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VIETNAM

Selected Issues

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Approved by the Asia and Pacific Department

October 6, 2006

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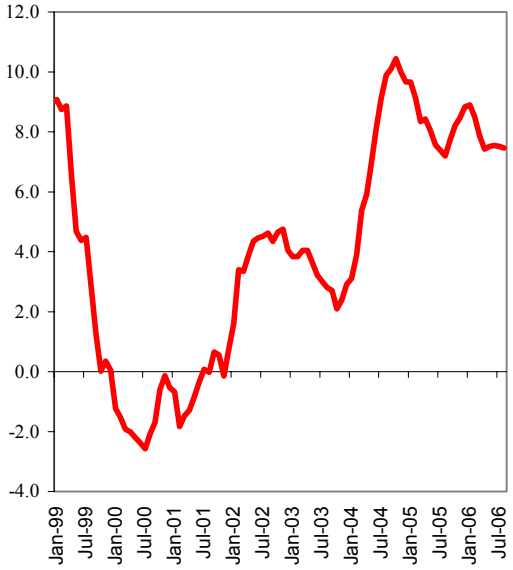
I. What Drives Inflation in Vietnam? A Regional Approach[1]

A. Introduction

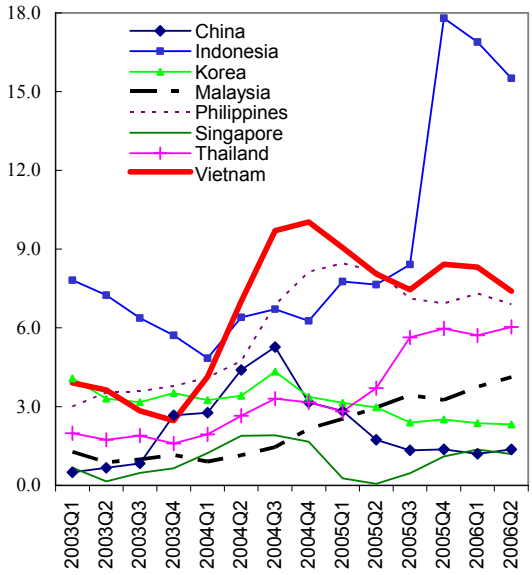
1. **Vietnam was remarkably successful in bringing down inflation in the 1990s to a single digit range, after a period of very high inflation in the late 1980s**. Following the early years of price liberalization and economic reforms launched under the authorities' "Doi moi", or renovation program, inflation rose to a peak of 453 percent in 1986 and fell rapidly thereafter as macroeconomic policies were tightened. After remaining in the single digit range during the second half of the 1990s, inflation began an upward trend that accelerated in late 2003 (Figure 1). Since then, Vietnam has experienced inflationary pressures that seem more persistent than in the recent past and higher than in other emerging markets in the region, with the exception of Indonesia (Figure 2).

Figure 1. Vietnam: Headline Inflation,1999-2006, (y-o-y percentage change) 1/



Source: General Statistics Office.
1/ Monthly data.

Figure 2. Emerging Asia: Headline Inflation, 2003-06, (y-o-y percentage change) 1/



Source: CEIC Data Company Ltd.
1/ Quarterly data.

2. **The potential unfavorable effects of inflation on poverty and growth are well-known.** Inflation increases income inequality because it is essentially a regressive tax with an adverse impact on the poor (Easterly and Fischer, 2001). Because the poor do not generally hold financial assets that provide an adequate hedge against inflation, but only cash and bank deposits, inflation can quickly erode their purchasing power. Inflation can also hurt

[1] Prepared by Patrizia Tumbarello (APD).

growth once it exceeds a certain threshold (Sarel, 1996; and Khan and Senhadji, 2001). High inflation clouds price signals and limits the quality and the quantity of investment. It can also hurt a country's export competitiveness by leading to increases in domestic production costs and to an appreciation of the real exchange rate.

3. **Understanding the root causes of inflation is critical in establishing the appropriate policy response.** This chapter addresses several questions. Is inflation in Vietnam a worrisome phenomenon or merely a temporary change in relative prices that will be self-correcting and benign? To what extent is the recent inflation attributable to the effects of supply shocks, higher oil prices, and the liberalization of administered prices? In particular, have the above factors exerted only a transitory impact on inflation or are they likely to have had more permanent effects on core inflation? Is there any evidence that excess demand pressures have also been at play? What explains Vietnam's inflation differential with other emerging countries in the region?

4. **To shed light on these questions, the chapter analyzes the available empirical evidence using several different approaches.** Section B uses a disaggregated approach to examine the key components of headline inflation, as well as some alternative measures of inflation, including proxies for core and fuel inflation. It also makes a preliminary attempt to assess the relative roles of external shocks, relative price changes (i.e., Balassa-Samuleson effects), administered prices, and demand pressures. Section C uses a more formal Vector Error Correction Model to estimate the proximate determinants of inflation in Vietnam, while Section D estimates a cross-country dynamic panel model to explain the differential behavior of inflation in Vietnam relative to other countries in the region. Section E presents a simple panel model, with country-fixed effects, to identify the threshold above which inflation is likely to exert a negative effect on growth. The main conclusions are summarized in Section F. The specification of the econometric models, as well as data issues, is reported in Annex 1.

5. **The main results suggest that monetary developments have exerted an increasing influence on inflation in Vietnam over the last few years and that inflationary inertia plays a larger role in Vietnam than in other countries in the region.** This suggests that reducing inflationary expectations may be more difficult than in some other countries. Furthermore, while the output gap plays a role in explaining the short-term fluctuations in the rate of inflation, movements in core inflation have become increasingly important in explaining inflation dynamics, possibly reflecting the second-round effects of oil price increases. The evidence indicating the presence of Balassa-Samuelson-type effects is mixed. The analysis on the desirable rate of inflation points to the conclusion that it is not a country's inflation rate per se that may matter most, but how it compares with inflation in neighboring countries and trading partners.

B. Recent Determinants of Inflation in Vietnam

6. **Headline inflation in Vietnam has been high by regional standards in recent years, but shows some indication of abating in 2006.** However, while the year-on-year rate of inflation has declined from 9.7 percent in 2004 and 8.8 percent at the end of 2005 to 7.5 percent in August 2006, it has remained well above the rates prevailing in Vietnam's major trading partners.

7. **Cross-country data suggest that the volatility and persistence in Vietnam's inflation have also been high compared to other emerging economies in Asia** (Table 1 and Section D below). While a number of external shocks, including rising food and oil prices, were the dominant causes of inflation beginning in 2004, most of these shocks were common to the rest of the region. Although food price inflation began to decelerate in 2005, headline inflation remained on an upward trend, at least until the beginning of 2006. The series of nonfood prices excluding oil components, which was constructed as a proxy for core inflation, shows that core inflation trended up in Vietnam at a faster rate than in most neighboring countries (Figure 3).

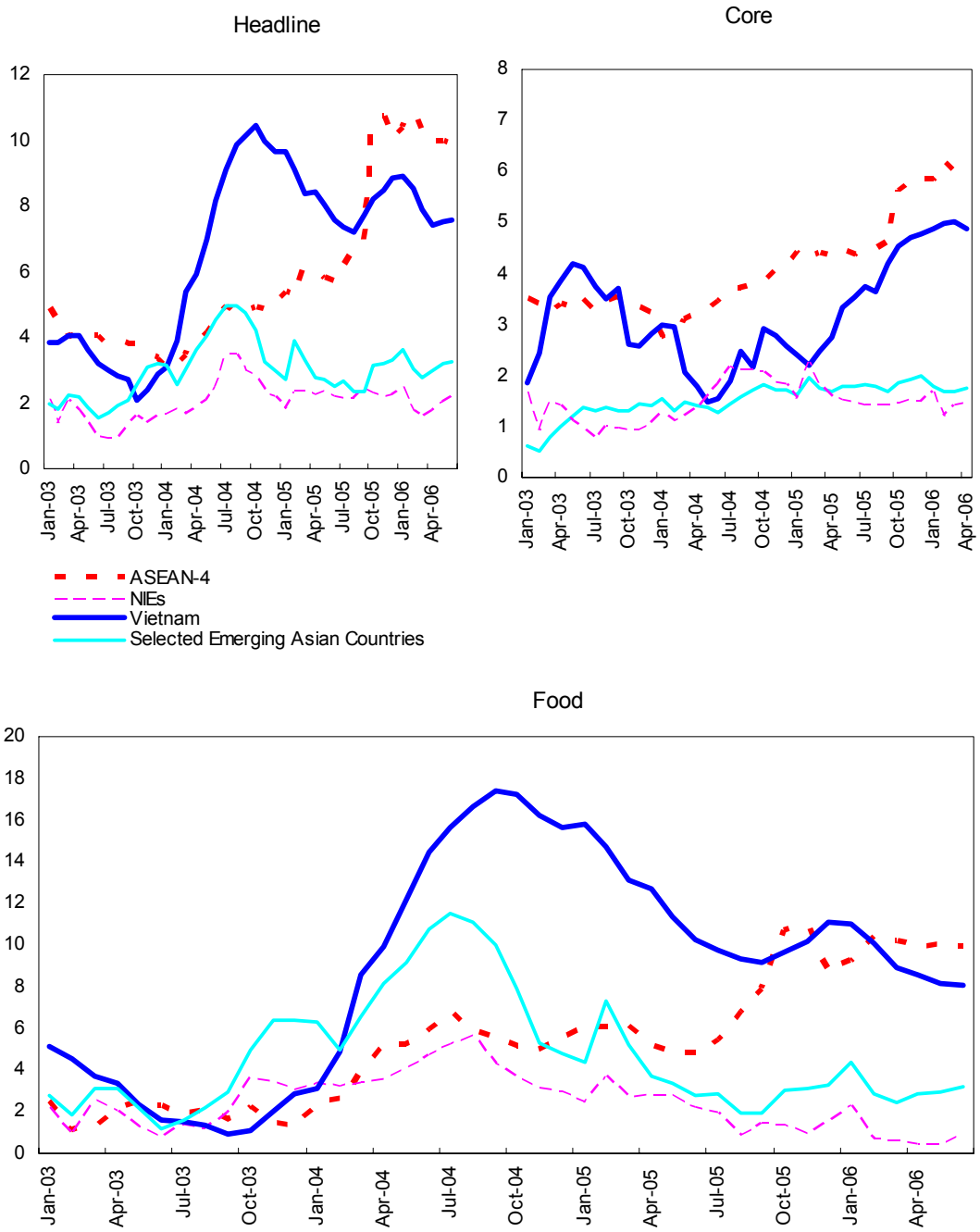
Table 1. Vietnam and Emerging Asia: Headline Inflation Statistics, 2002Q1-2006Q2 1/ 2/
(In percent)

	Mean	Median	Maximum	Minimum	Std. Dev.
ASEAN-4	5.8	5.1	10.8	3.1	2.2
Newly-industrialized economies (NIEs)	1.8	1.8	3.5	0.3	0.7
Selected Emerging Asian Countries	2.6	2.7	5.0	0.8	1.1
Vietnam	**6.0**	**5.6**	**10.4**	**1.6**	**2.6**

Sources: General Statistics Office; and Fund staff estimates.
1/ Monthly data.
2/ ASEAN-4 includes: Indonesia, Malaysia, Philippines, and Thailand. NIEs includes: Hong Kong, Korea, Singapore, and Taiwan POC. Selected Emerging Asian Countries include: China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

8. **The above observations suggest that some factors that may be specific to Vietnam may have magnified and perpetuated the impact of external shocks on inflation**. The remainder of this section makes a preliminary attempt to ascertain the presence of such idiosyncratic factors. Following a review of the nature of the recent external shocks, and their apparent effects on inflation in Vietnam since 2004, the section assesses in turn the possible roles of productivity-driven changes in relative prices, changes in policies relating to administered prices, and demand pressures.

Figure 3. Vietnam and Emerging Asia: Different Measures of Inflation, 2003-06
(percentage change, year-on-year) 1/



Sources: CEIC Data Company Ltd; Authorities' data; and Fund staff estimates.

1/ ASEAN-4 includes: Indonesia, Malaysia, Philippines, and Thailand. NIEs includes: Hong Kong, Korea, Singapore, and Taiwan POC. Selected Emerging Asian Countries include: China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

The food supply and oil price shocks

9. **Food price inflation in Vietnam has been both higher and more volatile[2] than in the other countries in the region, and it was by far the most important contributor to the pick-up of inflation beginning in 2004** (Table 2). This appears to have reflected a combination of factors on both the supply and demand sides. The pick-up of international food prices, especially rice, of which Vietnam is the world's second largest exporter, was undoubtedly a major factor in early 2004 (Figures 4 and 5). Although the government tried to moderate the impact on domestic prices by regulating the quantity of rice exports, an outbreak of avian flu, which also occurred in early 2004, led to increasing pressures on beef, fish and seafood prices, while widespread droughts subsequently led to supply shortfalls for other domestically-produced food products. As the impact of the initial supply shocks abated, inflation in the prices of food staples, which include mainly rice and cereal products, moderated somewhat in 2005. However, inflation in the prices of foodstuffs, which include a much broader variety of items, remained in the double-digit range in 2005, suggesting that

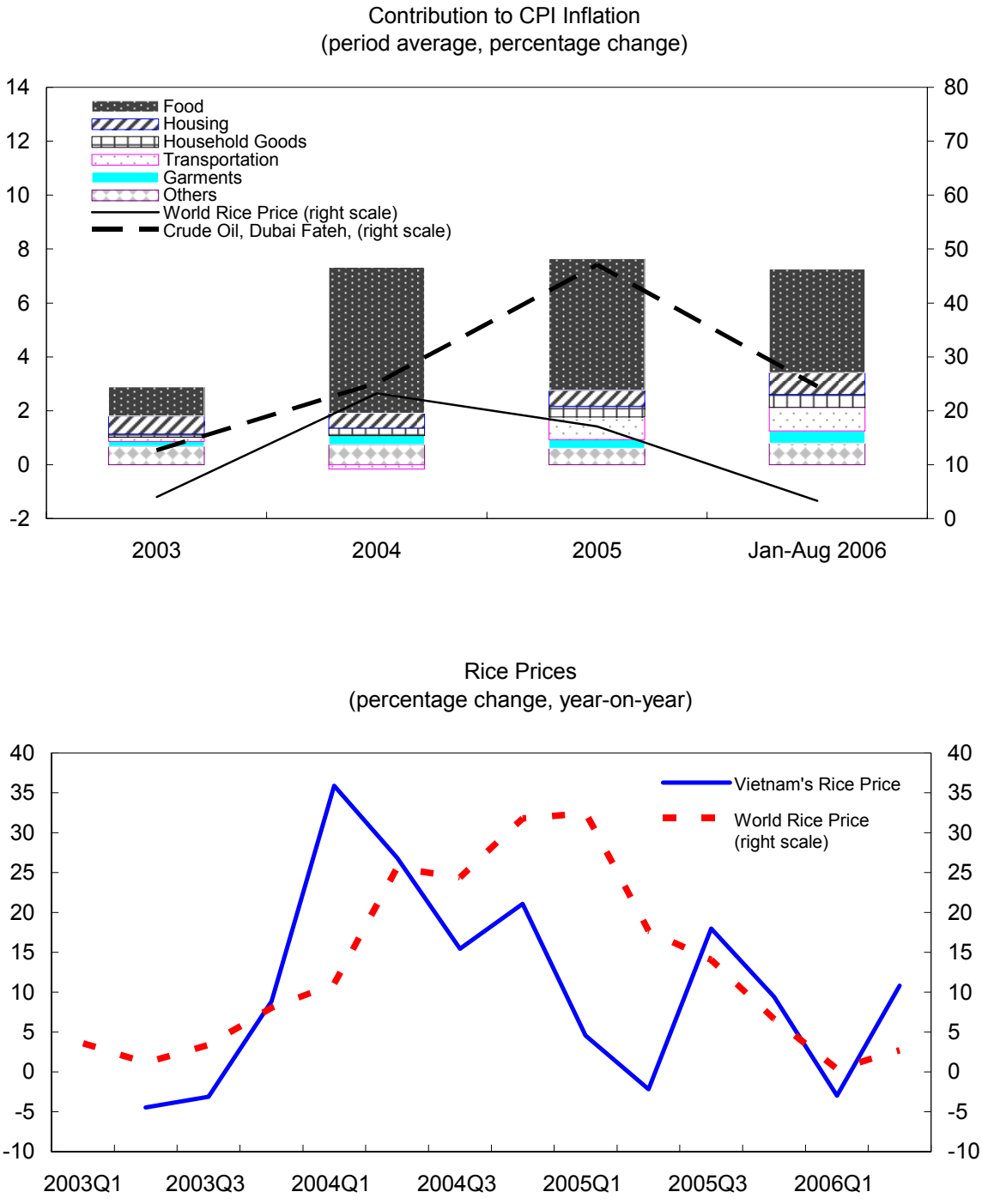
Table 2. Vietnam: CPI Inflation, 2003-06

	2003	2004	2005	Jan 2006-Aug 2006
	(Period average, Annual percentage change)			
CPI Inflation	3.2	7.7	8.3	7.8
of which:				
Food and foodstuff	2.5	12.6	11.3	9.0
of which: Staples	0.6	12.7	9.0	7.8
Other food	3.4	13.4	12.2	9.3
Non-food:	3.9	3.0	5.0	6.6
of which: Garments	2.4	4.3	4.2	5.9
Housing and construction	8.2	6.6	7.2	9.8
Household goods and equipment	1.2	3.1	4.3	5.2
Transportation	1.6	1.6	8.3	8.8
Others	4.1	4.6	3.7	4.8
	(Period average, Contribution to CPI inflation)			
Food and foodstuff	1.1	5.4	4.9	3.8
of which: Staples	0.1	1.3	0.9	0.8
Other food	1.0	4.1	4.0	3.1
Non-food:	2.1	2.3	3.4	4.0
of which: Garments	0.2	0.3	0.3	0.5
Housing and construction	0.7	0.5	0.6	0.8
Household goods and equipment	0.1	0.3	0.4	0.5
Transportation	0.2	0.2	0.8	0.9
Others	0.9	1.0	1.3	1.3

Sources: General Statistics Office; and Fund staff estimates.

[2] During January 2003-June 2006, the standard deviation of food price inflation was 5.1 percent in Vietnam, 3.1 percent in ASEAN-4, and 1.3 percent in the newly-industrialized economies (NIEs).

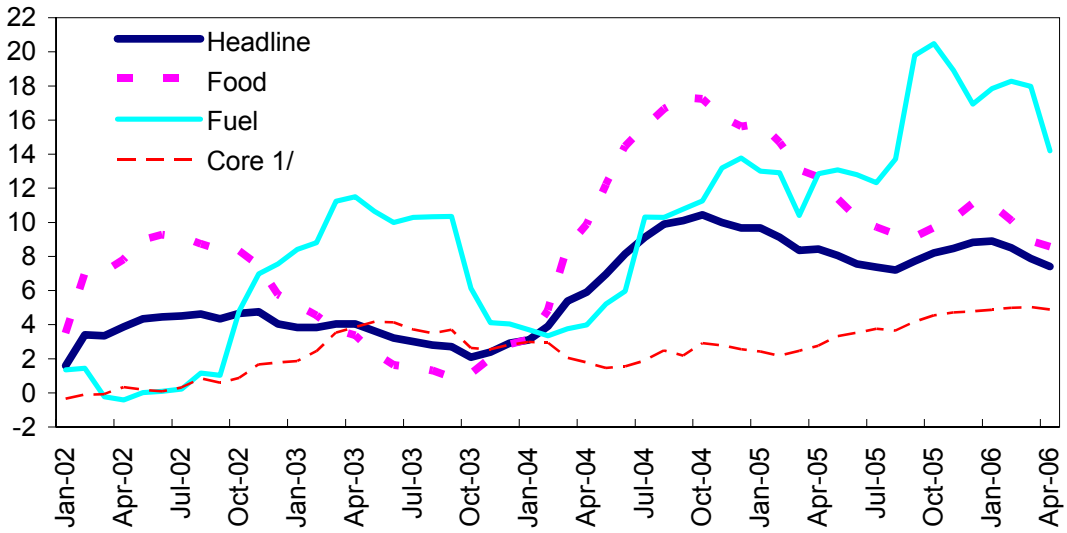
Figure 4. Vietnam: Contribution to CPI Inflation and Rice Prices, 2003-06



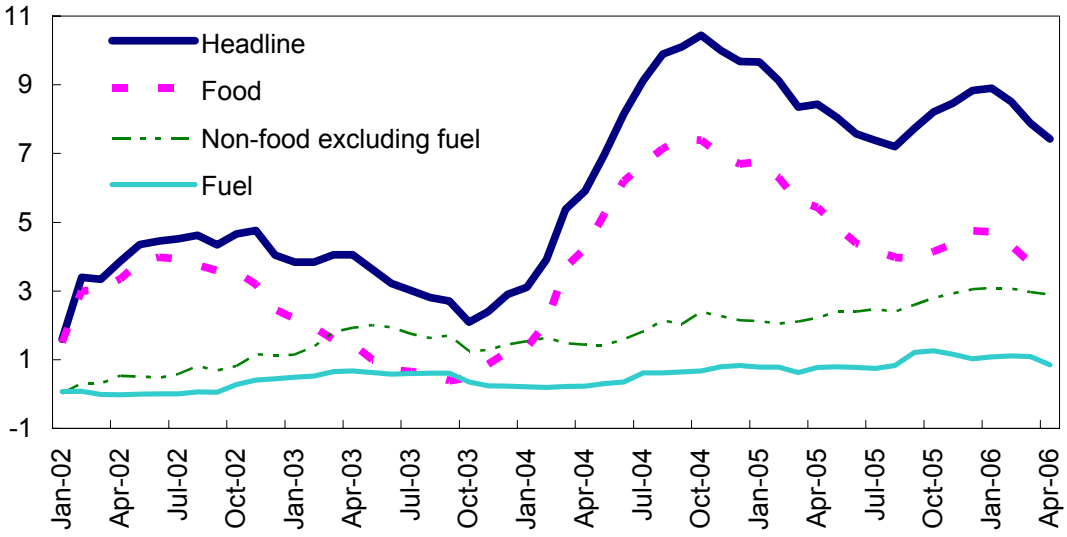
Sources: IMF Commodity Price System, Reuters; General Statistics Office; and Fund staff estimates.

Figure 5. Vietnam: Consumer Prices, 2002-06

Inflation
(period average, percentage change, year-on-year)



Contributions to Headline Inflation
(percentage change)



Sources: General Statistics Office; and Fund staff estimates.

