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### **Thailand: Selected Issues**

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THAILAND

**Selected Issues**

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Approved by the Asia and Pacific Department

February 2, 2007

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## I. OVERVIEW

**The three papers presented here examine investment in Thailand—from both a regional and country-specific perspective—and recent developments and outstanding challenges in the financial sector.** In order to raise growth to potential over the medium term, Thailand needs to broaden the sources of growth away from the external sector and toward domestic demand, especially toward public and private investment. Further strengthening the financial sector would also enhance medium-term growth prospects.

**Low investment following the 1997 financial crisis is not restricted to Thailand, but is part of a wider regional pattern.** Chapter II documents that the post-crisis Asian investment slump is unusually prolonged and deep compared with other crisis episodes. Cross-country regressions using a panel of 85 countries establish that the Asian investment slump is only partly accounted for by overinvestment in the years preceding the crisis. Three alternative explanations are found to be broadly consistent with the empirical evidence: a riskier post-crisis environment, corporate and financial sector weaknesses, and a sluggish nontradable goods sector.

**The public sector needs to play a leading role in investment over the medium term, both because of its own contribution to growth and because of its catalytic role in crowding in private sector investment.** Chapter III analyzes the opportunities and challenges of implementing large-scale infrastructure investments by the Thai public sector (the so-called “megaprojects”). It argues that given the need to upgrade infrastructure and relieve transportation bottlenecks, and given the fiscal space provided by several years of public sector surpluses and low public debt, efficiently executed megaprojects are amply justified. The chapter also examines country experiences with Public-Private Partnerships (PPPs), which represent one way of using public infrastructure investment to crowd in the private sector.

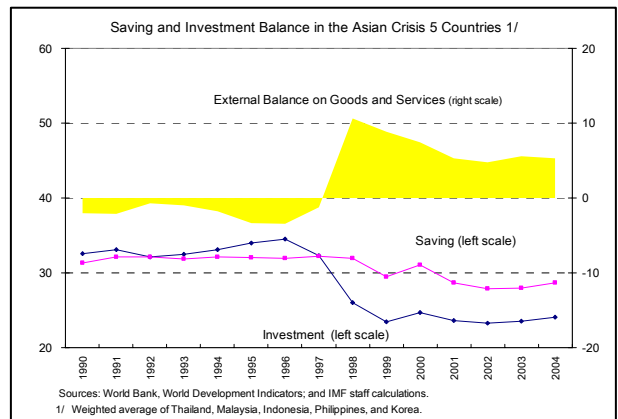
**A decade after the Asian crisis, Thailand’s financial sector has been significantly strengthened,** but further reforms are needed to address remaining vulnerabilities, improve regulatory oversight, and broaden and deepen capital markets. Chapter IV provides an assessment of the progress made to date, including improvements in the efficiency and resilience of financial markets; and operational restructuring, better risk management, and lower NPLs in the banking system. Core challenges going forward include reducing distressed assets in banks, and legal reforms to further strengthen the financial system. Such reforms would enhance medium-term growth by easing the transformation of savings—both domestic and international—into domestic investment.

## II. INVESTMENT RECOVERY FROM FINANCIAL CRISES: A VIEW FROM CROSS-COUNTRY EXPERIENCES<sup>1</sup>

*Lower investment in emerging Asia compared with the pre-crisis period is a puzzle. This paper examines the post-crisis behavior of investment in Asia. Based on cross-country historical experiences we argue, first, that the investment slump after the Asian crisis is exceptional. Second, the paper shows that the investment slump can be characterized as a reaction to pre-crisis overinvestment. However, the overinvestment cannot be a full explanation of the still low investment. Third, the paper examines reasons that might account for the slow investment recovery. Explanations discussed include: (i) a riskier investment environment, (ii) weaknesses in the financial and corporate sectors, and (iii) sluggish nontradable sectors. We show these explanations are loosely consistent with the observed patterns of investment, though none of them are strong enough to fully explain the slow investment recovery on their own.*

### A. Introduction

1. **Since the 1997 financial crisis, the saving-investment balance in emerging Asian countries has shifted from a deficit to a significant surplus.** While there has been an active debate over whether the large surpluses in emerging Asia reflect an “investment drought” or a “saving glut,” the data point to the former. In contrast to the relatively stable savings, investment declined almost simultaneously with the crisis and has only partially recovered. Thus, the limited contribution of investment to output growth and the resulting large current account surpluses have focused much interest on the factors driving the recent stagnation of investment in Asia.<sup>2</sup>



2. **Although the roots of the investment slump are complex and may differ across countries, the simultaneous investment decline in Asia could have regional explanations.** Using a cross-country panel of 85 countries, this paper attempts to study the effects of financial crises on investment. Like other recent studies (e.g., WEO, 2005), the investment regression in this paper is not very successful in tracking recent developments,

<sup>1</sup> Prepared by Masahiro Hori. Martin Schindler kindly provided his data, which constitute the core of the dataset used in this paper.

<sup>2</sup> WEO (2005), Asia and Pacific REO (2005, 2006a, 2006b), and Dell’Ariccia and Eskesen (2006) are examples of such studies by Fund staff. Millikamas, Thaicharoen, and Rodpingsangkaha (2003) focused on stagnant investment in Thailand.

especially those after the Asian crisis. However, the deviations from the standard model themselves may contain important messages, as described in the following sections. By examining the residuals from the investment regressions, this paper tries to explain the post-crisis investment slump and propose policies to remedy the situation.

3. **Based on cross-country historical experiences, this paper, first, argues that the contraction of investment after the Asian crisis is exceptional.** Pre-crisis investment was far beyond the level suggested by economic fundamentals, and the post-crisis investment fall has been exceptionally severe and prolonged. Excluding the Asian crisis episodes in 1997, only 9 out of more than 100 independent currency crisis events identified in this paper could be categorized as *investment slump crises* like the Asian crisis.

4. **Then, by comparing the investment slump crisis with the others, the paper shows that the investment slump can be broadly characterized as a reaction to pre-crisis overinvestment.** In general, there was rapid credit growth during the period leading up to the investment slump crisis, allowing economies to expand beyond fundamentals. Overinvestment took place largely due to overtly optimistic market expectations. Therefore, we cannot expect investment in emerging Asia to recover its pre-crisis level. On the other hand, we might well expect investment to pick up eventually, so long as the current investment is still below its normal level.

5. **Finally, this paper turns to why investment has yet to recover, by focusing on five crisis-affected Asian countries.**<sup>3</sup> A riskier investment environment, weaknesses in the financial and corporate sector, and sluggish nontradable sectors are the likely factors that are examined. We show that explanations based on these three factors are loosely consistent with the observed patterns of investment in the Asian-crisis countries, though none of them are strong enough to explain all the slow investment recoveries on their own.

6. **The paper is organized as follows:** Section B briefly looks back at investment developments in Thailand before and after the Asian crisis, and argues that the after-crisis investment slump is a regional phenomenon that warrants cross-country study. Section C runs cross-country investment regressions as references to evaluate the “right” level of investment. Using deviations from the regressions as our source of information, we try to highlight the features of the *investment slump crisis* including the Asian crisis. Section D turns to the causes of the deviations, and Section E concludes.

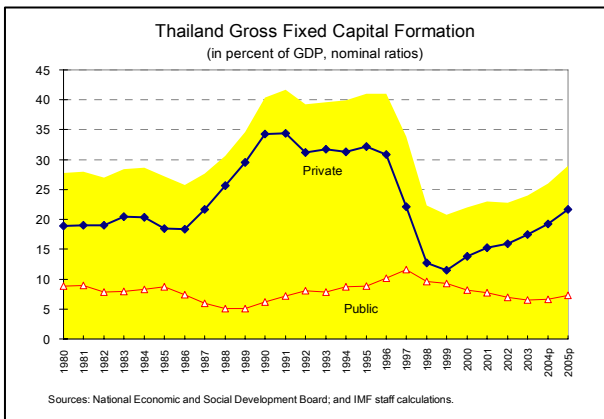
## **B. Background Facts**

7. **The investment decline in Thailand since the Asian crisis has been sizable and prolonged.** Investment dropped from over 40 percent of GDP during 1990–96 to about

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<sup>3</sup> These are Indonesia, Korea, Malaysia, Philippines, and Thailand. In the following text, we refer to them as the Asian-crisis countries.

20 percent in 1999. While investment has grown since then, it remains well below pre-crisis levels and only regained its pre-1990 average (29 percent of GDP) in 2005, eight years after from the crisis. While the initial drop in investment was largely due to a decline in private investment, public investment has contributed to the slowness of recovery. Despite the very negative contribution of investment during the crisis, the contribution of investment to output recovery after 1999 was smaller than that of a typical expansion.



**Relative Contribution to Real Output Growth 1/**

	Consumption	Fixed Investment	Net Export and Others
Typical Expansion 2/	0.70	0.48	-0.18
1999–2005	0.69	0.26	0.06
Typical Recession 3/	0.68	0.16	0.17
1997–98 4/	-0.64	-3.90	3.54

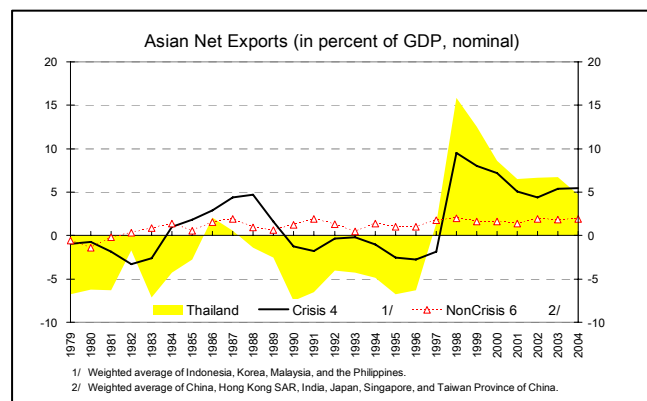
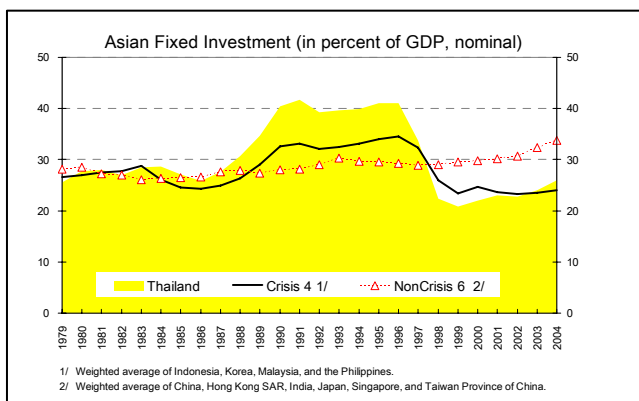
1/ Unweighted average.

2/ Average of three expansionary cycles: 1966–69, 1976–78, and 1987–96.

