

Inflation in developing Asia: Demand-pull or cost-push?

Introduction

Rising inflation has emerged as by far the biggest macroeconomic challenge confronting developing Asia in 2008 and will remain a challenge in the near future (see the chapter, also in Part 2, *Macroeconomic effects of high oil prices*). In fact, inflation, as measured by consumer price indexes, gathered pace in 2007 and accelerated sharply in the first half of 2008 throughout the region. Increased inflation is affecting virtually all developing Asia, although the exact magnitude differs across countries and subregions. For the region as a whole, inflation is projected to rise to 7.8% in 2008, up sharply from 4.3% in 2007 and 3.3% in 2006. The benign paradigm of strong growth and subdued inflation seems to have ended.

The obvious question to ask is: What has happened? The equally obvious answer is the spike in international commodity prices, particularly food and oil prices (see the other Part 2 chapters, *Causes of high food prices* and *Are high oil prices here to stay?*). Indeed, according to an increasingly popular diagnosis for the new inflation problem, the region is suffering from a bout of cost-push inflation. The sheer speed of the recent rise in commodity prices and hence input costs gives a great deal of credibility to this diagnosis. If higher food and oil prices are indeed what underlie Asia's inflation, the scope for anti-inflationary monetary tightening, which works by damping aggregate demand, would come at a steep cost in terms of forgone growth. There is a very real risk that the cost-push diagnosis will influence regional monetary authorities and become an excuse for inaction against inflation.

The central objective of this chapter is to examine the validity of the cost-push diagnosis of inflation through rigorous empirical analysis. The fundamental questions addressed here are: Is developing Asia's inflation really a case of cost-push inflation about which monetary authorities can do very little? Or: Are there other factors at play behind the region's current episode of inflation? The impressive economic growth in developing Asia over the past decade and the growth acceleration from 2005 to 2007 took place with low inflation. This allowed monetary policy to be accommodative and may have lulled monetary authorities

into complacency. Is it possible that developing Asia's inflation may be of the demand-pull variety in which excess aggregate demand leads to rising prices? The answer to that question has enormous implications for monetary policy in the region.

The answer uncovered through econometric analysis is that developing Asia's inflation is largely homegrown and due to excess aggregate demand and inflation expectations. This is the central finding of the chapter. Surging aggregate demand, which consists of domestic demand—consumption, investment, and government spending—as well as net exports, has generated relentless upward price pressures. Aggregate supply, or the economy's productive capacity, has not been able to meet the incremental demand in many Asian countries. Although external food and oil price shocks have contributed to inflation pressures, the empirical evidence presented in this chapter firmly rules out the widely held view that Asia's rising inflation is mostly due to exogenous external shocks beyond the region's control. For example, in the case of the People's Republic of China (PRC), excess aggregate demand explains about 64% of consumer price inflation. For the region as a whole, excess aggregate demand and inflation expectations jointly account for about 60% of consumer price inflation. The evidence in this chapter is consistent with the stylized fact of accelerating growth accommodated by easy monetary policy in the region in the past year and at present. In particular, the region's recent robust growth makes it entirely conceivable that overheating of the economy due to unsustainable demand growth fueled by cheap credit and expansionary monetary policies, coupled with exchange rate policy favoring undervaluation, may have helped bring about the current rash of high inflation.

The inescapable policy implication that flows from this key finding is that monetary policy will remain effective and relevant in fighting inflation in developing Asia. Since the evidence here indicates that excess aggregate demand explains a major part of the region's inflation, raising policy interest rates and changing the stance of monetary policy toward tightening are necessary to damp demand and anchor inflation expectations. Although the global food and oil shocks are exogenous external shocks largely beyond the region's control, decisively and preemptively diffusing the risk of deeply entrenched long-term inflation is well within the control of the region's central banks. Furthermore, monetary policy itself is likely to have contributed to the formation of inflation pressures. More precisely, loose monetary policies throughout the region, evident in the negative real interest rates that have appeared since late 2007 in most of the nine developing Asian countries considered in this chapter, have stoked aggregate demand to unsustainable levels.

In addition to the central objective of determining the relative importance of demand-pull versus cost-push inflation, an additional objective of the chapter is to evaluate the extent to which the oil and food shocks have actually translated into cost-push inflation. While the evidence speaks out loudly and clearly against the popular belief that external shocks are solely to blame for the region's current inflation woes, it also reveals that those shocks have played a supportive role. Excess aggregate demand growth may have kindled the flames in the first place, but commodity shocks are adding fuel to the fire. They are likely to add

even more fuel in the future since global oil and food shocks typically affect domestic prices after a time lag. The analysis of this chapter indicates that limited pass-through of external shocks to domestic prices is partly due to government subsidies, which are expected to be lifted in the future. It is, therefore, important to evaluate empirically the degree of pass-through of global oil and food prices to domestic prices.

The rest of this chapter is organized as follows. The following section, *Methodology for estimating sources of inflation and pass-through*, lays out the empirical methodology that was used to estimate the sources of inflation and extent of pass-through. It also discusses the transmission mechanism that transforms external shocks into domestic inflation. *Cost-push versus demand-pull factors in Asia's inflation* then lays out and discusses the central empirical findings of this chapter, which pertain to assessing the relative importance of external oil and food price shocks in explaining Asia's inflation. The main finding is that excess aggregate demand and inflation expectations overshadow the two external shocks as sources of Asia's inflation. The section also tracks the recent evolution of the output gap, a measure of excess aggregate demand, in the region. The penultimate section, *Pass-through of oil and food price shocks to Asia's inflation*, reviews additional empirical results, which relate to the pass-through of global food and oil prices to domestic prices. *Conclusion and policy inferences* highlights the chapter's key findings along with their implications for the region's policy makers.

Methodology for estimating sources of inflation and pass-through

The empirical analysis of this chapter seeks to identify the sources underlying developing Asia's inflation, in particular the relative importance of demand-pull factors versus cost-push factors. An additional objective is to examine empirically the pass-through of food and oil price shocks to domestic prices. This section briefly lays out the model used to carry out the two analyses. The sample consists of nine regional economies, namely PRC, India, Indonesia, Republic of Korea (henceforth Korea), Malaysia, Philippines, Singapore, Thailand, and Viet Nam. (Box 2.4.1 explains the technical details of the model and the econometric procedure in greater detail.) The statistical model used to decompose the sources of inflation assumes that domestic prices are set along a distribution chain. That is, prices are revised at three different stages—imports at the border, production, and consumption behind the border—which together make up a stylized distribution chain of goods and services. The model has two exogenous variables, namely oil and food price inflation (hereafter referred to as cost-push factors or international supply shocks), and five endogenous variables (or demand-pull factors), namely excess aggregate demand,¹ the exchange rate, import prices, producer price inflation, and consumer price inflation.