1/ Proxy of core inflation, defined as nonfood component of CPI net of fuel and fuel-related items.

demand pressures may have also been at play. In particular, the progressive increase in the common minimum wage, together with large adjustments in the civil service wage scale introduced under the government's Public Administration Reform Program, led to considerable increase in the purchasing power of wages. [3] This, combined with the rising level of economic activity and a generalized increase in aggregate demand, is likely to have fueled expectations of rising inflation, thus exacerbating and prolonging the inflationary impact of supply-side shocks in the agricultural sector.[4] Indeed, demand pressures may well have had a more immediate impact on food rather than nonfood components of the CPI during the recent period for at least two reasons. First, food markets in Vietnam are much more decentralized and less prone to be subjected to formal or informal price controls, which may have been applied to varying degrees in other sectors, as discussed below. Second, even in fully-liberalized market economies, empirical studies have found that prices are least sticky in wholesale and retail trade (which typically include most food distribution) and most sticky in the service sector (which account for a large share of Vietnam's nonfood CPI).[5]

10. **Petroleum price increases appear to have had a modest direct effect on inflation in Vietnam, peaking at about 1 percent in 2005 (Table 3)**.[6] This low contribution has been a result of the relatively small direct weight of petroleum products in the CPI basket, together with the government's use of a combination of import duty reductions and the management of administered prices to contain the indirect effects on inflation in the short run. While domestic oil prices were increased nine times between end-2003 and August 2006, they generally remained below the levels of world prices. Nevertheless, Vietnam made further progress in passing through world petroleum prices during 2006. Average petroleum prices were raised in two stages in April and August 2006, by a cumulative 18.5 percent. Following these increases, the pass-through of increases in international oil prices since 2003 was deemed to have been complete for gasoline and kerosene, but still incomplete for diesel. With international oil prices beginning to retreat in September, the authorities reinstated the import duty on most petroleum products other than kerosene and diesel, initially at a level of 5 percent and subsequently increased to 15 percent, and reduced gasoline prices by 8.5 percent.

---

[3] The common minimum wage has been successively raised by 38 percent in January 2003, 20.7 percent in October 2005, and another 28.6 percent in October 2006. Average civil service wages were increased by an additional 30 percent in October 2004. Minimum wages in foreign-invested firms were raised by 39-45.8 percent (42% on average) as of February 2006.

[4] For a more extensive discussion of the cost-push and demand-pull factors, as well as the role of inflationary expectations in explaining the recent behavior of inflation, see Central Institute for Economic Management, *Vietnam's Economy in 2005*, pp. 32-36.

[5] See, for example, Blinder, Canetti, Lebow and Rudd (1998).

[6] Although small, the contribution of petroleum prices to the CPI increased from nearly zero in 2001 to more than one percent in 2005.

Table 3. Vietnam: Petroleum Prices: Direct and Indirect Contributions to Headline Inflation, 2001-05
(In percent)

	2001	2002	2003	2004	2005
Petroleum Prices	0.02	0.14	0.22	0.83	1.02
Direct effect 1/					
of which : Fuel for cooking	0.03	0.11	0.08	0.27	0.44
Fuel and lubricants	-0.02	0.01	0.10	0.52	0.49
Indirect effect 2/					
of which : Public transport	0.01	0.03	0.04	0.04	0.09
Electricity	0.03	0.31	0.02	0.00	0.01

Sources: General Statistics Office; and Fund staff estimates.
1/ Accounting for 3.27 percent of the CPI basket until April 2006.
2/ Accounting for 2.6 percent of the CPI basket until April 2006.

11. **However, the second-round effects of the oil price shock are likely to have been substantial.** As already noted, core inflation has trended up in recent years. This trend reflects significant contributions from increases in the prices of housing and construction materials, transportation and telecommunications, garments, and household goods and equipment, which are likely to include some second-round effects of the surge in oil prices, and can be viewed as a measure of the persistent effects of the recent supply shocks.[7] As illustrated in Figure 6, core and oil price inflation have increased in tandem in recent years (the correlation coefficient between the two series amounted to 0.86 over the period January 2003-April 2006). [8]

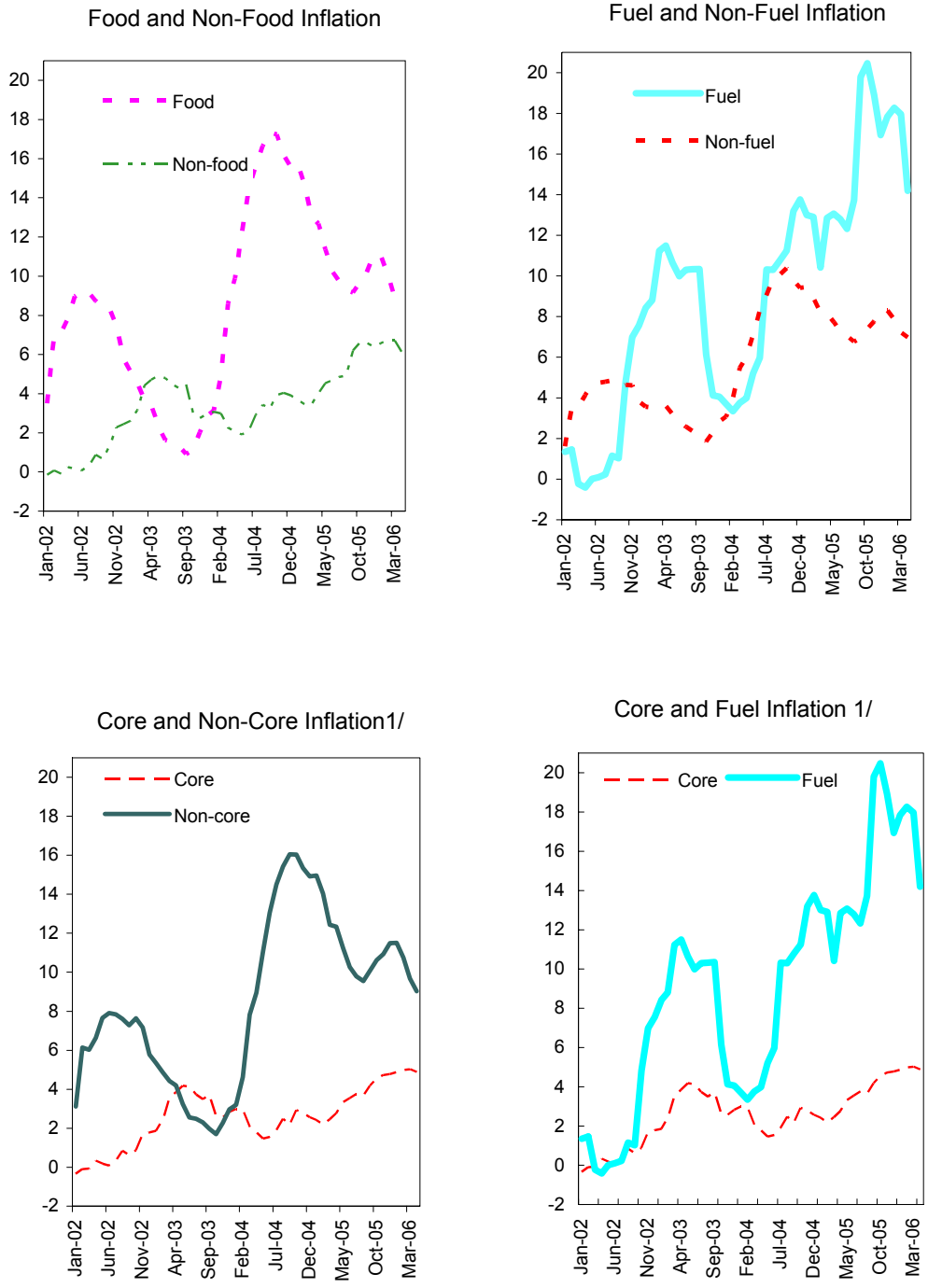
Is inflation in Vietnam explained by the Balassa-Samuleson effect? The role of relative prices

12. **Another question on the recent trend in inflation is the extent to which it has reflected changes in the prices of tradable relative to nontradable goods (Table 4)**. While in 2004 headline inflation was dominated by increases in prices of internationally traded goods, particularly food and energy, and the increases in the prices of nontradables remained more restrained, increases in the prices of nontradables gathered pace recently.

[7] For a similar interpretation, see, for example, Blinder (1997) who has argued that core inflation is the persistent part of inflation, which is highly correlated with future inflation.

[8] The CPI index was revised in May 2006. The total weight of food and foodstuff was reduced to 42.85 per cent in the new index, down from 47.90 percent under the old index. However, detailed data of the new index are currently unavailable, making it difficult to assess the impact of the latest round of increases in oil prices on core inflation.

Figure 6. Vietnam: Different Measures of Inflation, 2002-06
(period average, percentage change, year-on-year)



Sources: General Statistics Office; and Fund staff estimates.

1/ Proxy of core inflation, defined as non food component of CPI net of fuel and fuel-related items.

There was a significant appreciation of the real effective exchange rate in 2005, reflecting also the recent de facto peg of the dong to the U.S. dollar, and the consequent nominal effective appreciation of the dong during 2005.While these trends were attenuated in 2006, as the earlier appreciation of the nominal effective exchange was reversed, a key question is whether the increases in the prices of nontradables should be expected to become a major driver of inflation in the period ahead.

Table 4. Vietnam: Price Indicators, 2003-06

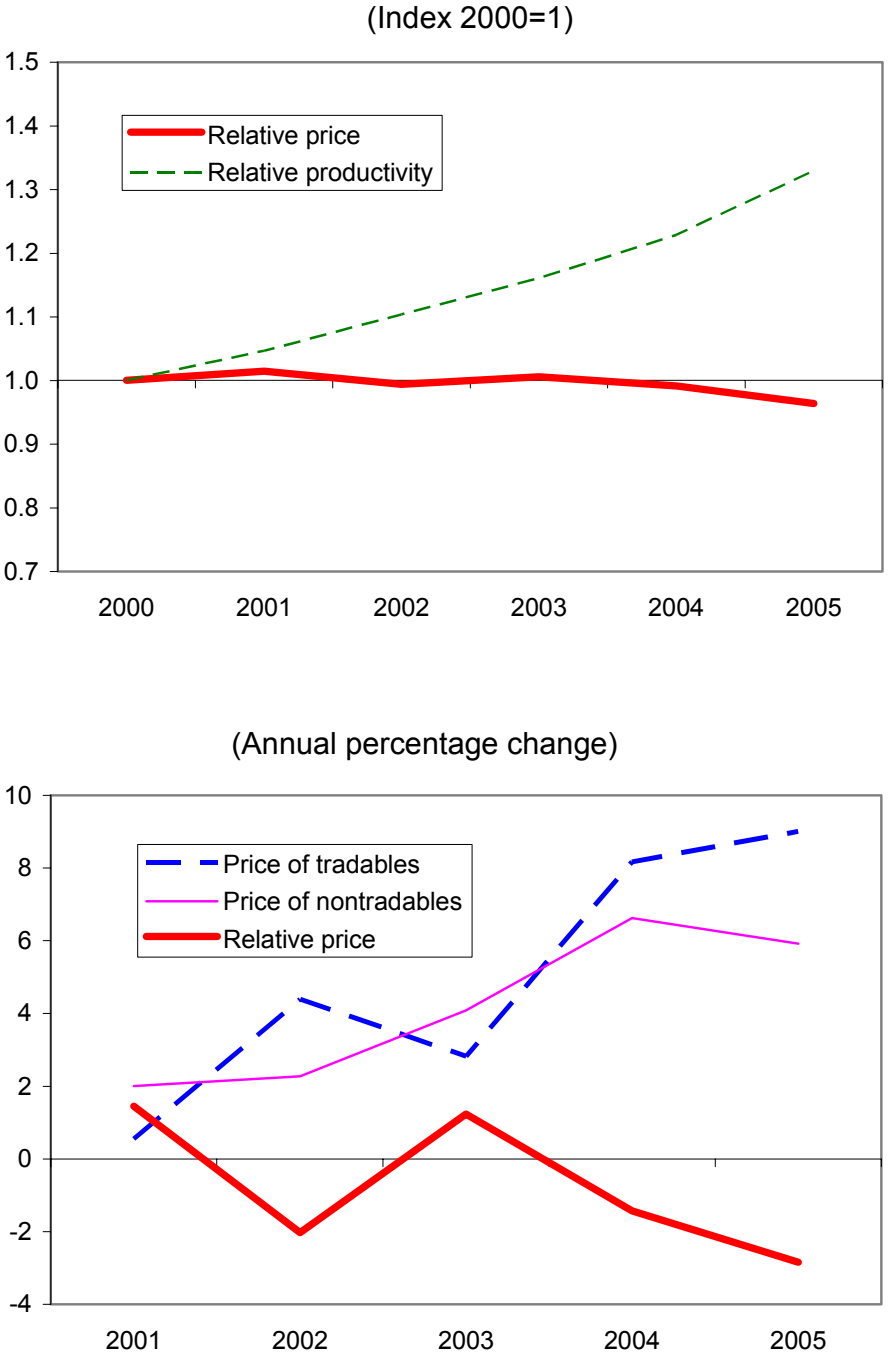
	2003	2004	2005	Jan 2006-Aug 2006 Prel.
	(Period average, Annual percentage change)			
CPI inflation	3.2	7.7	8.3	7.8
Price of nontradables	4.1	6.6	5.9	7.5
Price of tradables	2.8	8.1	9.0	8.1
Relative price of nontradables/tradables	1.2	-1.4	-2.8	-0.6
GDP deflator	6.7	8.2	8.0	...
Import prices	3.2	5.4	-0.9	...
Export prices	1.1	6.6	11.8	...

Sources: General Statistics Office; WEO database; and Fund staff estimates.

13. **More specifically, it would be important to ascertain the extent to which the recent upward trend in inflation in Vietnam is a result of an adjustment of the relative prices of nontradable goods and services, as suggested by the Balassa-Samuelson hypothesis**. The Balassa-Samuelson effect arises when a developing economy experiences large productivity gains in the tradable sectors that trigger generalized wage increases and higher inflation in the nontradable sector, resulting in cost-push inflation in the nontradable goods sector. If the underlying dynamics of prices are due to this process, inflation can be viewed as a temporary side-effect of an equilibrium movement in relative prices that would eventually subside as the productivity gap between the tradable goods sectors in Vietnam and its trading partners diminishes. In such a case, an increase in inflation driven by the productivity gap between the two sectors would be only transitory and self-limiting and should not be a cause of concern.

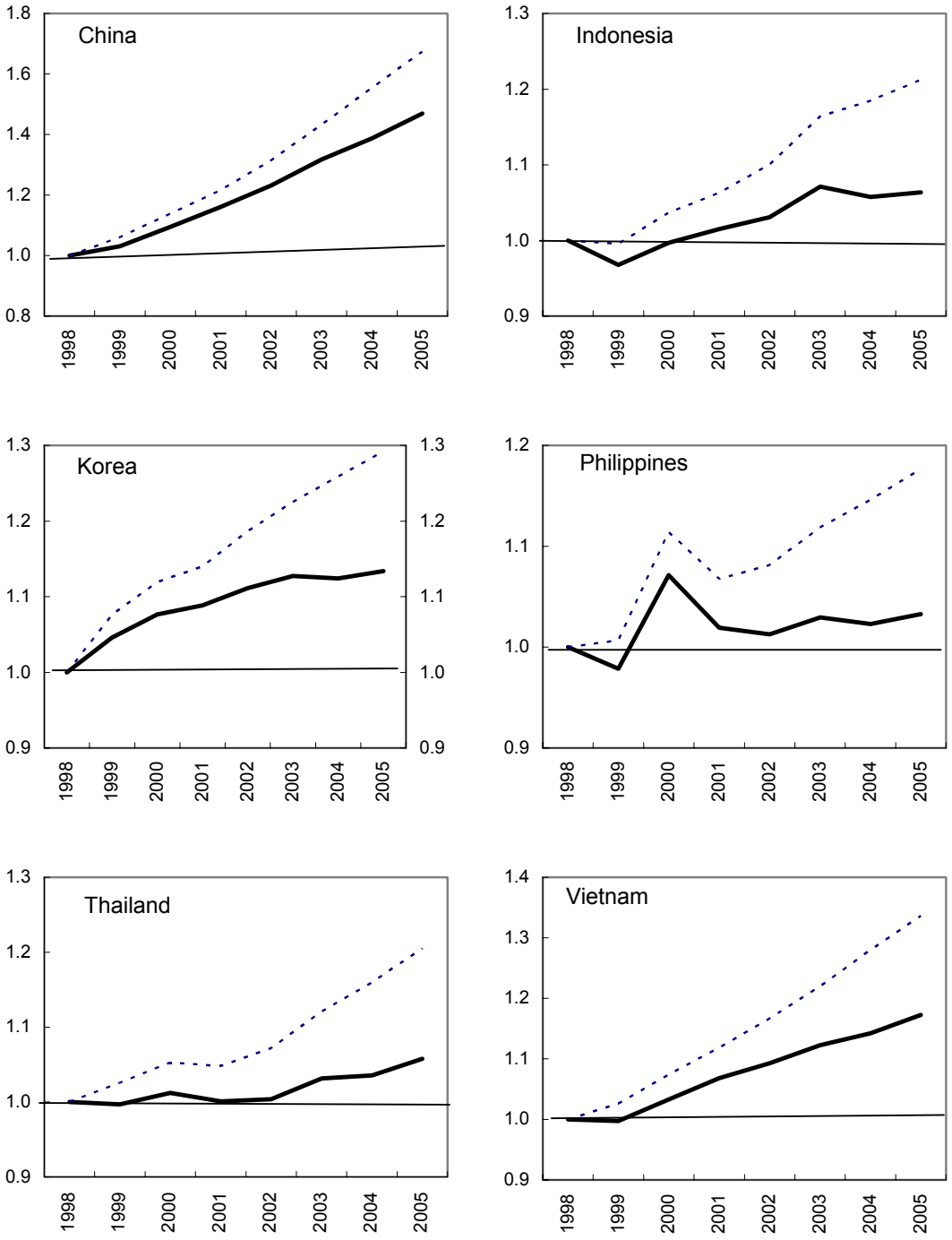
14. **The evidence indicating the presence of the Balassa-Samuelson hypothesis in Vietnam is mixed**. On one hand, Figure 7 points to a trend increase in productivity in the tradable sector relative to the nontradable sector, which is in line with the prediction of the Balassa-Samuelson hypothesis. Moreover, Figure 8 shows that labor productivity has increased more rapidly in Vietnam than in the more advanced partner countries, as proxied by the United States, and that the real exchange rate has appreciated. These developments are consistent with the Balassa-Samuelson hypothesis.

Figure 7. Vietnam: Relative Price and Relative Productivity, 2000-05 1/



Source: Fund staff estimates.
1/ Relative price= Price of nontradables/price of tradables. Relative productivity= productivity in the tradable sector/productivity in the nontradable sector.

Figure 8. Selected Asian Countries: Measures of Productivity and Real Exchange Rates, 1998-2005 1/



Sources: WEO databases; Information Notice System database; and Fund staff estimates.
1/ Indices: 1998=1. Solid line = Asian country's labor productivity/ U.S. labor productivity, Dashed line = Real exchange rate. Labor productivity = GDP/Employment.

15. **On the other hand, there is no evidence of a medium-term trend increase in the relative price of nontraded goods compared to traded goods**. According to the Balassa-Samuelson effect, the latter should show a strong upward trend. Thus, it is difficult to attribute the recent years' inflation to equilibrating changes in relative prices between the tradable and nontradable sectors.[9]

16. **A possible way to reconcile this apparently conflicting picture is by arguing that in a dual economy, where a big part of the labor force is still underemployed in the agricultural sector, it is not surprising to find only slight evidence of the pass-through of the impact of tradable sector productivity gains on wages in other sectors**. This is because any upward pressure on wages in the lower-productivity nontradables sector is likely to be limited as long as a large pool of underemployed labor in agriculture remains willing and able to secure employment in the nonagricultural sector at currently prevailing wages (see, e.g., Harris-Todaro, 1970).

The role of administered prices

17. **Changes in policies relating to administered prices could also play an important role in influencing inflation dynamics**. Administered prices are currently officially estimated to account for less than 10 percent of Vietnam's CPI basket, but they were much more prevalent at earlier stages of the transition to a market-based system. In general, price liberalization, in and of itself, should not cause permanent increases in the rate of inflation, but should only lead to one-off adjustments in the price level during the period in which it occurs. In Vietnam, a large number of prices were controlled between 1992 and 2002, in accordance with Decision 137 of April 27, 1992. The prices of several important commodities, including rice, cement, urea fertilizer, and steel for construction, were liberalized to a great extent during 2002–04.[10] However, key prices and tariffs, including for electricity, water, petroleum products, air tickets, bus fares, postal services and telecom charges continue to be set by the government, and some of the prices for other key inputs remain subject to legal ceilings or administratively set price ranges. The government has tightened controls over these prices over the last two years as a part of its efforts to limit inflation.

18. **Indeed, the largest increases in inflation occurred after the bulk of price liberalization took place, and during a period in which the administrative controls on some prices were tightened**. As a result, it is entirely possible that the actual rate of inflation may have understated the extent of inflationary pressures over the last two years.

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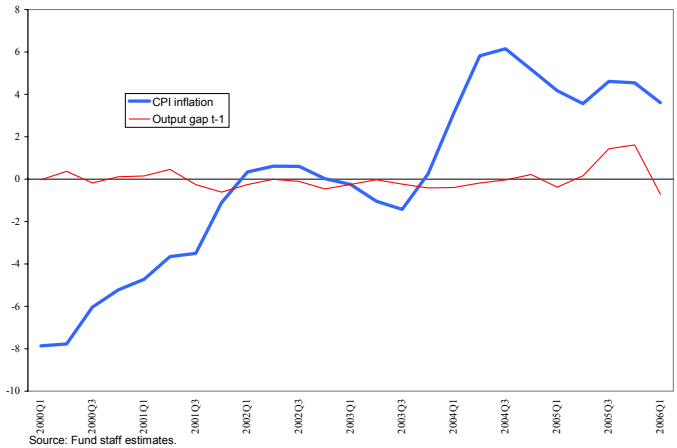
[9] The lack of any compelling evidence of a Balassa-Samuelson effect is consistent with the results found in Chapter III below.

[10] Ordinance No.40 on Prices, 2002; Decree No. 170 of December 12, 2003; and Circular 15 of March 9, 2004.

Against this background, while it is difficult to argue that price liberalization has made a significant contribution to the recent up-tick in inflation, it probably played a role in increasing the impact of monetary conditions on inflation, as discussed below.

The role of demand pressures

Figure 9. Vietnam: CPI Inflation and the Output Gap, 2000Q1-2006Q1, 1/

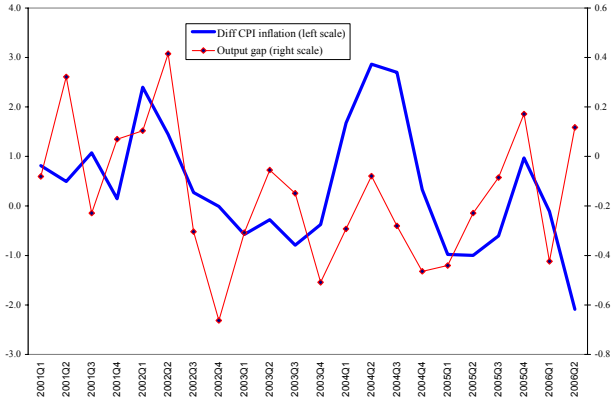


Source: Fund staff estimates.
1/ Both series have been de-meaned (i.e., each value has been substructed by its period mean), as in Rudebusch and Svensson, 1998.

