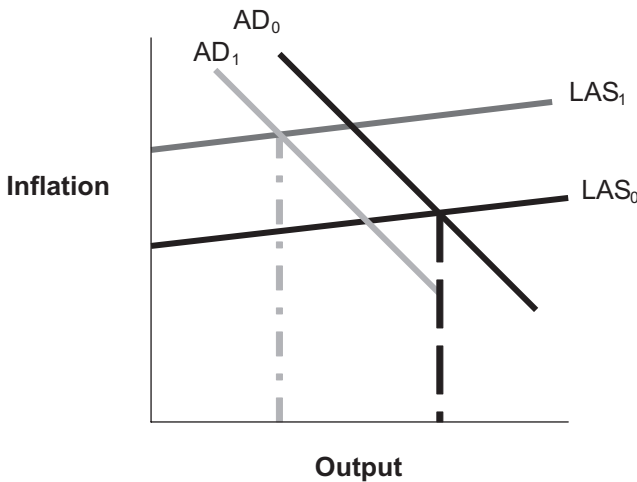
[4]   As compared to the standard practice in which development economics is the framework used to analyse the large informal sector and macroeconomic theory is applied only to the small modern sector.

The longer-run aggregate supply (LAS) is elastic (figure 10). But inefficiencies, distortions and cost shocks push aggregate supply upwards, over an entire range, rather than only at full employment, since that is not reached at current output ranges and output can increase. The LAS becomes vertical only as the economy matures and full productive employment is reached. With such a structure, demand has a greater impact on output and supply on inflation. This is the sense in which the economy is supply constrained.[5]

The food price wage cycle is an important mechanism propagating price shocks and creating inflationary expectations. Monsoon failures or international oil price shocks have been dominant inflation triggers. A political economy of farm price support, consumption subsidies and wage support, with built-in waste, inefficiencies and corruption, contributes to chronic cost push inflation. Poor targeting of consumption subsidies imply that nominal wages rise with a lag pushing up costs and generating a second round of inflation stemming from a temporary supply shock. The political economy indexes wages informally to food price inflation. If the rise in average wages exceeds that in agricultural productivity, prices rise, propagating inflation. Other types of populist policies that give short-term subsidies but raise hidden or indirect costs also contribute to cost push inflation. For example, neglected infrastructure and poor public services increase costs.

Rigorous empirical tests based on structural vector autoregression (VAR), time series causality, generalized method of moments (GMM) regressions of aggregate demand (AD) and aggregate supply (AS), and calibrations in a dynamic stochastic general equilibrium (DSGE) model for the Indian economy support the elastic longer-run supply and the dominance of supply shocks (Goyal, 2009b, 2008, 2005).

Shocks that have hit the Indian economy serve as useful experiments in helping reveal its structure. Consider, for example, the summer of 2008 when the economy was thought to be overheating after a sustained period of more than 9 per cent growth. During that period food and oil spikes had contributed to high inflation. Sharp monetary tightening, which sent short-term interest rates above 9 per cent during the summer, and the fall of U.S. investment bank Lehman Brothers, which froze exports, were large demand shocks that hit the economy. Industrial output declined sharply in the last quarter of 2008, but WPI-based inflation only fell after the drop in oil prices at the end of the year while CPI inflation remained

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[5]   The analysis draws on and extends earlier work. See Goyal (2011). References not given because of space constraints are available at www.igidr.ac.in/~ashima.

high.[6] Demand shocks with a near vertical supply curve, should affect inflation more than output. But the reverse happened. Output growth fell much more than inflation.

The V shaped recovery, which set in by the summer of 2009, also indicates a reduction in demand rather than a leftward shift of a vertical supply curve. A destruction of capacity would be more intractable and recovery would take longer. Since labour supply ultimately determines potential output for the aggregate economy, the potential is large in the region.

The impact of a sustained high CPI inflation on wages possibly explains the quick resurgence of WPI inflation in November 2009 when industry had barely recovered. The manufacturing price index fell for only for a few months before rising to its November 2008 value of 203 by April 2009. A booming economy does add pricing power, but supply side shocks also can contribute to manufacturing inflation.

Such outcomes are possible only if inflation is supply determined, but demand determines output. Components of demand such as consumer durable spending and housing are interest-rate sensitive. During the crisis, the lag from policy rates to industry was only 2-3 quarters for a fall and one quarter for a sharp rise. Policy rates have affected output growth since 1996. Nevertheless, the economy is supply constrained.

Since the recent inflationary episodes in South Asia have included a sharp rise in food prices, based in part on international food, oil and commodity shocks, the next section develops a simple analytical structure that opens the closed economy analysed above to bring in international shocks. Both it and section IV on political economy identify some of the mechanisms that convert a relative price shock into inflation.

B. Open economy

The AD-AS apparatus in the section above depicted the internal balance of an emerging market. Internal balance holds when aggregate demand for domestic output equals aggregate supply at full employment of resources, with inflation remaining low and stable. An open economy must also be concerned with external balance or equilibrium in the balance of payments. The current account surplus or

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[6]   Indian data show industrial growth slumped to 0.32 per cent over October-December 2008, but WPI inflation remained at 8.57 per cent and CPI inflation at 10 per cent. WPI inflation began falling gradually from January 2009.

the net balance of trade (exports minus imports) must be financed by sustainable capital flows. Adjustment to full internal and external balance normally requires a combination of a change in relative prices (real exchange rates) and in demand or expenditure (Goyal, 2009a, 2004).

The real exchange rate (Z), is a relative price comparing the world purchasing power with the purchasing power of the domestic currency. It is given by the ratio of the nominal exchange rate (E), multiplied by the foreign price level and divided by the domestic price level ($Z = EP^*/P$). If there is perfect purchasing power parity, Z should equal unity.

A key conceptual distinction for a small country is that it must take international prices as given. If markets are competitive, traded goods (exportables and importables) can be combined into a single category because in a perfectly elastic world, demand for exports and a perfectly elastic world supply of imports makes their prices independent of domestic variables. But this means that the terms of trade, or the ratio of export to import prices, cannot change to help make the adjustment to full equilibrium or balance. Therefore, the distinction between traded and non-traded goods is required. Since trade equalizes the domestic to the border price of the traded good, the real exchange rate is given by the ratio of the prices of traded to non-traded goods ($Z = EP_T/P_N$). This is the dependent economy model[7] in which the real exchange rate and domestic absorption ($A = C+G+I$) are the two means of reaching internal and external balance. Exchange rate policy, which changes the nominal exchange rate (E), and fiscal policy which changes government expenditure (G), are the two policy instruments, affecting Z and A respectively. The first is an expenditure-switching policy. It changes the direction of demand and supply. Demand shifts between domestic output and imports, and domestic resources shift between sectors producing traded and non-traded goods. The second is an expenditure-changing policy. It changes the level of total demand.

Figure 11 reproduces the Swan diagram and Figure 12 the underlying labour market equilibrium. The curve IB gives internal balance or the combinations of Z and A at which output demand equals full employment output, Y_f. The curve is downward sloping because depreciation and a rise in demand both raise output. As domestic absorption rises, Z must appreciate to reduce foreign demand for exports, and total demand, to the full employment output level. Values above the curve generate inflation, as a more depreciated exchange rate and higher absorption raise demand. Those below the curve generate unemployment.

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[7]   The dependant economy model was first applied to Australia (see Swan, 1960 and Salter, 1959) but has been used extensively and generalized to other times and countries. Trevor Swan developed a convenient diagrammatic representation known as the Swan Diagram.