In this chapter, aggregate demand is proxied by output gap, which is the gap between actual and potential output (the level of output consistent with non-accelerating inflation). Potential output is an exogenous variable in the model. Therefore, changes in the output gap purely reflect

2.4.1 The model, econometric procedure, and notes

To examine the pass-through of external shocks—fuel and food—into inflation, a vector autoregression (VAR) model is estimated and a recursive Cholesky orthogonalization is applied to identify the primitive shock in the VAR model. This approach is taken to model the dynamic interrelationship between the price variables in the distribution chain. The ordering and choice of variables is motivated by the idea that prices are revised at each of three different stages—import, production, and consumption—which constitute a stylized goods and services distribution chain. The model controls for international supply shocks and domestic demand pressure. The model applied here is based on McCarthy (1999), Bhundia (2002), and Duma (2008) but is extended to include food prices.

In this model, inflation at each of the three stages is composed of seven components. The first two components—oil (π^{oil}) and food (π^{food}) price inflation—are the effects of international supply shocks on inflation. The third component—aggregate demand (y)—is to proxy the demand shock. The effect of the exchange rate shock (e) on inflation is captured in the fourth component. The fifth and sixth are the effects of shocks on inflation at the previous stage of the chain and the effect of shocks at that stage of the distribution chain. In the model, import price inflation (π^{im}) affects consumer price inflation (π^c) directly, and indirectly through its effects on producer/wholesale price inflation (π^p). The last component is the expected inflation at each stage, which is based on information available at period $t-1$. The seven components can be written as follows:

$$\begin{aligned}\pi_t^{oil} &= E_{t-1}(\pi_t^{oil}) + \varepsilon_t^{oil} \\ \pi_t^{food} &= E_{t-1}(\pi_t^{food}) + a_1 \varepsilon_t^{oil} + \varepsilon_t^{food} \\ y_t &= E_{t-1}(y_t) + b_1 \varepsilon_t^{oil} + b_2 \varepsilon_t^{food} + \varepsilon_t^y \\ \Delta e_t &= E_{t-1}(\Delta e_t) + c_1 \varepsilon_t^{oil} + c_2 \varepsilon_t^{food} + c_3 \varepsilon_t^y + \varepsilon_t^{\Delta e} \\ \pi_t^{im} &= E_{t-1}(\pi_t^{im}) + d_1 \varepsilon_t^{oil} + d_2 \varepsilon_t^{food} + d_3 \varepsilon_t^y + d_4 \varepsilon_t^{\Delta e} + \varepsilon_t^{im} \\ \pi_t^p &= E_{t-1}(\pi_t^p) + e_1 \varepsilon_t^{oil} + e_2 \varepsilon_t^{food} + e_3 \varepsilon_t^y + e_4 \varepsilon_t^{\Delta e} + e_5 \varepsilon_t^{im} + \varepsilon_t^p \\ \pi_t^c &= E_{t-1}(\pi_t^c) + f_1 \varepsilon_t^{oil} + f_2 \varepsilon_t^{food} + f_3 \varepsilon_t^y + f_4 \varepsilon_t^{\Delta e} + f_5 \varepsilon_t^{im} + f_6 \varepsilon_t^p + \varepsilon_t^c\end{aligned}$$

where ε_t^{oil} , ε_t^{food} , ε_t^y , and $\varepsilon_t^{\Delta e}$ are the shocks corresponding to supply, demand, and exchange rate shocks. ε_t^{im} , ε_t^p , and ε_t^c are the shocks emerging from import, producer, and consumer price inflation. E is the expectation.

In this model, the degree of endogeneity increases as one moves down the order. This may create the drawback of the recursive structure because prices can feed back

into the exchange rate within a period of one quarter, the frequency of the dataset. Thus, alternative orderings of variables need to be estimated in order to check for robustness of the results. Both bilateral and nominal effective exchange rates (trade-weighted) are used to check the sensitivity of the results.

Based on the augmented Dickey-Fuller test, all variables were found to be non-stationary $I(1)$, with the exception of the output gap (y), which exhibits stationarity $I(0)$. No cointegration was found between the variables, and the output gap enters as a stationary variable. Thus the VAR model was estimated for first differences to avoid the spurious regression problem. The standard diagnostic tests—consisting of an autoregressive root test (stability condition), auto-correlation Lagrange Multiplier test, normality test, and White heteroskedasticity test—were performed. A visual inspection of the residuals was also performed to ensure that there are no major outliers. The lag-length criteria provided by the Akaike and Schwarz Information criteria and diagnostic tests are applied to determine the appropriate lags in the model.

The relative importance of cost-push versus demand-pull factors in determining producer and consumer price inflation is explored through variance decomposition, which separates the variation in endogenous variables (producer and consumer price inflation) into the component shocks in the VAR model. In order to measure pass-through coefficients, impulse response functions are applied. These functions trace out the dynamic effects on prices originating from a one-time shock to the system, and account for disturbances to the other endogenous variables. Thus the pass-through coefficients of oil (or food) price shocks are obtained by dividing the cumulative impulse responses of each price index after j months by the cumulative response of the oil price after j months to the oil (or food) price shock.

Notes

The model is estimated for nine developing Asian countries, covering the period Q1 1996–Q1 2008. In the People's Republic of China (PRC) and Viet Nam, the estimation period is Q1 1999–Q1 2008 because of a lack of data for the quarterly producer price index and for quarterly GDP, respectively. For Indonesia and Malaysia, because of a lack of information on import prices, the estimation covers the period Q1 2000–Q1 2008.

Dubai, spot UK Brent, and average of Dubai, UK Brent, and West Texas Intermediate are used to proxy raw oil data. The free on board US Gulf Coast price for wheat; the free on board Bangkok price for rice; and the cost, insurance, freight northwest Europe price for palm oil are used to proxy international wheat, rice, and palm oil prices, respectively.

2.4.1 The model, econometric procedure, and notes (continued)

Aggregate demand (y) is measured by the deviation of quarterly GDP from its trend, which is derived from application of the Hodrick-Prescott filter. Other methods, such as exponential smoothing and the Kalman filter, provide virtually identical results but the Hodrick-Prescott filter is selected here since it has performed the best in terms of explanatory and predictable power and of diagnostic tests.

For the PRC, there are no quarterly GDP data, so the industrial production index (2000 = 100) is used as a proxy. The measure of import prices (measured in domestic currency) varies among countries. For Thailand, the unit value of imports is used while for Korea and Singapore the actual data of import prices are used. In India, Indonesia, and Malaysia, a deflator derived from imports

of goods and services in quarterly GDP is used. Import prices are excluded from the PRC and Viet Nam estimations. Producer prices are excluded from the latter because of data limitations. The exclusion of these variables may lead to underestimation of the pass-through of external shocks into inflation in these two countries.