19. **Excess demand pressure or overheating of the economy is a common cause of inflation in both industrial and developing countries**. A frequently-used measure of the extent of such pressure is the output gap. The most common definition of the output gap is the difference between actual output and potential output, with the latter defined as the level of output consistent with stable inflation. When output grows above its long-term potential rate, inflation would start to increase as bottlenecks in production, capacity limits and a tightening of labor markets would lead workers to demand higher wages and firms to increase their prices and wages as their costs of production and demand for their products rise. The output gap has been successfully applied in many studies to test the traditional Phillips curve specification of the inflation-unemployment tradeoff. While there is considerable evidence that the output gap is an important factor in determining inflation in advanced economies, its applicability to emerging economies should be taken with caution, as the conditions of near-full employment are rarely in place.

20. **A preliminary effort to assess the extent that the output gap has been an important determinant of inflation in Vietnam over the period Q1 2000–Q2 2006 does not point to any consistent pattern of causality, partly because the output gap exhibited limited variability through most of this period.** However, the more recent data suggest that the increase in inflation during 2005 could be partly attributed to the fact that the output gap is estimated to have been above potential during 2005 (Figure 9). Short-term fluctuations of inflation appear to be particularly influenced by the behavior of the output gap. This can be seen in Figure 10 that plots the first differences of CPI inflation and the output gap. The econometric analysis provided in section D below corroborates some of these findings.

Figure 10. Vietnam: First Difference of CPI Inflation and the Output Gap 1/



Source: Fund staff estimates.
1/ First difference of CPI Inflation and output gap.

21. **The growth of monetary and/or credit aggregates is another commonly used**

indicator of the extent of demand pressures, which may also be a useful gauge of the thrust of monetary policy. Previous empirical studies have found little evidence of a robust link between monetary growth and inflation in Vietnam, despite a sustained rapid growth of monetary and credit aggregates.[11] This could be attributed in part to the rapid structural transformation of the economy since the launching of the authorities' renovation program in the late 1980s, which may have resulted in sustained rapid increases in private saving and money demand. However, there is some evidence that the correlation between money and inflation has become positive and strong beginning in 2002, with trends in monetary aggregates appearing to affect inflation with a lag of about 12 months (see correlation matrix, Tables 5 and 6, and Figure 11). The growth of credit to the economy appears to be even more highly correlated with CPI inflation during this recent period, suggesting that credit may have become a useful leading indicator of inflation. Of course these findings need to be viewed with caution, as the fact that inflation appears to be correlated with lagged monetary and credit aggregates is not a proof of causation (Tobin, 1971), especially during a period in which the money demand function may have shifted significantly.

Table 5. Vietnam: Correlation Matrix: CPI and Selected Variables, 2000Q1-2006Q2

	CPI inf.	Output gap	Credit	Credit t-1	Credit t-2	M2	M2 t-1	M2 t-2	Reserve money	Reserve money t-1	NEER t-2
CPI inflation	1.00										
Output gap	0.21	1.00									
Credit	0.06	0.29	1.00								
Credit t-1	0.07	0.39	0.86	1.00							
Credit t-2	0.17	0.47	0.52	0.82	1.00						
M2	-0.38	0.16	0.54	0.59	0.49	1.00					
M2 t-1	-0.53	0.08	0.47	0.57	0.46	0.92	1.00				
M2 t-2	-0.62	0.12	0.38	0.52	0.49	0.80	0.93	1.00			
Reserve money	-0.44	0.01	-0.16	-0.11	-0.02	0.34	0.25	0.21	1.00		
Reserve money t-1	-0.70	-0.20	-0.09	-0.07	-0.15	0.45	0.50	0.39	0.59	1.00	
NEER t-2	-0.48	0.04	-0.28	-0.03	0.26	0.39	0.55	0.63	0.26	0.33	1.00

Source: Fund staff estimates.

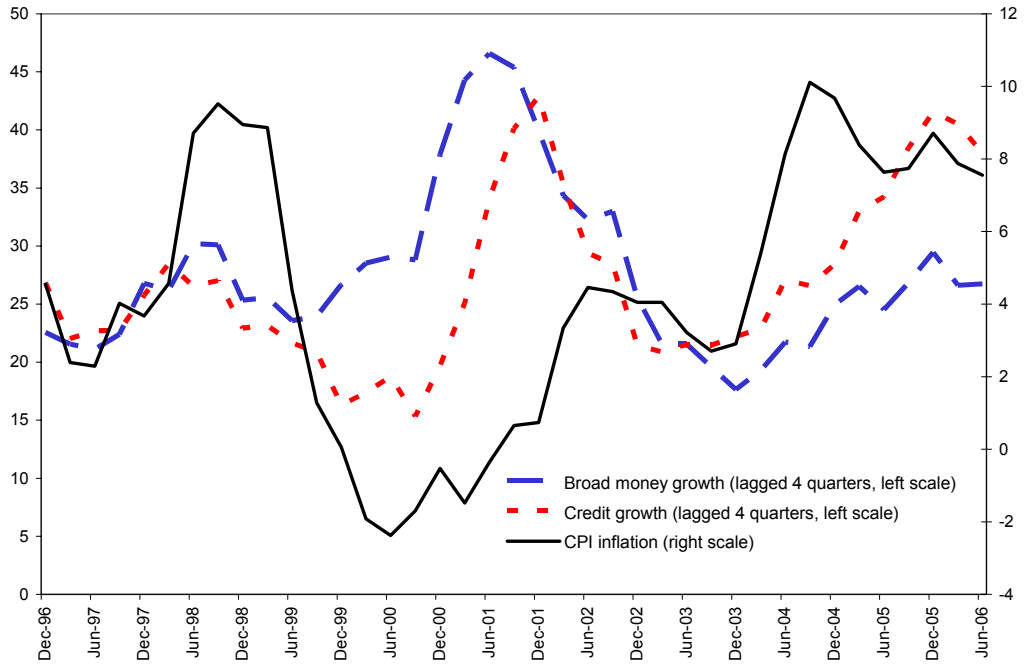
Table 6. Vietnam: Correlation Matrix: CPI and Selected Variables, 2002Q1-2006Q2

	CPI inf.	Output gap	Credit	Credit t-1	Credit t-2	M2	M2 t-1	M2 t-2	Reserve money	Reserve money t-1	NEER t-2
CPI inflation	1.00										
Output gap	0.36	1.00									
Credit	0.66	0.29	1.00								
Credit t-1	0.79	0.40	0.91	1.00							
Credit t-2	0.79	0.48	0.67	0.88	1.00						
M2	0.72	0.27	0.39	0.58	0.75	1.00					
M2 t-1	0.69	0.21	0.33	0.53	0.74	0.86	1.00				
M2 t-2	0.48	0.24	0.14	0.34	0.65	0.51	0.74	1.00			
Reserve money	-0.31	0.02	-0.39	-0.28	-0.13	0.06	-0.10	-0.21	1.00		
Reserve money t-1	-0.55	-0.19	-0.42	-0.33	-0.25	0.01	-0.03	-0.23	0.59	1.00	
NEER t-2	0.03	0.12	-0.51	-0.33	0.03	0.17	0.37	0.50	0.12	0.09	1.00

Source: Fund staff estimates.

[11] See, for example, Peiris (2003) and Al-Mashat (2004).

Figure 11. Vietnam: Inflation and Growth in Monetary and Credit Aggregates, 1996Q4-2006Q2
(year-on-year, percentage change)



Sources: State Bank of Vietnam; and Fund staff estimates.

22. **A number of factors aside from the process of monetization of the economy may account for the complexity of the interrelationships between monetary and credit aggregates and inflation in Vietnam over the last decade**. First, as already noted, the authorities have pursued a policy of a de facto peg of the dong to the U.S. dollar through most of the period under review, with the notable exception of the period of the Asian crisis in the late 1990s, when the dong/U.S. dollar rate depreciated significantly. As a result, the exchange rate has been an important anchor of stability, and helped contain increases in import prices at a time that the opening up of the trade system allowed consumers to channel an increasing share of their demand into imports. Indeed, the nominal effective appreciation of the dong during 2000–01 is likely to have played an important role in reducing inflation during that period.

23. **Second, and partly as a consequence of this exchange rate policy, monetary growth was to a large extent fueled by market-driven increases in net foreign assets rather than by policy factors (e.g., recourse to heavy bank financing of fiscal deficits)**. At the same time, the largely state-owned banking system accumulated a substantial amount of excess liquidity, which served to moderate the impact of the money-credit multiplier that might otherwise amplify the growth in money and credit. It is possible that the above effects wore off in recent years, as import penetration into the domestic market leveled off and state-owned banks intensified their lending to help meet the government's ambitious investment and growth targets. Moreover, as noted above, the liberalization of administered prices is

likely to have increased the responsiveness of domestic prices to monetary actions and other factors that affect aggregate demand.

C. An Error Correction Model

24. **This section uses a more systematic estimation technique, based on a Vector Error Correction Model (VECM), to investigate the extent to which movements in monetary aggregates, the output gap, and the nominal exchange rate have affected inflation in Vietnam.** This method allows us to simultaneously estimate the relationships among all variables of interest. The approach is similar to Khan and Schimmelpfenning (2006). The model is estimated for the period 2001Q1–2006Q2 on a quarterly basis, and includes the following variables: the headline CPI, broad money (M2), the nominal effective exchange rate (NEER), and the output gap.[12] The specification of the estimated system is provided in Annex 1. The accumulated impulse responses to shocks standardized to one standard deviation are presented over a two-year horizon.

25. **The results (Figure 12) indicate that**:

- Monetary factors have been important in influencing inflation in Vietnam and they are estimated to have affected CPI dynamics with a lag of about 12 months.

- CPI responds positively to a narrowing output gap (i.e., as actual GDP increases relative to potential, inflationary pressures begin to emerge).

- A depreciation of the nominal exchange rate does lead to pressure on the CPI, but the degree of pass-through is relatively modest and incomplete.[13] This rather modest effect may be related to the very limited movement of the exchange rate in the sample period, together with the presence of administered prices, which may have distorted measures of the pass-through of exchange rate changes.

- A positive shock to broad money temporarily increases output with a one-year lag, but it does not have a positive long-term effect on output. The positive impact on output disappears after two years—a result that is in line with other empirical studies (see, for example, Christiano, Eichenbaum, and Evans, 1996).

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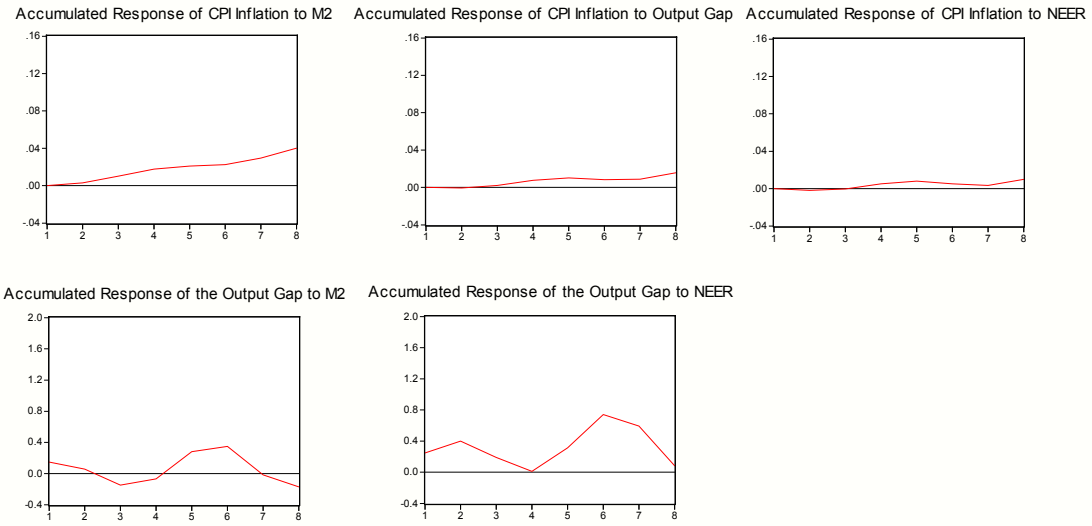
[12] The output gap has been defined as actual output, seasonally adjusted, less potential output expressed as a percent of potential output. The potential output has been estimated using a Hodrick-Prescott (HP) filter. To correct for the end-point sample bias typically arising in applications of the HP filter, potential output has been estimated using projected output data.

[13] On the empirical evidence of low pass-through from exchange rate to CPI in emerging Asian countries, see Ito and Sato (2006).

- A nominal depreciation of the exchange rate has a temporary positive effect on output, which peaks after about one year, but subsequently tapers off and eventually disappears. Presumably, this is the result of price effects induced by the nominal depreciation, which over time cause the real exchange rate to change by less than the nominal rate.

Figure 12. Vietnam: Accumulated Response to One Standard Deviation Shock 1/



Source: Fund staff estimates.
1/ Inflation is expressed in percentage points divided by 100. The output gap is expressed in percentage points.
Quarters are reported on the horizontal axis.

D. What Explains Vietnam's Relatively High Inflation Rate Compared to Other Countries in the Region? A Dynamic Panel Model

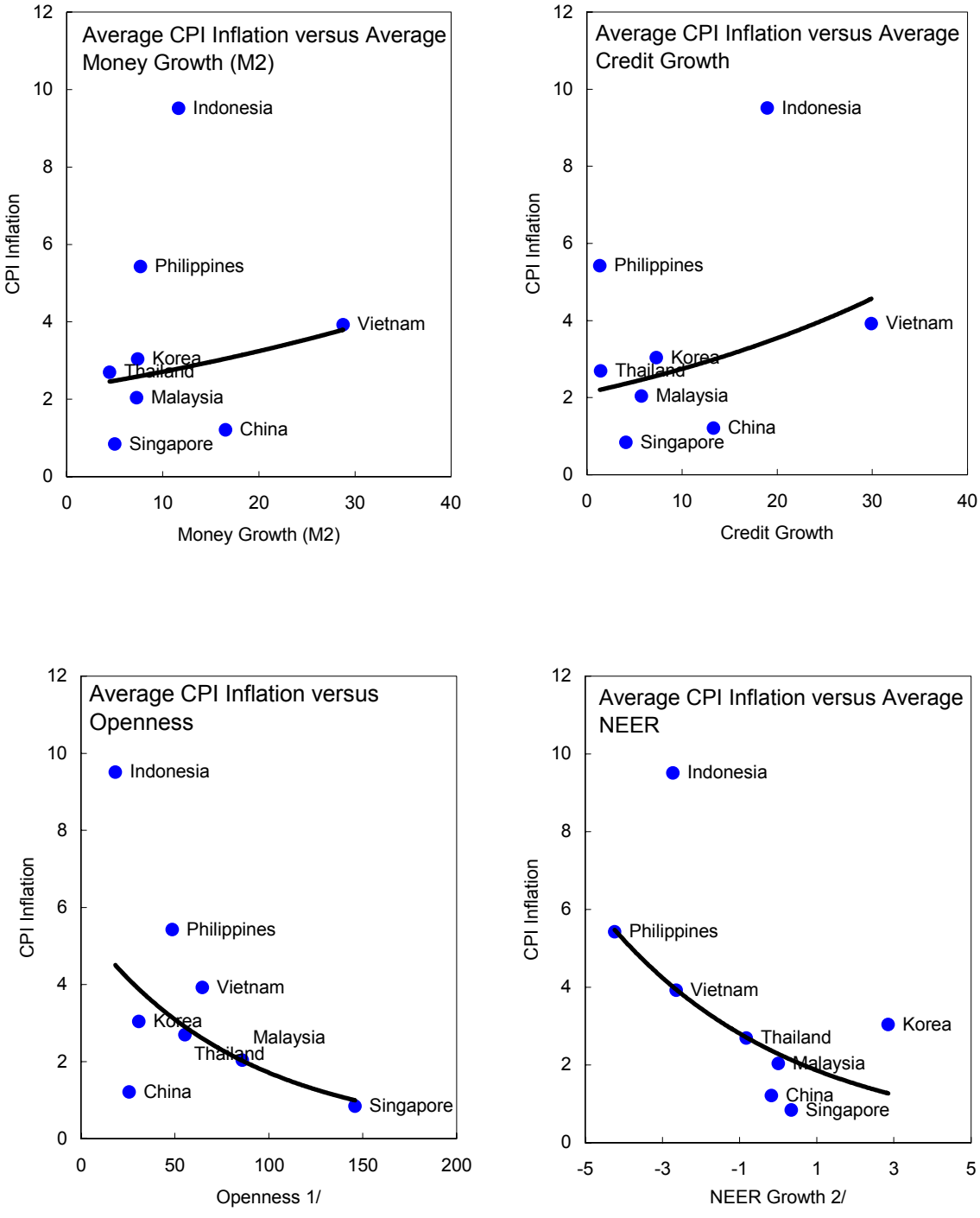
26. **Since 2004, headline inflation in Vietnam has been higher than in other emerging Asian countries, with the sole exception of Indonesia** (Figure 13). Some stylized facts common to all countries in the sample indicate that inflation is largely a monetary phenomenon, especially for the period beginning in 2003 (Figure 14), and is closely correlated with credit growth.[14] It is also negatively correlated with openness—defined as imports over GDP—and with the NEER.[15]

27. **A cross-country dynamic panel model has been estimated to cast light on how the sources of inflation in Vietnam may have differed from those of the other countries**

[14] These results corroborate the findings of Palomba (2006), who has carried out similar tests using a slightly different sample of Asian countries that excludes China and Vietnam.

[15] For a recent analysis of the positive effects of globalization on inflation control in emerging markets, see IMF (2006), Box 3.1.

Figure 13. Selected Asian Countries: CPI Inflation versus Selected Economic Variables, 2000-06

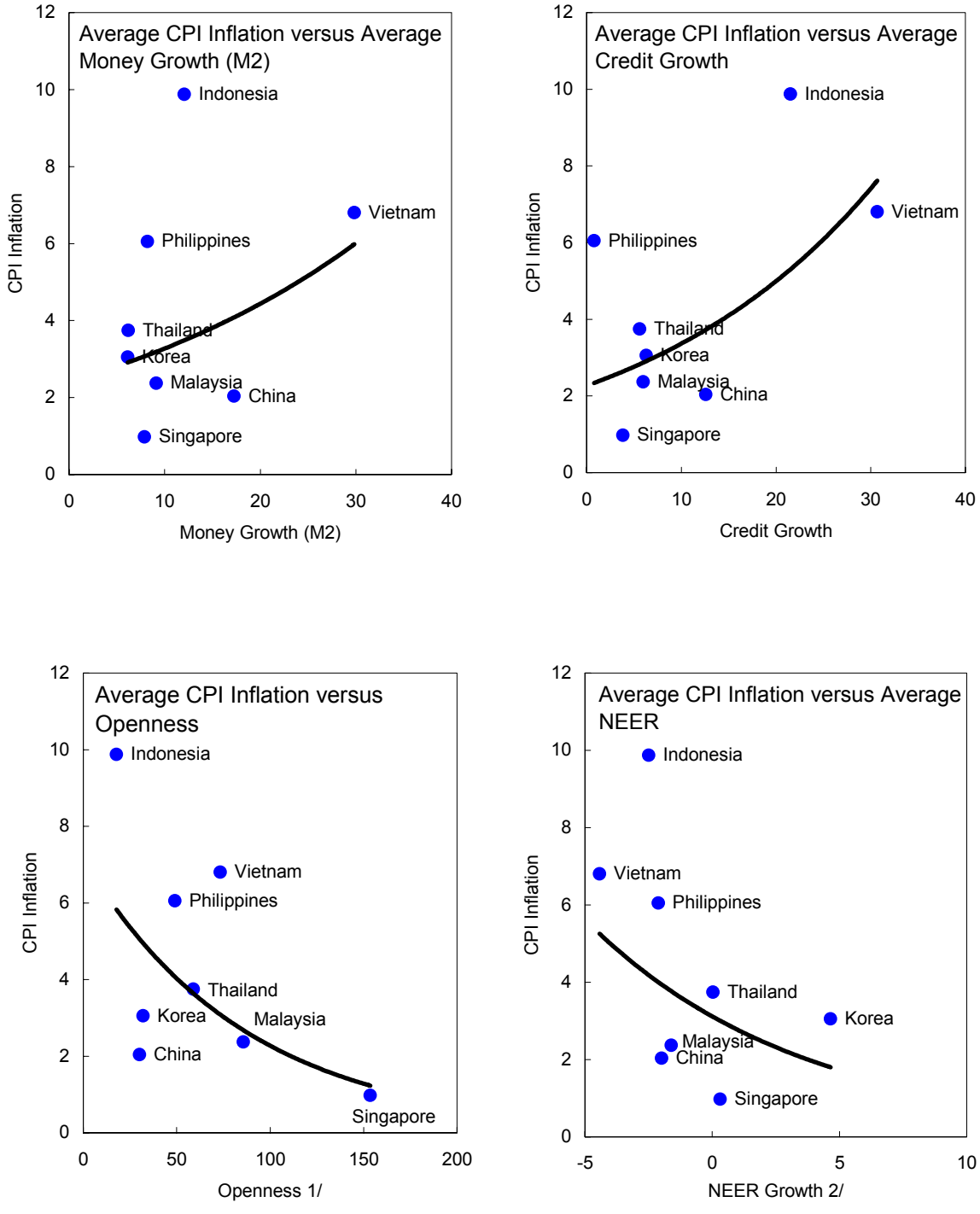


1/ Imports/GDP.

2/ Nominal Effective Exchange Rate. Lower NEER indicates depreciation.

Sources: Authorities' data; IMF APDCORE database; Information Notice System database; and Fund staff estimates.

Figure 14. Selected Asian Countries: CPI Inflation versus Selected Economic Variables, 2003-06



1/ Imports/GDP.

2/ Nominal Effective Exchange Rate. Lower NEER indicates depreciation.

Sources: Authorities' data; IMF APDCORE database; Information Notice System database; and Fund staff estimates.

in the region. The panel includes China, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand, as well as Vietnam. The sample consists of quarterly data covering Q12000–Q2 2006, which is the longest common period over which an internally consistent data set is available.[16]The model was estimated using a differenced generalized method-of-moments (GMM) estimator that allows past actual values of the dependent variable (in this case CPI inflation) to affect its current level without being subject to the problems of endogeneity present in dynamic panel analysis.

28. **The econometric model was estimated using the following variables**: current inflation (dependent variable), lagged inflation, which captures the inflation-inertia component, lagged broad money to capture lags in the transmission of monetary policy; lagged NEER, which is intended to captures the degree of pass-through from the exchange rate to domestic prices; and lagged output gap, as a measure of excess demand pressures. The output gap is estimated using the Hodrick-Prescott Filter (HP filter) and is measured as the deviation, in percentage points, of actual seasonally adjusted output from a measure of GDP trend. A positive number indicates that output is above trend. Finally, country-specific dummies for Vietnam are introduced in the different regressions to explain how much more or less each of the sources of inflation counts in Vietnam compared to the other countries in the region. Annex 1 provides more details on the specification of the estimated model.