Figure 11. Internal and external balance with a real wage target
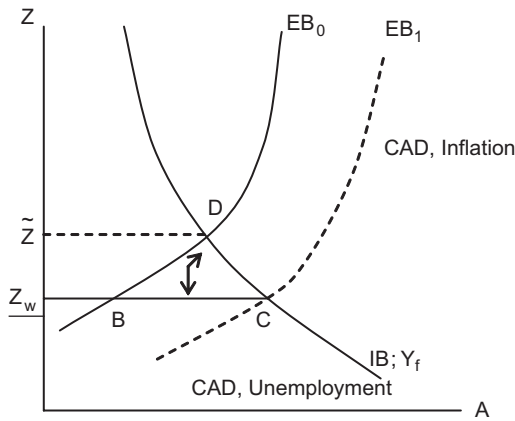
Figure 12. The labour market
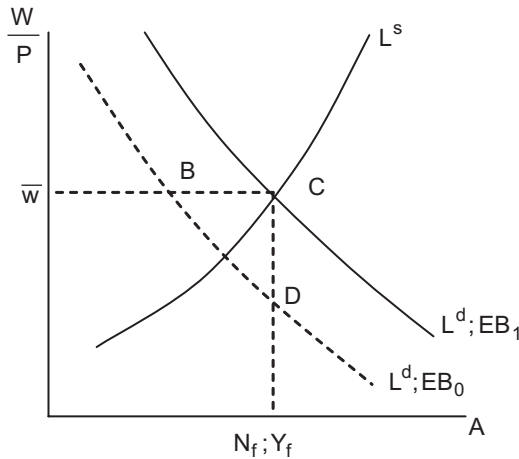
For external balance (EB), capital flows (B) must equal net imports (M-X). Curve EB_0 gives external balance or the combinations of the two variables that yields an acceptable current account deficit (CAD) of the balance of payments where B = M-X. At a given current account, output and imports can only rise if exports rise. The latter requires depreciation in Z, so the curve slopes upwards. The CAD is lower than capital inflows can safely finance above the EB curve, that is, B > M-X. Below the curve inflows are inadequate to finance the deficit or B < M-X. IB and EB are satisfied at the equilibrium real exchange rate, $\tilde{Z}$.

Figure 13. Aborting a foreign price shock
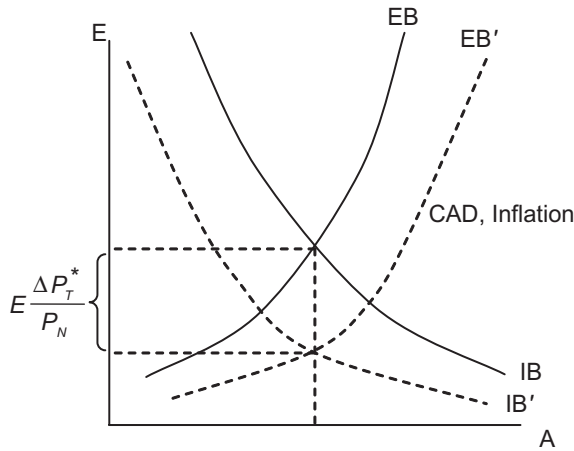
In a low per capita income emerging market, wages depend on the price of food. The level of real wages must be high enough to cover the purchase of the basic consumption basket, in which food has a large share. Productivity falls if wages are below this point so employers will not reduce wages below that level. Employment becomes demand determined. But wages cannot rise above the threshold because workers in large numbers make themselves available for employment at the threshold and even below it in the short-run. The efficiency wage determines a real wage target:

$$\overline{w} = \frac{W_t}{P_{T,\,t}} \tag{1}$$

Despite continuing tariff barriers, agricultural liberalization has been sufficient to make agricultural products traded goods. Therefore nominal wages, W, are raised in line with traded goods prices, P_T, to maintain the real wage target (1) in the medium-term.[8]

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[8]   The argument carries through if P is a weighted average of traded and non-traded goods prices, with weights given by respective consumption shares. It just complicates the algebra.

Perfect trade arbitrage ensures that the prices of traded goods are set by world prices multiplied by the nominal exchange rate. The prices of non-traded goods are set as a markup on unit labour costs where β_N is labour per unit output and m is the profit share.

$$P_{N,\,t} = \frac{\beta_N}{(1 - m)}\ W_t \tag{2}$$

If W is substituted out using the wage target, the value of the real exchange rate ($Z = P_T/P_N$) can be set to a level that satisfies the wage-price relations equations 1 and 2, and is called Z_w, or the target level of the real exchange rate. It is the target level because it satisfies the real wage target equation 1. Z_w decreases with the real wage target and increases with a rise in productivity, that is, a fall in unit labour cost β_N.

$$Z_w = \frac{(1 - m)}{\overline{w}\beta_N} \tag{3}$$

The horizontal line at Z_w in figure 11 graphs equation 3, or the level where Z satisfies the real wage target. If $\tilde{Z}$ exceeds Z_w, sustained inflation results. The reason behind this is that a triangular region DBC, an area of unemployment and a current account deficit, is formed. The arrows show the direction of motion in DBC. If $Z > Z_w$ real wages are below the target value. That is, Z or P_T/P_N is higher than that required by the wage target. Since the target wage is not attained, wages rise in an attempt to reach $\overline{w}$. Therefore, W will rise. If W rises from equation 2 so will P_N, pushing Z back towards Z_w. Nominal depreciation to improve the CAD will spark another rise in W. Inflation will be above its steady-state value as long as $Z > Z_w$, and there will be a CAD if $\tilde{Z} > Z$. The system does not settle down; inflation continues. A steady state is achieved when $Z = Z_w = \tilde{Z}$.

Figure 12 shows the corresponding labour market equilibrium. Labour supply rises with real wages. The labour demand curve L^d, corresponding to EB_0, slopes downwards. It shows how, for a given current account, employment rises as the real wage falls, with absorption adjusted to achieve the given current account. Along EB, as Z rises, real wages must decline since as P_T rises, wages in terms of traded goods must be falling. Even if the consumption basket includes non-traded goods and the prices of these goods hold steady, aggregate price will still rise with P_T.

The real wage rigidity prevents the effective use of price switching, and can keep the economy in the region of unemployment and a current account deficit. Since a rise in absorption makes the CAD worse, it may be stuck around B,

(Figures 11 and 12), with large unemployment. Output is demand determined below the IB schedule and limited by available labour supply above it. Note that even with unemployment, there is inflation, supporting the flat but upward rising AS curve of section III.A. Aggregate supply is elastic since there is unemployment, but cost driven inflation is pushing it upwards.

Any policy that closes the triangle DBC is a solution. A rise in capital flows that shift EB_0 to EB_1 allows absorption and employment to rise along BC with the wage target satisfied. The accompanying rise in imports is met through the inflows. The more appreciated exchange rate along EB_1 shifts L^d up in figure 12 so real wages can rise. Without a rise in productivity shifting up BC in figure 11, however, inflows may consequently widen the CAD to a risky point that could trigger a reversal.

A rise in productivity of non-traded goods can reduce the region of the triangle DBC, shifting up the target real exchange rate. The wage target can be satisfied at a more depreciated exchange rate. Equation 3 shows that Z_w rises with productivity $1/\beta_N$.

If a rise in agricultural productivity reduces food inflation, that is the domestic price of T goods falls, E can appreciate, satisfying $P_T = E\,P_T^*$ and shifting Z towards Z_w. Prices of non-tradable goods also fall with wages, reducing domestic inflation.

Sometimes the wage price cycle is set off by an international shock such as a rise in P_T^*, which in turn raises Z above Z_w. A nominal appreciation in response to such a shock can abort the cycle. Figure 13 graphs the IB and EB curves in the E and Y space in a demand determined short-run. A rise in P_T^* shifts both curves downwards proportionately by the amount by which the real exchange rate depreciates ($E\Delta\,P_T^*/P_N$). The earlier equilibrium would now be in a position of excess demand and a current account surplus, and domestic prices would tend to rise as a result, with additional support from wages rising with the traded goods prices. A simple nominal appreciation proportional to the change in P_T^* can abort the entire process, shifting the IB and EB back to the original position, and preventing a rise in nominal wages in response to the rise in P_T^*.