Oil, wheat, rice, palm oil, consumer, and producer prices; bilateral exchange rates; nominal effective exchange rates of the PRC, Malaysia, Philippines, and Singapore; import prices of Korea, Thailand, and Singapore; and industrial production index of the PRC are obtained from *International Financial Statistics*, International Monetary Fund. GDP is from the CEIC database. The nominal effective exchange rates for India, Indonesia, Korea, Thailand, and Viet Nam are obtained from country sources.

movements of aggregate demand. An increase in this variable thus implies an upward aggregate demand pressure. In particular, a value of the output gap that is greater than one reflects excess aggregate demand.

Aggregate demand also adjusts in this model when there are changes in international oil and food prices. Changes in aggregate demand affect the exchange rate in addition to the balance-of-payments position, which adjusts in response to the international oil and food price shocks. These commodities' prices, in conjunction with the exchange rate, then immediately affect import prices. This would in turn quickly affect producer price inflation and finally (depending on pass through) consumer price inflation. Import prices affect consumer prices in two ways: directly (since some imported products are consumed directly) and indirectly through their effects on producer prices. In the next period, changes in consumer prices would feed back to aggregate demand, the exchange rate, import demand, and producer prices through their effect on expected inflation. This is, in short, the transmission mechanism used to determine the degree of oil and food price pass-through to domestic prices.

Cost-push versus demand-pull factors in Asia's inflation

In this section, domestic inflation in nine developing Asian economies is decomposed into cost-push and demand-pull factors. Cost-push factors consist of international oil and food prices, and demand-pull factors include mainly excess aggregate demand, as proxied by the output gap, and inflation expectations, which are a function of lagged domestic inflation. Whether inflation is the cost-push or demand-pull variety has important implications for policy responses. In the case of cost-push inflation—a situation where domestic inflation is driven by a substantial rise in input prices of goods and services—a marked economic slowdown and rising unemployment is expected along with an increase in domestic inflation. Tightening monetary policy in the face of such negative supply shocks would come at a steep cost since the tightening reduces aggregate demand, and exacerbates the economic slowdown. Therefore, the cure could be worse than the disease if indeed

the runup in the producer price and consumer price indexes is largely due to cost-push inflation.

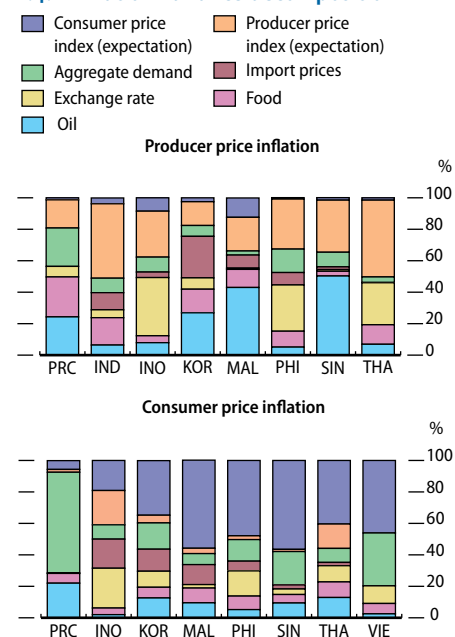
In contrast, when inflation is driven by a substantial increase in aggregate demand that is beyond a country's production capacity (demand-pull inflation), a tightening in monetary policy could help reduce aggregate demand and tame increases in prices of goods and services, especially nontraded goods. Aggregate demand would then fall back below that country's production capacity and inflation would decline.

However, when inflation expectations are taken into account, monetary policy could play an important role in containing inflation pressure, regardless of the source of the inflation shock. There is always a risk that inflation expectations could become entrenched and lead to a cost-price spiral. The stagflation experience of industrial countries in the 1970s, kicked off by a supply-side shock—the first oil shock—shows that this is a very real risk. These observations imply that monetary policy could play a major role in curbing inflation pressure, even in the face of a negative supply shock. In short, decomposition of domestic inflation into its sources, including inflation expectations, would help monetary authorities in implementing appropriate monetary policy responses. The effectiveness of monetary policy would be more limited if the sources of inflation are mainly external cost-push factors rather than demand-pull factors, but even then monetary policy would not be completely impotent.

The results of the model estimation show that two factors unrelated to external price shocks—excess aggregate demand and inflation expectations (represented by the appropriately lagged dependent variable of consumer price inflation)—account for much of the consumer price inflation in the nine countries.² More than 60% of the consumer price inflation variation in the PRC results from demand pressure, and 34% and 21% in Viet Nam and Singapore. Inflation expectations explain more than 45% of consumer price variations in the latter two countries. For other countries, excess aggregate demand accounts for less than 17% of the variation in consumer price inflation; inflation expectations account for almost 40–50% of the variation. The two non-external factors thus jointly account for about 60% of the variation in consumer price inflation in the region as a whole.

External cost-push factors³ appear to be more important in explaining producer price inflation than consumer price inflation (Figure 2.4.1). These factors account for about 50% of the variation in producer price inflation in the PRC, Korea, Malaysia, and Singapore. In countries where exchange rates are relatively stable, such as Malaysia, and Singapore, international oil prices account for about one half of the total variation in producer price inflation. In Singapore, which has the highest oil dependency among the nine countries, oil prices explain 50% of the variation. In Indonesia, Philippines, and Thailand, the exchange rate explains much of the producer price inflation. In Indonesia, the exchange rate accounts for almost 40% of the total variation in producer price inflation. The corresponding figures for the Philippines and Thailand are 29% and 27%. In India, more than 50% of the variation in producer (wholesale) price inflation is explained by the two non-external factors, in particular inflation expectations (this time using the appropriately

2.4.1 Inflation variance decomposition



PRC = China, People's Republic of; IND = India; INO = Indonesia; KOR = Korea, Republic of; MAL = Malaysia; PHI = Philippines; SIN = Singapore; THA = Thailand; VIE = Viet Nam.

Source: Staff calculations.

[Click here for figure data](#)

lagged dependent variable—producer price inflation), and external shocks account for about 25% of the variation.

Overall, global price shocks account for less than 30% of the total variation in consumer price inflation. As was the case for producer prices, the international oil price is the main external determinant of consumer price inflation in the PRC, Korea, Singapore, and Thailand. In the PRC, oil price inflation explains 22% of the variation in consumer price inflation. Food prices are also important in explaining consumer price inflation in these countries, especially Malaysia and Thailand. Movements in the international food price index account for about 10% of the consumer price variation in both countries. In the PRC and Singapore, food price inflation shocks explain about 5–6% of the variation in consumer price inflation.