3/ Average of two contractionary cycles: 1970–75, and 1979–86.

4/ Contributions add up to -1 to reflect negative output growth during this period.

8. **The investment slump after the crisis had an international dimension.** For example, comparing 1990–96 with 2000–04, investment declined by between 4 and 17 percentage points of GDP in the Asian-crisis countries. On the other hand, effects on the other six Asian countries/economies were relatively minor at least in the 1990s.<sup>4</sup> Given relatively stable saving rates in the region, albeit at higher levels than in other regions, the collapse of investment and subsequent sluggish investment recovery led to a sustained external surplus in the crisis countries.



<sup>4</sup> While we observe rapid investment declines in Hong Kong SAR, Singapore, and Taiwan Province of China in the 2000s, they are not directly related to the Asian crisis, and their impact on the world economy is offset by the recent investment boom in China as seen in the noncrisis country weighted average series in the figure above.



9. **The broad-based decline in investment relative to GDP in the Asian-crisis countries warrants a regional study on the effects of financial crises on investment.** To be sure, the extent and nature of the investment slump, as well as factors underlying it, may differ across countries. However, the drastic turn of events after the crisis and the observed impact, which was centered on the crisis-affected countries, suggest that there are some underlying factors that were affected by the crisis and caused the emerging Asia's investment slump. In the next section, we adopt a cross-country historical perspective to find out what factors may explain the investment slump.

### C. Econometric Evaluation

#### Reference regressions as a measure of the normal investment

10. **Though controversial, projections from econometric models provide us with a yardstick to determine whether investment is now at the “right” level.** While current investment rates in emerging Asia are apparently lower than pre-crisis levels, this might just reflect a pruning of pre-crisis overinvestment. At least investment has been, and still is, higher than that in other regions. However, recent empirical studies that tackled the question of the “right” level have generally found that recent investment in emerging Asia (excluding China) is lower than predicted by fundamental factors.<sup>5</sup> Drawing on these earlier studies, we run cross-country regressions of the determinants of the ratio of investment to nominal GDP, to obtain a measure of normal investment.

11. **The specification broadly follows that by Barro and Lee (2003), which used lagged GDP, government size, trade openness, demographics, and a democracy index as control variables.** We supplement it with other variables—real per capita GDP growth, population growth, inflation rate, share of agriculture/industry in GDP, dependency ratio, etc.—that are likely to account for the normal level of investment. We adopt specifications without lagged dependent variables and generalized 2 stage least squares (G2SLS) random-effects estimations<sup>6</sup> so that we may use projections (fitted values) from the regressions as our reference investment.<sup>7</sup>

12. **The sample used in our study consists of 85 countries over the period 1975–2004.** Data series were taken from a variety of sources, including the World Bank's *World*

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<sup>5</sup> See Chinn and Ito (2005) and WEO (2005), for example.

<sup>6</sup> We also run regressions with fixed effects, though we do not report them because of limited space, as they produced similar results.

<sup>7</sup> In the recent literature, it may be more fashionable to run generalized method of moments (GMM) dynamic panel regressions to estimate investment equations; however, here we adopt a specification without lagged-dependent variable to obtain fitted values as “normal investment.” Dynamic regressions, with which we calculate normal investment as the ratio of fitted values over one minus the coefficient on the lagged-dependent variable, may be used to confirm the robustness of our findings.

*Development Indicators*, the IMF's *International Financial Statistics* and the *World Economic Outlook*, and national authorities. Countries were selected based on data availability, although we excluded some small countries, for which data appeared unreliable, from our sample.<sup>8</sup>

13. **Our results confirm the findings by earlier studies, such as WEO (2005) and Barro and Lee (2003).** We tried four combinations of specification by including and excluding two key independent variables, that is, public investment ratio and domestic saving ratio. The results are robust irrespective of the combinations (Table 1). The initial level of per capita GDP negatively affects the investment ratio. Higher output/population growth boosts investment significantly. Inflation and trade openness are positively related to investment, while the increases in dependency ratio result in lower investment regardless of age. The investment ratio is affected also by industrial structures, though they are not always statistically significant. The nonlinear relationship between democracy and investment, as found by Barro and Lee, is confirmed. Significant coefficients on the public investment, roughly 0.5, indicate that public investment is only partially offset by adjustments in private behavior. Significant positive coefficients on saving ratio reconfirm the strong relationship between saving and investment, which was originally reported by Feldstein and Horioka (1980).

14. **As the regressions above do not control for the impact of financial crises, any effect of crises would show up as deviations from the estimated models.** Obviously, the most straightforward and conventional way to evaluate the impact is to use crisis dummy variables, which take on the value *one* if a crisis occurred for each country in that year, in the regressions.<sup>9</sup> Table 2 reports the coefficients on dummy variables, which we obtained by adding the currency and banking crisis dummies to our system.<sup>10</sup> To capture persistent impact, we included crisis dummies with lags up to five years. Estimated coefficients show that a currency crisis is significantly associated with a decrease in the investment ratio by about 1 percentage point, and the negative impact persists at least for a few years. A banking crisis is also associated with a 1 percent reduction in the investment ratio, though the impact eases up relatively quickly.

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<sup>8</sup> We also ran the same regressions using the sample of only 46 industrial and emerging market countries that were included in the WEO (2005) regressions to exclude possible contamination from unreliable data; however, we do not report the results since the qualitative nature of our analyses is not very much affected.

<sup>9</sup> Identification of financial crises is crucial for our analyses. We identify financial crises, both currency and banking, by relying on previous studies. Data on currency crisis until 2000 are from Gupta, Mishra, and Sahay (2003). We extended our currency crisis data until 2004 by applying definitions by Frankel and Rose (1996) and Melesi-Ferretti and Razin (1998). The source of banking crisis data is Demirgüç-Kunt and Detragiache (2005).

<sup>10</sup> We omit the coefficients on other independent variables, since they are not much different from those in our reference models without the crisis dummies in Table 1.

**Table 1. Investment Ratio Reference Models: Panel Regression**  
(G2SLS random-effects IV regression )

Investment Ratio (Percent of GDP)	Reference Models (85 Countries/Economies)			
	[1]	[2]	[3]	[4]
Real GDP per capita based on PPP	-0.0001 *** ( 0.0000 )	-0.0001 *** ( 0.0000 )	-0.0003 *** ( 0.0000 )	-0.0003 *** ( 0.0000 )
Real per capita GDP growth (average of the past 5 years)	0.785 *** ( 0.046 )	0.733 *** ( 0.047 )	0.572 *** ( 0.048 )	0.528 *** ( 0.047 )
Population growth (average of the past 5 years)	2.239 *** ( 0.262 )	2.124 *** ( 0.256 )	1.880 *** ( 0.250 )	1.803 *** ( 0.241 )
Inflation rate (average of the past 3 years)	0.001 *** ( 0.000 )	0.001 *** ( 0.000 )	0.001 *** ( 0.000 )	0.001 *** ( 0.000 )
Government consumption ratio (percent of GDP, average of the past 3 years)	-0.070 ** ( 0.033 )	-0.111 *** ( 0.032 )	0.019 ( 0.032 )	-0.029 ( 0.030 )
Trade openness: (Ex + Im)/GDP (average of the past 3 years)	0.018 *** ( 0.006 )	0.010 * ( 0.005 )	0.012 ** ( 0.005 )	0.003 ( 0.005 )
Agriculture value added (percent of GDP) (average of the past 3 years)	-0.039 ( 0.026 )	-0.022 ( 0.025 )	-0.048 ** ( 0.025 )	-0.036 ( 0.023 )
Industry value added (percent of GDP) (average of the past 3 years)	0.079 *** ( 0.023 )	0.096 *** ( 0.022 )	-0.032 ( 0.024 )	-0.015 ( 0.023 )
Population ages 65 and above (percent of total)	-0.477 *** ( 0.124 )	-0.466 *** ( 0.116 )	-0.255 ** ( 0.117 )	-0.203 * ( 0.108 )
Population ages 0–14 (percent of total)	-0.520 *** ( 0.070 )	-0.479 *** ( 0.068 )	-0.507 *** ( 0.067 )	-0.461 *** ( 0.064 )
Log (life expectancy)	2.882 ** ( 1.440 )	5.624 *** ( 1.794 )	2.815 ** ( 1.360 )	4.635 *** ( 1.649 )
Log (total fertility rate)	0.433 ( 1.113 )	-0.145 ( 1.085 )	2.988 *** ( 1.075 )	2.589 ** ( 1.035 )
Democracy index	0.414 *** ( 0.146 )	0.403 *** ( 0.139 )	0.449 *** ( 0.139 )	0.441 *** ( 0.130 )
Democracy index squared	-0.043 ** ( 0.017 )	-0.037 ** ( 0.016 )	-0.038 ** ( 0.016 )	-0.033 ** ( 0.015 )
Relative price of oil (2000=1.0) x oil exporting country dummy	-0.381 ( 0.285 )	-0.625 ** ( 0.272 )	-0.567 ** ( 0.270 )	-0.816 *** ( 0.254 )
Relative price of oil (2000=1.0) x oil importing country dummy	0.109 ( 0.282 )	0.062 ( 0.289 )	0.280 ( 0.268 )	0.243 ( 0.271 )
Public fixed capital formation Ratio (percent of GDP)		0.512 *** ( 0.046 )		0.463 *** ( 0.042 )
Domestic saving ratio			0.319 *** ( 0.026 )	0.335 *** ( 0.025 )
R-sq: within	0.310	0.386	0.379	0.462
between	0.624	0.668	0.662	0.701
overall	0.483	0.541	0.539	0.594
Sigma_u	2.733	2.340	2.462	2.000
Sigma_e	3.694	3.479	3.508	3.264
Rho	0.354	0.311	0.330	0.273
Hausman test: difference not systematic	35.170	48.160	46.830	63.280 **
Number of observations	2201	2136	2201	2136
Number of countries	85	85	85	85