A number of recent studies have shown that the real wage rate has been rising in the Indian rural and informal sectors. Rural employment assurance schemes such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) have contributed to this. But a slower than potential output growth rate and persistent but small inflation rate can be explained in our model if the trend rise in the wage target has exceeded that in agricultural productivity, so that the economy

is caught in the inflationary triangle. The analysis underlines the importance of a rise in agricultural productivity to allow higher real wages without a rise in inflation.

IV. CHRONIC COST PUSH INFLATION: THE POLITICAL ECONOMY OF FOOD PRICES

In section III.A, it is argued that ill-designed government interventions may initially provide short-term benefits but lead to chronic cost-push inflation over time. Because of the importance of food prices in South Asia, a good example of this is illustrated through actions by the Indian Government with regard to food economy,[9] which shows the doubtful short-term benefits and longer-term supply-side inefficiencies.

As such, multiple government interventions were designed to ensure food security in this populous country where a large number of inhabitants lived below the poverty line. Consumers needed food availability at affordable prices and farmers had to be motivated to increase production to feed the growing population. An elaborate procurement system guaranteed a market and price support for key foodgrains. This supported a public distribution scheme that provided subsidized foodgrains to the poor. Buffer stocks and trade policy (taxes and tariffs) complemented these objectives. Additional incentives for farmers came from subsidized inputs and total exemption from income taxes. Also, some restrictions were placed on the movement and marketing of some agricultural goods to restrain speculative hoarding, and on exports to ensure domestic supply.

The Indian Government sets procurement prices based on recommendations from an independent regulator, the Commission for Agricultural Costs and Prices (CACP). Multiple agencies are involved in the process. The Food Corporation of India (FCI) is responsible for procurement and buffer stocks. The Ministry of Agriculture has a say in policies that affect agricultural pricing and marketing. The Ministry of Consumer Affairs is concerned with prices consumers pay. Since agriculture is a State subject, State policies also affect outcomes, especially in the production, marketing and movement of commodities across borders.

In such a setup, the interests of farmers were pitted against those of consumers. There was limited coordination among the multiple agencies, which

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[9] Other countries in the region had similar programmes. For Bangladesh see Rahman and others (2008). Most net food importers such as Asian developing countries intervene to ensure affordable food. Bangladesh and Sri Lanka are among the top ten global food importers. India is a marginal net exporter (Nomura, 2010).

tended to be insular. Vested interests developed and enforced status-quoism in large programmes. As argued below, the greater opening out entailed in the 1990s reforms aggravated dysfunctional parts in the system. It created additional shocks the system could not adapt to.

Border prices became a focal point for the farmers' lobby. Although agricultural liberalization was slow and fractional, it meant a closer link between domestic and border prices. Agricultural exports grew from $4 billion when reforms began to $17 billion in the period 2008-2009. The comparative figures for imports were only $1 billion to $5 billion. Sharp rises occurred in exports of meat, dairy, rice, vegetables and fruits, sugar, animal feeds and vegetable oils. Therefore, border price changes could be expected to have a large impact. The World Trade Organization (WTO) permissible aggregate measure of support was 10 per cent and in this case, it was considered to be negative to the extent border prices exceeded domestic prices. WTO compatible tariff rates are much higher at 100 per cent compared to the 30 per cent that are actually applied on agricultural imports.

Since some agricultural exports were restricted, farmers could argue they were discriminated against, in order to ensure food security and supply the Public Distribution System (PDS). Thus, when the gap between border prices and domestic prices rose, there was strong pressure to raise domestic procurement prices. This created a clear pattern in procurement price increases, changes in stock, and domestic inflation impulses.

Higher procurement prices were set in the 1970s, when the green revolution commenced, as incentives to farmers to adopt new techniques. The distinction between the procurement and support price was lost after the 1970s, and the support price, at which farmers could make assured sales, approached the market price. In the 1990s, it had overtaken the latter. In the 1980s, meanwhile, the rate of increase was kept low to share the gains of better productivity with consumers. In the 1990s, as productivity growth slowed more rapid price increases were granted. A double devaluation of the exchange rate contributed to upward pressures by widening the gap between domestic and border prices. The steady increase in stocks held by the Government indicated that prices were set too high. The average level rose from 10.1 million tonnes in the 1970s to 13.8 in the 1980s and 17.4 in the 1990s (Goyal, 2003). In July 2002, it peaked at 63 million tonnes, then fell. But in 2010, there was another peak. This cyclic movement in stocks was a new feature after the reforms.

Table 2. Price policy and its consequence

Year	Wheat stocks (million tonnes)	Wheat inflation (base: 81-82)	Unit value (Rs./Qtl)	MSP (Rs./Qtl)	+/- overmsp[a]	Agricultural growth
1989-1990	..	..	..	..	..	2.1
1990-1991	5.6	13.9	223.2	215	8.2	3.8
1991-1992	2.2	15.5	219.3	225	-5.7	-2.0
1992-1993	2.7	10.3	278.2	275	320.0	4.2
1993-1994	7.0	10.4	525.0	330	195.0	3.8
1994-1995	8.7	7.1	488.9	350	138.9	5.8
1995-1996	7.8	-0.5	579.9	360	219.9	-2.5
1996-1997	3.2	18.4	609.5	380	229.5	8.7
1997-1998	5.0	0.6	679.8	475	234.8	-5.1
1998-1999	9.7	9.0	750.0	510	240.0	7.9
1999-2000	13.2	13.1	650.0	550	100.0	-1.8
2000-2001	21.5	1.1	510.3	580	-69.8	-6.0
2001-2002	26.0	-0.7	502.1	610	-107.9	7.6
2002-2003	15.7	0.2	479.4	620	-140.6	-13.2
2003-2004	6.9	3.1	584.0	620	-36.0	21.0
2004-2005	4.1	1.5	727.5	630	97.5	-2.7
2005-2006	2.0	3.9	755.5	640	115.5	4.7
2006-2007	4.7	11.5	757.9	700	57.7	4.3
2007-2008	5.8	4.1	946.0	850	96.0	4.6
2008-2009	13.4	5.8	1 041.0	1 000	41.0	1.6
2009-2010	16.1	9.7	..	1 080	..	..
2010-2011	32.1	..	..	1 100	..	..

Source: GOI (2010).

Note: [a] overmsp is the excess of unit export value over minimum support price (MSP).

Table 3. Food regressions

	Whstocks	Whstocks	Rogmsp	Whinfl
	1	2	3	4
Cons	5.53 (0.2)	13.77 (0.00)	6.85 (0.00)	7.52 (0.01)
Rogunit	-.19 (0.05)	-0.13 (0.17)	0.16 (0.09)	
Whstocks				-0.31 (0.11)
Whinfl		-0.36 (0.15)		
Edepre				0.24 (0.05)
Rogagr				0.21 (0.24)
Msp	0.01 (0.26)			
Overmsp		-0.02 (0.15)		
Number of obs	18	18	18	19
Adj R-squared	0.2159	0.4109	0.1201	0.2989
Root MSE	5.9754	5.1792	6.1236	4.975
Prob > F	0.0631	0.0151	0.0872	0.0400

Note:　p-value for the regression coefficients is given in brackets; P = 0 implies strong significance of the coefficient.

Table 2 gives details for wheat, in the post-reform period. It clearly shows how minimum support price (MSP) responds to the excess of export price realizations (unit value) over the MSP, and wheat stocks tend to peak with the rise in MSP. Domestic wheat inflation is higher in periods of large exchange rate depreciation.