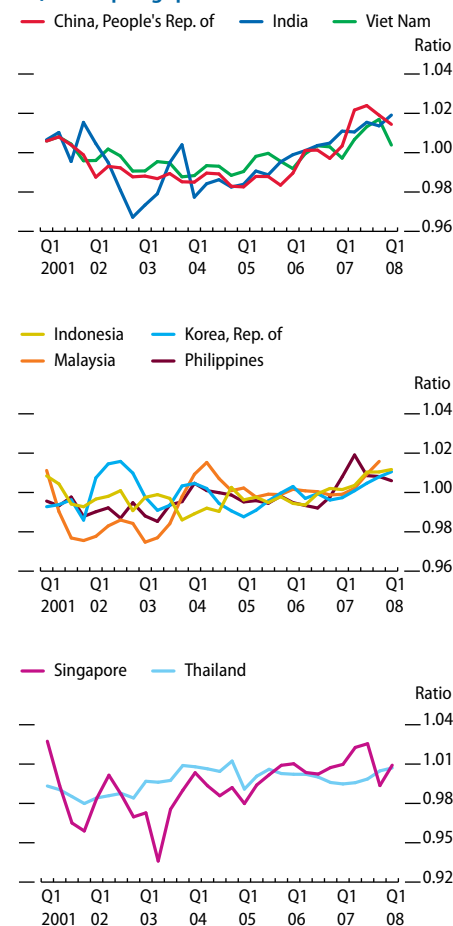
The variance decompositions amply demonstrate the importance of factors unrelated to external price shocks, such as excess aggregate demand and inflation expectations, in explaining the recent surge of inflation in developing Asia. The unsustainably high output growth that took place in 2005–2007 was, in part fueled by excessively expansionary monetary policy in many developing Asian countries. Figure 2.4.2 shows that the output gap has expanded since 2005 in many countries. In the PRC and India, the ratio of actual GDP to the trend of GDP increased from 0.98 in 2005 to almost 1.02 in 2008. The fact that the ratio exceeded 1 in the two countries since 2006 suggests that aggregate demand has exceeded the rate of utilization of production capacity that is consistent with non-accelerating inflation, putting significant upward demand pressure on producer and consumer price inflation. The easy monetary policy therefore contributed to the formation of higher inflation expectations.

Demand pressure also built up in Viet Nam in 2005–2007 and the ratio still exceeded 1 in the first quarter of 2008. This suggests that demand pressure was still responsible for inflation pressures there. Aggregate demand pressure increased, too, in Indonesia, Korea, Malaysia, Philippines, and Singapore after late 2006. The output gap ratio exceeded 1 in these five countries in 2006. However, in Singapore the rise in oil and food prices caused a decline in aggregate demand in late 2007 and brought down the output gap ratio toward 1.

In contrast to other countries, Thailand did not experience any significant demand pressures. This reflects the slow recovery of private investment and the overhang of political uncertainty. The ratio of actual GDP to the trend of GDP peaked in early 2005 above 1.1 but then fell back gradually to below 1 by the third quarter of 2006.

Expansionary monetary policies and sustained balance-of-payments surpluses in many Asian countries had leaked into domestic liquidity during the past few years. This helped fuel aggregate demand expansion and an increase in the output gap ratio. Figure 2.4.3 clearly shows that both nominal and real lending rates declined in the nine countries during 2001–2006. Even though countries such as the PRC, India, Korea, Singapore, Thailand, and Viet Nam have raised their nominal interest rates since 2007 in response to surging global oil and food prices, real interest rates still fell due to an even more significant increase in inflation. The real lending rate was negative in the PRC, Singapore, Thailand, and

2.4.2 Output gap

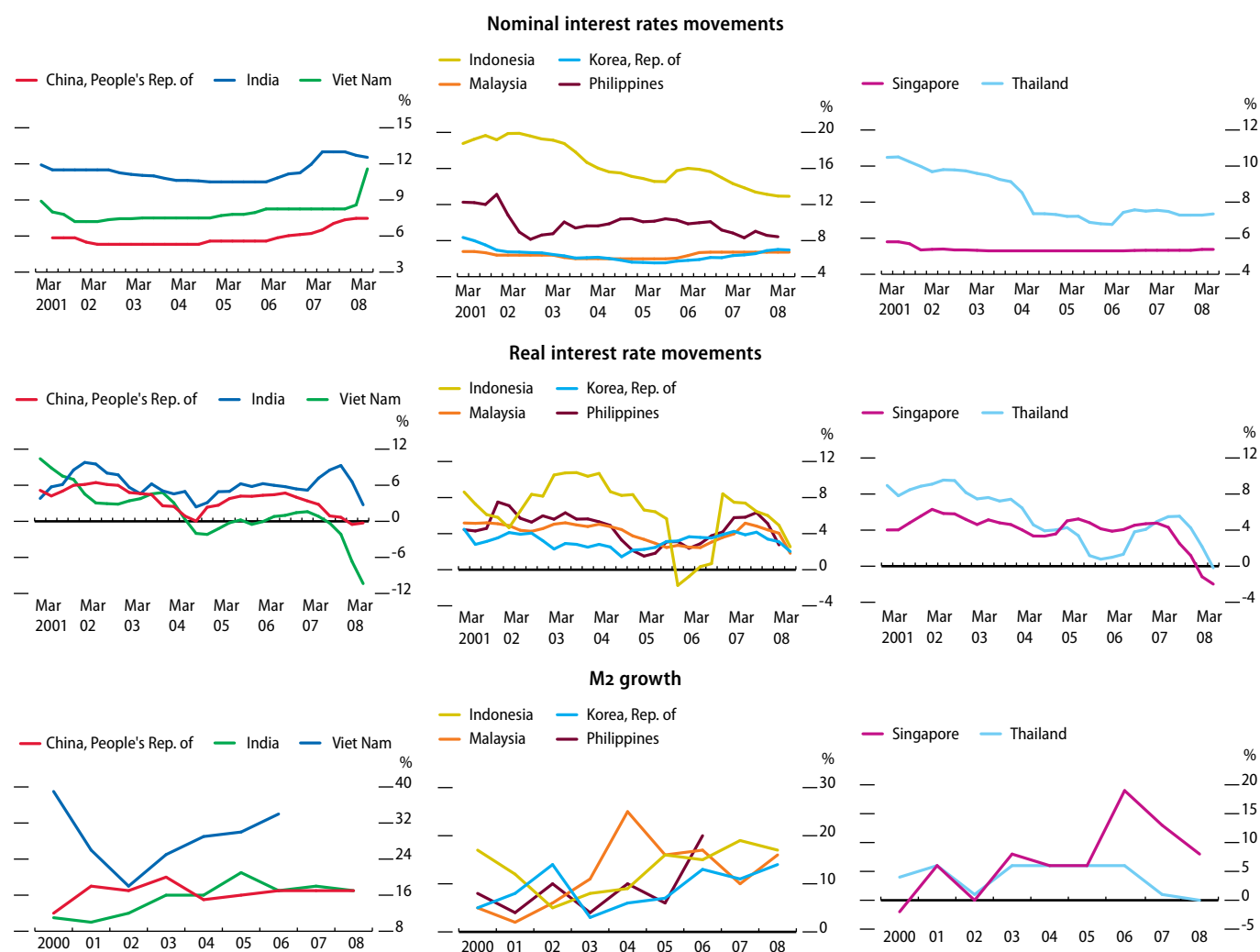


Notes: Output gap is measured by the deviation of quarterly GDP from its trend. Trend GDP is calculated using a Hodrick-Prescott filter.