## Notes:

1. Numbers in parentheses are standard errors. Significance level are \* 10%; \*\* 5%; \*\*\* 1%.

2. All regressions are estimated by G2SLS random-effects IV regression and include time dummies and a constant.

**Table 2. Coefficients on Financial Crisis Dummies in the Reference Models**  
(G2SLS random-effects IV regression )

	Reference Model Sample (85 Countries/Economies)			
	[1]	[2]	[3]	[4]
<b>Currency crisis dummy</b>	-0.205 ( 0.357 )	-0.387 ( 0.337 )	-0.246 ( 0.366 )	-0.403 ( 0.347 )
Currency crisis dummy (1 year lag)	-0.815 ** ( 0.337 )	-1.211 *** ( 0.320 )	-0.810 ** ( 0.346 )	-1.190 *** ( 0.330 )
Currency crisis dummy (2 year lags)	-0.932 *** ( 0.331 )	-1.158 *** ( 0.313 )	-0.797 ** ( 0.338 )	-1.037 *** ( 0.321 )
Currency crisis dummy (3 year lags)	-0.206 ( 0.329 )	-0.343 ( 0.310 )	-0.102 ( 0.337 )	-0.242 ( 0.320 )
Currency crisis dummy (4 year lags)	-0.277 ( 0.321 )	-0.271 ( 0.302 )	-0.338 ( 0.329 )	-0.316 ( 0.312 )
Currency crisis dummy (5 year lags)	-0.582 * ( 0.323 )	-0.497 ( 0.304 )	-0.715 ** ( 0.331 )	-0.605 * ( 0.313 )
<b>Banking crisis dummy</b>	-1.031 *** ( 0.389 )	-0.717 * ( 0.368 )	-0.873 ** ( 0.400 )	-0.583 ( 0.380 )
Banking crisis dummy (1 year lag)	-0.572 ( 0.477 )	-0.851 * ( 0.450 )	-0.647 ( 0.490 )	-0.914 * ( 0.465 )
Banking crisis dummy (2 year lags)	0.618 ( 0.465 )	0.399 ( 0.439 )	0.432 ( 0.478 )	0.244 ( 0.453 )
Banking crisis dummy (3 year lags)	0.160 ( 0.453 )	-0.001 ( 0.427 )	0.074 ( 0.466 )	-0.072 ( 0.441 )
Banking crisis dummy (4 year lags)	-0.268 ( 0.451 )	-0.050 ( 0.426 )	-0.188 ( 0.464 )	0.016 ( 0.440 )
Banking crisis dummy (5 year lags)	-0.133 ( 0.375 )	-0.310 ( 0.354 )	-0.384 ( 0.384 )	-0.526 ( 0.364 )
Number of observations	1547	1547	1568	1568
Number of countries	85	85	85	85

Notes:

1. Numbers in parentheses are standard errors. Significance level are \* 10%; \*\* 5%; \*\*\* 1%.

2. All regressions are estimated by G2SLS random-effects IV regression and include the same explanatory variables as those in the regressions in Table 1.

15. **Though the estimated negative impacts are consistent with previous studies, they cannot satisfactorily account for the investment slump after the Asian crisis.** A combined currency and banking crisis is accompanied by a contraction of the investment ratio of about 2 percentage points. While this finding is in line with earlier studies (see Barro and Lee, 2003; Schindler, 2005), it is by far smaller than the 10–20 percentage point investment decline after the Asian crisis. In that respect, the sharp contraction of investment in the Asian-crisis countries was really exceptional.<sup>11</sup>

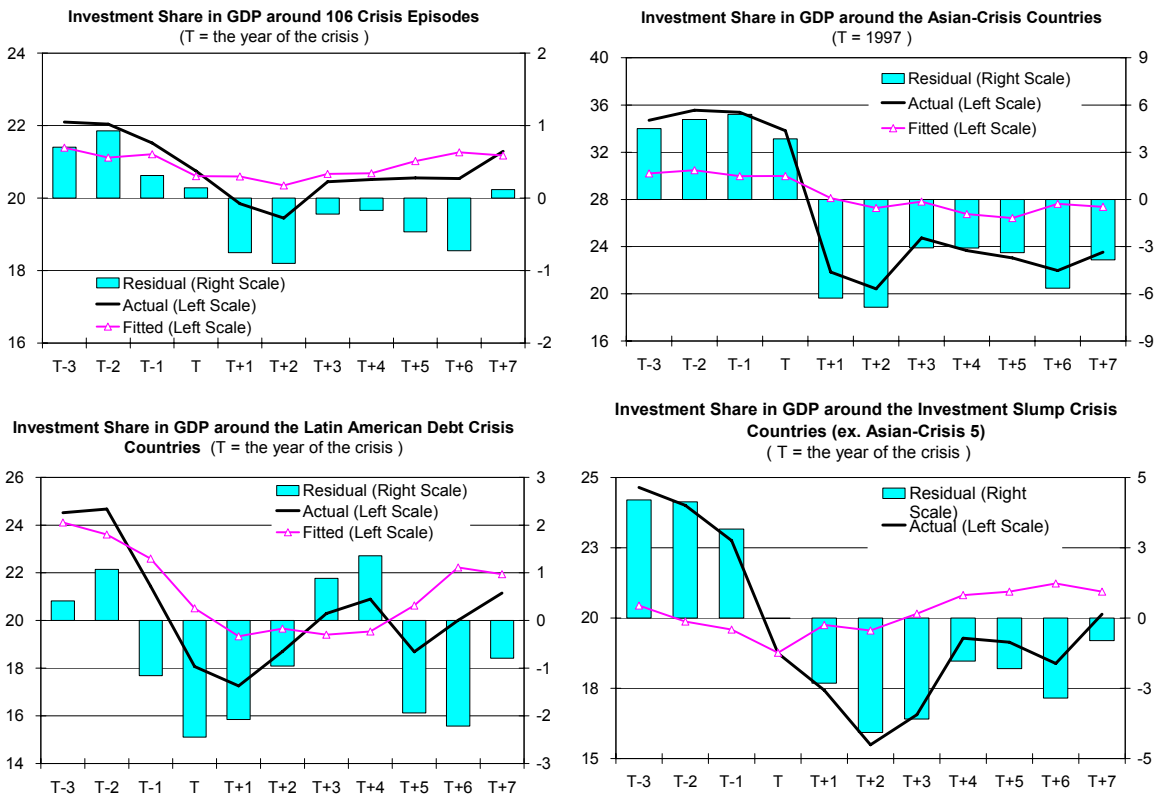
<sup>11</sup> Our interpretation here contrasts with that of Barro and Lee (2003), who argue that the Asian-crisis countries were not exceptional. However, their argument results from their failure to consider the high investment ratio of emerging Asian countries in normal times. If we take that into account, the regression results themselves, that is, column [4] and [5] of Table 1 in the Barro and Lee paper, demonstrate that the drop in investment ratio in the Asian-crisis countries was about 5 percentage points (on a five-year period basis) and thus is exceptionally large.

**Deviations from the reference regression**

16. **The large difference between the investment collapse after the Asian-crisis and the estimated 2 percent damage from financial crises suggests that the effects of financial crises on investment are highly diverse.** To shed light on the diversity, the sections below focus on crisis events only rather than all observations as was done in the regressions, and they consider in more detail the economic adjustment before and after the crises. To maximize our observations, we focused on currency crises, for which more observations are available; contemporaneous banking crises are examined only as cases of twin crises. After applying a window of three years to isolate independent crises, we identify 106 independent crisis events in 85 countries over the period from 1980–2004.

17. **The changes in investment ratios before and after the crisis events and average deviations from the estimated reference model are reported in Table 3** (see also the figure below.<sup>12</sup> Row (a), which tabulates the average of all 106 events, shows that a currency crisis results in a 1–2 percentage point fall in the investment ratio on average, and roughly

**Share of Investment Relative to GDP: Actual vs. Reference Model Prediction**



<sup>12</sup> To avoid the specification issue, we here report the average of deviations from regression results in eight forms, that is, four combinations of specification times and two types of estimation (random effect vs. fixed effect).

Table 3. Investment Ratios Before and After Financial Crises and Deviations from the Reference Model

	[1] 1/2/	[2] 3/4/	[3] 3/4/	[4] 3/4/	[5] 5/	[6] 5/	[7] 5/	[8] 5/	[9]	[10]
	Investment Ratio: before the crisis (Average for period from T-3 to T-1)	Change in Investment Ratio: Average Ratio from T to T+1 minus the ratio in column [1]	Change in Investment Ratio: Average Ratio from T+2 to T+4 minus the ratio in column [1]	Change in Investment Ratio: Average Ratio from T+5 to T+7 minus the ratio in column [1]	Residual: 3 year Average (from T-3 to T-1)	Residual: 2 year Average (from T to T+1)	Residual: 3 year Average (from T+2 to T+4)	Residual: 3 year Average (from T+5 to T+7)	Average years to reach target bands, i.e., (target level-1, target level+1). 6/ [Ratio of Episodes that recovered] 7/	Pre-Crisis Level ± 1
<b>(a) Average of all crisis episodes</b>	<b>21.4 (21.1)</b>	<b>-1.6 (-0.8)</b>	<b>-2.1 (-0.9)</b>	<b>-1.2 (-0.2)</b>	<b>0.3</b>	<b>-0.5</b>	<b>-0.7</b>	<b>-0.4</b>	<b>2.2 [ 94/101]</b>	<b>2.9 [ 35/52]</b>
<b>(b) Asian Crisis in 1997</b>	<b>35.2 (30.2)</b>	<b>-7.4 (-1.2)</b>	<b>-12.3 (-2.9)</b>	<b>-12.4 (-3.1)</b>	<b>5.0</b>	<b>-1.2</b>	<b>-4.3</b>	<b>-4.3</b>	<b>3.00 [ 1/5]</b>	<b>not yet</b>
Thailand T=1997	41.4 (34.1)	-14.3 (-2.6)	-18.9 (-5.8)	-16.1 (-4.1)	7.3	-4.4	-5.9	-4.7	not yet	not yet
Malaysia T=1997	42.1 (32.3)	-7.3 (-0.5)	-17.6 (-2.1)	-20.2 (-3.4)	9.8	3.1	-5.6	-7.0	not yet	not yet
Indonesia T=1997	31.2 (28.1)	-7.0 (-2.0)	-12.9 (-4.1)	-10.8 (-3.5)	1.1	-1.9	-5.7	-4.2	not yet	not yet
Philippine T=1997	23.5 (22.4)	-1.0 (0.7)	-4.0 (0.8)	-6.4 (0.1)	1.1	-0.6	-3.6	-5.5	not yet	not yet
Korea T=1997	37.8 (34.1)	-7.3 (-1.4)	-8.0 (-3.5)	-8.4 (-4.6)	3.7	-2.3	-0.8	-0.1	3	not yet
<b>(c) Latin American Crises in 80s</b>	<b>23.5 (23.4)</b>	<b>-5.9 (-3.5)</b>	<b>-5.3 (-4.4)</b>	<b>-3.5 (-3.0)</b>	<b>0.1</b>	<b>-2.3</b>	<b>-0.2</b>	<b>0.3</b>	<b>1.80 [ 5/5]</b>	<b>1.67 [ 3/3]</b>
Argentina T=1981	26.3 (23.8)	-4.1 (-4.4)	-6.8 (-5.8)	-7.8 (-5.5)	2.5	2.8	1.5	0.2	0	0
Brazil T=1983	22.5 (22.2)	-6.3 (-3.1)	-2.3 (-1.8)	-7.8 (-5.5)	0.3	-2.9	-0.2	2	2	2
Chile T=1982	21.6 (21.9)	-11.0 (-3.7)	-5.0 (-4.0)	1.8 (1.9)	0.3	-7.7	-1.4	-0.5	3	data not available
Mexico T=1982	25.9 (25.6)	-5.2 (-2.3)	-7.0 (-6.0)	-4.5 (-5.5)	0.3	-2.5	-0.6	1.3	3	3
Venezuela T=1984	21.4 (23.7)	-2.8 (-4.0)	-7.0 (-6.0)	-4.5 (-5.5)	-2.2	-1.0	-0.6	1.3	1	data not available
<b>(d) Other Asian countries/economies</b>	<b>30.8 (29.7)</b>	<b>-0.8 (-1.1)</b>	<b>-3.3 (-3.1)</b>	<b>-5.6 (-4.5)</b>	<b>1.1</b>	<b>1.4</b>	<b>1.0</b>	<b>0.0</b>	<b>-</b>	<b>-</b>
Hong Kong SAR T=1997	32.8 (27.5)	-1.0 (-1.2)	-6.4 (-2.0)	-10.1 (-3.7)	5.3	5.5	0.9	-1.1	-	-
Singapore T=1997	34.4 (36.8)	1.4 (-0.5)	-3.8 (-5.0)	-15.7 (-8.4)	-2.5	-0.6	-1.3	-9.8	-	-
Taiwan Province of China T=1997	24.5 (23.2)	-0.0 (-1.7)	-2.8 (-3.7)	-5.8 (-6.4)	1.3	3.0	2.2	2.0	-	-
Japan T=1997	28.5 (27.2)	-0.7 (-1.4)	-2.5 (-3.1)	-4.7 (-4.9)	1.3	1.9	1.9	1.5	-	-
China T=1997	40.5 (40.5)	-2.6 (-1.5)	-3.1 (-4.0)	2.6 (-2.5)	0.0	-1.1	0.9	5.2	-	-
India T=1997	23.9 (22.7)	-1.9 (-0.4)	-1.0 (-0.9)	0.2 (-0.9)	1.2	-0.3	1.1	2.3	-	-
<b>(e) Other Episodes of the Investment Slump Crisis 8/</b>	<b>23.8 (20.0)</b>	<b>-5.7 (-0.7)</b>	<b>-6.7 (0.2)</b>	<b>-4.6 (-1.2)</b>	<b>3.8</b>	<b>-1.2</b>	<b>-3.1</b>	<b>-1.9</b>	<b>5.71 [ 7/9]</b>	<b>7.33 [ 3/9]</b>