Econometric results

29. **The econometric results suggest that, for all the countries in the sample, past inflation, the output gap, broad money, and NEER are important determinants of inflation (Table 7).** As expected, current inflation depends positively on past inflation, the output gap, and broad money, and negatively on the NEER. The degree of openness played no role in explaining inflation across the sample (this result is not shown).

Table 7. Sources of Inflation in Vietnam and Selected Asian Countries 1/

	Regressions				
	(1)	(2)	(3) 2/	(4)	(5)
Past inflation (cpi_{t-1})	0.61***	0.64***	0.62***	0.66***	0.67***
M2 growth (t-1)	0.044**	0.079***	0.016**	0.039**	0.022
NEER growth (t-2)	-0.034***	-0.025**	-0.422***	-0.027**	-0.036***
Output gap (t-1)	0.094**	0.089**	0.045	0.086**	0.080*
Past inflation (VNM dummy)	0.18***	...	...	...	...
M2 growth (VNM dummy)	...	-1.268**	0.080*	...	...
NEER growth (VNM dummy)	...	...	...	-0.094**	...
Output gap (VNM dummy)	...	...	...	...	0.05
Observations	184	184	152	184	184
			P-value		
Sargan test	0.991	0.992	0.992	0.993	0.996
Test of Autocorrelation of order 1	0.000	0.000	0.010	0.000	0.000
Test of Autocorrelation of order 2	0.102	0.114	0.205	0.103	0.104

Source: Fund staff estimates.
1/ Dependent variable CPI inflation. Differenced GMM estimates, based on quarterly data, 2000Q1-2006Q2.
2/ Regression (3) covers the period 2002Q1-2006Q2.
*, ** and *** denote significantly different from zero at 10, 5, and 1 percent level, respectively.
The sample includes: China, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

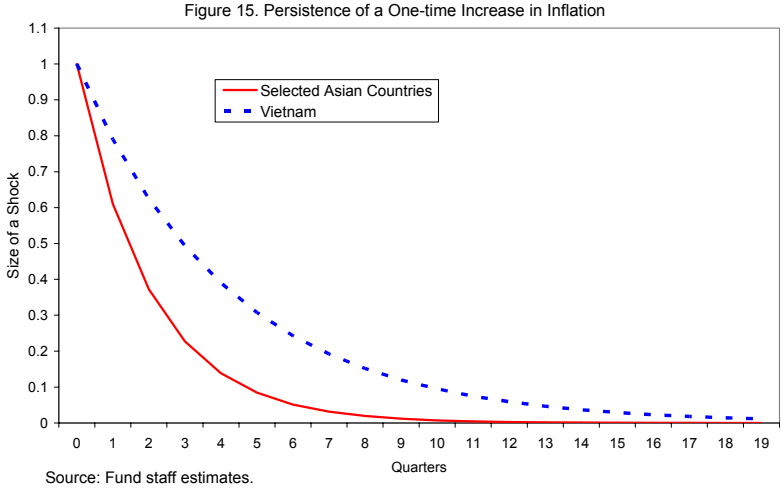
30. **The econometric results on Vietnam show a higher degree of persistence in inflation than in the other countries** (Table 7, regression 1). In particular, one percentage point of past inflation is associated with an inflation increase of about 0.79 percent in the current period in Vietnam—0.18 percentage points higher than the sample average. As shown in Figure 15, the effects of a shock on inflation last almost twice as long in Vietnam

[16] See Annex 1 for a discussion on data issues.

as in the other Asian countries. For example, a one percentage increase in inflation would typically take 10 quarters to disappear in the selected Asian countries and about 20 quarters in Vietnam. The higher inertia component may reflect the sluggish adjustment of inflationary expectations, also related to the public's memory of high inflation that lasted until 1993. This also suggests that once inflationary expectations are entrenched, it is more difficult to control inflation.

31. **The econometric results also suggest that money had a negative effect on inflation in Vietnam, unlike in the other countries in the region during the sample period 2000Q1–2006Q2** (Table 7, regression 2), but this effect becomes positive, statistically significant and stronger than in the other countries over the period 2002–06 (regression 3). This result is consistent with the foregoing discussion in Section B and could be partly explained by the liberalization of administered prices that may have strengthened the transmission mechanism through which aggregate demand affects inflation from 2002 onwards. Based on the results for the period 2002Q1–2006Q2, a one percentage point increase in broad money is associated with an increase in inflation of about 0.1 percent (0.016+0.08), equivalent to 0.08 percentage points higher than in other countries.

Figure 15. Persistence of a One-time Increase in Inflation



Source: Fund staff estimates.
Selected Asian countries include: China, Indonesia, Korea, Malaysia, Philippines, Singapore, and Thailand.

32. **A depreciation of the NEER by one percentage point is associated with an increase in inflation of 0.12 percent in Vietnam, approximately 0.1 percentage points higher than in the rest of the sample (Table 7, regression 4).** The excess demand pressures, proxied by the output gap, have similar effects in Vietnam and other countries in the region (i.e., the coefficient on the dummy on Vietnam representing the output gap in regression 5 is not significant). This suggests that a one percentage point increase in the output gap will increase inflation by the same amount as in the other emerging countries in the sample.[17]

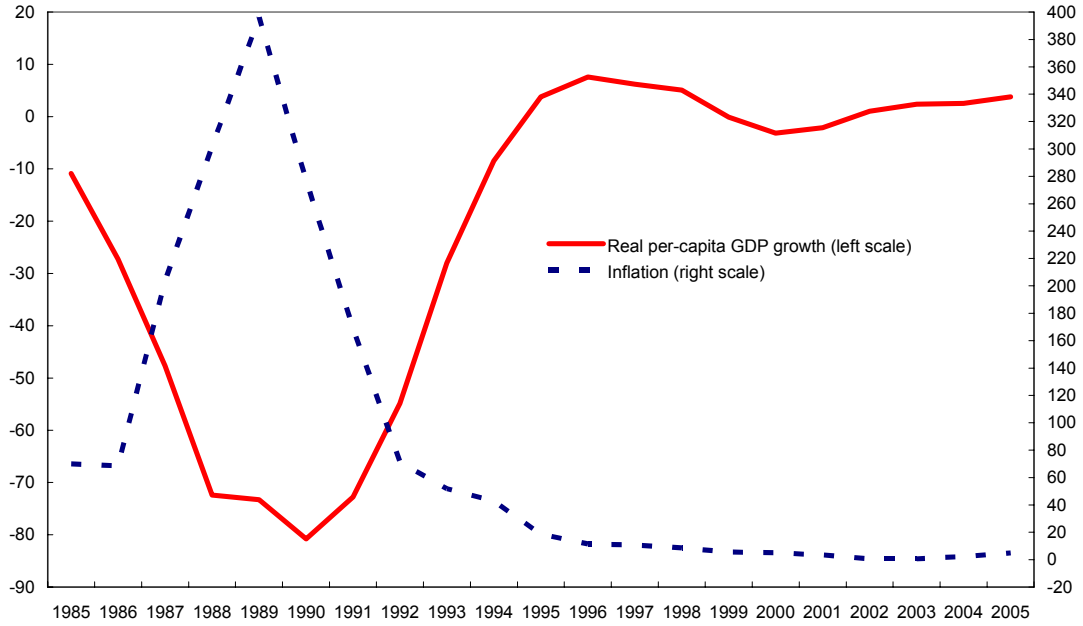
[17] For an analysis of whether the output gap was an important determinant of inflation over an earlier period in a broader sample of Asian economies, see Coe and McDermott, 1996.

E. Inflation and Growth

33. **High inflation negatively affects both the poor and economic growth.** A cursory look at Vietnam's growth performance since the launching of its reforms in the 1980s indicates that growth has been lowest during periods of high inflation. Figure 16 shows that real per capita GDP growth is clearly positively correlated in Vietnam with a declining trend in inflation. In particular, real GDP per capita was severely depressed as inflation surged during the early years of transition, but recovered strongly as inflation was brought back under control in the 1990s.

34. **Several empirical studies provide evidence that inflation may have a negative impact on growth once it exceeds a certain threshold and that the relationship between inflation and growth is non linear**, as first identified by Fischer (1993). At low levels of inflation, the relationship can be non-existent, or even positive, while at higher rates it becomes negative. Several authors (Sarel 1996, Gosh and Phillips, 1998, Khan and Senhadji, 2000 among others) have tried to identify such a kink in the relationship between inflation and growth. Empirical studies pointed to a wide range of values for the threshold after which inflation has negative impact on growth somewhere in between 3 percent (Burdekinm et al., 2000) and 40 percent (Bruno and Easterly, 1998). Extending this analysis, more recent empirical studies have aimed to identify the so-called optimal inflation rate. Khan (2005) for example finds that the optimal rate for Middle Eastern and Central Asian countries is on the order of 3.2 percent.

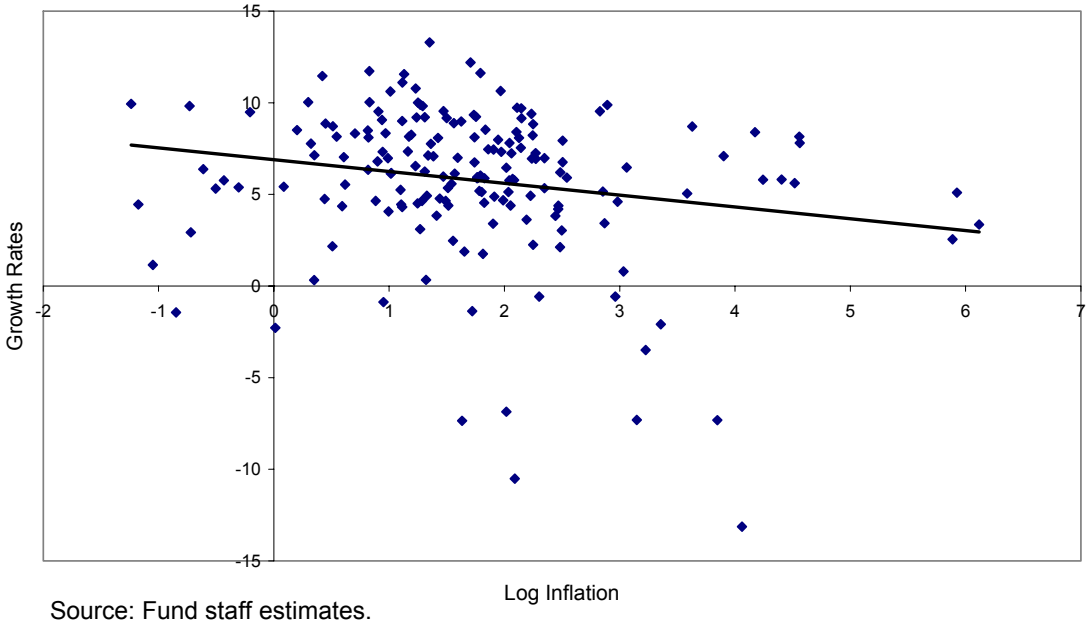
Figure 16. Vietnam: Real per-Capita GDP Growth and CPI Inflation, 1985-2005
(3-year moving average, in percent)



Sources: General Statistics Office; and Fund staff estimates.

35. **In the case of the Asian countries, including Vietnam, we find a similarly low optimal rate of inflation**. Figure 17 shows that a negative relationship exists between inflation and growth for a selected sample of Asian countries over the period 1980–2005.[18] This graphic result is confirmed by model (1) in Table 8, where real GDP of the sample countries is regressed on the log of inflation. Country-fixed effects are included in the model to control for country-specific factors. However, regression 1 assumes that the relationship is linear. We allow for non-linearity by assuming a quadratic relationship between inflation and growth in line with Khan (2005). The econometric results of this exercise are reported in Table 8, model 2. The coefficient on log inflation is positive, but the coefficient on square of log inflation is negative. This suggests that, at a very low level of inflation, the relationship between growth and inflation is positive, but after a certain point the relationship becomes negative. The concavity of the relationship between growth and inflation implies that an optimal growth-maximizing level of inflation exists, which is estimated to be 3.6 percent (Figure 18) in this model in line with the rate estimated by Khan (2005).

Figure 17. Inflation and GDP Growth Rates in Selected Asian Countries, 1980-2005 1/



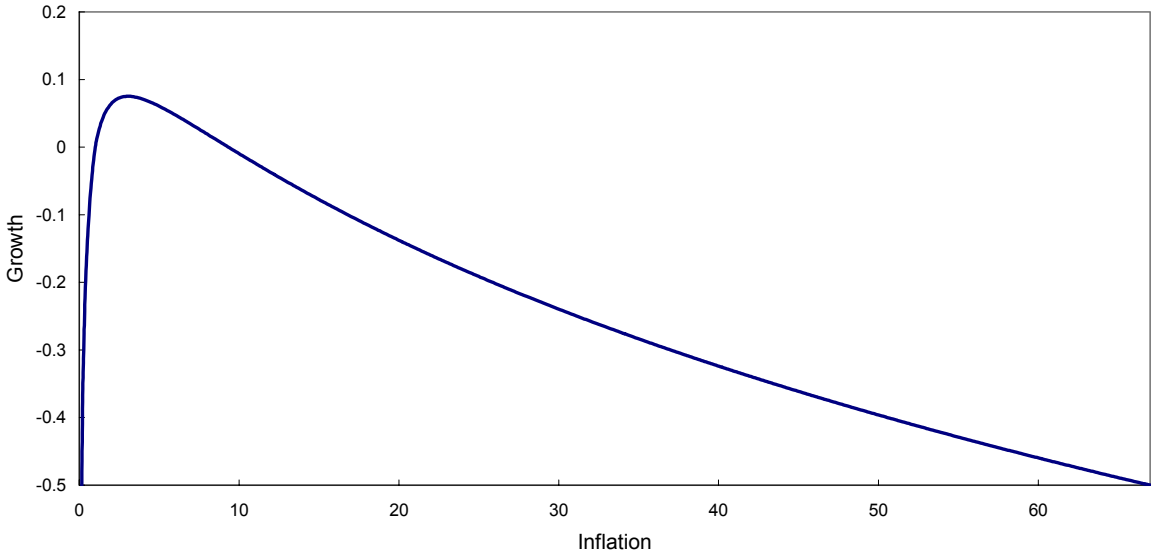
Source: Fund staff estimates.
1/ The sample includes: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

[18] The sample includes: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

Table 8. Relationship Between Inflation and Growth in Selected Asian Countries 1/		
	Model	
	(1)	(2)
Log inflation	-0.47	0.3102
Square of log inflation	...	-0.3198***
Observations	173	173

Source: Fund staff estimates.
1/ Dependent variable is real GDP growth. The sample period is 1980-2005.
*, ** and *** denote significantly different from zero at 10 percent, 5 percent, and 1 percent level, respectively. The sample includes: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

Figure 18. Effects of Inflation on Growth in Selected Asian Countries 1/



Source: Fund staff estimates.
1/ The sample includes: Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

36. **The lower threshold estimated in this study seems plausible in light of the fact that global inflation has been much more contained in recent years than it was in previous decades.** While the above estimates are at the low end of the range reported in the empirical literature, most of that literature covered an earlier period when global inflation was higher. In this context, it is entirely possible that optimal inflation rate for any given country depends critically on the inflation rate of major trading partners and regional competitors.

F. Conclusions

37. **This chapter has employed several empirical approaches to shed light on the nature of the inflation process in Vietnam.** A number of important structural changes that have taken place in the economy over the last two decades make it difficult to estimate stable behavioral relationships for key macroeconomic variables The results suggest that, unlike during the earlier phases of Vietnam's transition experience, monetary factors appear to have become an important determinant of inflation over the last few years possibly because liberalization of administered prices increased the responsiveness of domestic prices to monetary actions; and stronger inflation inertia than in other Asian countries has implied that recent food supply and oil price shocks have resulted in a more permanent increase in core inflation. At the same time, there is no strong evidence to suggest that inflation is a benign manifestation of productivity-driven increases in the prices of nontradables relative to tradables (i.e., the Balassa Samuelson effect), and consequently, there is little reason to believe that current inflation will correct itself in the absence of appropriately restrained macroeconomic policies.

References

Al-Mashat, R., 2004, "Vietnam's Experience with Rapid Credit Growth and Low Inflation," (unpublished; Washington: International Monetary Fund).

Blinder, A., 1997, "Commentary," *Federal Reserve Bank of St Louis Review*, May/June, pp. 157-162.

Blinder, A., E. Canetti, D. Lebow, and J. Rudd, 1998, *Asking about Prices: A New Approach to Understanding Price Stickiness* (New York, NY: Russell Sage Foundation Publications).

Blinder, Christiano, L., J. M. Eichenbaum, and C. Evans, 1996, "The Effects of Monetary Policy Shocks: Evidence from the Flow of Funds," *The Review of Economics and Statistic*s, Vol. 78, No. 1, pp. 16-34.

Bruno, M., and W. Easterly, 1995, "Inflation Crises and Long-Run Growth," NBER Working Paper, No. 5698, (Cambridge, MA: National Bureau of Economic Research).

Burdekinm, R., A. Enzau, M. Keil, T. Sitthiyot, and T. Willett, 2000, "When Does Inflation Hurt Economic Growth? Different Nonlinearities for Different Economies," Claremont Colleges Working Paper in Economics 2000-22 (Claremont, California, Claremont McKenna College).

Central Institute for Economic Management, 2006, *Vietnam's Economy in 2005* (The Publishing House of Political Theory, Hanoi).

Coe, D., and C. J. McDermott, 1996, "Does the Gap Model Work in Asia?," IMF Working Paper No. 96/69 (Washington: International Monetary Fund).

Easterly W., and S. Fischer, 2001, "Inflation and the Poor," *Journal of Money, Credit, and Banking*, Part 1, Vol. 33, Issue 2 (May), pp. 160-178.

Fischer, S., 1993, "The Role of Macroeconomic Factors in Growth," *Journal of Monetary Economics*, Vol. 32, No. 3 (December), pp.485-512.

Gosh, A., and S. Phillips, 1998, "Warning: Inflation May be Harmful to Your Growth," *IMF Staff Papers*, Vol. 45, No. 4, pp. 672-710.

Harris, J., and M. Todaro, 1970, "Migration, Unemployment and Development: A Two-Sector Analysis," *American Economic Review*, Vol. 60, pp.126-142.

International Monetary Fund, 2006, *World Economic Outlook, April 2006, Inflation and Globalization*, (Washington: International Monetary Fund).

Ito, T., and K. Sato, 2006, "Pass-Through of Exchange Rate Changes and Macroeconomic Shocks to Domestic Inflation in East Asian Countries," NBER Working Paper No. 12395 (Cambridge, MA: National Bureau of Economic Research).

Khan, M., 2005, "Inflation and Growth in MCD Countries," Mimeo, International Monetary Fund.

Khan M., and A. Schimmelpfenning, 2006, "Money or Wheat?," IMF Working Paper No. 06/60 (Washington: International Monetary Fund).

Khan, M., and A. S. Senhadji, 2001, "Threshold Effects in the Relationship Between Inflation and Growth," *IMF Staff Papers*, Vol. 48, No. 1, pp 1-21.

Laxton, D., and P. Pesenti, 2003, "Monetary Rules for Small, Open, Emerging Economies," *Journal of Monetary economics*, Vol. 50, No. 5:1109-52.

Lee, Il Houng, 2005, "Impact of Oil Price Increase in Vietnam and Policy Response," presentation made at the Institute for Price and Market Research, October 21, Hanoi.

Nguyen Tri Hung, 1999, "The Inflation in Vietnam," *CAS Discussion Paper*, No. 22, Center for ASEAN Studies, Belgium.

Palomba, G., 2006, "Explaining Higher Inflation in Indonesia," *Indonesia Selected Issues*, IMF Country Report No. 06/318 (Washington: International Monetary Fund).

Peiris, S.J., 2003, "Inflationary Dynamics in Vietnam," in *Vietnam: Selected Issues*, IMF Country Report No. 03/381 (Washington: International Monetary Fund).

Rudebusch, G., and L. Svensson, 1998, "Policy Rules for Inflation Targeting," NBER Working Paper No. 6512 (Cambridge, MA: National Bureau of Economic Research).

Sarel, M., 1996, "Nonlinear Effects of Inflation on Economic Growth," *IMF Staff Papers*, March 1996, pp.199-215.

Tobin, J., 1971, "Money and Income: Post Hoc Ergo Propter Hoc?" in *Essays in Economics*, ed. by J. Tobin, Vol. 1, Chapter 24 (Amsterdam, North-Holland Publishing Company).

Troung Van Phuoc and Chu Hoan Long, 2005, "The Determinants of the Consumer Price in Vietnam: A Quantitative Approach," (unpublished, Hanoi).

ANNEX 1

Specification of the Econometric Models and Data Issues

Vector Error Correction Model (Section C)

A Vector Error Correction Model (VECM) is a restricted Vector Autoregression (VAR) model designed for use with nonstationary series that are known to be cointegrated. Cointegration relations are built into the specification so that the long-run behavior of the endogenous variables converges with their cointegrating relationships while allowing for short-run adjustment dynamics.

The following system was estimated:

$$\Delta \ln CPI_t = \alpha_{11}(\beta_{11} \ln CPI_{t-1} + \beta_{12} \ln M2_{t-1} + \beta_{13} \ln NEER_{t-1} + \beta_{14} Outputgap_{t-1} + \beta_{15}) + C_{11}\Delta \ln CPI_{t-1} + C_{12}\Delta \ln M2_{t-1} + C_{13}\Delta \ln NEER_{t-1} + C_{14}\Delta Outputgap_{t-1} + C_{15} + \varepsilon_t^{CPI}$$

$$\Delta \ln M2_t = \alpha_{21}(\beta_{11} \ln CPI_{t-1} + \beta_{12} \ln M2_{t-1} + \beta_{13} \ln NEER_{t-1} + \beta_{14} Outputgap_{t-1} + \beta_{15}) + C_{21}\Delta \ln CPI_{t-1} + C_{22}\Delta \ln M2_{t-1} + C_{23}\Delta \ln NEER_{t-1} + C_{24}\Delta Outputgap_{t-1} + C_{25} + \varepsilon_t^{M2}$$

$$\Delta \ln NEER_t = \alpha_{31}(\beta_{11} \ln CPI_{t-1} + \beta_{12} \ln M2_{t-1} + \beta_{13} \ln NEER_{t-1} + \beta_{14} Outputgap_{t-1} + \beta_{15}) + C_{31}\Delta \ln CPI_{t-1} + C_{32}\Delta \ln M2_{t-1} + C_{33}\Delta \ln NEER_{t-1} + C_{34}\Delta Outputgap_{t-1} + C_{35} + \varepsilon_t^{NEER}$$

$$\Delta Outputgap_t = \alpha_{41}(\beta_{11} \ln CPI_{t-1} + \beta_{12} \ln M2_{t-1} + \beta_{13} \ln NEER_{t-1} + \beta_{14} Outputgap_{t-1} + \beta_{15}) + C_{41}\Delta \ln CPI_{t-1} + C_{42}\Delta \ln M2_{t-1} + C_{43}\Delta \ln NEER_{t-1} + C_{44}\Delta Outputgap_{t-1} + C_{45} + \varepsilon_t^{Outputgap}$$

Dynamic Panel Model (Section D)

In order to explain Vietnam's relatively high inflation rate compared to other countries in the region, the following model was estimated:

$$\pi_{it} = \alpha_i + \beta_1 \pi_{it-1} + \beta_2 M2_{it-1} + \beta_3 ygap_{it-1} + \beta_4 NEER_{it-2} \beta_5 imp/GDP_{it-1} + \gamma_1 VNMdummy,$$

where π_{it} is current inflation, *i* indicates the country, and *t* the time period; π_{it-1} is lagged inflation, which captures the inflation-inertia component; $M2_{it-1}$ is lagged broad money, $ygap_{it-1}$ is the output gap, which captures excess demand pressures, with on period lag, and *NEER* is the nominal effective exchange rate. Country-specific dummies for Vietnam are introduced in the different regressions to explain how much more or less each of the sources of inflation matters in Vietnam compared to the other countries in the region.