Regressions reported in table 3 bear out these impressions. MSP and the rate of growth of unit value *(rogunit)* affected wheat stocks *(whstocks)*. *Rogunit* affected *rogmsp*. Exchange rate change *(edepre)* was strongly significant for wheat inflation *(whinfl)*, which also responded to the agricultural growth *(rogagr)*, and *whstocks*. The table reported the best regressions. All the variables were tried in each regression. But to conserve degrees of freedom, insignificant ones were dropped. As the number of observations are low, the regressions are only indicative.

Nevertheless, the data illustrate the importance of border prices for MSP, of MSP for stocks and the exchange rate for wheat inflation. These factors are clearly responsible for the erratic behaviour of food stocks in the post-reform period. The first peak in stocks occurred after a devaluation and excess of unit value over domestic prices (overmsp) led to a sharp increase in the latter in the 1990s. Excess domestic stocks coincided with a slump in world food prices, and some appreciation

of the Indian rupee. Some stocks had to be exported at a loss; MSP did not decrease but only minor increases were registered in those years. As a result, domestic inflation was low. MSP was increased again substantially since stocks had hit a low and unit value again exceeded MSP in the period 2006-2007 after the international food price shocks. Price increases in India were staggered, preventing the prices from peaking in tandem with international prices. However, they did not fall even after international food prices fell.

Stocks built up again dramatically even as domestic food inflation continued in double digits. Steep depreciation and volatility of the Indian rupee contributed to price pressures. The Government was unable to sell its stocks since their cost price exceeded the market price and it was reluctant to offer the stock at a low price on concerns that the commodity would be sold back to the Government. So, the State became the biggest hoarder, helping keep prices high.

In retrospect, is appears that the post-reform Government intervention was dysfunctional. It neither protected the consumer nor was able to induce higher production from the farmer. Policies that meant to help the situation resulted in high storage costs and wastage of grain. These costs, together with the pervasive input subsidies, diverted investment for rural infrastructure. Productivity remained low and supply-side bottlenecks persisted. With regard to the analysis in section III.A, the policies contributed to a chronic upward crawl of the AS curve. Low agricultural productivity and the shocks from MSP kept the economy in the triangular region DBC of figure 11 in section III.B. The analysis illustrates the point that direct subsidies can create indirect costs.

V. EVIDENCE ON INFLATION DRIVERS

This section presents some evidence on demand and supply shocks, the role of policy and the pressures creating chronic inflation.

Table 4 gives Indian aggregate and sectoral growth and inflation rates, and calculates policy responses and macroeconomic outcomes for periods of external shocks. The dollar oil price inflation and the FPLL component of the WPI capture oil price shocks. Agricultural growth and WPI (PA) capture supply shocks emanating from agriculture. For the first three oil price shock episodes, policy and outcome variables starting from one year before and continuing for one year after the price spike are given. Each period saw about a 100 per cent rise in international oil prices, but the pass through to Indian prices was a policy decision.

Table 4. Demand and supply shocks

	Domestic shocks as a percentage of GDP			Growth rates		Inflation				
	Policy	Credit	Demand	GDPfc	Agri	WPI (AC)	WPI (PA)	WPI (FPLL)	WPI (MFG)	$ Oil
External shocks										
Oil shocks										
1972-1973	0.7	5.5	0.4	-0.3	-8.2	10.0	9.7	4.0	11.3	-0.6
1973-1974	-2.1	-1.7	1.3	4.6	10.6	20.2	28.1	18.6	14.4	15.9
1974-1975	-1.0	-2.3	1.8	1.2	-2.9	25.2	25.2	51.8	21.0	118.6
1975-1976	1.6	6.3	-6.7	9.0	14.5	-1.1	-6.6	10.5	1.4	14.4
1976-1977	1.9	8.8	0.8	1.2	-7.2	2.1	0.8	5.3	2.3	4.9
Oil shocks										
1978-1979	3.8	9.5	3.9	5.5	3.3	0.0	-1.3	4.4	0.2	4.2
1979-1980	-0.4	9.6	-3.0	-5.2	-15.5	17.1	13.8	15.7	20.2	42.2
1980-1981	0.0	0.7	-4.5	7.2	15.1	18.2	15.0	25.2	19.2	58.4
1981-1982	-2.0	-0.9	-5.4	5.6	7.0	9.3	11.3	20.7	5.2	25.5
1982-1983	1.1	4.7	-1.3	2.9	-4.0	4.9	6.7	6.5	3.5	-9.6
Macro stabilization										
1990-1991	-1.1	-2.0	1.2	5.3	3.8	10.3	13.0	12.3	8.4	23.7
1991-1992	-1.7	-1.6	-4.6	1.4	-2.0	13.7	18.1	13.2	11.3	-14.2
Asian crisis										
1995-1996	-1.2	-1.7	-1.9	7.3	-2.5	8.0	8.2	5.1	8.5	10.5
1996-1997	-2.2	-3.7	-1.4	8.0	8.7	4.6	8.4	10.4	2.1	20.2
Oil shocks										
1998-1999	0.7	2.6	-0.1	6.7	7.9	5.9	12.1	3.3	4.4	-34.2
1999-2000	-1.1	5.6	3.7	6.4	-1.8	3.3	1.2	9.1	2.7	39.9
2000-2001	0.3	11.1	-2.0	4.4	-6.0	7.2	2.8	28.5	3.3	61.4
2001-2002	0.8	6.9	-0.8	5.8	7.6	3.6	3.6	8.9	1.8	-18.8
2002-2003	1.1	12.5	3.4	3.8	-13.2	3.4	3.3	5.5	2.6	5.0
Oil and food price shocks, global crisis										
2007-2008	3.0	7.7	1.1	9.2	5.0	4.7	7.7	1.0	5.0	12.8
2008-2009	0.4	13.5	-1.5	6.7	1.1	8.3	10.0	7.4	8.0	46.7
2009-2010	1.4	11.6	..	7.4	1.1	3.8	11.0	-2.4	3.2	-37.9

Source: Reserve Bank of India website www.rbi.org.in; data for international fuel prices from www.eia.doe.gov

Notes: fc – factor cost; Agri – Agriculture; AC – All Commodities; PA – Primary Articles; MFG – Manufacture; $ oil is for calendar years

The table captures the monetary and fiscal response in the "Policy" variable. This is calculated as the rate of change of reserve money, Central Government revenue, and capital expenditure, each as a percentage of GDP. That is, period t gives the total of the three variables each minus their respective values in period t-1. A negative value implies policy contraction exceeding that in GDP. The table shows this to be negative in years when the GDP growth rate fell due to an external shock. Thus policy amplified the shocks.

The "credit" variable does a similar calculation for broad money M3, bank credit to the commercial sector and total bank credit, capturing outcomes of policy tightening. This was more severe in the earlier shocks. The availability of more financial substitutes and of external finance reduced the impact of policy tightening on credit variables. Policy was now acting more through prices (interest rate changes) than quantities. The world over, as financial markets deepen, central banks switch to targeting short-term interest rates, as nominal money targets become difficult to achieve with unstable money multipliers. Quantitative response is moderated since it becomes less effective.

Finally, the "demand" variable is the sum of changes in C, G, Gross Domestic Capital Formation (GDCF),[10] and CAD as a percentage of GDP. Thus, each shock plus the policy response imparted a considerable negative impulse to aggregate demand. While the supply shock pushed up the As of section III.A, the policy response shifted the AD leftwards. The general perception is that demand and supply factors cause inflation (Mohanty, 2010). But the analysis suggests that if demand falls when supply side shocks are pushing up inflation, demand cannot be contributing to inflation.