Notes:  
 1. Numbers in column [1] (outside of parentheses) are investment to GDP ratios averaged over 3 years before the crises. Taking an example of the row of Thailand, 41.4 means the averaged ratio for the period from 1994 (T-3=1997-3) to 1996 (T=1997-1) was 41.4 percent.  
 2. Numbers in column [1] in parentheses are the same period averages of the fitted values (estimated investment ratios) from our reference regressions. Again taking a Thai example, the averaged fitted value for Thailand from 1994 to 1996 is 34.1 percent.  
 3. Numbers in columns [2]-[4] (outside of parentheses) report changes in the investment to GDP ratio from the pre-crisis average in the column [1]. For example, -14.3 for Thailand and column [2] means the ratio decreased by 14.3 percent to 27.1 percent (1997-98 average) from the pre-crisis 41.4 percent (1994-96 average). Similarly, -18.9 for Thailand and column [3] means the investment ratio decreased by 18.9 percent from 41.4 to 22.5 percent (1999-2001 average).  
 4. Numbers in columns [2]-[4] (inside of the parentheses) report changes in the estimated investment ratios (averaged fitted values) from their pre-crisis average in the column [1]. For example, (-2.6) for Thailand and column [2] means the estimated ratio decreased by 2.6 percent (2002-04 average) from the pre-crisis 34.1 percent (1997-98 average). Similarly, (-5.8) for Thailand and column [4] means the averaged fitted value decreased by 4.1 percent from 34.1 to 30 percent (2002-04 average).  
 5. Numbers in columns [5]-[8] are residuals from the reference regressions averaged over the designated period. For example, -5.9 for Thailand and column [7] means averaged actual investment ratio for 1999 (T+2=1997+2)-2001(=1997+4) period is higher than the averaged model prediction for the same period by 5.9 percent.  
 Following relations hold among the columns as long as there is no dropout of samples.  
 (a) Degree of Pre-Crisis Overinvestment = Figures in column [5] = Outside-Paranthesis figures in column [1] - Inside-Paranthesis figures in column [1]. For example, 7.3 = 41.4 - 34.1.  
 (b) Degree of Post-Crisis Investment Slump = Figures in columns [6]/[7][8] = Outside-Paranthesis figures in columns [2]/[3]/[4] + Degree of Pre-Crisis Overinvestment.  
 For example, -4.4 = -14.3 - (-2.6) + 7.3.  
 6. Numbers outside of brackets report (averaged) years to recover the targeted band levels of investment, i.e., reference model predictions ± 1 percent point for column [9] and pre-crisis investment ratios ± 1 percent point for column [10], respectively. "Not yet" means the investment has not yet reached the targeted level as of 2004. For example, Korea recovered its model prediction level three years after the crisis. None of the Asian-Crisis 5 countries have recovered the pre-crisis levels as of 2004.  
 7. Fractions in brackets in columns [9] and [10] are ratios of the number of episodes which recovered the targeted band levels to total number of episodes in the groups. For example, [ 94/101 ] for row (a) and column [9] means, 94 out of 101 observations examined eventually recovered the model prediction levels of investment in our sample.  
 8. Nine episodes in (e), i.e., Argentina (1989), Bulgaria (1994), Cameroon (1994), Colombia (1997), Finland (1991), Iran (1993), Russia (1998), Sweden (1992), and South Africa (1984), were selected based on the following four conditions: (i) [2]<0, (ii) [5]>[6], (iii) [7]<-1, and (iv) [8]<0.

half of the fall can be traced by our reference model (without the financial crisis dummies). While the average pre-crisis investment ratio is slightly higher (by 0.3 percentage points) than the model prediction, it falls below the prediction by about 0.5 percentage points to GDP on and after the crisis. However, investment ratios recover the model prediction levels relatively quickly in almost all countries (2.2 years on average).

18. **Investment performance before and after the Asian crisis (row (b) of Table 3) is more extreme than that of the average crisis.** The crisis started from overinvestment of roughly 5 percentage points of GDP, and underwent a nose dive in investment of 12 percentage points on average. Thailand and Malaysia experienced a nearly 20 percent drop. And the post-crisis investment ratio is about 5 percentage points lower than our model predictions, as only one-fourth of the fall can be traced by our model. Four out of five crisis-affected countries (Korea is the exception) have not yet recovered to their model-predicted levels, let alone their pre-crisis levels.

19. **The investment slump after the Asian crisis is remarkable even if compared with the similar investment decline in Latin America during the 1980s debt crisis (row (c)).** While the initial fall in Latin America was comparable to that of the Asian crisis countries, more than half of the decline could be traced by the model, and all Latin American countries recovered to model-predicted investment levels in three years or less. Another distinctive feature that differentiates the Latin American crisis from the Asian crisis is its pre-crisis level of investment. As column [1] or [5] clearly shows, pre-crisis investment before the Latin American crisis was close to the model predicted levels. The investment slump for the Asian-crisis countries also stands out when compared with the other economies in emerging Asia. Although these other economies also faced investment declines in the 2000s (with the exception of China and India), most of the declines can be explained by the model.

20. **Scrutiny of the 106 crisis events reveals the investment slump after the Asian crisis to be exceptional.** In order to find similar examples, we set four criteria to be satisfied by the investment slump crises: (i) the investment rate drops immediately after the crisis (the number in column [2] is negative), (ii) the investment rate relative to its model prediction also drops right after the crisis (the number in column [5] is larger than that in column [6]), (iii) the investment rate two to four years after the crisis is lower than the model prediction by at least 1 percentage point (the number in column [7] is less than -1), and (iv) the investment rate remains below the prediction after five to seven years from the crisis (the number in column [8] is negative). Four of the five Asian-crisis countries satisfy these criteria (Korean investment fails to meet criterion (iii)). Other than the Asian-crisis countries, only 9 out of more than 100 currency crisis episodes could satisfy the criteria.<sup>13</sup> In that sense, the investment decline after the Asian crisis is not just another currency crisis.

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<sup>13</sup> See note 8 of Table 3 for the selected crisis episodes.

## Characteristics of the investment slump crisis

21. **The investment slump crisis was preceded by a period of overinvestment.** The nine episodes selected were characterized by a sizable and prolonged investment slump as previously defined (see row (e) of Table 3), though the severity of the slump was not as great as in the Asian crisis. Another point that should be noted is the evidence of pre-crisis overinvestment (see column [5] of row (e)). This evidence, which appeared independently of our criteria, supports the conventional belief that a high run-up before the crisis leads to a harder crash.

22. **The investment slump crisis hit seemingly well-performing economies** (see Table 4). Pre-crisis investment rates are generally higher in the investment slump crises, and moreover, there appears to be a run-up phase just before the investment crash (column [1]). Columns [2] to [5] report the differences in four fundamental variables that are often considered to be grounds for financial crisis. Perhaps surprisingly, the saving rate is higher and the fiscal condition appears healthier in the investment slump crises. On the other hand, there appears to be a pre-crisis escalation of the current account deficit before the investment slump, probably due to an exuberant private sector, followed by a strong reaction after the crisis. We could not detect systematic differences regarding inflation.

23. **The pre-crisis overinvestment appears to be fueled by an overly optimistic public mood and lax financing.** Shares of short-term debt to total external debt are higher for the investment slump crises, though the difference is not statistically significant. Then again, we notice pre-crisis inflows of short-term capital in the slump episodes. The domestic credit to GDP ratio is also higher, and we can observe rapid pre-crisis expansion of credit in the investment slump countries. That is to say, there seem to be fast growing credit markets during the period leading up to the investment slump crises, allowing economies to expand far beyond market fundamentals. Optimistic pre-crisis evaluations by country risk rating institutions<sup>14</sup> corroborate the overly optimistic mood before the investment slump crises. The degree of currency devaluation after the crises is not very different between the two groups, despite the clear difference observed in their current account outcomes. The ratio of twin crises, or contemporaneous currency and banking crises, is significantly higher for the investment slump crises, suggesting that the banking sector had a role in the investment slump.

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<sup>14</sup> Columns [8] and [9] of Table 5, respectively, report the financial risk index and the political risk index from the Poverty Reduction Strategy (PRS) group. The financial risk index ranges from a high of 50 (least risk) to a low of 0 (highest risk), while the political risk index ranges from 100 (least risk) to 0 (highest risk).