Data Issues

Data availability is a major challenge in analyzing inflation in Vietnam and in the other countries in the region. The need for the real GDP series to calculate the output gap dictated that 2000 was the earliest starting date. In addition, most of the monetary series in many Asian countries suffered from structural breaks after the 1997 Asian crisis, while in Vietnam a structural break in the monetary aggregates occurred in 1999, reflecting the switch to a large survey for the collection of monetary data.

Actual quarterly output data, despite the relatively short sample period, are preferable to estimated monthly data constructed by interpolation. Real GDP data in Vietnam are available on a quarterly basis from 1999 onwards.

II. Assessing Reserve Adequacy in Vietnam—A Forward Looking Approach[1]

A. Introduction

1. **Vietnam's international reserves have recorded a sharp increase over the last few years, contributing to a significant reduction in most indicators of external vulnerability.** The level of gross international reserves (GIR) held by the State Bank of Vietnam (SBV) more than tripled from US$3 billion at end-2000 to US$10.9 billion as of mid-2006, boosted by high oil prices, strong growth in non-oil exports and remittances, and robust FDI and ODA flows. However, as imports have also grown rapidly, the increase in reserve coverage has been more modest. Thus, the level of reserves was equivalent to about 11 weeks of imports as of mid-2006, falling somewhat short of the 3-month benchmark, which is the usual standard used in the assessment of reserve adequacy in low-income countries. The rapid growth of bank deposits in the context of a high degree of dollarization of the banking system has also kept official reserves lower than foreign-currency deposits throughout the period.

2. **Even if the balance of payments continues to record significant surpluses over the medium term, Vietnam's transition to an emerging market, with increasing openness to capital flows, will necessitate close monitoring of external vulnerability and reserve adequacy indicators, as well as a stepping up of capacity building of financial agents regarding risk management**. During the initial years of the transition process, risks would probably be mitigated by an initially low stock of short-term debt and fairly limited mobility of private financial capital. However, over time, external vulnerability could increase as capital account restrictions are gradually liberalized in line with the authorities' plan to move towards full convertibility of the dong by 2010, and as administrative controls over the borrowing decisions of equitized state-owned enterprises and commercial banks are removed.

3. **This chapter develops a framework for the assessment and monitoring of external vulnerability in Vietnam, and draws some implications which could help guide the authorities' policies as they pursue their plans to liberalize the capital account in the period ahead.** The remainder of the chapter is organized as follows. Section B develops a preliminary assessment of the adequacy of Vietnam's reserves based on historical and cross-country comparisons of selected vulnerability indicators against the corresponding thresholds commonly used in the literature. Section C includes a qualitative discussion on how the assessment of vulnerability would need to be modified over the medium term as Vietnam continues its reform program, progressively liberalizing capital account transactions. Section D extends the analysis to assess the prospects for the various vulnerability indicators over the medium term, using a balance of payments stress testing exercise. The main findings and policy recommendations are summarized in Section E.

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[1] Prepared by Carol Baker.

B. Vietnam's Reserve Adequacy during 2000–2005 in an International Perspective

4. **Global international reserve holdings have increased sharply since 1990, driven mostly by the improving balance of payments position of the developing world.** Since 2000, much of the rise in reserves can be attributed to the Asia region, most prominently China. While the share held by oil-exporting countries has recorded a surprising modest decline, this is probably a reflection of several major oil-exporters' inclination to invest a considerable share of their surpluses in nonreserve assets. As of end-2005, world holdings of reserves topped US$4.3 trillion, and as of February 2006 China overtook Japan as the country with the largest reserve holdings in the world (Figure 1).

5. **Countries generally hold reserves to limit their external vulnerability through the maintenance of adequate foreign-currency liquidity, but the specific motives for holding reserves may vary from country to country.**[2] While there is no one-size-fits-all rule regarding reserve coverage, the literature espouses as a general rule three months of prospective imports for low-income countries with no access to international capital markets. For emerging markets that already have such market access, the heterogeneity of exposures to external risk makes generalization very difficult. However, a widely accepted minimum standard is the so-called Guidotti-Greenspan rule of one hundred percent coverage of short-term debt on a remaining maturity basis (Box 1). [3]

6. **Despite Vietnam's low-income status and de jure capital account restrictions, both current account and capital account vulnerability indicators are relevant to assessing reserve adequacy in the period ahead.** Continuing rapid monetization, relatively high dollarization, and a de facto fixed exchange rate, together with incipient access to international capital markets, and a slow-but-steady opening of the capital account, are all likely to influence the economy's external vulnerability.[4]

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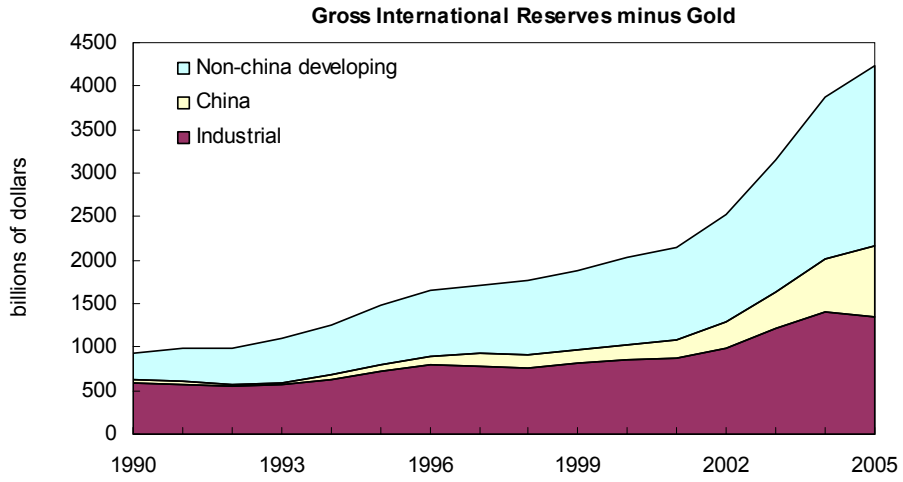
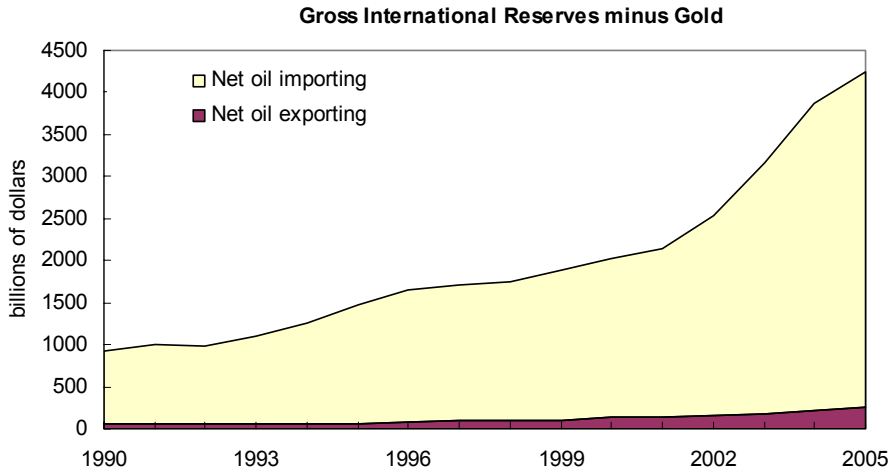
[2] While a full discussion of the motives for holding international reserves is beyond the scope of this chapter, these may include *precautionary* considerations (e.g., to absorb external shocks to the balance of payments without having to adopt policies that may lead to significant reductions in output or have a reserve for national disasters or emergencies) as well as concerns about *market confidence* (e.g., to reassure markets that the government will be able to meet external obligations or to defend an exchange rate peg).

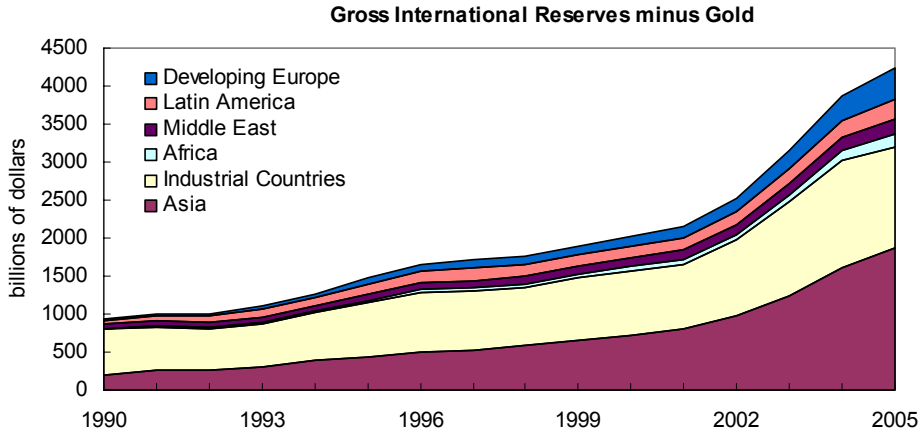
[3] Pablo Guidotti, who was Argentina's Deputy Finance Minister during 1996-99, was the first to suggest that reserves should be sufficient to allow a country to forego access to capital markets for a period of one year in his remarks to the G-33 Seminar in Bonn in March 1999. Alan Greenspan, then Chairman of the U.S. Federal Reserve, also put forth such a rule in April 1999 (with additional enhancements) in his remarks before the World Bank Conference on Trends in Reserve Management.

[4] Vietnam's first dollar-denominated sovereign bond was issued in October 2005 in the amount of US$750 million. The government is currently considering the possibility of a new bond issue in the latter part of 2006.

Figure 1. Gross International Reserves (GIR) minus Gold and their Distribution
1990–2005







Source: IMF, World Economic Outlook.

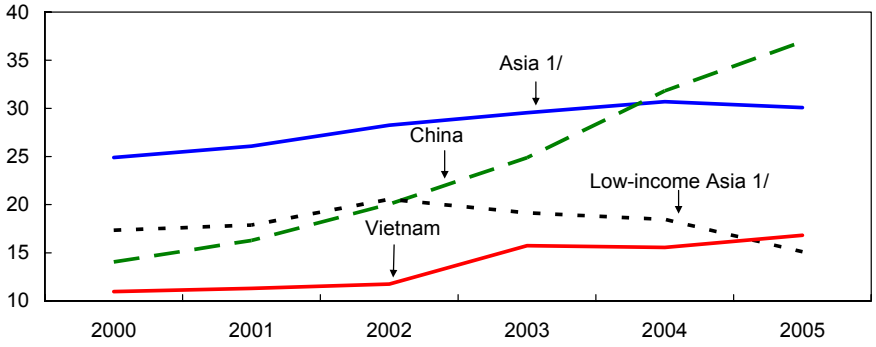
Box 1: Selected Reserve Adequacy Benchmarks

Ratio	Benchmark	Vulnerability	Description
Gross international reserves (GIR) to prospective imports of goods and non-factor services	Three months	Current account	Standard benchmark for low-income countries and countries without access to international capital markets. Benchmark could be made country specific, depending on past and expected future volatility of current account flows.
GIR to broad money	No recognized benchmark	Capital flight	Particularly relevant for countries whose financial systems are subject to rapid shifts in market sentiment, often associated with an overvalued currency, a weak banking system or unpredictable shifts in asset preferences.
GIR to short-term (ST) external debt (based on remaining maturity)	100%	Liquidity	Particularly relevant for countries with market access, substantial private external borrowing and/or large public debt service payments.
GIR to ST external debt plus ST foreign-currency linked public domestic debt (based on remaining maturity)	No recognized benchmark	Liquidity	Particularly relevant for the countries above and those which have a large fraction of domestic debt denominated in foreign currency.
GIR to ST external debt plus current account deficit	No recognized benchmark	Current account and liquidity	Particularly relevant for countries with a large current account deficit and market access.
Consolidated banking sector reserves (CBSR) to ST debt by remaining maturity plus resident's foreign exchange deposits.	No recognized benchmark	Liquidity	Particularly relevant for dollarized economies.

Current account and capital account benchmarks

7. **Consistent with global trends, Vietnam's gross international reserves have increased** from about 11 percent of GDP in 2000 to nearly 17 percent of GDP in 2005, in an environment of sustained high economic growth. This increase is in line with the reserve gains recorded by the Asia region as a whole, but much lower than the increase experienced by China, India, Korea or Malaysia (Figure 2).

Figure 2. Vietnam: GIR as a Percentage of GDP

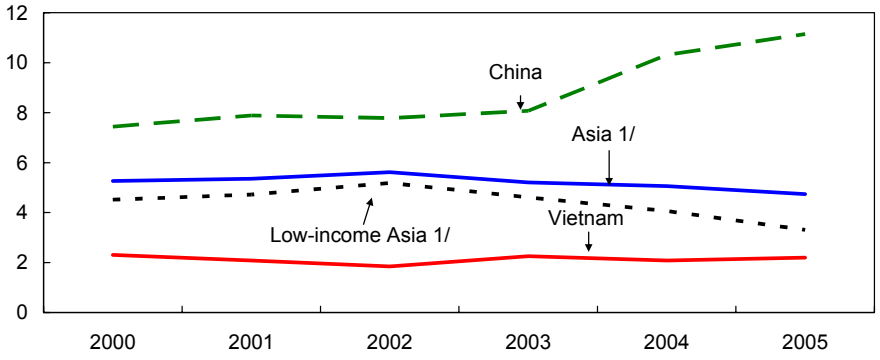


Source: International Financial Statistics.

1/ Includes Bangladesh*, Bhutan*, Cambodia*, China, Hong Kong, India, Indonesia, Korea, Lao PDR*, Malaysia, Mongolia*, Myanmar*, Nepal*, Philippines, Singapore, Sri Lanka*, Thailand. Low-income countries denoted by an asterisk (*).

8. **With imports rising significantly, the import coverage of reserves has increased rather modestly,** from about 2.1 months of imports in 2000 to 2.6 months of imports as of mid-2006. Thus, the level of reserves has remained below the low-income country benchmark of three months of prospective imports of goods and non-factor services, and well below the regional average including other low-income countries, although not dissimilar to the levels recorded in neighboring Cambodia and Lao PDR (Figure 3).

Figure 3. Vietnam: GIR in Months of Imports



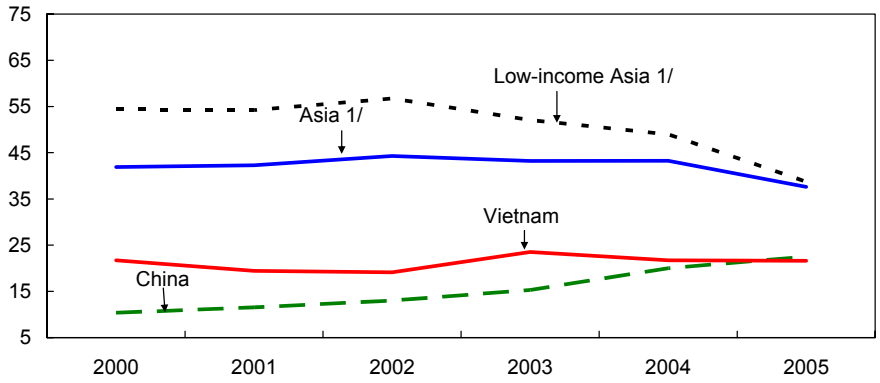
Source: International Financial Statistics.

1/ Includes Bangladesh*, Bhutan*, Cambodia*, China, Hong Kong, India, Indonesia, Korea, Lao PDR*, Malaysia, Mongolia*, Myanmar*, Nepal*, Philippines, Singapore, Sri Lanka*, Thailand. Low-income countries denoted by an asterisk (*).

9. **The ratio of reserves to broad money has remained broadly steady** over the past five years, as monetization has kept pace with reserve accumulation (Figure 4). This ratio is typically used to indicate vulnerability to capital flight by domestic residents, which could be triggered by a loss of confidence in the domestic currency or concerns about the stability of the banking system. Vietnam has a lower reserve coverage of broad money than most

countries in the region, with the notable exception of China, whose significantly higher level of reserves is offset by its much higher monetization. While it could be argued that this ratio may be less relevant for Vietnam than for countries with a more open capital account, China's experience with capital flight in the wake of the Asian Crisis demonstrates how porous capital controls can be in times of turmoil.

Figure 4. Vietnam: Ratio of GIR to Broad Money
(In percent)

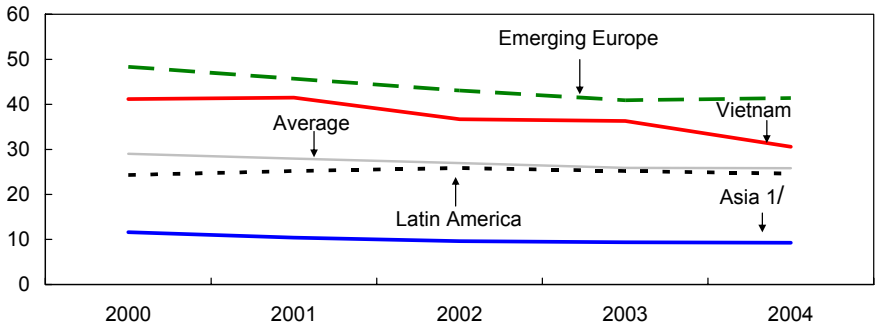


Source: International Financial Statistics.

1/ Includes Bangladesh*, Bhutan*, Cambodia*, China, Hong Kong, India, Indonesia, Korea, Lao PDR*, Malaysia, Mongolia*, Myanmar*, Nepal*, Philippines, Singapore, Sri Lanka*, Thailand. Low-income countries denoted by an asterisk (*).

10. **GIR coverage of dollar deposits remains less than one hundred percent, but the consolidated banking sector's reserve (CBSR) coverage has exceeded one hundred percent in recent years**. While GIR coverage for most large emerging markets has increased to above 4 times dollar deposits, the growth of official reserve coverage of dollar deposits in Vietnam has been restrained as dollar deposits rose dramatically from US$1.8 billion in 2000 to US$11.4 billion as of June 2006. At the same time, the net foreign assets (NFA) of banks declined in nominal terms from US$4.6 billion in 2001 to US$3.2 billion in 2005. This vulnerability indicator is particularly relevant for Vietnam, because, in the event of an adverse movement in market sentiment, there could be large withdrawals of foreign exchange deposits which would need to be quickly accommodated to restore market confidence, as capital controls would have no effect on residents' ability to withdraw their deposits from the domestic banking system. While commercial banks could initially tap their own foreign assets to fund such a withdrawal, these would probably be insufficient to withstand a full-fledged run on dollar deposits, as a considerable share of foreign-currency deposits has been used to fund foreign-currency loans. As a result, recourse to official reserves might be necessary to restore financial stability. While foreign-currency deposits have declined from more than 40 percent of total deposits in 2000 to less than 30 percent in 2006, the degree of dollarization remains high in Vietnam relative to the regional average (Figures 5 and 6).

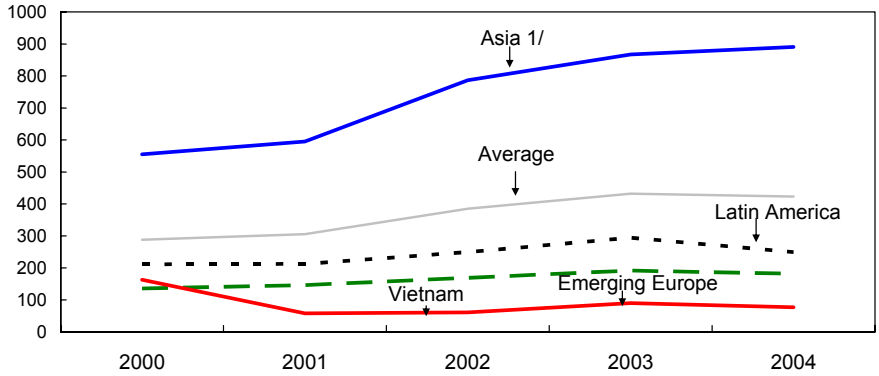
Figure 5. Vietnam: Foreign Exchange (Forex) Deposits as a Percentage of Total Deposits



Sources: Authorities and Fund staff estimates.

1/ Asia includes China, India, Indonesia, Korea, Malaysia, Philippines and Thailand. Emerging Europe includes Croatia, Czech Republic, Estonia, Latvia, Lithuania, Russia, Turkey and Ukraine. Latin America includes Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela.

Figure 6. Vietnam: Ratio of GIR to Forex Deposits (In percent)

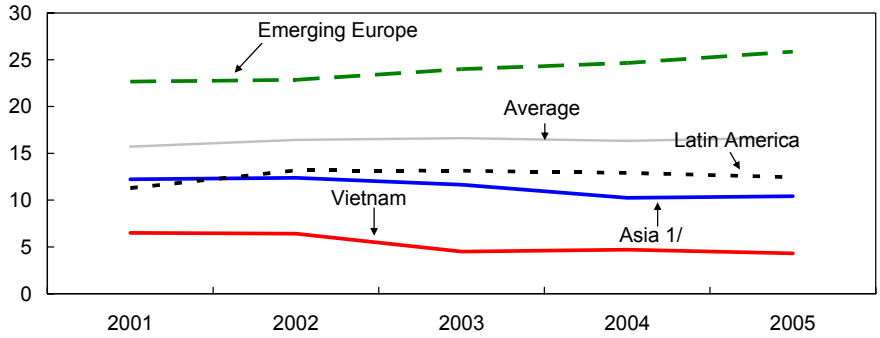


Sources: Authorities and Fund staff estimates.

1/ Asia includes China, India, Indonesia, Korea, Malaysia, Philippines and Thailand. Emerging Europe includes Croatia, Czech Republic, Estonia, Latvia, Lithuania, Russia, Turkey and Ukraine. Latin America includes Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela.

11. **Reserve coverage of short-term debt on a remaining maturity basis appears to be adequate**. While the comprehensiveness of debt data is uncertain, official data indicate that the bulk of external debt is either public or publicly-guaranteed and carries highly concessional terms. Private debt consists mostly of FDI-related debt and short-term trade credits, which tend to be less volatile in times of crisis. The benign structure of debt is likely the result of the government's regulation-based external debt management policy, including a requirement that all external debt contracts be approved by the Ministry of Finance prior to disbursement. Going forward, however, graduation from low-income status can be expected to progressively decrease the concessionality of new public external borrowing while increasing Vietnam's recourse to international capital markets. At the same time, equitization of state-owned enterprises (SOEs) and the gradual relaxation of external borrowing regulations will likely lead to higher private sector external debt exposure (Figures 7 and 8).