Source: Staff calculations.

[Click here for figure data](#)

2.4.3 Nominal and real interest rates and money supply growth



Notes: Nominal interest rate is lending rate while real interest rate is lending rate adjusted by consumer price inflation. The direction of real policy rate and real lending rate is similar.

Source: CEIC Data Company, Ltd, downloaded 2 September 2008.

[Click here for figure data](#)

Viet Nam in 2007 and first half of 2008. This indicates that monetary policy responses have lagged behind price developments. Another sign of loose monetary policy that helped stoke demand is the growth of the broad money supply (M2) in the early part of this decade. In Viet Nam, M2 grew by around 30% while in the PRC and India it grew by more than 15%. The rise in oil and food prices provoked some tightening of monetary policy since 2007. As a result, money supply growth declined in 2007 and first half of 2008, resulting in a decline in the output gap ratio.

Pass-through of oil and food price shocks to Asia's inflation

In the preceding section, it was seen that excess aggregate demand and inflation expectations were the immediate catalysts for Asia's inflation. Nevertheless, the evidence also indicates that external factors still accounted for a substantial part of it. In this context, an important issue

is the extent to which two major external cost-push shocks—the recent runups in international oil and food prices—have actually passed through to domestic prices. The higher the pass-through, the greater the impact of the oil and food shocks on Asia's inflation. The key results that emerge from the empirical analysis of pass-through are now presented.

Pass-through of oil price shock to domestic prices

Oil price shocks appear to have an almost immediate impact on domestic prices and the impact tends to persist for a year in almost all countries—see Jongwanich and Park (2008). The level of oil intensity, oil efficiency, market structure and competition, as well as government policy measures, are all factors that determine the degree of oil price pass-through in each country. The empirical analysis yields three central results.

First, the pass-through of oil prices to producer prices tends to be higher in oil-exporting countries than in oil-importing countries, reflecting the sharp increase in the opportunity cost of home oil consumption relative to export. In Malaysia, the pass-through gradually increases from 0.08% in the first quarter to reach a cumulative total of 0.15% in the fourth. (Cumulative pass-through refers to the total pass-through after a specified time period. For example, if the pass-through after 1 quarter is -0.03 and the pass-through during the second quarter is 0.08, then the cumulative pass-through after two quarters is 0.05.) In the PRC and Indonesia, which produce substantial amounts of oil (Table 2.4.1), the cumulative pass-through increases to around 0.15% after 1 year, in response to a 1% increase in oil prices. For other oil-importing countries, the cumulative pass-through of oil prices to producer prices is around 0.07% after 1 year. Singapore is an exceptional case in the sense that the high pass-through to producer prices is due to high intensity of oil use in total energy consumption—almost 90% in Singapore, but less than 55% in all the other countries.

Second, the impact of crude oil price increases on domestic prices is diluted along the distribution chain. The pass-through coefficients, which measure the response to oil price shocks, tend to be lower for consumer than producer prices. The gap between them in each country stems from firms' ability to pass higher costs on to consumers. For example, with intense market competition, private producers may cut their profit margins instead of immediately charging higher prices to consumers. Government policy measures such as fuel subsidies, electricity subsidies, and others such as an administered price policy, aim to control living costs, or reduce or delay the pass-through of oil price increases to consumer price inflation. Figure 2.4.4 shows that the gap between pass-through to producer prices and pass-through to consumer prices is rather narrow in the Philippines and Thailand relative to the other countries.

Third, the degree of oil price pass-through to consumer prices is higher for countries with limited fuel subsidies. Within a group of four countries with comparable energy efficiency levels, pass-through to consumer prices is higher in the Philippines and Thailand (about 0.04% after 1 year) than in Indonesia and Malaysia (less than 0.02%). Although the level of energy efficiency is relatively low in PRC, India, and Viet Nam (total energy consumption relative to GDP in 2005 was 30%

2.4.1 Oil dependency and energy efficiency for selected economies, 1995, 2003, and 2005

Region/Economy	Oil self-sufficiency			Intensity of oil use (%)			Energy efficiency		
	1995	2003	2005	1995	2003	2005	1995	2003	2005
United States	-0.6	-0.7	-0.8	37.8	39.5	40.1	12.4	9.0	8.1
Eurozone	-0.6	-0.6	-0.6	43.5	41.3	40.8	6.9	6.2	5.3
Japan	-1.0	-1.0	-1.0	55.7	49.8	48.2	3.9	5.2	5.0
East Asia excluding Japan	-0.1	-0.4	-0.5	26.0	24.3	23.7	47.9	30.9	29.9
China, People's Rep. of	-0.1	-0.4	-0.5	20.1	22.6	20.5	47.9	30.9	29.9
Hong Kong, China	-1.0	-1.0	-1.0	62.7	61.4	60.2	4.4	6.0	5.8
Korea, Rep. of	-1.0	-1.0	-1.0	66.0	51.6	48.6	12.3	14.3	11.7
Taipei, China	-1.0	-1.0	-1.0	54.5	46.2	45.0	10.5	13.8	12.6
Southeast Asia	0.0	-0.2	-0.3	57.7	49.0	47.8	15.1	20.7	18.4
Indonesia	0.9	0.0	-0.2	51.8	50.4	48.9	16.1	20.0	18.7
Malaysia	0.7	0.5	0.3	56.4	39.9	39.7	16.5	23.3	18.6
Philippines	-1.0	-1.0	-0.9	72.1	54.4	52.5	13.0	15.8	13.5
Singapore	-1.0	-1.0	-1.0	95.3	88.3	87.9	14.1	18.2	17.3
Thailand	-0.9	-0.8	-0.8	67.2	53.2	52.8	12.6	22.6	20.6
Viet Nam	0.8	0.6	0.5	9.4	13.8	14.6	24.5	24.7	23.1
South Asia	-0.6	-0.7	-0.8	30.6	34.5	31.5	28.8	22.4	19.2
India	-0.6	-0.7	-0.7	28.7	33.7	30.8	32.1	23.7	20.1
Sri Lanka	-1.0	-1.0	-1.0	68.9	81.9	82.6	11.2	11.0	9.0
Pacific	2.5	0.2	2.1	77.0	80.5	81.6	10.3	15.8	11.7
Central Asia	0.0	1.5	1.8	28.7	20.8	19.8	118.6	99.4	67.2
World	-0.1	-0.1	-0.1	39.0	37.7	36.6	12.3	11.5	10.3

Notes: The oil self-sufficiency index is oil production less consumption, divided by consumption; a positive number indicates some degree of self-sufficiency. If there is no domestic oil production the index is equal to -1. Intensity of oil use in energy consumption is petroleum consumption divided by total energy consumption. Energy efficiency (the energy intensity of GDP) is total energy consumption in thousand British thermal units per US\$ of GDP (in 2000 prices). The shading indicates a decline in intensity of oil use and an increase in energy efficiency.