Table 4. Comparison Between Investment Slump Crises vs. Non-Investment Slump Crises

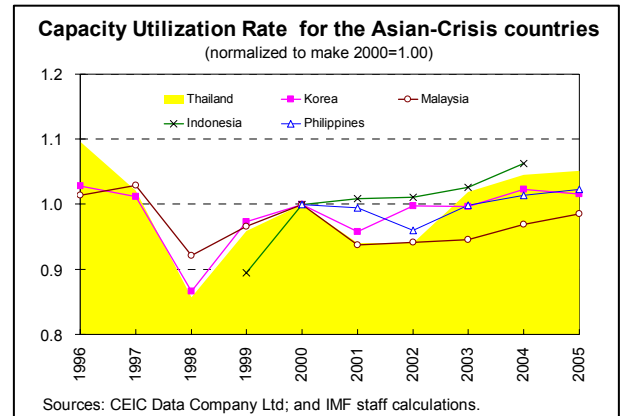
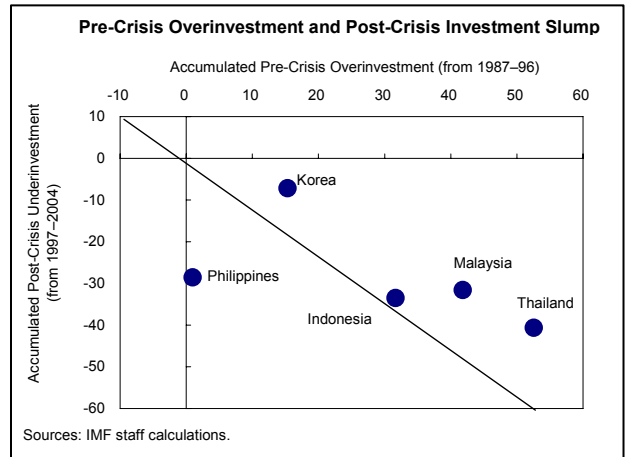
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
	Investment Ratio	Saving Ratio	General Government Balance (Ratio to Nom. GDP)	Current Account Balance (Ratio to Nom. GDP)	Inflation Rate	Share of Short-term Debt to Total External Debt	Domestic Credit to Nom. GDP	Financial Risk Index	Political Risk Index	Real Effective Exchange Rate $[\tau-3, \tau-1]=1.0$	Twin Crisis Ratio
<b>(a) All Sample (106 Episodes)</b>	Level $[\tau-3, \tau-1]$ 2/	17.4 [18.7]	-4.5 [-4.3]	-3.1 [-3.1]	33.2 [11.9]	16.7 [14.0]	35.2 [26.9]	30.4 [28.9]	59.7 [61.3]	1.0	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	0.1	-0.2	0.3	-111.8	-0.3	3.1	1.6	1.9	-0.7	
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-1.6	-0.4	0.6	37.7	-2.8	0.4	-0.6	-0.2	-11.2	0.36
<b>(b) Investment Slump Sample (14 Episodes)</b>	Level $[\tau-3, \tau-1]$ 2/	25.5 [27.0]	-1.6 [-1.4]	-4.5 [-3.9]	37.9 [8.8]	24.5 [19.2]	61.5 [53.6]	36.4 [38.3]	66.7 [64.5]	1.0	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	-2.0	0.6	-1.1	-73.8	2.6	11.1	2.0	4.4	-1.2	
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-6.6	-1.6	-2.6	161.8	-4.6	7.5	-4.3	-2.4	-14.9	0.80
<b>(c) Asian Crisis (5 Countries)</b>	Level $[\tau-3, \tau-1]$ 2/	31.7 [35.4]	1.1 [1.4]	-4.6 [-3.9]	6.1 [5.6]	25.8 [22.2]	85.0 [62.8]	41.9 [43.0]	70.4 [69.3]	1.0	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	0.3	0.8	-0.9	-1.0	3.6	18.9	0.4	6.4	3.1	
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-7.4	-2.0	7.3	5.2	-2.6	17.1	-1.4	-3.6	-14.4	1.00
<b>(d) Other Slump Crises (9 Episodes)</b>	Level $[\tau-3, \tau-1]$ 2/	22.4 [22.0]	-2.6 [-3.1]	-4.5 [-4.0]	53.8 [19.3]	23.7 [14.0]	49.7 [39.8]	33.3 [32.7]	64.7 [61.7]	1.0	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	-3.1	0.5	-1.2	-110.1	2.3	6.8	3.0	3.1	-4.2	
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-6.2	-2.7	-2.8	240.1	-5.8	2.7	-0.4	-1.7	-15.1	0.70
<b>(e) Non-Investment Slump Sample (92 Episodes)</b>	Level $[\tau-3, \tau-1]$ 2/	16.0 [18.0]	-5.0 [-4.4]	-2.9 [-3.0]	32.4 [12.0]	15.7 [13.7]	30.8 [23.3]	29.1 [27.9]	58.2 [60.1]	1.0	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	-0.51	0.4	-0.3	-118.0	-0.7	1.8	1.5	1.3	-0.7	
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-0.76	-0.3	0.1	17.2	-2.6	-0.8	0.2	0.3	-10.5	0.29
<b>(f) H0: (b)=(e) 3/ (Welch's Test)</b>	Level $[\tau-3, \tau-1]$	3.2 ***	4.1 ***	2.6 **	0.3	1.3	2.9 ***	2.8 **	2.5 **	-	
	Change from $[\tau-6, \tau-4]$ to $[\tau-3, \tau-1]$	1.0	-1.6	1.2	0.4	1.3	2.4 **	0.3	1.3	-0.1	***
	Change from $[\tau-3, \tau-1]$ to $[\tau, \tau+1]$	-6.0 ***	-1.4	-2.2 **	0.9	-0.6	2.0 *	-2.3 **	-1.2	-0.8	3.8
	Change from $[\tau-3, \tau-1]$ to $[\tau+2, \tau+4]$	-5.0 ***	-0.6	-1.6	-1.4	-1.1	-0.6	-1.6	-1.9 *	-0.6	

Notes:

1. Reported figures in columns (a)-(e) are the averages of crisis episodes included in each categories. Since some data are not always available for all episodes, number of observations in each calculation does not necessarily equal to the reported total observations.
2. Figures in the brackets in the rows of "Level" are medians to see the effects of abnormal observations.
3. Row (f) reports the result of hypothesis testing to see whether the averages of selected categories are significantly different. Figures in column [1]-[10] are T-statistics for Welch's Test, and figures in column [11] are normal st \*\*\*, \*\*, and \* in row (f) indicate statistical significance at 1, 5, and 10%, respectively.

## D. What Might Explain the Deviation?

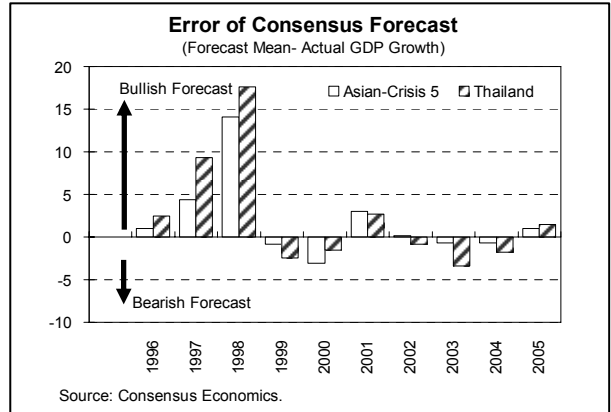
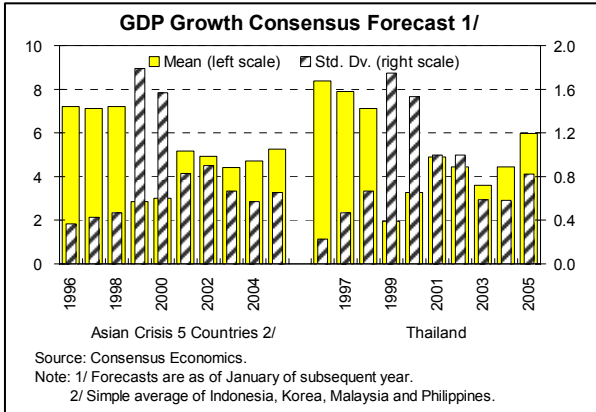
24. **Several factors, certainly more than those examined in our regressions, contributed to the investment slump after the Asian crisis.** A buildup of excess capacity in the run-up to the crisis and corporate overleveraging, which resulted partly from excess reliance on foreign currency loans, look consistent with our findings (except for the Philippines). However, nearly a decade has passed since the crisis, and capacity utilization has generally returned to its pre-crisis level, so overinvestment cannot be a full explanation of the still low investment. Although lack of comprehensive cross-country data keeps us from further formal testing, this section examines possible reasons for lower Asian investment than expected, by focusing only on the Asian-crisis countries. In particular, it considers three possible explanations: (i) a riskier investment environment, (ii) weakness in the financial and corporate sectors, and (iii) sluggish nontradable sectors.<sup>15</sup>



### Riskier investment environment

25. **Heightened risk of investment after the crisis could have depressed investment.** Modern investment theories predict that greater uncertainty will lead agents to put off investment (Dixit and Pindyck, 1994). Evidence for higher risk is the standard deviation in the consensus forecast of GDP growth for the Asian countries, which increased sharply after the crisis. Both the higher investment risk and the pessimistic growth expectation, which has been more depressed than actual growth, could have pushed down post-crisis Asian investment, as is argued in REO (May 2006).

<sup>15</sup> These three are all raised by recent issues of Asia and Pacific Regional Economic Outlook (REO). REO (May 2006) also examines foreign direct investment (FDI) diversion to China. However, we neglect this explanation here, since FDI is a relatively small part of total investment, and FDI into Thailand increased right after the crisis. Moreover, recent studies (Eichengreen and Tong, 2005, and Mercereau, 2005) failed to find formal evidence of FDI diversion.



26. **However, measures of macroeconomic volatility have lately returned to their pre-crisis level.**<sup>16</sup> The standard deviations of macroeconomic variables, that is, industrial production, wholesale/producer price, and stock price, have generally returned to their pre-crisis levels in the Asian-crisis countries. Therefore, this casts doubt on explanations that rely on actual volatility as an indication of increased risk.