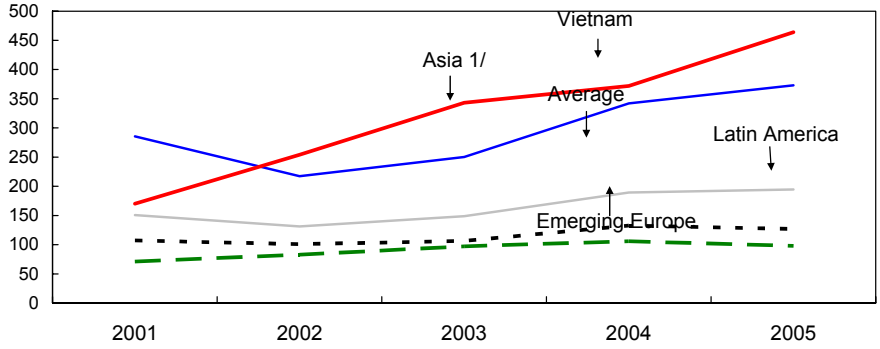
Figure 7. Vietnam: Short-Term External Debt based on Remaining Maturity



Sources: Authorities and Fund staff estimates.

1/ Asia includes China, India, Indonesia, Korea, Malaysia, Philippines and Thailand. Emerging Europe includes Croatia, Czech Republic, Estonia, Latvia, Lithuania, Russia, Turkey and Ukraine. Latin America includes Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela.

Figure 8. Vietnam: Ratio of GIR to Short-Term External Debt by Remaining Maturity
(In percent)



Sources: Authorities and Fund staff estimates.

1/ Asia includes China, India, Indonesia, Korea, Malaysia, Philippines and Thailand. Emerging Europe includes Croatia, Czech Republic, Estonia, Latvia, Lithuania, Russia, Turkey and Ukraine. Latin America includes Brazil, Chile, Colombia, Mexico, Peru, Uruguay and Venezuela.

12. **Vietnam's reserves are currently above a composite minimum benchmark based on external debt falling due within one year and the risk of capital flight.** This benchmark aims to answer the question *would the country have sufficient reserves to service short-term external debt (i.e., debt falling due within the next 12 months) in the event of capital flight.* Using a range of 10 percent to 20 percent of broad money as a proxy for potential capital flight, an upper (i.e., more conservative) and lower minimum benchmark for reserves can be estimated as the sum of external debt falling due within one year and the potential for domestic capital flight. Under this definition, Vietnam has held sufficient reserves since 2002 to cover the lower-range estimate (i.e., based on 10 percent of broad

money) of potential capital flight, but insufficient to cover the upper-range estimate (Table 1).[5]

Table 1. Vietnam: Composite Minimum Reserve Benchmark based on Broad Money
(in billions of dollars, unless specified)

Year	Short-term Debt (a)	Broad Money (b)	Benchmark 1/ 10% (c)	Benchmark 1/ 20% (d)	Reserves	Adequacy
2000	1.865	15.370	3.402	4.939	3.030	below (c)
2001	1.990	18.565	3.847	5.703	3.387	below (c)
2002	1.454	21.418	3.596	5.738	3.692	between (c) & (d)
2003	1.640	26.348	4.274	6.909	5.620	between (c) & (d)
2004	1.696	33.742	5.070	8.444	6.314	between (c) & (d)
2005	1.844	43.399	6.184	10.524	8.557	between (c) & (d)

1/ Indicates the lower bound for reserves and is equivalent to short-term debt plus coverage of 10 percent and 20 percent of broad money, respectively, e.g. c = a + (0.1*b), d = a + (0.2*b).

13. **When the risk of capital flight is assessed relative to a composite minimum benchmark based on foreign-currency deposits, the results are sensitive to the measure of reserves**. In this case the minimum benchmark is computed as the sum of short-term debt on a remaining maturity basis and dollar deposits (as opposed to broad money), and aims to answer the question *would the country have enough reserves to service its short-term external debt in the event of a run on deposits denominated in foreign exchange (Forex).* In the case of Vietnam, while GIR have fallen clearly below the minimum threshold throughout the period of study, CBSR, which is a more comprehensive measure of the banking system's ability to accommodate large withdrawals of foreign-currency deposits, have hovered around the benchmark (Table 2).[6]

[5] Following the approach proposed by De Beaufort and Kapteyn (2001), capital flight by domestic residents during times of crisis has been approximated to be equal to one standard deviation of broad money. For countries with a managed float or pegged exchange rate, capital flight of 10–20 percent of broad money falls in the range of one standard deviation for a group of 21 emerging markets, plus China and India. De Beaufort and Kapteyn (2001) have also proposed a way to account for country-specific risk by scaling the benchmarks by independently derived estimates of country risk, such as The Economist's Crisis Risk Index or the Composite Crisis Risk Index compiled in the International Country Risk Guide. This approach may be particularly well suited for cross-country comparisons of reserve adequacy. However, when used in stress testing for an individual country, scaling by such estimates of country risk can result in an endogeneity bias, because the country risk estimates themselves are derived from vulnerability indicators, including reserve adequacy. Hence, the benchmarks derived in this chapter have not been scaled by any extraneous risk factors.

[6]The sum of short-term debt based on remaining maturity and foreign-currency deposits could be viewed as a maximum exposure. Further refinements to this exercise could include constructing a risk-weighted benchmark, or calculating reserve adequacy taking into account the authorities' non-zero lower bound for reserve holdings (i.e., the reserve level at which the exchange rate would be allowed to move significantly).

Table 2. Vietnam: Composite Minimum Reserve Benchmark based on Forex Deposits
(in billions of dollars, unless specified)

Year	Short-term Debt (a)	Foreign currency Deposits (b)	Benchmark c = a + b	GIR	Adequacy	CBSR 1/	Adequacy
2000	1.865	1.854	3.719	3.030	below	6.599	above
2001	1.990	5.884	7.874	3.387	below	7.805	near
2002	1.454	6.093	7.547	3.692	below	7.640	near
2003	1.640	6.220	7.860	5.620	below	8.419	above
2004	1.696	8.215	9.911	6.314	below	9.248	below
2005	1.844	10.003	11.847	8.557	below	12.007	near

1/ Consolidated banking sector reserves are equal to GIR plus the reserves of deposit money banks.

14. **In sum, the above vulnerability indicators present a broadly positive picture of reserve adequacy in Vietnam over the period 2000–2005**. While the import coverage of reserves still falls somewhat short of the three-month benchmark, this is in large part attributable to the dynamic growth of exports and imports over the last few years, together with the high import content of exports, and should not be cause for concern as long as the recent years' trend increase in reserves is sustained. In addition, short-term debt based on remaining maturity appears adequately covered. However, although recent current account deficits have been more than financed through FDI and ODA, and the comfortable balance of payments surpluses have led to a steady accumulation of reserves by the SBV, increasing monetization together with the progressive opening up of the capital account could amplify pressures on reserves in times of stress over the medium term.

C. The Effects of the Continued Transition to a Market Economy on Reserve Adequacy

15. **Over time, the transition to an open capital account will increase the relevance of balance sheet vulnerability indicators, and heighten the need for the authorities to improve their monitoring of capital flows and to put in place institutions and regulations aimed at mitigating the associated new risks**. Forthcoming WTO accession, the equitization of SOEs and state-owned commercial banks (SOCBs), and the development of the domestic capital market are already leading to increasing private capital flows in the context of a broadly favorable global financial environment. Graduation from IDA-only status and the shift to market-based foreign currency-denominated borrowing by the sovereign, together with the eventual contracting of external debt by the domestic private sector and SOEs, will open Vietnam to an entirely new set of challenges in risk management. Improvements in the monitoring of capital flows and in the prudential-regulatory environment would be essential in such a context to avoid or minimize sudden pressure on reserves that could necessitate large adjustments in interest and exchange rates and, possibly, lead to severe output losses.

16. **A more comprehensive balance sheet approach to risk analysis would take into account the inter-linkages between sectors and the channels through which risks in the**

private sector can result in a liquidity risk to the sovereign.[7] The monitoring of the government's external debt will need to be expanded to cover the private sector's foreign liabilities, including (but not limited to) short-term foreign liabilities of the banking sector, unhedged foreign-currency debt of the non-financial sector, SOEs' foreign-currency liabilities to residents and foreigners, and the risks associated with derivative contracts undertaken by the banking sector. As recent crises in other countries have shown, significant private sector exposures to interest, rollover and exchange rate risks can result in large public liabilities or undermine the authorities' ability to adjust macroeconomic policies as needed to protect financial stability.

17. **The opening of the capital account also has implications for the choice of exchange rate regime**. A key consideration should be the extent to which the exchange rate regime can help mitigate vulnerabilities. A pegged exchange rate usually requires higher reserve coverage both to stabilize the exchange rate and ensure credibility of the regime itself.[8] In addition, when the exchange rate has been fixed over longer periods of time, it can result in false perceptions of stability and/or implicit guarantees, as well as a lack of incentives for private entities to appropriately hedge risk, leading to a build-up of unhedged foreign-currency liabilities. While the authorities could exit the peg in the event of severe pressure on reserves, this has proven difficult and costly in times of stress. Therefore, the move towards a more flexible exchange rate regime, which is the authorities' medium-term objective, needs to be appropriately timed to minimize any risks and possible costs associated with this transition.

18. **While improved monitoring of capital flows, an adequate stock of reserve holdings, and a more flexible exchange rate regime can help decrease external vulnerability, these measures cannot substitute for sound economic fundamentals underpinned by strong policies and solid institutional arrangements**. Successful transition to a more open, market-based economy will require the putting in place of institutions and practices aimed at minimizing risks posed by debt roll-over and currency exposure, as well as decreasing the likelihood of private sector imbalances that could result in pressure to bail out firms. While in-depth discussion of these key institutional arrangements and practices is beyond the scope of this chapter, these arrangements would need to include effective management of the debts of the enlarged public sector, sound

[7] This may be even more important in the early years of the transition given that the distinction between SOEs and private firms can be expected to become blurred as the state retains its controlling interest in a growing number of equitized SOEs.

[8] For example, De Beaufort and Kapteyn (2001) estimate that, for countries with independently floating exchange rates, no more than between 5 and 10 percent of M2 would be mobilized against reserves in a relatively short time period, compared with a corresponding range of 10 to 20 percent of M2 for countries with a managed float or fixed rate regime.

supervision and regulation of financial institutions, and improved corporate governance and insolvency regime.

D. Estimates of Reserve Adequacy under Alternative Scenarios

19. **Stress tests of the balance of payments can be a useful means to illustrate how the adequacy of reserves could be influenced over the medium term by alternative paths of public debt and private liabilities**. This section develops a number of alternative scenarios to explore the impact of shocks to standard sources of vulnerability such as the current account balance and debt service, as well as the implications of continuing dollarization and monetization. As already noted, Vietnam is currently in the enviable position of having generally favorable vulnerability indicators. The low initial levels of short-term debt and private capital flows in the context of a strong balance of payments make a capital account crisis in the coming years fairly unlikely. Against this background, the exercise that follows aims to highlight potential future risk factors (as opposed to imminent risks) that may warrant close monitoring over the medium term.

20. ***Baseline Scenario*** – The baseline projection is based broadly on the SEDP for the period 2006–2010, with continued strong investment-led growth of around 7½ percent per year; relatively high inflation buoyed by strong demand; robust exports; strong investment-driven imports; and a moderate deterioration of the current account toward its historical average as oil prices slowly decline. At the same time, continued robust FDI and ODA along with incipient private capital flows contribute to a steady and strong increase in reserves as a percent of GDP, with reserve coverage of imports leveling off at 3–4 months of imports over the medium term.[9]

21. Under such a scenario, reserves would remain adequate to confront current account and liquidity risks over the medium term. The reserve coverage of imports would rise above 3 months, coverage of short-term debt based on remaining maturity would average over 600 percent, and reserves would fully cover foreign-currency denominated deposits in the banking system (Figure 9). In addition, reserves would be above the upper bound required to service short-term debt in the event of capital flight (Figure 10, panel 1) or a withdrawal of dollar deposits throughout most of the projection period (Figure 11, panel 1).

22. ***Alternative Scenario 1: an increase in short-term debt based on remaining maturity to the regional average*** – As already noted, Vietnam currently has a very low level of short-term debt, due to the highly concessional nature of medium- and long-term debt and the small stock of short-term debt by original maturity. In this scenario, short-term debt nearly

[9] The SEDP does not contain targets on monetization or dollarization. Under the baseline, foreign currency deposits are assumed to stabilize at 20 percent of GDP, while increasing monetization leads broad money to rise to 100 percent of GDP by 2011.

triples from about 4 percent of GDP in 2005 to the regional average of about 11½ percent of GDP from 2006 onward. While reserve coverage of short-term debt would decline dramatically, it would still average more than 200 percent over the projection period, well in excess of the Guidotti-Greenspan benchmark of 100 percent (Figure 9, panel 3). All other vulnerability indicators would remain in reasonably safe ranges, except for the ability to continue to service short-term debt while simultaneously covering capital flight equivalent to 20 percent of broad money (Figure 10, panel 2) or a run on dollar deposits in the banking sector (Figure 11, panel 2).[10]

23. ***Alternative Scenario 2: a decline in the oil price*** - A decline in the oil price would affect the economy through two broad channels: net oil export receipts and fiscal revenues. Vietnam is a crude oil exporting country with no refining capacity. Hence, any change in oil prices affects both export receipts and the oil import bill. While net exports are positive, the trade balance shows limited sensitivity to changes in the oil price.[11] In contrast, the fiscal accounts would be significantly impacted by the fall in corporate and natural resource taxes paid by Petrovietnam, and through lower VAT and import tax revenue on imported petroleum products. The total impact on vulnerability indicators would be transmitted through lower reserve accumulation and higher amortization on debt contracted to fill the resulting financing gap. The implied sizable decline in oil receipts resulting from the assumed shock to the oil price would leave current account indicators and short-term debt coverage in safe ranges (Figure 9), with both composite minimum reserve benchmarks remaining basically covered (panel 3, Figures 10 and 11).

24. ***Alternative Scenario 3: a worsening of the trade balance*** – The baseline scenario represents a somewhat rosy outlook for export growth, while imports are assumed to grow broadly in line with the investment-led growth strategy of the SEDP. Under Scenario 3, the average rate of export growth is left unchanged, but smoothed over the period (i.e., a base effect), which could be interpreted as a delayed take-off in export growth following WTO accession. The trade deficit would increase to about 6.4 percent of GDP (from 4.8 percent of GDP under the baseline), leading to a stock of reserves which is 25 percent lower than under

[10] GIR is used to assess the adequacy of reserve coverage of forex deposits over the medium term in all scenarios given the uncertainties regarding trends in banks' net foreign assets (NFA) going forward. As already noted, commercial banks' NFA declined from US$4.6 billion or 78 percent of foreign-currency deposits in 2001 to US$3.2 billion or 32 percent of foreign-currency deposits in 2005, as commercial banks have steadily drawn down their foreign reserves to fund their expanding foreign-currency loans.

[11] The oil price used in this scenario is the published Spring WEO baseline (3/9/2006) which was based on oil prices that were lower by 13, 20, 18, 17 and 15 percent over the years 2006–2010, respectively, than under the corresponding August 1, 2006 WEO baseline. The impact of a lower oil price on the current account peaks at about -1 percent of GDP in 2007 and it falls steadily thereafter, reaching a level of about -0.1 percent of GDP by 2009.

the baseline. While coverage of short-term debt would remain adequate, all other indicators would fall below their respective benchmarks.

25. ***Alternative Scenario 4: the combined effects of a worsening of the trade balance with an increase in short-term debt to the regional average*** – These combined effects would not only decrease reserves but increase the minimum reserves required for liquidity purposes (i.e., the lower bound of the composite minimum benchmark). Under such a scenario, only reserve coverage of short-term debt would remain adequate, but would fall dramatically from over six times to about 1½ times of short-term debt based on remaining maturity.

26. ***Alternative Scenario 5: an increase in monetization*** – Under the baseline scenario, broad money was gradually raised from 85 percent of GDP to 100 percent of GDP, as monetization continues to increase during the transition. In this scenario, broad money is raised to 145 percent of GDP, similar to the ratio of China in recent years. Even under a higher level of monetization, reserves would remain reasonably adequate to cover capital flight in the case that short-term debt remains low (Figure 10, panel 6). However, reserve coverage would be inadequate in the event that short-term debt had, in the meantime, risen to regional levels (i.e., as under alternative scenario 1).

Table 3. Vietnam: Summary of Stress Test Results 1/

Scenario	GIR/Import	GIR/M2	GIR/ST Debt	GIR/Forex Deposits	Composite I (ST Debt +10-20% of M2)	Composite II (ST Debt + Forex Deposits)
Baseline	> 3 months	22 – 26%	> 6 times	rising to > 130%	> 20% bound	> lower bound during 2008-11
Alt. 1: Higher ST debt	...	...	.> 2 times	...	> 10% but < 20%	< lower bound
Alt. 2: lower oil price	> 3 months	22 – 24%	> 5 times	rising to 120%	> 10% but < 20%	< lower bound
Alt. 3: worse trade balance	declining to < 3 months	...	> 5 times	falling to < 100%	> 10% but < 20%	< lower bound
Alt. 4: scenario 1 plus 3	declining to < 3 months	...	> 1½ times	falling to < 100%	falling to < 10%	< lower bound
Alt. 5: higher monetization	...	falling to 18%	...	...	> 10% but < 20%	...
Alt. 6: higher dollarization	...	...	...	falling to < 80%	...	< lower bound

1/ Indicators not affected by stress test denoted by "...".

27. ***Alternative Scenario 6: increasing dollarization*** – In this scenario, foreign-currency deposits are assumed to increase to 30 percent of GDP by 2011 (from 20 percent under the baseline). Under such circumstances, the strong pace of reserve accumulation would be insufficient to cover short-term debt by remaining maturity in the event of a run on forex deposits (Figure 11, panel 6).

28. **Based on the above, the Vietnamese economy would seem to be most vulnerable to shocks to the current account, but as capital account liberalization progresses, vulnerability to a sudden loss of confidence would increase**. Thus, over time, additional scenarios exploring the effects of different assumptions about capital flows and financial sector risks will become increasingly relevant. The liberalization of portfolio outflows by domestic agents could eventually make it more difficult for the authorities to respond to shocks leading to domestic capital flight or a withdrawal of dollar deposits. With regard to foreign investors, the authorities will also need to be mindful of the potential effects of a large cumulative increase in portfolio inflows, which are already largely liberalized. Such inflows could be readily reversed in times of stress (i.e., portfolio inflows could be akin to "hot money"), thus testing the resolve of the monetary authorities to defend the currency (i.e., capital flight by foreigners).

29. **The above considerations suggest that prudent reserve management, including careful determination of the desirable level of reserve holdings, will gain increasing importance in Vietnam in the period ahead**. Given that reserve holding is both costly and implies potential risks to the SBV's balance sheet, the authorities will need to weigh the relative merits of lower vulnerability versus these costs. While the ongoing liberalization of the financial sector, and the accompanying decline in financial sector repression, can be expected to increase the sterilization costs of operations that may be required to preserve monetary stability in the context of continuing large increases in GIR, they are also likely to increase the importance of maintaining an adequate level of reserves.

E. Conclusions

30. **Vietnam's favorable terms of trade and strong balance of payments imply that the current level of reserves is broadly adequate, even though it falls short of the standard benchmark of three months of imports**. Most liquidity-based indicators also point to low vulnerability. Vietnam's relatively limited openness to capital flows, along with its highly concessional debt and prudent foreign debt management, have helped to keep the level of short-term debt low. Under the broadly favorable assumptions of the staff's baseline scenario, vulnerability to external debt distress would remain low over the medium term, although dollarization will continue to pose risks. While stress tests indicate that the balance of payments could be significantly worse under a less favorable external environment, the associated risks appear to be relatively moderate and would be most pronounced under a confluence of events, which would simultaneously affect the trade balance along with debt service requirements.

31. T**he low vulnerability to external distress provides the authorities with a positive backdrop against which to move toward greater exchange rate flexibility and the implementation of structural reforms aimed at ensuring that vulnerabilities remain low**. The current de facto fixed exchange rate, while useful in anchoring inflationary expectations in the recent past, has discouraged the utilization of hedging instruments and the development of a culture of risk management. In the coming period, while capital flows are still relatively modest and the balance of payments remains fundamentally sound, moving from a position of strength to greater two-way exchange rate flexibility could obviate the need for potentially more costly and painful adjustments down the road, in the event that the external environment deteriorates markedly.

32. **The current position of strength should also be taken advantage of to establish a sound framework for the monitoring and regulation of capital account transactions**. There is a need to enact institutional arrangements and practices aimed at effectively monitoring vulnerabilities as well as prudential and regulatory norms aimed at limiting risks. Improved data reporting and disclosure requirements would have to be an important element of these efforts. As the capital account is progressively liberalized, and SOEs and SOCBs are given greater financial autonomy, additional steps would need to be taken to improve the mechanisms for the control of public debt operations of the enlarged public sector, strengthen corporate governance and insolvency regimes, and upgrade the supervision and regulation of the banking system.

References

De Beaufort Winjholds, J. and A. Kapteyn, 2001, "Reserve Adequacy in Emerging Market Economies," IMF Working Paper, WP/01/143, International Monetary Fund, Washington D.C.

Greenspan, Alan, 1999, "Currency Reserves and Debt," Remarks before the World Bank Conference on Recent Trends in Reserve Management, Washington D.C., April 29.

Guidotti, Pablo, 1999, Remarks to the G-33 Seminar, Bonn, Germany (March 11)

Hviding, K., M. Nowak, and L. Ricci, 2004, "Can Higher Reserves Help Reduce Exchange Rate Volatility?", IMF Working Paper, WP/04/189, International Monetary Fund, Washington D.C.