Source: Energy Information Administration, available: <http://www.eia.doe.gov/emeu/international/oilconsumption.html>.

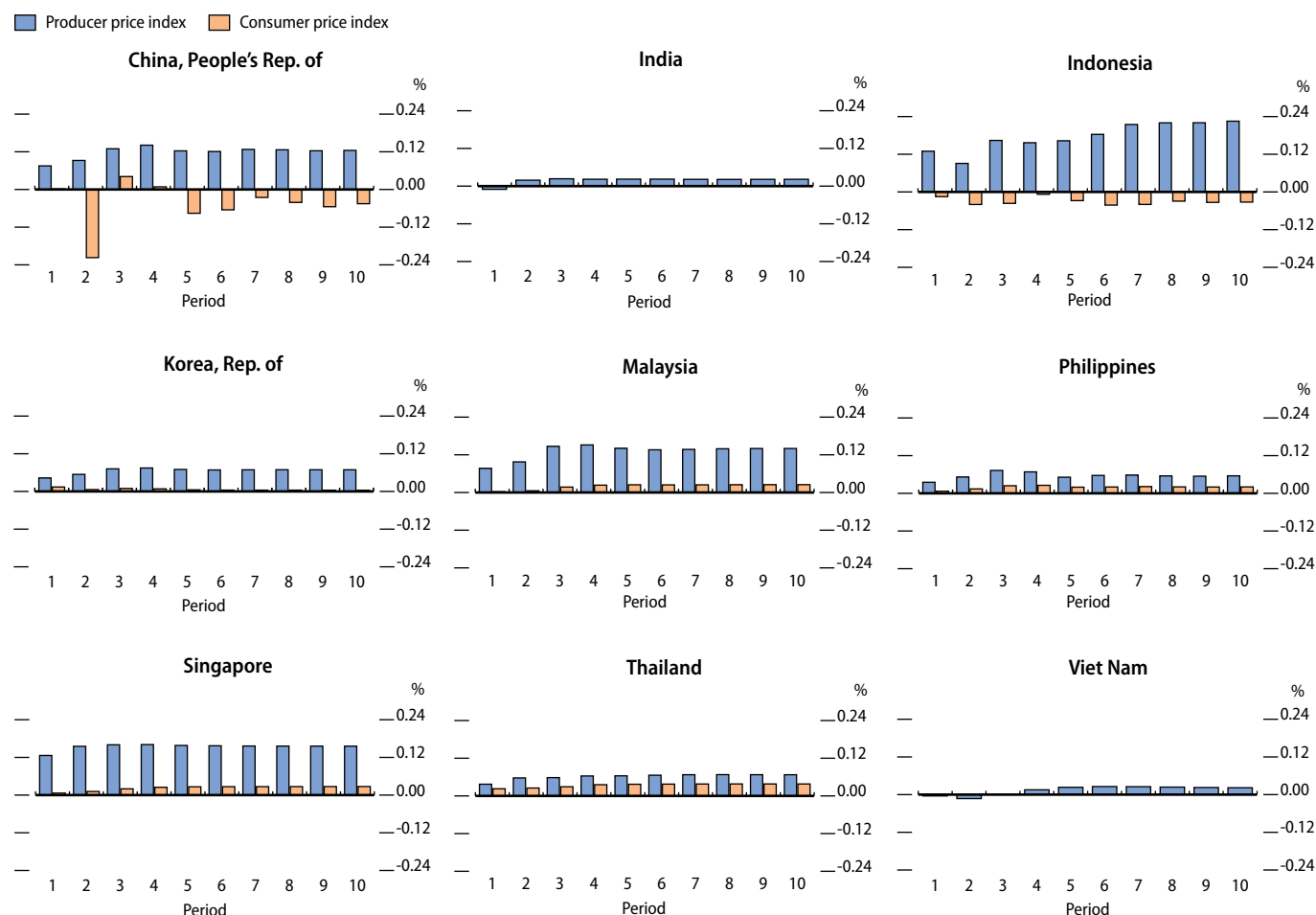
in the PRC and around 20% in India and Viet Nam), fuel price subsidies limit the impact of oil price increases on consumer prices. In the PRC, the pass-through to consumer prices is negative after two quarters, and turns slightly positive in the third and fourth quarters. Controls and government intervention in decisions on pricing therefore have cushioned consumers from the full burden of rising fuel costs. Similarly, in India and Viet Nam, the pass-through coefficient is negative in the first quarter but turns slightly positive after 1 year. Korea is an exceptional case in the sense that the low pass-through to consumer prices is due to superior energy efficiency (total energy consumption relative to GDP in 2005 was 11%) rather than fuel subsidies.

Pass-through of food price shock to domestic prices

This section examines the impact of the global food price shock on domestic prices in the nine Asian countries. Food is not a homogeneous product, so three specific food products that are particularly important for the region are analyzed—rice, wheat, and palm oil. Three key results emerge from the empirical analysis (Figure 2.4.5).

First, the pass-through to producer prices is higher in food-exporting countries than in food-importing countries. The higher pass-through will provide farmers in those countries with incentives to expand their production. This result is consistent with the findings of the chapter, *Causes of high food prices*, also in Part 2, which finds a substantial degree

2.4.4 Cumulative coefficients of oil price pass-through



Notes: Period is in quarterly terms. For India, the wholesale price index was used.

Source: Staff calculations.