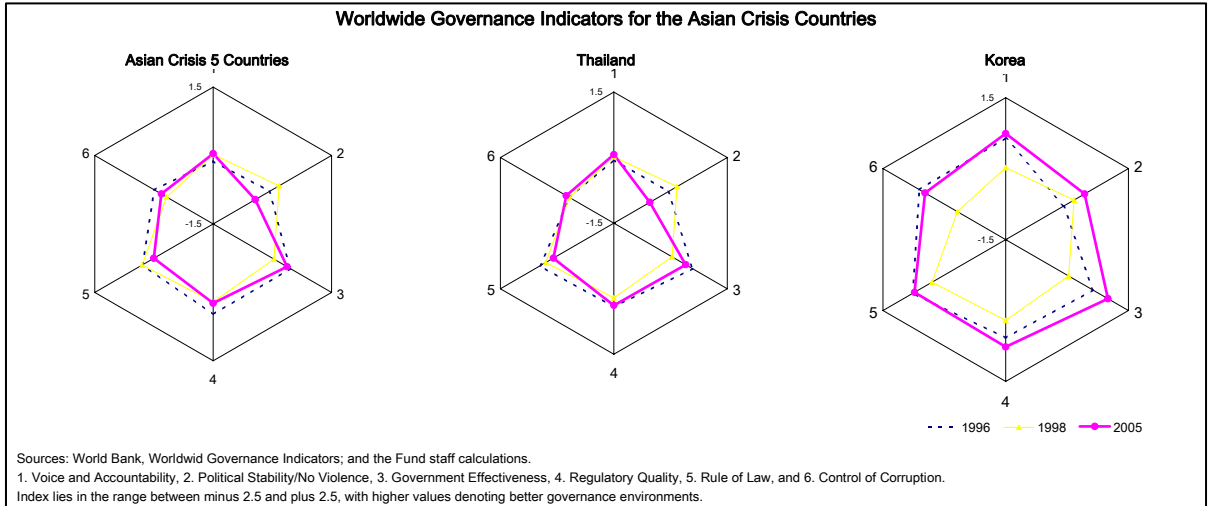
#### Fluctuations of Macro Indicators Before and After the Crisis

	S.D. of Annualized Quarterly Growth Rate				
	Thailand	Indonesia	Korea	Malaysia	Philippines
<b>Industrial Production</b>					
1992.1q–1997.2q	8.9	16.5	9.9	6.6	15.0
1997.3q–2002.4q	12.2	23.2	16.3	18.6	16.8
2003.1q–2006.1q	8.1	13.3	6.8	8.0	21.2
<b>Wholesale Price Index</b>					
1992.1q–1997.2q	4.6	5.3	2.7	5.6	8.5
1997.3q–2002.4q	9.7	47.9	11.1	11.3	4.9
2003.1q–2006.1q	5.3	10.4	4.8	8.5	4.0
<b>Stock Price Index</b>					
1992.1q–1997.2q	61.8	42.5	39.1	39.2	51.5
1997.3q–2002.4q	78.1	63.2	90.6	76.0	68.9
2003.1q–2006.1q	45.8	34.8	38.2	19.4	19.6

Sources: CEIC Data Company, Ltd.; and IMF staff calculations.

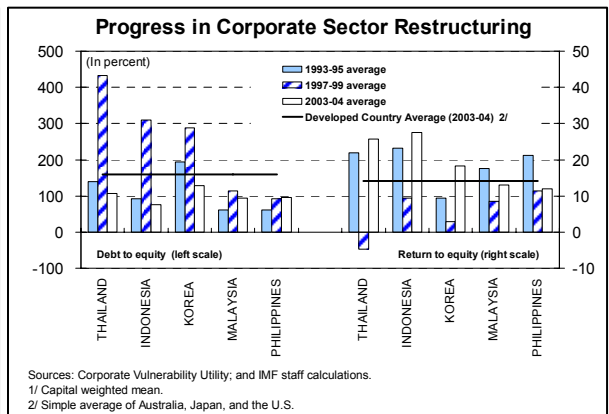
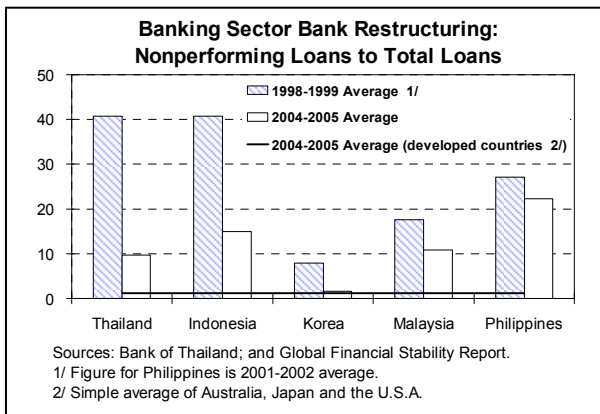
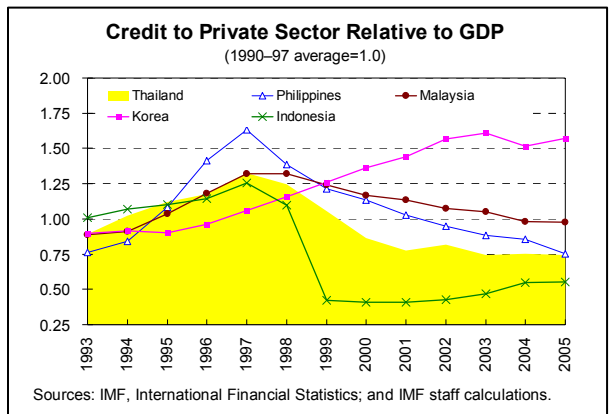
27. **Nonetheless, despite the waning actual volatility, the perceived investment environment continues to be weak compared with the pre-crisis period.** Worldwide Governance Indicators by the World Bank Institute evaluate the governance environment of countries along six dimensions—voice and accountability, political stability, government effectiveness, regulatory quality, the rule of law, and control of corruption. The indicators for the Asian-crisis countries generally deteriorated after the crisis, and have not yet recovered, except those for Korea. Relatively sound investment in Korea (see the residuals in the column [8] of Table 3) may indicate the importance of these perceptions on investment.

<sup>16</sup> As another piece of evidence of the waning risk, sovereign spreads for Thailand and Malaysia are consistently shrinking after their post-crisis jump.



## Weakness in financial and corporate sectors

28. While financial and corporate sector restructuring has progressed, financing may be a constraint on investment. In the aftermath of the Asian crisis, the sharp deterioration in banking-system solvency and liquidity caused banks to rein in credit, with a sizable impact on investment. This was exacerbated by bank-dominated financial systems. Credit to the private sector as a share of GDP fell drastically and has not yet recovered. While significant progress in restructuring has mitigated the impact of the financial crises,<sup>17</sup> still



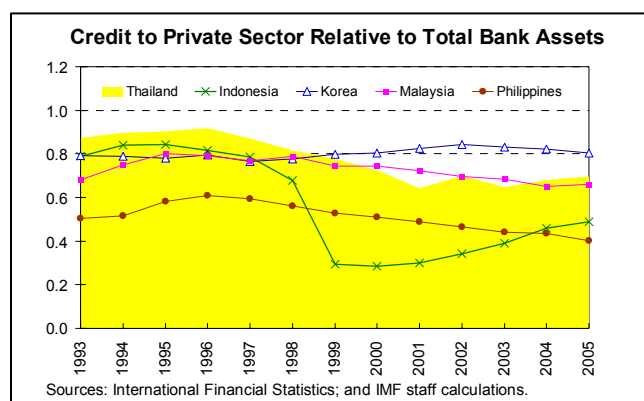
<sup>17</sup> REO (May 2006) argues that corporate and financial sector restructuring, which once acted as a constraint on investment, no longer seem to be an important factor at a regional level. Indeed, corporate restructuring in the region seems to have been largely completed at least for listed firms.

high nonperforming loan (NPL) ratios for four out of five crisis countries<sup>18</sup> remains an issue. This may be particularly true for small and medium enterprises (SMEs) that do not have access to capital markets (see table below). As a sign of the severe lending climate, the share of claims on the private sector in total bank assets continued to fall until 2005 in three crisis countries including Thailand (see figure below). The relatively better performance of Korea in this regard again seems to suggest some role of financial factors in the lingering investment slump.

#### Share of Firms that Regard Financing as an Obstacle

	Large Firms		Small and Medium Firms	
	Moderate	Major Obstacle	Moderate	Major Obstacle
Thailand	39%	11%	34%	44%
Indonesia	23%	39%	18%	41%
Malaysia	18%	6%	19%	26%
Philippines	20%	42%	29%	38%

Source: World Bank, World Business Environment Survey, 2000.



#### Sluggish nontradable sector

29. **The difference in performance between tradable (T) and nontradable (N) sectors may also explain the low investment in the Asian-crisis countries.** REO (September 2006) argues that a source of the post-crisis investment decline is financially starved N sector producers.<sup>19</sup> Firms in the T sector, typically large and able to pledge export receivables as collateral, have better access to international capital markets. Firms in the N sector, which are generally smaller, rely predominantly on domestic bank credit. In the face of cautious banks after the crisis, the smaller N firms were hit especially hard and benefited little from subsequent exchange rate depreciation due to their domestic nature. As the capacity utilization only covers mining and manufacturing industries, which largely overlap with the T sector, the sluggish N sector may fill the gap between the capacity utilization recovery and the investment slump.

30. **While corroboration is needed, casual observation from the *World Business Environment Survey* is loosely consistent with the premise of the sluggish N sector hypothesis.** First, firms in the T sector tend to be larger than those in the N sector, if we identify exporters with T sector firms and nonexporters with N sector firms. Second, the share of firms that regard financing as a major obstacle to their business is generally higher for the N sector firms. These findings agree well with our inference of a credit-constrained

<sup>18</sup> Thailand's NPLs have declined to 8.2 percent of total loans as of Q3, 2006.

<sup>19</sup> See Box 5.1 in the Asia and Pacific REO (September 2006) by Yong Sarah Zhou. Also see Tornell and Westermann (2003) for detailed discussion.

N sector, though the observed differences between the two sectors are very slight, and the number of observations for individual countries is not sufficient to be conclusive.<sup>20</sup>

### Size and Sectoral Distribution

	Small Firms		Large Firms	
	N Sector	T Sector	N Sector	T Sector
Thailand	61%	39%	24%	76%
Indonesia	82%	18%	54%	46%
Malaysia	65%	35%	40%	60%
Philippines	73%	27%	48%	52%

Sources: Tornell and Westermann (2003) that bases on World Business Environment Survey (WEBS, 2000).

Notes:

1. Small denotes small and medium firms up to 200 employees.
2. Large firms have more than 200.

### Share of Firms that Regard Financing as a Major Obstacle in Their Business Environment

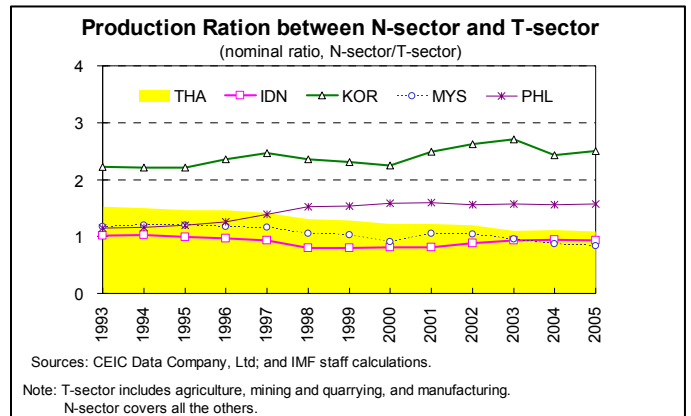
	Sector		Export	
	T Sector: Agriculture and Manufacturing	N Sector: Others 1/	T Sector: Yes	N Sector: No
Thailand	36%	46%	39%	43%
Indonesia	33%	43%	36%	43%
Malaysia	20%	24%	13%	29%
Philippines	41%	35%	45%	37%

Sources: World Bank, World Business Environment Survey (WBES, 2000) Interactive Dataset.