The first oil shock saw a drastic cut in reserve money growth, and some reduction in government expenditure. Inflation was negative by the third year, but growth loss was high. In the second oil shock the contraction was milder and was moderated also by the smaller effect the contraction in reserve money had on broad money. Inflation showed neither the peaks nor the troughs of the earlier episode and took a bit longer to moderate. The growth loss was concentrated in the first year, driven by a fall in agricultural output. Deficits expanded with subsidies. The third oil shock had a similar fiscal tightening and an even milder monetary squeeze. M3 growth was quite stable. Yet inflation moderated quickly; output growth was respectable and deficits narrowed. Apart from milder monetary contractions, a key difference accounting for improved outcomes was lower agricultural inflation compared to the earlier two episodes. Despite stagnating

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[10]   In figure 7 and figure 14 GFCF is used for India, since this is available in the IMF data set. In table 4, however, GDCF, since the data source is the Reserve Bank of India.

domestic agriculture, falling international prices in a more open regime had countered political pressures to ratchet up procurement prices.

The crude price shock during period 2002-2005 was equivalent to earlier episodes but the world, including India, bore it better than past episodes. The reasons behind this were openness, cheap imports, rising productivity that lower costs, less dependence on oil and more credible anchoring of inflation. There was also the absence of other adverse shocks.

But falling international food prices reversed in 2003, and the rise was particularly steep in 2007 (45.28 per cent) and 2008 (12.5 per cent), as competition from biofuels intensified. After being almost stationary from 1999, Indian procurement prices also jumped in the period 2006-2007, and inflation in primary articles reached 7.8 per cent. Crude oil rose sharply: more than 100 per cent during the period 2002-2005, and another 100 per cent since then. The oil pool account and administered price mechanism created in 1974 was dismantled in 2002 but administered prices were retained for petrol, diesel, kerosene and gas. The Government did not fully pass on these shocks. However, it was unable to subsidize the sheer magnitude of the rise and finally raised prices in 2008. Since fuel prices neither rose nor fell as much as in the international market, cumulative Indian fuel inflation had exceeded international fuel inflation until 2005; after that it was less. In 2010, petrol prices were also deregulated. As in the case of food policy, intervention did not lead to the price rises seen in the international market, but prices did not fall with the international market, so that costs moved in only an upward direction.

The global financial crisis followed the oil shock. Oil prices crashed but large liquidity made available by stimulus programmes fuelled inflation in commodities. For the first time, counter cyclical macroeconomic policy, enabled by the coordinated global stimulus, created a demand stimulus, although the overall demand shock was still negative. But high food price inflation led to a rapid resurgence of inflation, and a delayed exit failed to anchor inflation expectations.

Figure 14 graphs the demand shocks for the countries of South Asia. The policy aggravation of supply shocks was even higher in other countries. The series in the graph are calculated leaving out the CAD. A large CAD implies domestic resources are less than domestic requirements, but it is a consequence of domestic demand, rather than an additional demand component. A CAD also implies domestic demand is leaking abroad. Including it in the calculation of demand shock reduces demand even more as it widens during downswings. The two series for Bangladesh accommodate the data break that leads to an outlier in 1988.
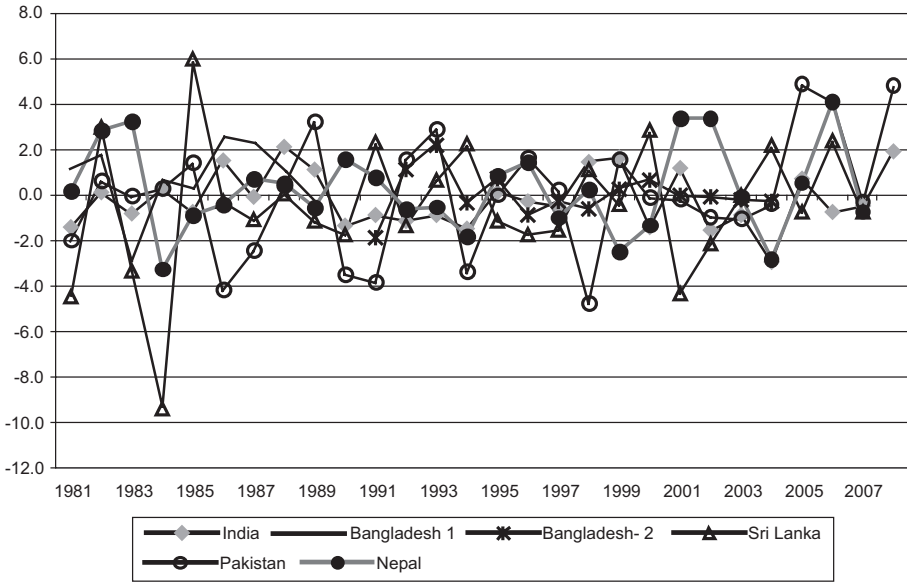
Figure 14. Demand shocks

Legend: India — Bangladesh 1 — Bangladesh- 2 — Sri Lanka — Pakistan — Nepal

Table 5. Averages and volatilities of inflation, exchange and interest rates

		Change in spot bilateral USD exchange rate	Inflation (WPI)	Call money rate	Long interest rate
Bangladesh	**1980-1990**				
	Average	8.6	7.4	11.7	13.6
	Standard dev	7.0	1.8	1.1	2.0
	1991-2000				
	Average	4.2	5.3	8.4	14.6
	Standard dev	2.4	2.6	1.8	0.7
	2001-2009				
	Average	3.2	6.4	8.4	15.4
	Standard dev	3.4	2.5	0.8	0.8
India	**1980-1990**				
	Average	8.4	8.9	9.8	16.5
	Standard dev	4.3	2.3	2.3	0.0
	1991-2000				
	Average	10.2	9.1	11.0	15.1
	Standard dev	8.8	3.4	4.4	2.2

Table 5. *(continued)*

		Change in spot bilateral USD exchange rate	Inflation (WPI)	Call money rate	Long interest rate
	2001-2009				
	Average	1.0	5.7	5.9	11.9
	Standard dev	6.1	2.5	1.5	0.9
Maldives	**1985**	0.7	..	9.0	9.1
	2001	4.0	..	..	7.0
	2009	..	..	..	6.5
Nepal	**1980-1990**				
	Average	9.5	10.2	5.4	12.6
	Standard dev	4.9	4.1	0.9	1.9
	1991-2000				
	Average	9.5	9.1	6.6	10.5
	Standard dev	7.9	4.6	3.0	1.8
	2001-2009				
	Average	1.1	6.4	3.8	6.1
	Standard dev	6.0	3.3	1.4	0.4
Sri Lanka	**1980-1990**				
	Average	9.3	12.4	18.7	12.7
	Standard dev	4.1	5.8	3.8	2.4
	1991-2000				
	Average	6.8	9.7	22.6	14.7
	Standard dev	2.9	3.3	7.7	2.0
	2001-2009				
	Average	4.7	11.2	15.9	12.7
	Standard dev	5.4	5.7	7.8	4.5
Pakistan	**1980-1990**				
	Average	8.3	7.0	7.8	9.0
	Standard dev	6.0	2.5	1.3	0.9
	1991-2000				
	Average	9.5	9.2	9.8	10.6
	Standard dev	3.4	3.2	7.7	3.9
	2001-2009				
	Average	5.1	8.4	7.6	7.4
	Standard dev	8.3	5.6	3.6	2.9

*Source:*   Calculated from IMF, IFS data.