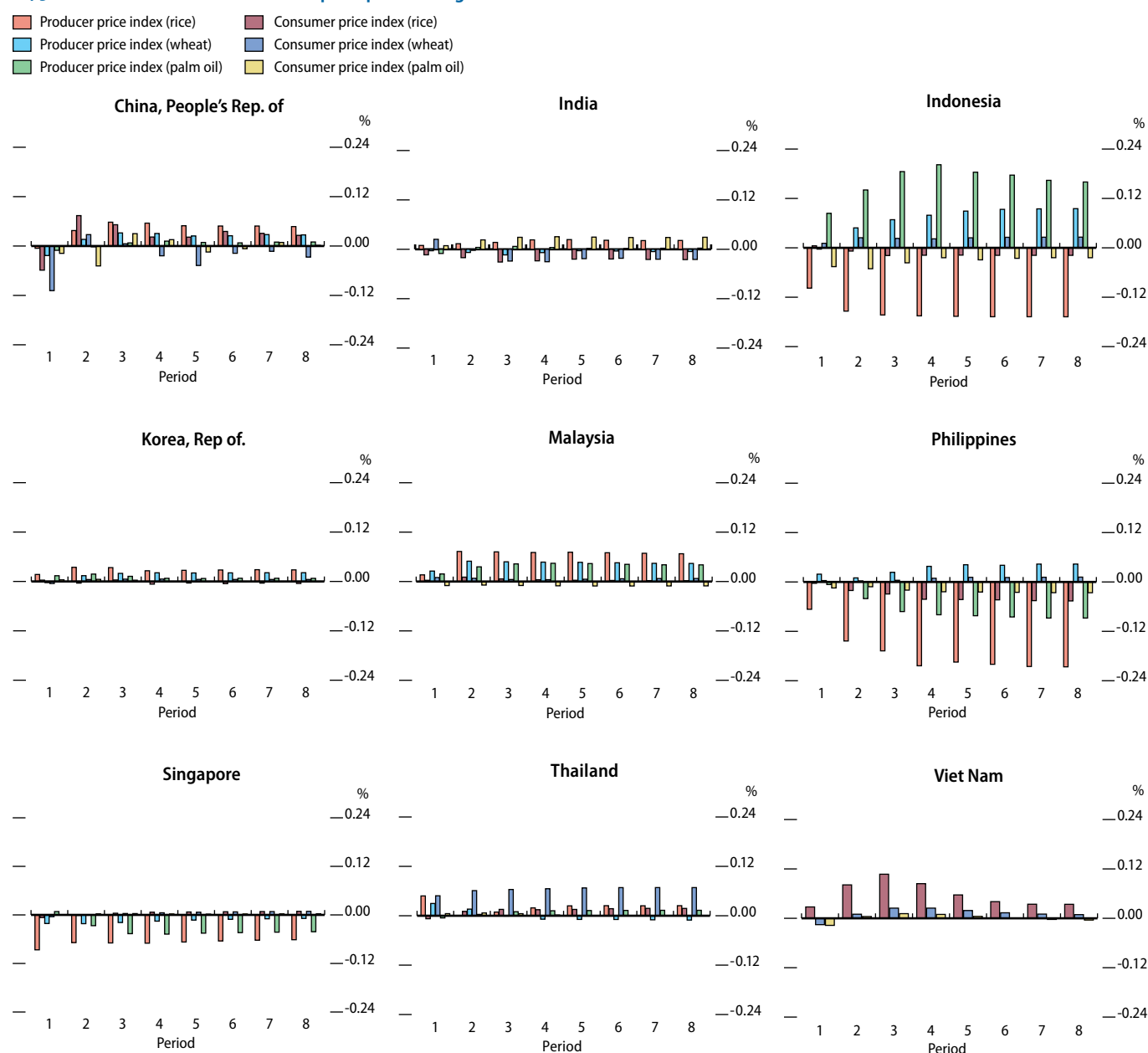
[Click here for figure data](#)

of transmission from world food prices (rice in particular) to domestic food prices. Among rice-exporting countries, such as Thailand (35% of global rice exports), India (17%), and the PRC (3%), producer prices increase by a cumulative total of 0.02–0.06% after 1 year in response to a 1% rise in the world rice price. In contrast, the pass-through coefficients are negative for Indonesia, Philippines, and Singapore.

The pass-through of palm oil prices to producer prices is higher in Indonesia and Malaysia than in the other countries. In Indonesia, producer prices rise by 0.08% in the first quarter and rise by a cumulative total of 0.2% after 1 year. In Malaysia, producer prices rise by 0.02% in the first quarter and a cumulative total of 0.04% after 1 year. For the other countries, producer prices increase by less than 0.03% after 1 year in response to a 1% rise in palm oil prices. The pass-through of wheat prices in India, a net wheat exporter, is an exception. The pass-through is limited by government subsidies. Note that a slight decline of the pass-through to producer prices in many countries results from a supply response to food price increases.

Second, palm oil pass-through coefficients tend to reflect the low share of vegetable oils in the consumption basket,⁴ and the pass-through coefficients to consumer prices for palm oil tend to be lower than for

2.4.5 Cumulative coefficients of food price pass-through



Notes: Period is in quarterly terms. For India, the wholesale price index was used.

Source: Staff calculations.

[Click here for figure data](#)

rice or wheat. The exceptions are the PRC and India, where wheat has a lower pass-through. The average per capita consumption of palm oil and vegetable oils among the nine countries was 3.2 kilograms (kg) and 9.5 kg respectively, compared to 39 kg for wheat and 102 kg for rice (Table 2.4.2). In Viet Nam, for example, the cumulative pass-through of rice prices to consumer prices is 0.08% after 1 year, compared to 0.02% for wheat and 0.01% for palm oil. In Thailand, the cumulative pass-through of palm oil, wheat and rice prices to consumer prices after 1 year are 0.002%, 0.01% and 0.07%, respectively.

Third, food subsidies limit the degree of pass-through to consumer prices in many Asian countries. While the per capita rice consumption of Indonesia and the Philippines is relatively high at 141 kg and 111 kg,

2.4.2 Consumption per capita of key agricultural products for selected countries and regions, 1995–2003

Region/Economy	Wheat			Rice			Palm oil		
	1995	2000	2003	1995	2000	2003	1995	2000	2003
China, People's Rep. of	79.3	74.1	61.4	91.3	87.6	78.5	1.1	1.0	1.5
India	63.6	57.2	63.6	80.7	74.7	71.1	0.8	3.1	3.4
Indonesia	21.3	19.4	17.3	146.5	148.9	141.1	7.1	7.7	7.9
Korea, Rep. of	48.7	52.9	48.4	95.3	87.8	77.7	1.2	1.9	2.7
Malaysia	65.6	35.6	65.6	86.8	86.1	70.8	7.5	6.1	6.2
Philippines	31.5	27.0	29.7	94.3	106.4	110.6	0.8	1.6	1.0
Singapore	-	-	-	-	-	-	-	-	-
Thailand	9.2	10.5	11.5	105.6	106.3	104.4	2.5	2.7	2.6
Viet Nam	6.0	8.1	10.1	163.0	169.6	169.1	0.0	0.0	0.0
Asia	69.2	66.4	63.5	87.1	84.3	79.4	1.7	2.3	2.7
Latin America	51.5	49.0	52.5	22.8	26.2	26.0	1.5	1.6	1.9
Developing countries	62.3	60.2	58.6	71.4	69.4	65.7	1.9	2.3	2.7
World	71.0	68.4	67.0	57.6	56.8	54.2	1.6	2.0	2.2

- = data not available.

Note: The shading indicates a decline in consumption per capita.

Source: Food and Agriculture Organization of the United Nations, available: <http://faostat.fao.org>.

respectively, and comparable to the PRC, Thailand, and Viet Nam (Table 2.4.2), high subsidy levels limit the pass-through (see ADB 2008a; and *Causes of high food prices*, also in Part 2 of this publication).

The pass-through coefficient is also negative or very low for Korea and Malaysia. This is a result of both a small share of rice in the consumption basket and some rice subsidies. For wheat, there is negative pass-through to wholesale prices in India and a very limited pass-through to consumer prices in Malaysia. Since the two countries are relatively heavy wheat consumers (more than 60 kg per capita), it is likely that the limited pass-through is largely due to government policies that impede the adjustment of domestic prices to international wheat price rises. In Indonesia and Malaysia, government policies such as export taxes and price controls on cooking oils limit the pass-through of palm oil prices to consumer prices. The per capita consumption of palm oil in these two countries is around 6–8 kg, or higher than the average of 3.2 kg for the eight Asian countries.