1/ Others include construction, service, and other.

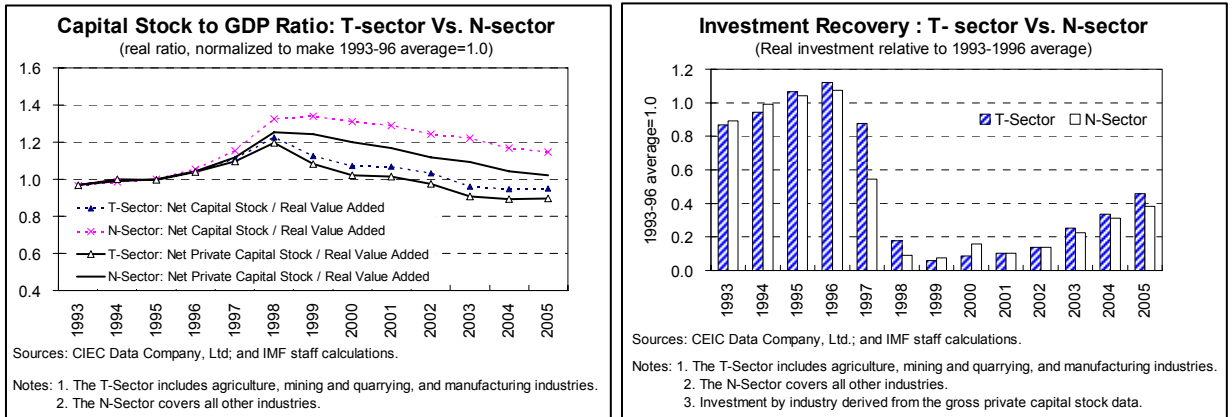
### 31. The sluggish N sector may partially explain the investment slump for a few countries including Thailand.

In the aftermath of the crisis, N sector output dropped relative to that of the T sector in three emerging-Asian countries, that is, Indonesia, Malaysia, and Thailand. Unfortunately, the lack of data on sectoral investment prevents us from region-wide examination; however, the progress of the capital-output ratio by sector in Thailand, that is, still high N sector capital-output ratio, seems to



<sup>20</sup> While the WBES is a survey of over 10,000 firms in 80 countries, the number of observations for individual countries is of the order of 100-200.

indicate N sector problems in the country. Our tentative estimates of Thai sectoral investment<sup>21</sup> reveal that the recent pace of investment recovery in the N sector is slightly slower than that in the T sector. As the N sector investment represents roughly seventy percent of total private investment, even the slight difference may be one of the contributing factors to the prolonged investment slump.



## E. Summary and Policy Implications

32. **This paper first argued the Asian investment slump is related to pre-crisis overinvestment.** Since the overinvestment leading to the Asian crisis was exceptionally high, it is natural to see a sizable and prolonged investment slump in the crisis-hit countries. As overinvestment took place largely due to optimistic market expectations, we cannot expect investment in emerging Asia to recover its pre-crisis level. On the other hand, we might well expect investment to be an important contributor to output growth, as long as the factors hindering investment fade away over time.

33. **Three factors (other than overinvestment) were examined that may explain the slow investment recovery from the Asian crisis.** These are (i) a riskier investment environment, (ii) weakness of the financial and corporate sectors, and (iii) a sluggish nontradable sector. Perceived investment risks continued to be high compared with the pre-crisis period, while actual macroeconomic volatility has lately returned to its pre-crisis levels. Financing still seems to restrain investment, though significant progress in restructuring has certainly mitigated this factor. The sluggish N sector is a constituent of the investment slump at least for a few countries including Thailand.

34. **However, none of the factors above can by themselves explain the investment slump in the Asian-crisis countries.** Indeed, the sluggish N sector holds true only for a few

<sup>21</sup> Here we estimated the investment by sector as an increment of sectoral gross capital stocks.

selected countries. The uncertainty and restructuring are convincing as an explanation of regional development as a whole; however, they may not be as useful in explaining cross-sectional diversity among countries in the region (except in the case of Korea's relatively better performance). Even overinvestment, the core account of this paper, does not apply to the Philippines episode. Various combinations of factors rather than one single factor, therefore, seem to account for emerging Asia's investment slumps.

**35. These findings suggest several policy implications:**

- In view of the cost of overinvestment, it is crucial that policies help foster balanced growth in investment. What is needed is private investment that is justified by economic fundamentals, as investment growth that is too high can jeopardize economic stability.
- Prudent macroeconomic policies, along with clear communication about the policy framework, will help to contain any increase in perceived macroeconomic risks. From this standpoint, the recent monetary policy stance of inflation targeting with a flexible exchange rate seems to be serving Thailand well.
- Efforts to remove obstacles to private investment, such as reducing red tape, improving governance, and establishing political stability, also would be helpful to deal with uncertainty and the investment climate.
- Addressing the legacies of the Asian crisis in financial and corporate sectors could help to stimulate investment. For example, the ratio of NPLs to total loans and the level of distressed assets while declining are still high. Further progress on this front remains a priority.
- Taking steps to expand the potential sources of financing, especially by encouraging the development of bond markets, would improve the efficiency of financial intermediation and provide backstops for banking systems in the crisis. Policies to reduce small firms' excessive reliance on bank credit and/or those to encourage bank lending to small firms might be a key to ameliorate the present situation.

**36. Given the complicated roots of the post-crisis investment slump in emerging Asia, a policy package that takes into account all of the necessary measures above is needed.** Going forward, productivity should be raised over the long run to further boost returns on investment, since that is the only way to maintain steady investment given an increasingly competitive international business environment.



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### III. PUBLIC INVESTMENT IN THAILAND: MACROECONOMIC EFFECTS AND IMPLEMENTATION<sup>22</sup>

#### A. Background

##### 37. In the aftermath of the Asian crisis, investment in Thailand collapsed.

Gross fixed investment dropped from over 40 percent of GDP during 1990–96 to about 20 percent of GDP in 1999. To some extent, this sharp decline reflected the extremely high investment rates in the decade running up to the crisis. However, investment in the aftermath of the crisis was low even relative to its pre-1990 average of about 29 percent of GDP.

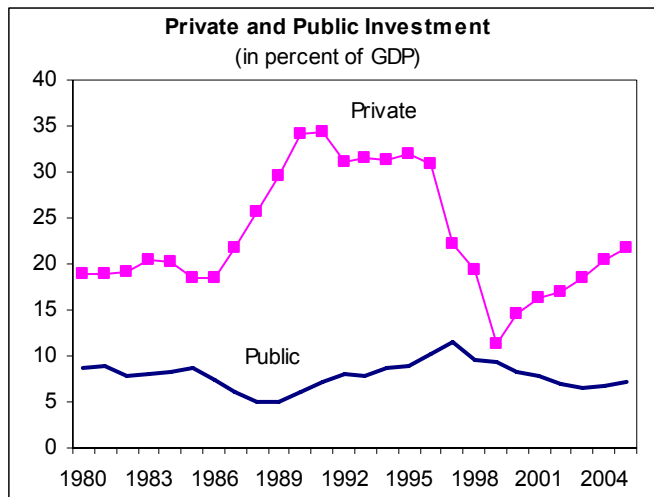
**Investment in Thailand**  
(in percent of GDP)

	Pre-1990	1990–96	Post-1997
Total	28.6	40.5	23
Private	21.2	32.3	15.1
Public	7.4	8.2	7.9

Source: Bank of Thailand

##### 38. While the sharp fall in private investment was the main driver of the decline in overall investment, public investment also contributed to the slowness of the post-crisis investment recovery.

At the onset of the crisis, the drop in investment was largely due to lower private investment, with public investment remaining broadly stable as a share of GDP. In the following years, however, public investment continued to contract in nominal terms and started to recover only in 2004, resulting in an average nominal growth rate of only 0.4 percent over the 2000–04 periods.



This largely reflected the post-crisis fiscal consolidation and the marked increase in public debt associated with the financial sector bailout. In addition, the share of public investment in GDP almost halved from 12 percent in 1997 to around 6 percent in 2004.

39. **Against this background, in November 2005 Thailand's authorities announced plans for B 1.8 trillion in new infrastructure spending over 2006–09, which was revised down to B 1.3 trillion in June 2006.** The megaprojects will be concentrated mostly in transportation, including mass transit, and water irrigation projects. These sectors comprise about 48 percent of overall spending. Real estate investment—mainly the completion of

<sup>22</sup> Prepared by Ivan Tchakarov.

low-cost housing projects and government building—accounts for 18 percent, and the expansion of education and public health services for the remainder. The plan has not been officially announced due to the political change in

September 2006, and the envisioned expenditure may be further revised by the new authorities in line with their own priorities. Nevertheless, the need for the infrastructure investments remains, and the government has already

proposed investment in three infrastructure projects: logistics, mass transit, and water management. The cabinet agreed in November 2006 to carry out five lines of mass transit projects that cost B 165 billion.

**Megaproject Spending**  
(in billions of baht)

	2006	2007	2008	2009	2006–09
Mass transit	0.3	28	76	46	150
Housing	29	44	116	55	244
Transportation	35	91	72	81	279
Water resources	70	60	42	32	204
Education	4	15	28	33	80
Public health	0.3	13	31	30	74
Other	28	71	99	100	298
<b>Total</b>	<b>167</b>	<b>322</b>	<b>464</b>	<b>377</b>	<b>1330</b>

Source: Public Debt Management Office, Ministry of Finance.

40. **The purpose of this chapter is to assess the need for, and the effects of, the megaproject initiative, and to describe best international practices in implementing large public spending programs.** The chapter shows that infrastructure development in Thailand still lags behind more advanced regional competitors, which could prove to be a drag on competitiveness and growth prospects. In Thailand the megaprojects fit within the authorities' medium-term fiscal framework without hindering debt sustainability. Regarding financing, in the face of budget constraints in most developing countries, private sector participation in the provision of infrastructure services via the channel of public-private partnerships (PPPs) has become more prominent. The paper also finds that while PPPs offer an increasingly popular vehicle for providing infrastructure, the results that they have produced around the world are mixed. In particular, in order to ensure positive results, it is imperative that the PPPs are carried out to increase efficiency rather than to move expenditure off the budget. In addition, governments have often granted generous minimum income guarantees to contract winners with potentially undesirable budgetary consequences. In that respect, the paper also considers some alternative approaches to implementing PPPs that may eliminate the incentives for renegotiating contracts and for providing generous minimum income guarantees.