Table 5 reports averages and standard deviations in exchange rate depreciation, inflation, and short- and long-term interest rates for South Asian countries during the pre-reform decade, the decade when reforms commenced and one post-reform decade. In the pre-reform decade, administered price and quantitative interventions repressed markets and kept volatilities low, but as the equilibrium was fragile, this led to a large impact of external shocks. Countries in the region lifted controls and liberalized markets in the 1990s. Initially volatility increased. Openness was itself a source of shocks as it increased diversity, which together with the deepening of markets reduced volatility. India shows an initial low, then rise fall pattern in volatility. Deeper markets are able to absorb shocks without high volatility in prices. In smaller, more open countries, volatility remains high. In Pakistan and Sri Lanka internal unrest and political instability also vitiated the pattern. But all the countries in the table adopted more flexible exchange rates, resulting in a drop in average levels of inflation and interest rates.

During the period 1996-2003, average interest rates rose sharply and their volatility exceeded that of exchange rates, partly due to the East Asian crisis and the use of interest rate defence, explaining the large fall in credit and demand during the Asian crisis (table 4). Exchange rate movements were restricted at the cost of higher interest rate movements. During the recent global financial crisis, the fall in credit and demand was much lower partly because more exchange rate flexibility allowed interest rates to target the domestic cycle.

The current consensus is that a managed float is one of the best exchange rate regimes for an emerging market (Corden, 2002). Svensson (2000) emphasizes that the exchange rate is an important tool of monetary transmission for a small open economy, with the lowest lag for the consumer price index. In line with the consensus, exchange rates in the region have moved to greater flexibility, but they are still managed.

The differential response of exchange rates to the food and oil price shocks during 2007 and 2008 provides a useful comparative static experiment to understand both the structure of the economies and of inflation (figures 15 to 19). In Pakistan and Sri Lanka, the international rise in foodgrain prices was passed on to the consumer, contributing to double-digit inflation. In India, procurement prices were raised but not as much and consequently, food price inflation was lower but more persistent as the price support system prevented domestic prices from falling when international prices fell. In countries that prevented much exchange rate depreciation during the global crisis, such as Sri Lanka and Bangladesh, inflation dropped to low single digits by 2009. In Pakistan, Nepal and India, food inflation remained high.

Figure 15. India price indices and E rates: rate of change
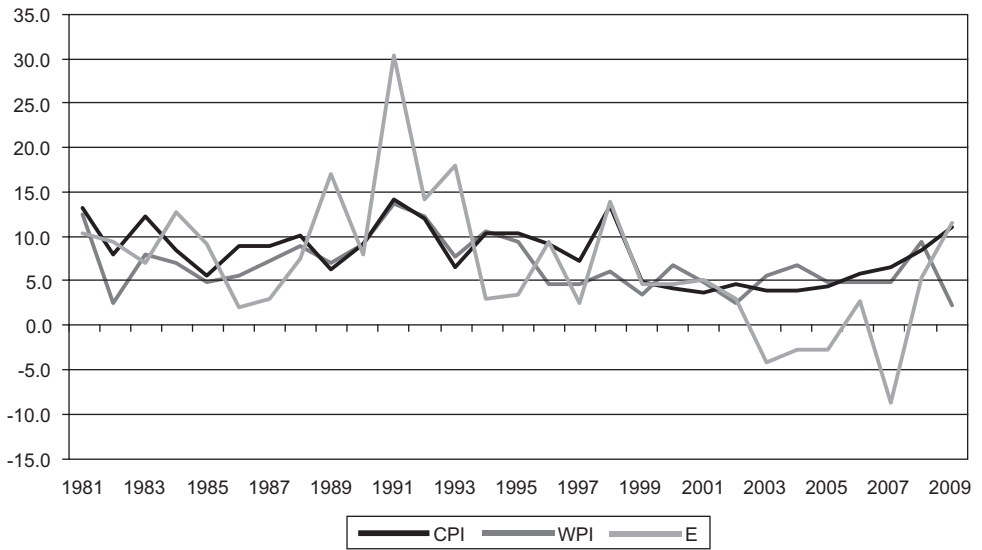
Figure 16. Bangladesh price indices and E rates: rate of change
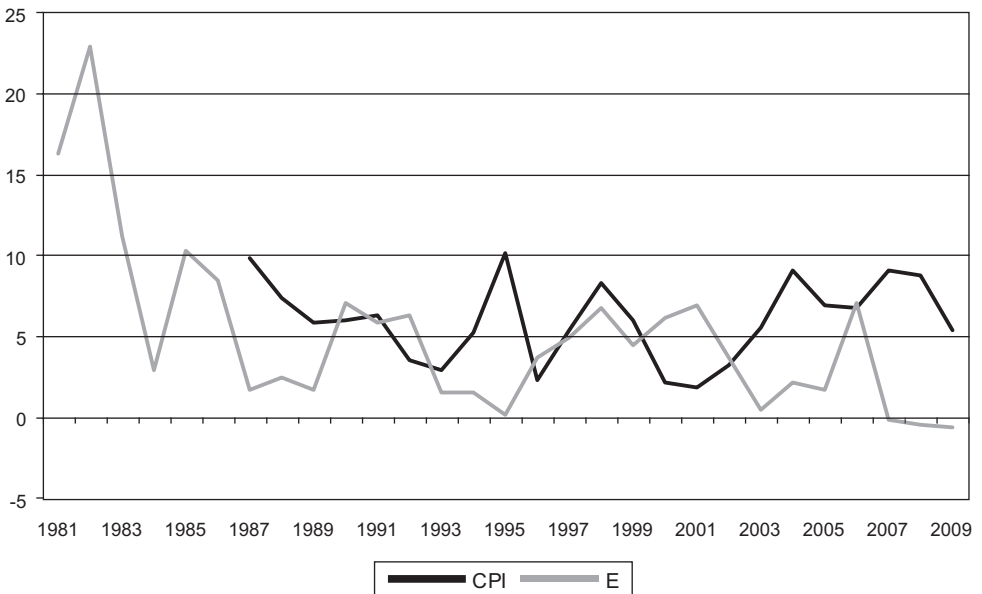
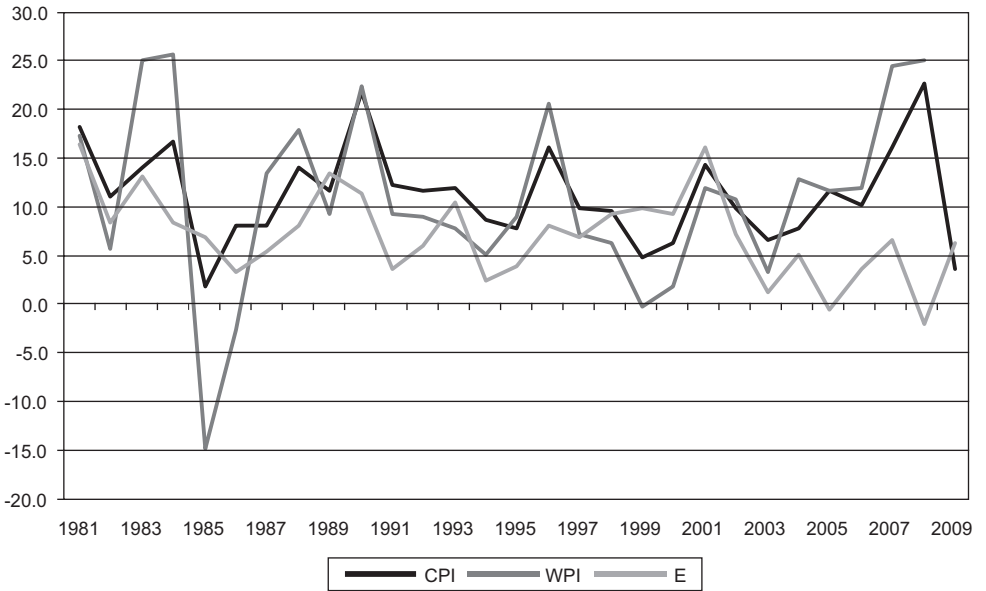**Figure 17. Sri Lanka price indices and E rates: rate of change**