Conclusion and policy inferences

The central finding that emerges from the empirical analysis of this chapter is that developing Asia's current inflation surge is largely due to two factors unrelated to the external oil and food price shocks, namely excess aggregate demand and inflation expectations. This finding stands in sharp contrast to the prevailing misconception that the region's rising inflation is beyond the control of monetary policy because it is mainly the result of recent global food and oil price shocks. The popularity of this view is partly due to the almost perfect coincidence of the spike in commodity prices and the spike in Asia's inflation. This provides regional policy makers with an excuse for not raising interest rates since monetary tightening tends to be much less effective against cost-push inflation as opposed to demand-pull inflation.

The specific evidence for the central finding is that external food and

oil price shocks explain less than 30% of Asia's consumer price inflation while excess aggregate demand and inflation expectations account for about 60%. At a minimum, such evidence implies that the region's current inflation is not entirely due to outside forces beyond the region's control. In light of the stylized facts of Asia's recent macroeconomic performance—years of uninterrupted rapid growth—it should come as no surprise that excess aggregated demand plays a role in the region's soaring inflation. The importance of overheating demand as a source of inflation is especially evident in the PRC. The recent evolution of the output gap indicates that excess aggregate demand has, in fact, been growing in many countries in the region. The influential role played by inflation expectations in Asian price increases should also come as no surprise. As noted earlier, years of lax monetary policies by Asian central banks have helped stoke aggregate demand and fueled inflation pressures. The generally accommodative stance of monetary policy has given rise to widespread expectations of higher prices.

The econometric analysis of the pass-through of global food and oil prices to domestic prices indicates that subsidies have limited the extent of pass-through in many countries. Nevertheless, there is a clear regionwide trend toward the reduction of subsidies, largely due to the fiscally unsustainable costs of subsidies in light of high international market prices. Those costs will eventually force those countries which still retain substantial subsidies to align their food and fuel prices more closely with international prices. Such prospective reduction of subsidies will significantly exacerbate inflation in many Asian countries. The finding that the pass-through of external price shocks has been substantially greater for producer prices than for consumer prices also implies greater pass-through in the coming months. Producers tend to pass on higher input costs to consumers only after a time lag. Therefore, both subsidy reduction and greater pass-through of producer costs to consumer prices imply that cost-push inflation pressures are set to intensify throughout Asia in the near future.

The central finding—that excess aggregate demand and inflation expectations are at least as important as external shocks as sources of Asian inflation—has vast implications for monetary policy in the region. In particular, it means that monetary tightening will continue to be a powerful tool for fighting inflation in Asia. Since domestic demand contributes substantially to aggregate demand and hence inflation, especially in the PRC, higher interest rates and other monetary contraction measures can exert their usual anti-inflation effect by cooling down demand. Monetary policy can also have a more direct and immediate impact on inflation expectations, which are to a large degree shaped by the basic stance of monetary policy. The prospects of greater cost-push inflation pressures in the near future further strengthen the case for firmly anchoring inflation expectations through preemptive and decisive tightening of monetary policy.

Effectiveness of monetary policy also depends on exchange rate policy. The movement of the exchange rate must be in line with tightening monetary policy, i.e. the exchange rate should be allowed to appreciate to reduce the domestic cost of imports. Intervention in the foreign exchange market to keep the exchange rate undervalued would limit

the effectiveness of tightening monetary policy in anchoring inflation expectations and clipping inflation pressures, especially in countries where the pass-through of exchange rate movements to domestic prices is relatively high.

Monetary tightening, while urgently needed to contain inflation before it gets out of control, is not without significant risks. In particular, the G3 slowdown will have adverse repercussions for the export and growth performance of developing Asia. Therefore, there is a downside risk that monetary policy may reinforce a contraction even after demand had already begun to slacken. However, it is important not to exaggerate those risks. The more urgent priority for monetary authorities right now is to contain inflation expectations rather than curb domestic demand. The region's growth prospects remain fundamentally strong even after fully factoring in the G3 slowdown. Therefore, such risks do not diminish or compromise the broader policy message that comes from this chapter—that there has to be a reshifting of the basic monetary policy stance toward tightening throughout developing Asia. For far too long, Asian monetary policy has been lax and accommodative of excessive aggregate demand.

One big reason for this is that since the end of the Asian crisis, priority has been to boost economic growth, all the more so since the region did not face an inflation problem. Loose monetary policy has fueled the backward-looking inflation expectations that the above analysis found to be such an important source of Asian inflation. Looking ahead, monetary policy accommodative of the food and oil price shocks will give rise to forward-looking inflation expectations, which will reinforce the already high backward-looking inflation expectations. This truly frightening prospect gives the region's central banks every reason to wake up to the importance of subduing inflation before it becomes entrenched and inflicts lasting damage on the economy.

In truth, the growth–inflation tradeoff facing Asian central banks today is an unusually favorable one. This is because the growth prospects of developing Asia remain fundamentally robust. The loss of output due to anti-inflationary tightening will somewhat dent the region's growth but is unlikely to push the region into recession. Central banks may come to rue not acting today as a rare missed opportunity to fight inflation at a manageable cost. However, given the enormous desire for growth in Asia, it would still take a great deal of political courage to decisively tighten policy. The central finding that external factors can at best account for only part of Asia's inflation should temper the collective regional tendency to blame uncontrollable outside forces and use them as an excuse for inaction. Instead, the region should view the homegrown nature of its inflation as an opportunity for effective action against a serious but controllable problem.

Endnotes

1 Aggregate demand includes both domestic demand and external demand for exports.

This complicates the argument since export demand is contingent on world income and relative prices, and is exogenous. However, authorities in Asia have tended to undervalue their currencies relative to those of major trading partners such as the G3 (United States, eurozone, and Japan), and this has propped up exports and limited imports in the past.

However, as inflation rises in Asia relative to the G3, there is real appreciation and export demand falls as a result of the relative price change. Demand is now being largely driven by internal domestic demand that is rising as a result of prolonged loose monetary policy and inappropriate exchange rate policies. See Jongwanich and Park (2008).

- 2 In fact, the formation of inflation expectations could have both backward- and forward-looking components (Mankiw et al. 2003; Ball 2000). However, previous studies such as McCarthy (1999), Bhundia (2002), and Duma (2008) found that backward-looking expectations better explain domestic prices in developing Asia. In addition, it needs to be recognized that developing Asia does not have reliable forward-looking indicators, as seen in industrial countries.
- 3 To capture the overall movements of food prices, the prices of rice, wheat, and palm oil are replaced by an overall international food price index, provided by the International Monetary Fund (International Financial Statistics, downloaded June 2008).
- 4 The share of food expenditure in the consumption basket in the consumer price index is a better indicator in explaining the degree of food pass-through to domestic prices. However, with data limitations, consumption per capita is used to proxy the importance of each food product in the consumption basket.

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