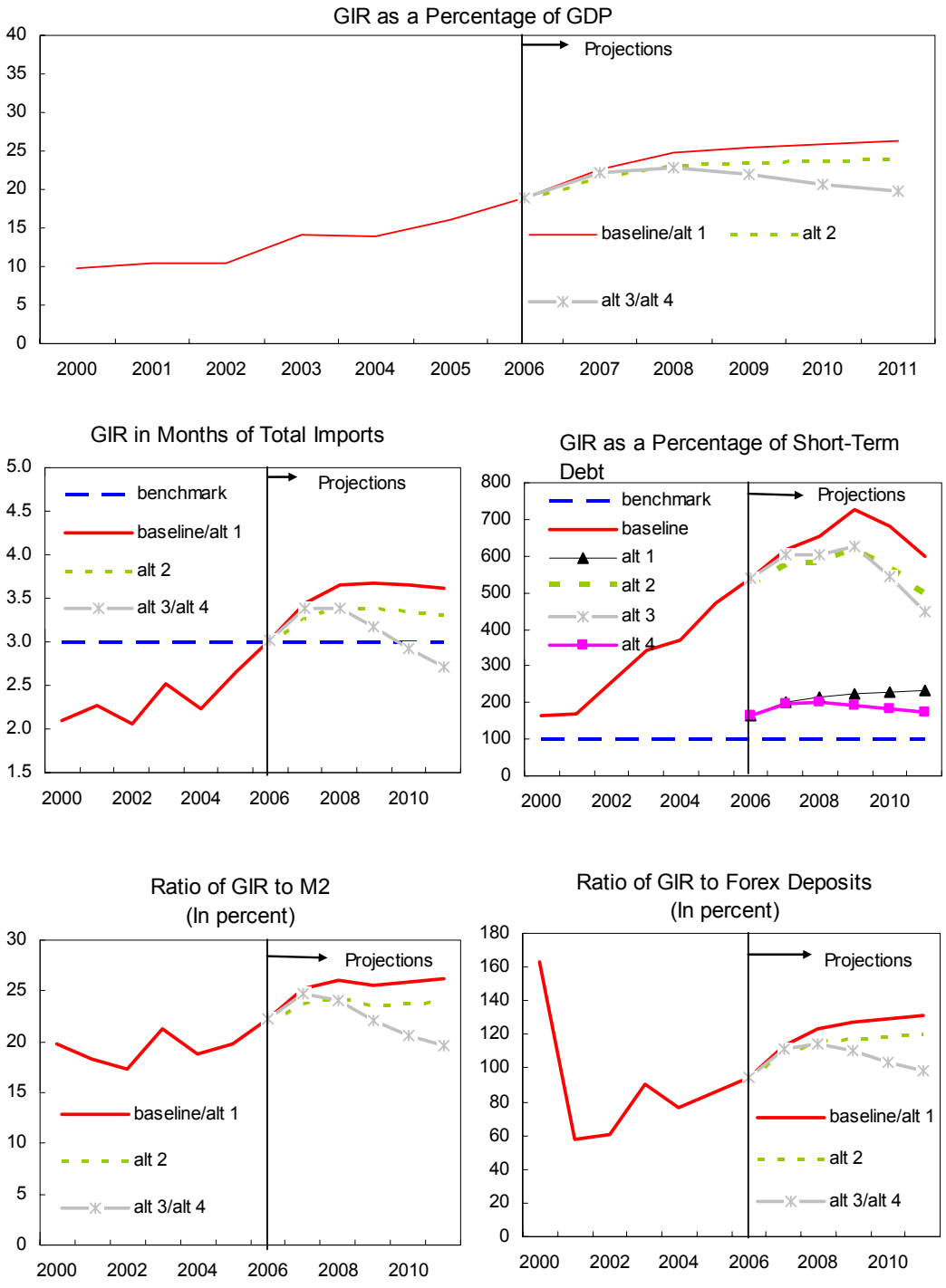
International Monetary Fund, 2001, "Guidelines for Public Debt Management," International Monetary Fund, Washington D.C. http://www/imf/org/external/np/mae/pdebt/2000/eng/guide.pdf

International Monetary Fund, 2001, "Issues in Reserve Adequacy and Management," International Monetary Fund, Washington D.C. http://www.imf.org/external/np/pdr/resad/2001/101501.pdf

International Monetary Fund, 2002, "Assessing Sustainability", International Monetary Fund, Washington D.C. http://www.imf.org/external/np/pdr/sus/2002/eng/052802.pdf

International Monetary Fund, 2004, "Liquidity Management", (unpublished; International Monetary Fund, Washington D.C.).

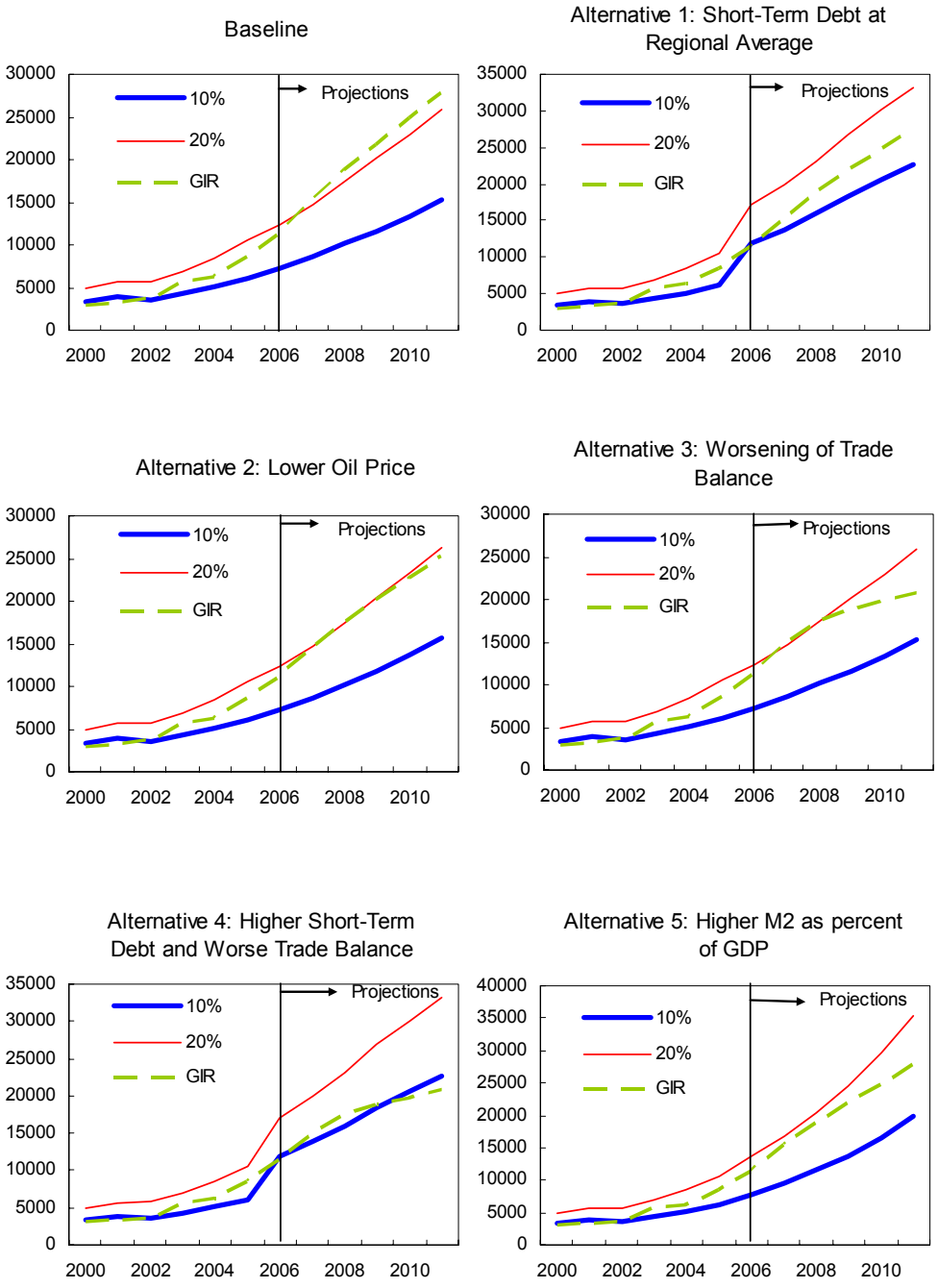
Figure 9. Vietnam: Selected Indicators of Reserve Coverage



Source: Fund staff estimates.

1/ Alternative scenarios correspond to : (1) short-term debt at regional average, (2) lower oil price, (3) a worsening of the trade balance, (4) combination of 1&3.

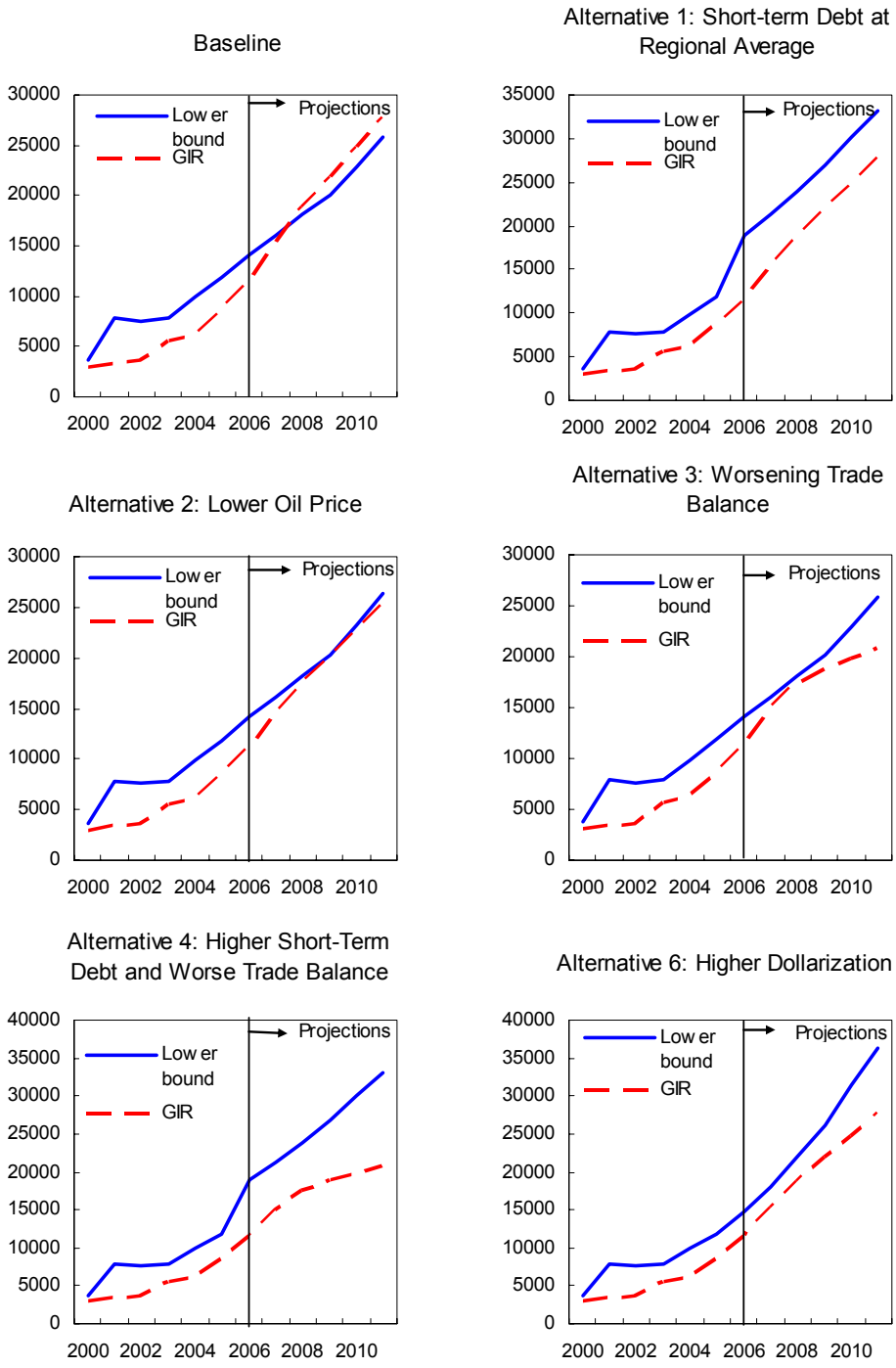
Figure 10. Vietnam: Coverage of a Composite Minimum Benchmark Based on Broad Money (M2) 1/



Source: Fund staff estimates.

1/ The minimum benchmark is equal to the sum of short-term debt based on remaining maturity and 10-20 percent of broad money. The 10 percent benchmark (20 percent benchmark) can be interpreted as the minimum amount of reserves necessary for the government to continue to service short-term debt in the event of capital flight equivalent to 10 percent (20 percent) of broad money (M2).

Figure 11. Vietnam: Coverage of a Composite Minimum Benchmark Based on Forex Deposits 1/



Source: Fund staff estimates.

1/ The minimum benchmark is equal to the sum of short-term debt based on remaining maturity and foreign currency denominated deposits in the banking system. It represents the minimum amount of reserves necessary for the government to continue to service short-term debt in the event of a run on foreign currency denominated deposits.

III. Assessing Real Exchange Rate Developments in Vietnam[1]

A. Introduction

1. Since the early 1990s, the strong performance of the Vietnamese economy has been underpinned by its strategy of export-led investment and growth. The development of competitive and profitable export industries has been of paramount importance for the success of this strategy. In this context, the authorities have been keen to guard against any prolonged exchange rate misalignments, which could undermine the prospects for sustainable growth.

2. Vietnam's real exchange rate has displayed sizable movements in recent years. The CPI-based real effective exchange rate (REER) appreciated significantly during the 1990s, rising by more than 30 percent between 1992 and 2000. During 2002-04, despite strong total FDI inflows exceeding 10 percent of GDP, the REER depreciated by 15 percent. However, this latter depreciation was largely reversed in 2005, when the REER appreciated by 13 percent. A number of questions arise from these developments: What have been the main factors influencing the evolution of the REER since the launching of Vietnam's transition to a market-based system in 1986? Are the recent fluctuations in the REER in any way related to economic fundamentals or are they indicative of a misalignment?

3. This chapter makes a first, preliminary attempt to shed some light on the forces underlying the recent movements in the real exchange rate. Assessing real exchange developments in Vietnam is particularly challenging since the economy has been undergoing rapid institutional development and structural changes in the context of its ongoing transition. These far-reaching changes are attested to by Vietnam's impressive transformation from a largely rural, autarkic, command economy in the early 1980s to today's increasingly open, diversified, market-oriented economy.

4. The key findings of the paper are as follows: (i) the long-run evolution of the dong's REER since 1992 seems broadly consistent with the Purchasing Power Parity (PPP) Hypothesis; (ii) the movements in the REER appear to have been in line with what one would expect based on movements in key fundamentals, such as the net foreign assets (NFA) of the banking system and the terms of trade; (iii) the opening up of the economy to international trade may have had varying influences on the REER over different sub-periods, and it may have contributed to the depreciation of the REER during 2002-04, although the evidence on this effect is not statistically significant; and (iv) while the effect of the differential growth of productivity between the tradable and nontradable sectors is estimated to have been statistically significant during 2000–05, it has the opposite sign from what

[1] Prepared by Faisal Ahmed.

would be expected in accordance with the Balassa-Samuelson hypothesis. This raises questions about the importance of Balassa-Samuelson-type effects in Vietnam during the last five years, but it does not preclude their relevance over longer time periods.

5. The remainder of the chapter is structured as follows. Section B provides an overview of key features in the evolution of the real exchange rate and its fundamentals. Section C investigates whether real exchange rate developments in Vietnam are consistent with the PPP hypothesis. An extended version of this hypothesis is used in Section D to estimate the relationships between the real exchange rate and the main underlying fundamentals as commonly defined in the literature. Section E concludes.

B. Some Stylized Facts Pertaining to Movements in the Real Exchange Rate

6. The appreciation of the REER during the early and mid-1990s was largely driven by Vietnam's still high rate of inflation, as the nominal effective exchange rate (NEER) showed no noticeable trend during this period. However, as inflation was reduced to the single-digit range in the late 1990s, movements in the REER began to reflect primarily trends in Vietnam's NEER. With the dong coming under downward pressure in the wake of the Asian crisis, the NEER and REER depreciated somewhat in 1998-99, and leveled off during 2000-02, before recording a significant depreciation during 2003-04. Thereafter, the re-emergence of persistently higher inflation compared to Vietnam's main trading partners led to a renewed divergence between trends in the REER and NEER. Thus, while the dong's de-facto peg to the U.S. dollar has helped to keep the fluctuations of the NEER within a narrow range over the last two years, Vietnam's high rate of inflation has resulted in a significant appreciation of the REER (Figure 1).

7. When REER movements are viewed in the context of overall macroeconomic developments, they appear to have been broadly in line with some of the key fundamentals. Sustained export growth, together with strong FDI in the context of rapid market-oriented reforms, supported the balance of payments and the foreign exchange market through the mid-1990s. At the same time, the opening up of the agricultural sector to international trade led to significant increases in domestic prices of basic goods, whose prices were previously set at artificially low levels (e.g., rice). [2] However, the pace of trade liberalization and market-oriented reform lost momentum in the second half of the 1990s. With the advent of the Asian crisis, FDI fell sharply, export growth slowed markedly, and the dong came under strong downward pressure, thus reversing some of its earlier real appreciation. As export growth recovered in 1999–2000, the overall balance of payments recorded large surpluses (as

[2] Large adjustments in domestic prices, together with accompanying appreciation of the real exchange rate, have been a common side-effect of early stages of trade liberalization in a number of developing countries (see, for example, Li (2003), who carried out a cross-country study on the impact of trade liberalization in 45 countries).

measured by the change in the banking system's NFA), helping to stabilize the REER at a level that was some 30 percent above its 1992 level. The subsequent depreciation of the REER in 2002-04 took place against the backdrop of a significant narrowing of the balance of payments surplus, and this depreciation was largely reversed in 2005–06 in the face of a resumed expansion of the balance of payments surplus.

8. More specifically, the economic variables that have been viewed in the literature as among the most important determinants of the equilibrium real exchange include the NFA of the banking system, the terms of trade, and trade openness.

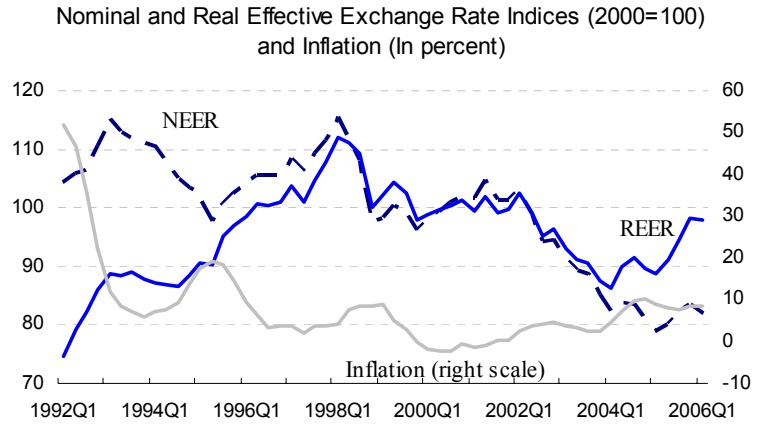
- Higher NFA allow a country to sustain a stronger real exchange rate because of higher income from the assets. In addition, the higher level of national wealth tends to increase domestic consumption, thus exerting upward pressure on non-tradable prices and the real exchange rate.

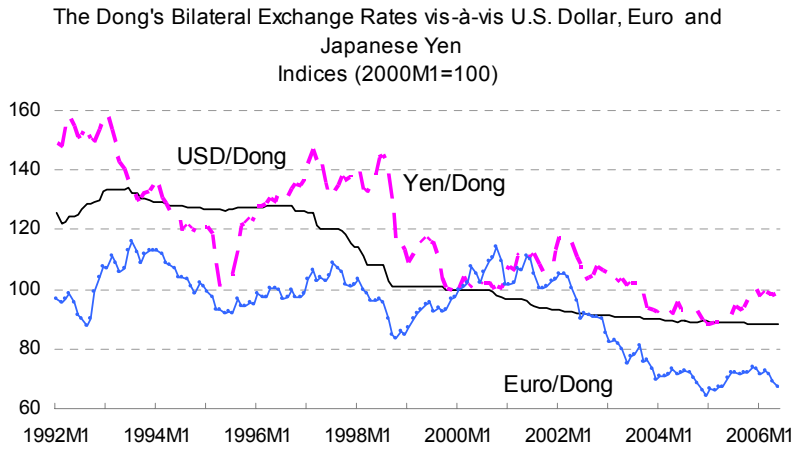
- An improvement in the terms of trade gives rise to an increase in domestic income and a stronger balance of payments, which put upward pressure on the real exchange rate. A positive terms of trade shock is equivalent to a positive productivity shock leading to higher wages and higher prices of non-tradables.

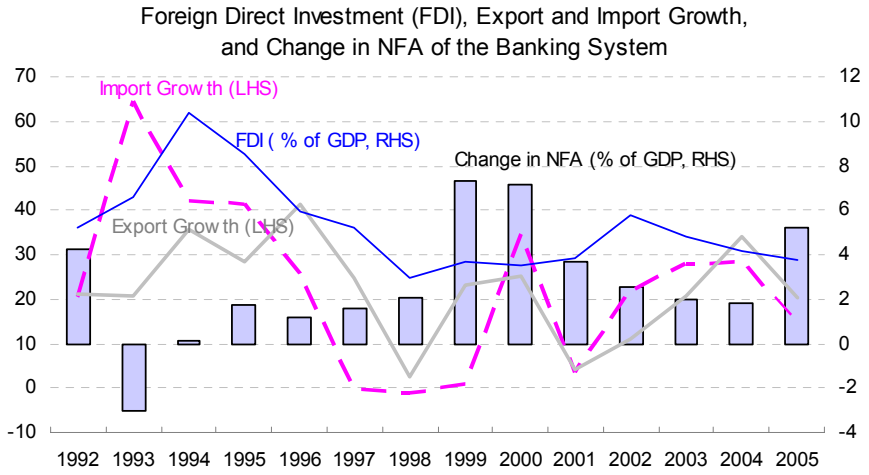
- In principle, the effect of trade liberalization on the real exchange rate can operate through multiple channels. A more open trade regime is generally associated with a more depreciated real exchange rate when the removal of the trade restrictions reduces the domestic price of tradables and discourages import substitution. On the other hand, if the trade restrictions were used primarily to keep the domestic prices of primary products artificially low (e.g., rice in Vietnam), increasing trade openness may raise the overall price level and the real exchange rate. Depending on the relative strength of these forces, the real exchange rate could move in opposite directions during different phases of a country's trade liberalization.

9. A cursory review of the evolution of the above fundamentals in Vietnam suggests that they may help to explain a significant part of the variation in the REER since the early 1990s. As can be seen from Figure 2 below, movements in the ratio of NFA of the banking system to GDP appear to have been in line with a good part of the variation of the REER during the entire period under review. The terms of trade exhibit somewhat greater short-term volatility, but their evolution over longer periods also appears to account for some of the variation in the REER. These results are consistent with the more formal regression analysis carried out in Section D below.