Figure 18. Pakistan price indices and E rates: rate of change
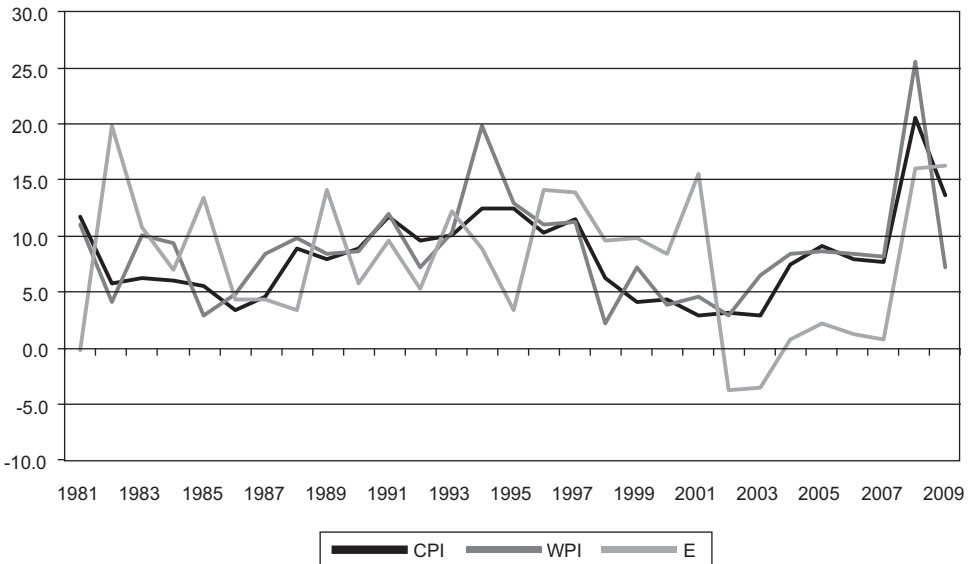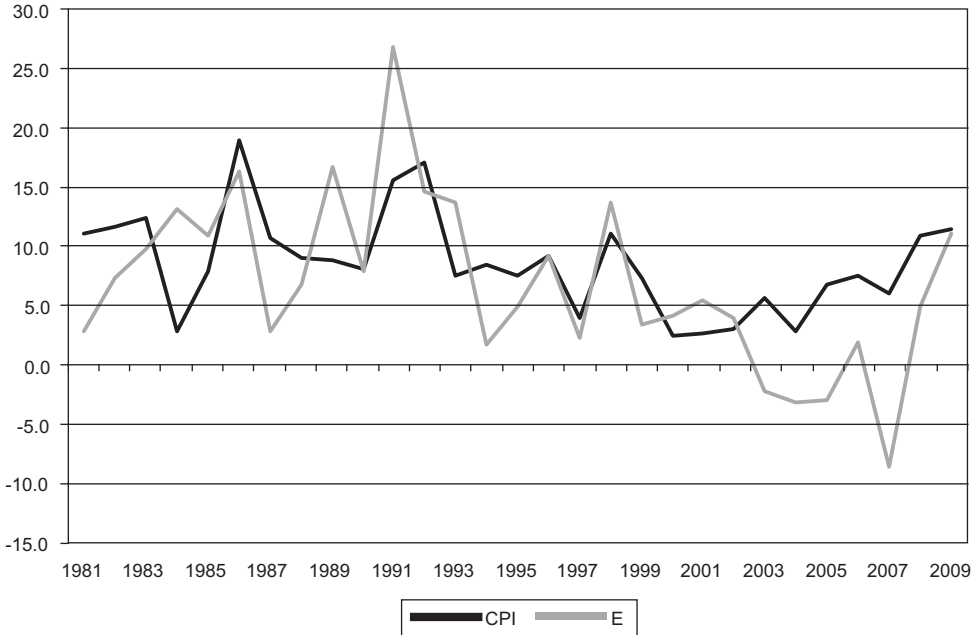
Figure 19. Nepal inflation and E rates: rate of change

The analysis of section III gives a useful framework to interpret the interaction between inflation and exchange rates. Countries whose currencies depreciated steeply during the food price shocks most likely put themselves in the triangle DBC of figure 11 where the wage-price cycle sustained inflation. Even with the two-step Indian exchange rate depreciation of the early 1990s, inflation peaked, suggesting that the gap $Z–Z_w$ had become positive. These experiences corroborate the link between food prices, wages, inflation and their implications for a sustainable real exchange rate.

VI. POLICY SUGGESTIONS

Once frequent supply shocks and the demand-supply elasticities are identified, policy implications follow. They may include a policy induced downwards shift of the supply curve in response to a supply shock; avoiding a larger than needed demand contraction; identifying and removing propagation mechanisms. These policy options are explored below.

A. Temporary shocks

Examples of temporary shocks that raise domestic prices are monsoon failures and international oil or other commodity shocks that raise border prices. These have been dominant inflation triggers. Mild monetary tightening after a cost shock can prevent inflationary wage expectations from setting in and further shifting up the supply curve. But a sharp tightening that shifts aggregate demand leftwards would have a large output cost with little effect on inflation. Reasonable interest rates encourage the supply response. A first round price increase from a supply shock should be allowed, but a second round wage-price increase should be prevented from setting in.

If the nominal exchange rate rises[11] (falls) with a fall (rise) in world foodgrain prices, domestic prices stay unchanged.[12] This applies similarly for oil price shocks in South Asia as the region is heavily dependent on oil imports. An opposite change in the nominal exchange rate in response to a temporary shock can prevent distorting administrative interventions that affect the food and oil sector.

There are short-term fiscal policies that shift down the supply curve, such as tax-tariff rates, and freer imports. Trade policy works best for individual country shocks that are not globally correlated. Nimble private trade can defeat speculative hoarders.

These short-run policies work only for a temporary shock. A permanent shock requires a rise in productivity to successfully prevent inflation. This is examined in sections B and C below.

B. Preventing chronic cost-push inflation

Food prices play a major role in propagation mechanisms, since they raise nominal wages with a time lag. A fundamental reason for chronic supply side inflation is that target real wages exceed labour productivity, so the solution is to raise worker productivity. Higher agricultural productivity is especially necessary to anchor food price inflation.

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[11] Goyal (2003) simulated such a policy using wheat prices. It led to a coefficient of variation of 0.2 for the nominal exchange rate, and removed the high wheat inflation of the 1990s.

[12] Shifting to winter daylight savings time in the United States of America saves thousands of firms from having to change their working hours. However, changing one exchange rate prevents thousands of nominal price changes that then become sticky and persist, requiring a painful prolonged adjustment.

With some liberalization, farm produce become traded goods and consequently, border prices begin to affect domestic food prices. A target real wage in terms of food prices then implies a target real exchange rate or ratio of traded to non-traded goods prices. In this case, the exchange rate contributes to inflation propagation mechanism. If the real exchange rate required to satisfy a real wage target rate appreciates above the rate required for equality of aggregate demand and supply, wages rise, raising the prices of non-traded goods. A nominal depreciation to increase demand helps sustain the cycle of continuous inflation. Higher productivity of non-traded goods can shift up the target real exchange rate, so the wage target can be satisfied at a more depreciated exchange rate, breaking a potential wage-price chain.

A rise in agricultural productivity allows the nominal exchange rate to appreciate, bringing the real exchange rate closer to the target real exchange rate and closing the inflationary gap between them, even while agricultural prices continue to equal border prices.