Figure 1. Summary Indicators of Exchange Rate Developments and External Performance, 1992-2006



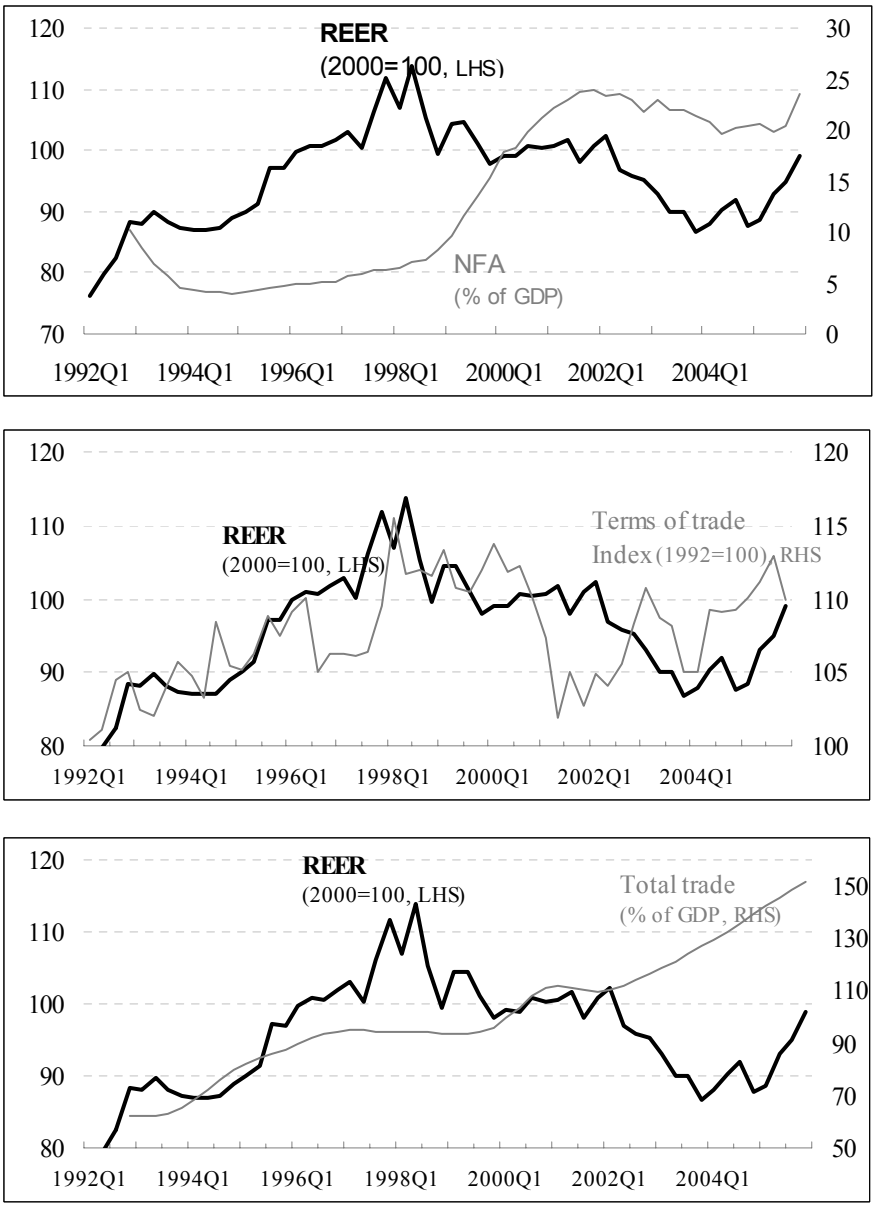




Sources: Data provided by the Vietnamese authorities; and IMF, Information Notice System (INS).

10. The role of openness to trade appears to have been more complex, possibly reflecting the already-noted ambiguous effects of trade liberalization. Thus, while the sweeping liberalization of the agricultural sector during the early phase of transition is likely to have contributed to the appreciation of the REER during the 1990s, trade liberalization may have had the opposite effect during the more recent period. Vietnam's signing of the ASEAN Free Trade Agreement (AFTA) in 1995 led to sharp reductions in tariffs on imports

Figure 2: Real Effective Exchange Rate and Key Fundamentals

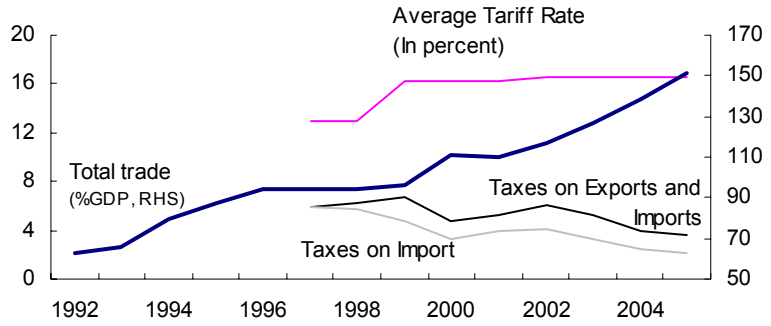


Source: IMF, Information Notice System (INS) and staff estimates

from the ASEAN countries. In addition, under the US Bilateral Trade Agreement (BTA), which was signed in 2001, average tariffs on Vietnam's exports to the US were reduced to 3-4 percent from some 40 percent, and Vietnam undertook significant commitments to reduce its owntariff and nontariff trade barriers. These measures paved the way for a rebound in FDI inflows, a surge in imports for capacity expansion in foreign-invested companies, and a revival of strong export growth.

11. In all, Vietnam's trade openness as measured by its total trade in goods and services reached over 150 percent of GDP in 2005 from about 50 percent of GDP in 1991. Although, according to the Trade Policy Database maintained by the IMF, Vietnam's average tariff rate rose in the late-1990s, and has since remained broadly unchanged, these data probably understate the extent of trade liberalization, as the average tariff rate is likely to have been boosted in recent years by tariffication of quantitative restrictions. Revenue-based measures of the restrictiveness of trade policies, such as average customs revenue on imported goods as a share of imports, have been on a declining trend.

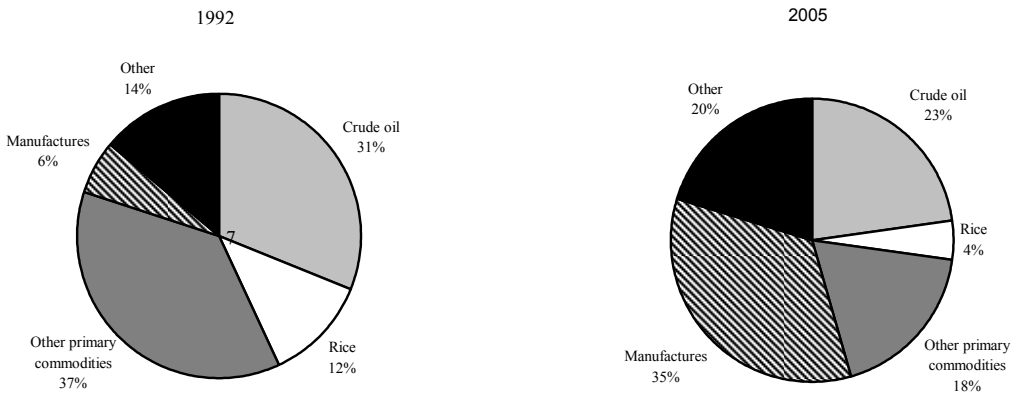
Figure 3. Trade Openness Indicators, 1992-2005
(In percent of imports, unless otherwise noted)



Sources: Trade Policy Database, IMF, Vietnamese Authorities and staff estimates.

12. The rapid growth and diversification of Vietnam's economy since the 1990s has dramatically transformed the structure of its exports. Manufacturing goods (e.g., garments and textile products, footwear, furniture) now constitute over one third of total exports—up from 6 percent in 1992. By contrast, the combined share of crude oil exports, rice and other primary commodities has declined to 45 percent, down from 80 percent in 1992. Despite the sharp increase in international oil prices over the last few years, net oil exports amounted to only 4.5 percent of GDP as of 2005.

Figure 4. Vietnam: Export Structure, 1992 and 2005



Sources: Vietnam authorities and IMF staff estimates.

C. The Real Exchange Rate and Purchasing Power Parity

13. This section examines the long-run evolution of the REER in Vietnam, with a view to ascertaining whether it is consistent with the Purchasing Power Parity (PPP) hypothesis. According to the PPP hypothesis, arbitrage in international goods markets equalizes over time the price of the same good in different countries. Based on a study of 94 developing and industrialized countries, Cheung and Lai (2000) concluded that the PPP hypothesis is more likely to be accepted for developing countries, in which domestic prices appear to converge more rapidly with international prices than in industrial countries.

14. A simple method of testing the PPP hypothesis is by estimating whether the evolution of the real exchange rate can be approximated by a process that is stationary around a constant level, which can be interpreted as the long-run equilibrium. Based on the movements of Vietnam's real exchange rate since 1992, tests indicate that its evolution is consistent with the PPP hypothesis. As Table 1 shows, the null hypothesis that the real exchange rate has a unit root (and therefore is non-stationary) is rejected.

Table 1: Unit Root Tests
Sample 1992Q1-2005Q4

	Dependent Variable D(LREER)
LREER(-1)	-0.143
	[0.006]
Unit root test statistics	
Augmented Dickey-Fuller (ADF)	-2.843
p-value	[0.059]
Phillips-Perron statistic	-2.841
p-value	[0.052]
Observations	56
R-squared	0.132
Adj R-squared	0.116
SE of regression	0.031
Durbin-Watson	0.99

Note: Numbers in parentheses are p-values.

15. The next section is devoted to studying in a more rigorous manner some of the key fundamentals that affect the evolution of the real exchange rate in the spirit of the extended-PPP approach developed by Edwards (1989). The extended PPP approach asserts that, even if purchasing power parity holds in the long-run, there are factors that may cause deviation of the actual real exchange rate from its PPP-determined level in the short to medium term.

D. Methodology and Empirical Results

Methodology and data issues

16. Although most of the early work on the real exchange rate was carried out for industrial countries, Edwards (1989) developed an equilibrium exchange rate model for developing countries based on the extended PPP approach. This approach makes it possible to use empirical estimation techniques to capture the co-movements of the equilibrium real exchange rate with key underlying economic fundamentals.

17. Aside from the already-discussed fundamentals, which include net foreign assets of the banking system, the terms of trade, and trade openness, the effects of the following two other factors have been commonly reviewed in the literature on exchange rate fundamentals:

- A deterioration in the fiscal balance can be expected to lead to increasing domestic demand (unless it is accompanied by an offsetting increase in private savings), with the resulting pressure on the prices of nontradables leading to an appreciation in the real exchange rate.

- Higher productivity growth in the tradable sector would tend to raise wages in that sector, and would gradually exert upward pressure on wages in the non-tradable sector, as labor from the non-tradable sector moves to the tradable sector. This, in turn, would tend to increase domestic demand and the prices of non-tradables, giving rise to an appreciated real exchange rate. This mechanism, known as the Balassa-Samuelson effect, crucially hinges on the assumption of full employment in the economy. A commonly used proxy in the literature for the productivity differential is per capita real GDP relative to trading partners (see MacDonald and Ricci, 2003).

18. Most of the existing empirical literature on the REER has focused on estimating the "equilibrium" real exchange rate using cointegration analysis, which requires long time series data with consistent definitions. [32] Furthermore, cointegration analysis can provide meaningful results only for economies that can be characterized as being on an equilibrium path. The ongoing rapid changes in the structure of the Vietnamese economy, together with data limitations, clearly suggest that Vietnam is not a good candidate for the use of cointegration analysis.[33]

19. Lack of a set of consistent and long time series data dictated the choice of our sample period, 2000-2005[34] at quarterly frequency. Where quarterly data are not available (e.g., fiscal deficit, relative real GDP per capita or trade openness), we employed cubic spline interpolation to generate quarterly data. Ideally, actual data at quarterly frequency would have provided more of the desired variability needed for estimation.

20. In light of the short sample period and the evolving structure of the economy, which precluded the use of cointegration analysis, we attempted to explore the determinants of the "equilibrium" real exchange rate consistent with Edwards' (1989) extended PPP approach using the Phillips-Hansen procedure of fully-modified OLS (FMOLS).[35] To provide a broader context for interpreting the econometric findings, we supplement the regression results with observations based on the pairwise correlations between the real exchange rate and its fundamentals.

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[32] See McDonald (1995) and Rogoff (1996) for a survey of the empirical studies that have attempted to estimate the equilibrium real exchange rate.

[33] Similar issues were raised for the case of China by Dunway and Li (2005).

[34] For instance, consistent coverage of the net foreign assets of the banking sector based on the monetary survey is available only from December 1999. Earlier data cover a smaller sample of financial institutions.

[35] FMOLS regression was designed by Phillips and Hansen (1990) to modify least squares to account for serial correlation effects and for the endogeneity in the regressors that may result from the existence of cointegrating relationships.

Sample Correlations

21. Although bilateral correlations between the real exchange rate and its fundamentals do not control for the movements of all relevant variables, the results could nevertheless be suggestive. The following results emerge from the sample period 2000Q1-2005Q4 (Table 2).

Table 2: Correlations: Real Exchange Rate and its Fundamentals, 2000Q1-2005Q4

	Real Exchange Rate	Net Foreign Asset	Terms of trade	Fiscal Deficit	Openness	Custom Rev 1	Custom Rev 2	Rel. per capita GDP
Real Exchange Rate	1.00							
Net Foreign Asset	0.26	1.00						
Terms of trade	-0.09	-0.72	1.00					
Fiscal Deficit	0.01	0.52	-0.42	1.00				
Openness	-0.59	-0.10	0.25	-0.10	1.00			
Custom Rev 1	0.19	0.08	-0.15	0.22	-0.79	1.00		
Custom Rev 2	0.38	0.26	-0.33	0.22	-0.90	0.95	1.00	
Rel. per capita GDP	-0.50	0.38	-0.13	0.12	0.81	-0.45	-0.50	1.00

Note: See appendix for data sources and definitions

- As expected, the real exchange rate is positively correlated with net foreign assets of the banking system.[36]

- The real exchange rate is negatively correlated with various measures of trade openness (a higher total trade-to-GDP ratio or lower customs revenue as a percent of imports is interpreted as a more open trade regime).

- Contrary to the theoretical prediction, the terms of trade are negatively correlated with the real exchange rate over the sample period, although the magnitude of the coefficient is very small. This could reflect the fact that the pairwise correlation coefficients do not control for the changes in the other variables.

- Similarly, contrary to the predictions of the Balassa-Samuelson hypothesis, relative productivity growth is negatively correlated to the real exchange rate.

22. As noted above, although the correlation coefficients might have some suggestive value, they do not isolate the impact of individual fundamentals on the "equilibrium" real exchange rate. The next step is to assess whether some of the above indicative associations hold once the data are analyzed using a more rigorous statistical test.

[36]Net foreign assets are normalized by GDP. Results are robust to alternative scalars of normalization, such as imports.

Regression Results

23. Table 3 presents the results of an econometric estimation of the real exchange rate regressed on NFA of the banking system (scaled by GDP), the terms of trade, the fiscal deficit, a measure of trade openness, and relative per capita real GDP. The estimation method is the Phillips-Hansen fully-modified OLS and the main findings are as follows:

- The NFA of the banking system are positively associated with the real exchange rate. An increase in NFA of 1 percentage point of GDP is associated with an appreciation of the real effective exchange rate of about 2 percent.[37]

- A positive terms of trade shock leads to an appreciation of the real effective exchange rate. A 1 percent increase in terms of trade is associated with a 0.6-0.7 percent increase in the real exchange rate. Alternative regressions with oil price as the proxy for the price of key commodity exports show that the impact of oil price on the real effective exchange rate is not significant.

- Increasing trade openness as measured by total exports and imports as a share of GDP is associated with a depreciated real exchange rate, although the results are not statistically significant. The results are somewhat less conclusive if one measures trade openness by trends in receipts from trade taxes, as neither of the two revenue variables we employ is statistically significant, and one of them has the wrong sign. To some extent, this may reflect the already-noted effects of tariffication of customs duties, which may have undermined the reliability of customs duty receipts as a measure of openness during a part of the sample period.

- An increase in the fiscal deficit is associated with an appreciation in the real exchange rate, but the results are not statistically significant.

- The results suggest that Balassa-Samuelson-type effects are unlikely to have played a major role in influencing exchange rate developments in Vietnam during the sample period (the sign of the relevant coefficient is statistically significant, but with the wrong sign). As noted in Chapter I, this could possibly be explained by the fact that the economy may not have been at full employment over the last few years. As wages for semi-skilled or unskilled workers rise, shifts from sectors with excess labor (e.g., agriculture) could dampen the upward pressure on wages in the nontraded goods sector. While wage pressure could be more visible in the market for skilled labor, which may be closer to full employment, the lack of disaggregated wage data makes it difficult to discern such a trend.

[37] These results are robust to alternative specification of net foreign assets scaled by imports.

Table 3. Determinants of Real Effective Exchange Rate
(Dependent variable: log(REER); sample 2000Q4-2005Q4

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Constant	3.993	4.165	3.8746	1.7473	2.14	1.3167
	[0.000]	[0.000]	[0.000]	[0.231]	[0.141]	[0.352]
NFAGDP	0.022	0.022	0.019	0.021	0.022	0.019
	[0.003]	[0.001]	[0.014]	[0.003]	[0.002]	[0.015]
TOT	0.006	0.005	0.007			
	[0.036]	[0.053]	[0.019]			
LTOT				0.618	0.557	0.702
				[0.043]	[0.061	[0.022]
FISCGDP	-0.006	-0.006	-0.004	-0.006	-0.006	-0.004
	[0.336]	[0.349]	[0.513]	[0.327]	[0.342]	[0.501]
CUSTREV1	0.007			0.006		
	[0.954]			[0.957]		
CUSTREV2		-0.006			-0.006	
		[0.549]			[0.548]	
OPENNESS			-0.008			-0.008
			[0.249]			[0.435]
LRGDPPC	-0.547	-0.634	-0.351	-0.547	-0.634	-0.354
	[0.003]	[0.000]	[0.203]	[0.003]	[0.000]	[0.202]

Note: P-values are reported below coefficients. Econometric software Microfit does not report R-square for Phillips Hansen estimates. Shaded numbers represent variable cofficients with significance at 10 percent or higher. 'L' signifies log of variables

E. Conclusions

24. This chapter has made a preliminary attempt to explore the key fundamentals that may have affected the recent evolution of the real exchange rate in Vietnam. In line with the predictions of most of the theoretical literature in this area, we find that movements in net foreign assets of the banking system and the terms of trade are likely to have played a significant role in influencing recent movements of the real exchange rate. Trade liberalization appears to be broadly associated with a depreciation in the real exchange rate in Vietnam during the period under review, but this effect is not statistically significant. Furthermore, the data suggest that the exchange rate is unlikely to have been significantly affected by Balassa-Samuelson-type effects during this period. Admittedly, given the data limitations and the ongoing structural changes in the economy, these results should be viewed as *illustrative.* A more rigorous econometric estimation of the determinants of the equilibrium real exchange rate will probably need to await the compilation of data over a longer period, after the pace of structural change in the economy has begun to ease.

ANNEX 1

Variables

The econometric analysis is based on a quarterly dataset from 2000 to 2005. Where quarterly data are not available, we generate the quarterly data from annual frequency using cubic spline interpolation. Any variable beginning in L represents the logarithm of the variable (e.g. LTOT stands for the log of the terms of trade, TOT).

- **LREER: Real Effective Exchange Rate**. In logarithmic terms. INS.

- **NFAGDP: Net Foreign Asset**. In percent of GDP. Net foreign asset of banking system (monetary authorities and commercial banks). Source: State Bank of Vietnam.

- **FISCGDP: Fiscal Deficit**. Fiscal deficit as a percent of GDP. Source: Ministry of Finance and staff estimates.

- **CUSTREV1**: Measure of openness. Custom revenue collected from VAT on imports and taxes on exports. In percent of total imports. Source: Ministry of Finance and staff estimates.

- **CUSTREV2**: Custom revenue collected from VAT on imports. In percent of total imports. Source: Ministry of Finance and staff estimates.

- **OPENNESS**: Measure of openness. Ratio of exports and imports to GDP. Sources: Vietnamese authorities and staff estimates.

- **RGDPPC: Real GDP per capita relative to trading partners**. Normalized to one for each country. The real GDP for trading partners is calculated as the trade-weighted average of the individual real per capita GDP. In logarithmic terms. Source: World Development Indicators, World Bank.

- **TOT**: Terms of trade. Calculated from the weighted average of import and export prices collected from various sources (Table A1). Weights are based on 2000-05 trade weights from the authorities.

Main goods exported and imported and relative weights

	Weight (2000-05)	Weight Normalized	Sources of data series
Export			
Textile and footwear	0.254	0.380	U.S. Bureau of Labor Services
Oil	0.214	0.319	IMF Commodity Price Database
Seafood	0.099	0.148	IMF Commodity Price Database
Rice	0.041	0.061	IMF Commodity Price Database
Coffee	0.026	0.039	IMF Commodity Price Database
Rubber	0.019	0.028	IMF Commodity Price Database
Coal	0.013	0.019	IMF Commodity Price Database
Tea	0.004	0.006	IMF Commodity Price Database
Import			
Machinery	0.174	0.324	Bank of Japan CGPI Survey
Oil	0.115	0.214	IMF Commodity Price Database
Garment and leather	0.090	0.168	U.S. Bureau of Labor Services
Steel	0.068	0.126	IMF Commodity Price Database
Plastic	0.033	0.062	Bank of Japan CGPI Survey
Cotton	0.032	0.060	IMF Commodity Price Database
Fertilizers	0.025	0.047	IMF Commodity Price Database

References

Cheung, Yin-Wong, and Kos S. Lai, 2000, "On Cross-Country Differences in the Persistence of Real Exchange Rates," *Journal of International Economics*, Vol. 50, pp. 375-397.

Choudhuri, Ehsan and Mohsin Khan, 2004, "Real Exchange Rates in Developing Countries: Are Balassa-Samuelson Effects Presents?" IMF Working Paper No. 04/188 (Washington: International Monetary Fund).

Dunaway, Steven and Xiangmin Li, 2005, "Estimating China's "Equilibrium" Real Exchange Rate," IMF Working Paper No. 05/202 (Washington: International Monetary Fund).

Dunaway, Steven, Lamin Leigh, and Xiangming Li, "How robust are estimates of China's Equilibrium Real Exchange Rate," Selected Issues Paper, WP/06/220.

Khan, M. and J. Ostry, 1991, "Response of the Equilibrium Real Exchange Rate to Real Disturbances in Developing Countries," IMF Working Paper No. 91/3 (Washington: International Monetary Fund).

MacDonald, Ronald, 1995, "Long-run Exchange Rate Modeling: A Survey of Recent Evidence," *Staff Papers*, International Monetary Fund, Vol. 42 (September), pp. 437-98.

MacDonald, R. and L. Ricci, 2003, "Estimation of the Equilibrium Real Exchange Rate for South Africa," IMF Working Paper No. 03/44 (Washington: International Monetary Fund).

Edwards, S., 1986, "Real Exchange Rate Variability: An Empirical Analysis of the Developing Countries Case," NBER Working Paper No. 1930 (Cambridge, Massachusetts: National Bureau of Economic Research).

Edwards, S., 1989, *Real Exchange Rates, Devaluation, and Adjustment*, Chapters 2, 3, 5. (Cambridge, Massachusetts: MIT Press).

Li, X., 2003, "Trade Liberalization and Real Exchange Rate Movements," IMF Working Paper No. 03/124 (Washington: International Monetary Fund).

Phillips, P. and B. Hansen, 1990, "Statistical Inference in Instrumental Variables Regression with I(1) Process," *Review of Economic Studies*, Vol. 57 (January), pp. 99-125.

Rogoff, K., 1996, "The Purchasing Power Parity Puzzle," *Journal of Economic Literature*, Vol. 34 (June), pp. 647-68.