Inflows appreciate the exchange rate and remove chronic inflation. The wage target is reached and the accompanying rise in imports met through the inflows. But it involves a risky widening of the current account deficit as appreciation encourages imports. Rising productivity increases the level of inflows that can be safely absorbed since the target exchange rate is more depreciated, encouraging exports. The CAD then still allows investment to exceed domestic savings but does not become too large.

C. Governance

Better governance and delivery of public services is necessary to improve productivity. Reform of food policy is urgent given the relentless food inflation. East Asian countries were careful to moderate food price increases and focus on a rise in agricultural productivity as long as food budget shares remained high. Food prices and the nominal rate of protection in agriculture was allowed to rise only after the food budget shares fell (Goyal, 2003). In addition, agriculture was taxed to fund development. Nevertheless, low food prices did not prevent agricultural incomes from rising, since at low per capita income levels demand for food is elastic. When development proceeded sufficiently to lower budget shares below 50 per cent, farm incomes began falling and governments turned from taxing to subsidizing agriculture. Since the share of the population in agriculture was now small, this was not a burden. In this period, food prices began to rise. Since food was now a small part of the budget, prices could rise without putting pressure on wages and inflation. As food budget shares fall agriculture must shrink.

In India, the move to subsidize agriculture came when food budget shares were still high. Food still accounted for more than 50 per cent of household expenditure among 95 per cent of rural households and 80 per cent of urban households in the 1990s (Goyal, 2003). More than 70 per cent of the population was still in rural areas even in the 2000s. The weight of the food group is 48.46 per cent in the new CPI-Industrial Workers base 2001. For low-income groups the share exceeds this while for high-income groups, it is lower.

Although the increase in the absolute agricultural price level was lower in the 1980s, output growth was more rapid. India is still in the range where income elasticities of demand for agriculture are high,[13] so that agricultural incomes rise more with increases in output, even after correcting for the effect of buffer stock and public food distribution policy. A more moderate nominal price increase enables better agricultural output and income growth.

Rising agricultural price levels do not guarantee favourable agricultural terms of trade, as nominal wages and industrial prices also increase. Over time, stable prices provide better incentives for farmers. If the procurement price were to become a true support price, foodstocks would reduce in a bad agricultural season when market prices rise, and increase as market prices fall in a good year. Farmers would get some assured income support even as the removal of restrictions on the movement and marketing of agricultural goods and better infrastructure allows them to diversify crops. Since price support can also use the option of just paying the difference between market and support prices, stocks need not rise when they are already high.

In reaction to the lower average stocks, public distribution schemes should focus on remote places where there are no private shops, or on very poor areas. Food coupons or cash transfers to women can provide support to those below the poverty line[14] while allowing them to diversify their food basket, as recent studies indicate. Foodgrains, for which the elaborate food policy structure is designed, now account for only 25 per cent of agricultural output. Thorough supply-side reform is required.

But such reform may take time to achieve. The analysis in this section has brought out the focal role of the unit value, which acts as a trigger for multiple interest groups to force undesirable policies such as a rise in MSP. Political jostling

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[13] Nomura (2010) puts $3,000 as the per capita income level after which income elasticities of demand fall.

[14] Basu (2010) has argued for such a policy redesign. Cash transfers to women are effective because women are more likely to apply them for family needs.

focuses on the short-term, ignoring negative long-term effects. Poor coordination among multiple agencies means they do not factor in each other's costs. They also neglect the big picture. Until thorough food policy reform occurs, a possible appreciation of the nominal exchange rate can prevent a sharp rise in border prices from triggering multiple interest group action and resulting in complex domestic distortions.

D. International

Emerging markets must find non-distortionary ways to respond to spikes in food and commodity prices, but large global spikes imply macro distortions beyond supply shocks (Gilbert, 2010), which should also be prevented. Policies such as quantitative easing that aim to drive up prices across asset categories should be implemented sparingly if at all. Excess liquidity creation in the West and poor real sector response are sending funds into commodities, and this may be contributing to price spikes. Investors have turned to commodity markets for speculation or for portfolio diversification.

What is the role of futures markets? A large number of studies of the 2008 commodity spike, surveyed in Irwin and Sanders (2010), have on balance not found evidence that the large-scale entry of index funds in commodity derivatives drove up prices. A correlation did occur but the correlation does not necessarily imply causality. Time series tests on the whole reject causality but they have their own flaws. Lack of convergence between spot and futures prices in certain markets also suggest problems in the working of these markets. A price spike above equilibrium levels in a storable commodity should raise its stocks, but stocks were declining in most commodity markets during that period. Moreover, prices of agricultural commodities without futures markets also rose at the same time. An Indian committee was set up to examine the effect of commodity futures markets as agricultural inflation rose (GOI, 2008). It found no unambiguous evidence of the effect of futures trading on inflation. For some commodities, inflation had accelerated after the introduction of futures, for others it had slowed down. Commodities where futures were banned such as sugar, tur and urad dals had higher inflation.

When inventories of a storable commodity are low, a demand or supply shock can result in a sharp price rise for that particular commodity. This is because it takes time for supply to increase. In such conditions, trading sends the prices higher merely because the market expects the prices to increase. Buying futures does not have the same effect as hoarding a commodity. Opposite paper positions can be generated in deep and liquid markets. As long as informed traders dominate

the markets, values are unlikely to deviate far from fundamentals. But herd behaviour, momentum trading and overreaction, make price discovery in financial markets flawed. Since futures markets serve the purpose of helping producers plan future output and to hedge risks, the answer is not to ban them, but to improve their operations.

Restricting participants in the market is counterproductive to creating liquidity. However, position limits can be used to reduce the share of speculative transactions. Contracts can be designed to encourage hedging over speculation by distinguishing between hedgers and speculators with differential margins and discounts in fees or taxes for each category. Margins that increase with price could reduce momentum trading. Since spot and futures markets around the world are becoming tightly integrated, convergence to common regulatory standards is necessary. One region with lax standards can affect others, especially during irrational periods of fear or hype. For example, most regulators impose position limits. The U.S. regulator finally proposed position limits in four energy commodities in 2010, but the European Union and a few other markets still do not have them. In 2009, a U.S. Senate subcommittee suggested a position limit of 5,000 contracts per wheat trader. The practice of giving position limit waivers should be discontinued. Arbitrage occurs in response to selective or regional regulatory tightening. Coordinated improvements in financial regulation are required to reduce global commodity price spikes.

VII. CONCLUSION

The similarities yet differences across South Asian countries, and their differential response to the severe food, oil price and other external shocks, provides a useful opportunity to better understand the structure of inflation in these economies. The analysis and evidence in this paper implies output is largely demand determined but inefficiencies on the supply side cause inflation. Since output volatility exceeded that of demand components, the latter were not an independent source of shocks. Procyclical policy, however, amplified the negative impact of supply shocks on output. Reduction in inflation was achieved at a high output cost. But well-intentioned administrative interventions turned relative price shocks into chronic cost-push inflation. The analysis shows why food price shocks can aggravate inflation. It is very important to protect the poor from inflation, especially food inflation. But it must be done effectively.

Controlling inflation is important for the very survival especially of democratic governments in the region. But complex and counterproductive schemes provide temporary respite, only to pass the problem on to the future. Onions are

widely consumed by the poor; so when the prices of onions shot up in 1998, the anger of the electorate almost brought down the Indian Government. A cartoon pictured Amartya Sen, who had recently been awarded the Noble prize in economics, talking on the phone: "Yes Minister, thank you Minister, no, I do not have a theory to bring down the price of onions". The year 2010 again saw a sharp 600 per cent rise in onion prices. The problem continues to be as urgent as it is unresolved. Knowledge of structure and behaviour makes successful anticipation and prevention possible. Structural features and supply-side policies offer additional instruments to reduce inflation.

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