41. **The paper is organized as follows.** Section B displays a battery of infrastructure rankings for a number of Asia Pacific countries. Section C discusses the link between public investment and growth. Section D assesses the sustainability of the public investment plans. Section E analyzes different financing options. Section F looks at international experience with PPPs, and Section G draws conclusions and offers some policy advice.

## B. Does Thailand Need More Infrastructures?

42. **Various indicators suggest that there is a need for improving infrastructure in Thailand.** Figure 1 provides a comparison of various infrastructure indicators among selected Asia Pacific countries along a number of dimensions. Clearly ASEAN-4 and low-income countries in the region lag behind the newly-industrialized and industrial economies in Asia in terms of the provision and overall quality of infrastructure services. Thailand is no exception in this regard although in general it compares favorably to other ASEAN-4 countries and, in particular, to the low-income countries in the region.

43. **Deficiencies in transportation figure prominently in the infrastructure ranking.** The need for upgrading infrastructure seems particularly acute in the area of transportation where Thailand lags appreciably behind the newly-industrialized countries in Asia. Relieving transportation bottlenecks would therefore be an important step in any public investment program and the megaprojects envisage that about 40 percent of all planned spending be directed to mass transit projects and other transportation-related initiatives.

## C. Public Investment and Growth in an International Perspective

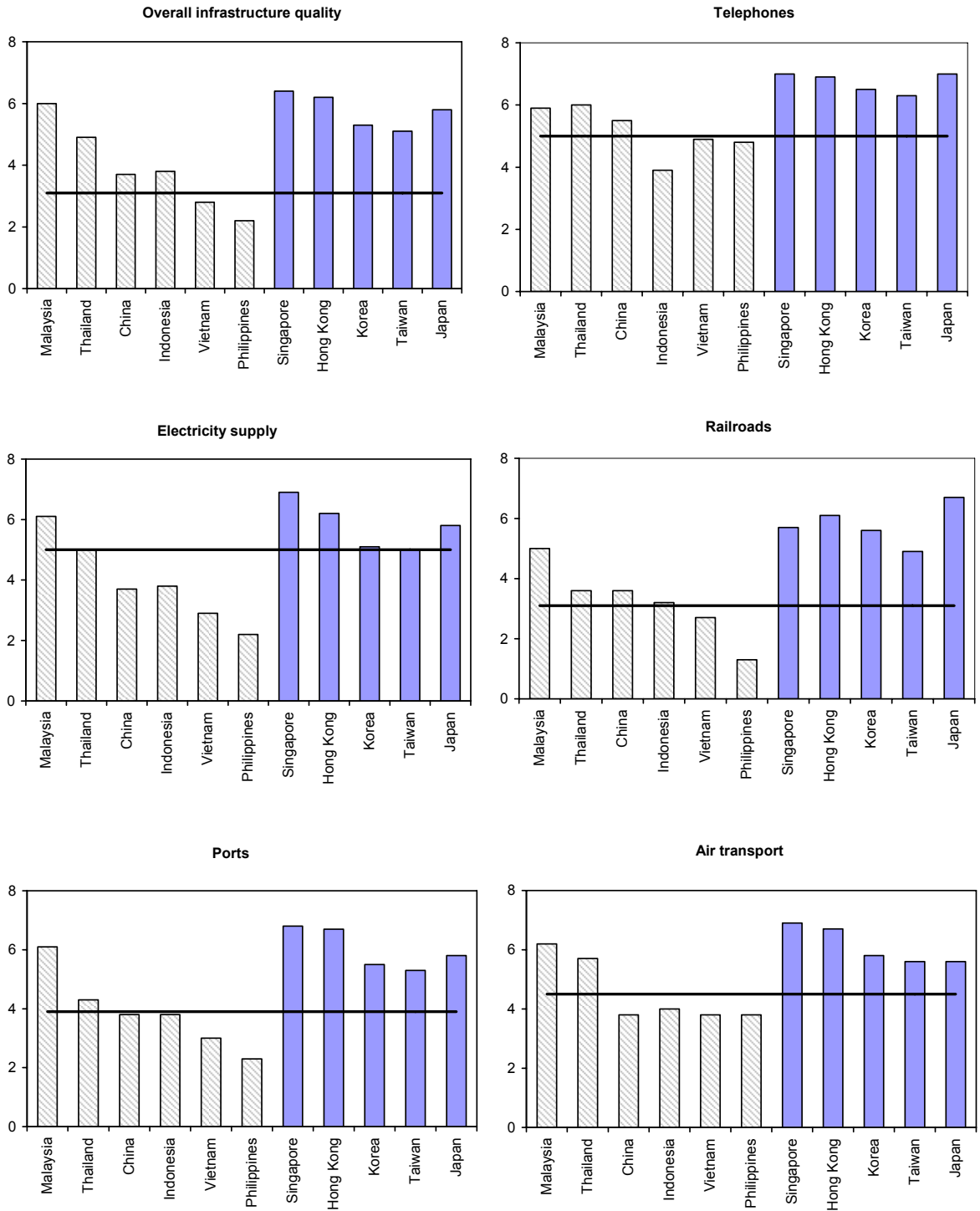
44. **Over the last three decades, the share of public investment in GDP has declined on average in advanced OECD countries, and more significantly so in Latin America, where it has also displayed substantial volatility.** This decline has been wholly or partly offset in these regions by a rising share of private investment in GDP. The share of total investment in GDP has fallen in OECD countries, while it has fluctuated around a broadly flat trend in Latin American countries. In contrast, the share of public investment in GDP has shown on average no clear upward or downward trend in Asian and African countries, albeit with significant volatility in some countries. The same is true for the shares of private and total investment in GDP in African countries. In Asian countries, these shares showed a rising trend through the mid-1990s, but fell sharply in the aftermath of the crisis that hit Southeast Asia in 1997.

45. **While a declining share of public investment in GDP may in theory adversely affect economic growth, the empirical evidence in this area remains mixed.** While individual infrastructure projects may often generate fairly high returns on investment, their impact on GDP growth is more uncertain.<sup>23</sup> Empirical studies that have tried to estimate such impact have yielded a wide range of results, although evidence of a positive impact appears to be more robust for developing countries. Briceno-Garmendia and others (2004) suggest that of 102 studies that have estimated the impact of infrastructure investment on productivity or

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<sup>23</sup> For example, World Bank-financed infrastructure projects that had at least 95 percent of loan commitments disbursed between 1999 and 2003, had an average economic return of 35 percent, with a spread ranging from 19 percent for water and sanitation projects to 43 percent for transportation projects.

Figure 1. Infrastructure Rankings



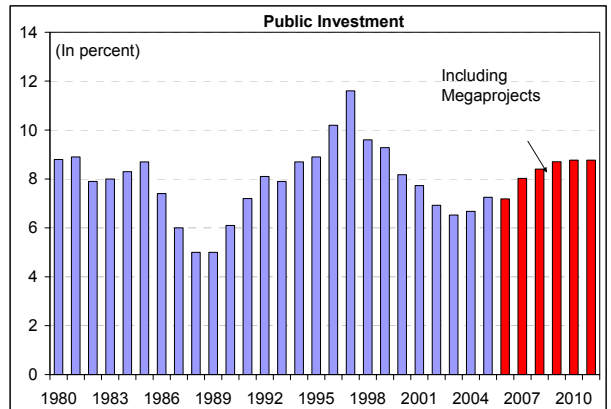
Source: World Economic Forum (2005).  
 1/ The horizontal line is the average for all surveyed countries.

growth, 53 percent showed a positive effect, 42 percent showed no significant effect, and 5 percent showed a negative effect. In multiple country studies, 40 percent showed a positive effect, 50 percent showed no significant effect, and 10 percent showed a negative effect. In contrast, all 12-single-country developing country studies showed a positive effect.

46. **The difficulty in uncovering a conclusive positive impact of public investment on growth may be due to a number of factors.** These include: (i) the difficulty in controlling for all the factors, in addition to public investment, that affect growth over the long term; (ii) the fact that a sizable portion of public investment is directed to supporting broad functions of government, including redistribution and the provision of public services, maintaining law and order, and administration, which do not directly boost productive potential; (iii) the lumpy nature of infrastructure investment, which implies that the full impact of investment in roads, telecommunications, and other infrastructure on growth can only be realized with considerable lags, once effective networks have been established.

#### D. Sustainability of Public Investment Plans

47. **The megaprojects will bring public investment closer to its historical levels.** The share of public investment in GDP has hovered around 8 percent in the pre-crisis period, before shooting up to 12 percent in the immediate run-up to the crisis. Staff estimates that the megaproject initiative will raise the share of public investment in GDP to about 9 percent in the medium term—closer to historical averages, but below its pre-crisis peak.



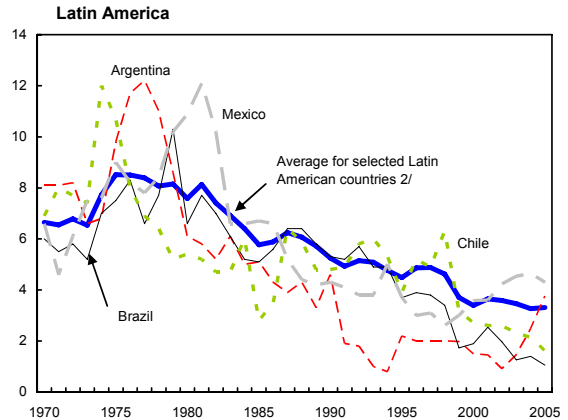
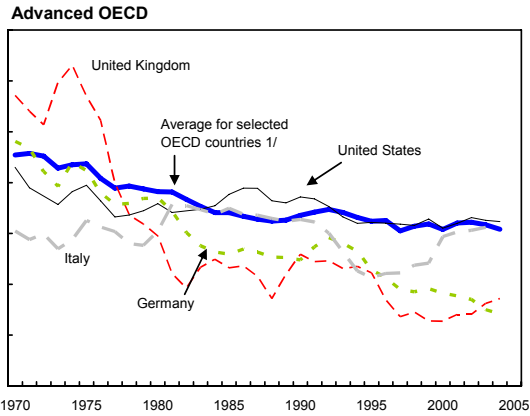
48. **The megaprojects should not jeopardize fiscal and external stability.** Based on the authorities' plans to contain current expenditure and improve tax revenues, the megaprojects should fit within the authorities' fiscal framework without hindering debt sustainability. The projects are also consistent with external sustainability, but will contribute to the projected deterioration of the current account over the medium term.

49. **A number of stress tests were developed to examine the debt sustainability of the envisaged public investment plans over the medium term.** A baseline scenario inclusive of the megaprojects is calculated to assess the evolution of the public debt relative to GDP until 2011. The sensitivity of debt dynamics to interest rates, exchange rates, and growth later is examined.

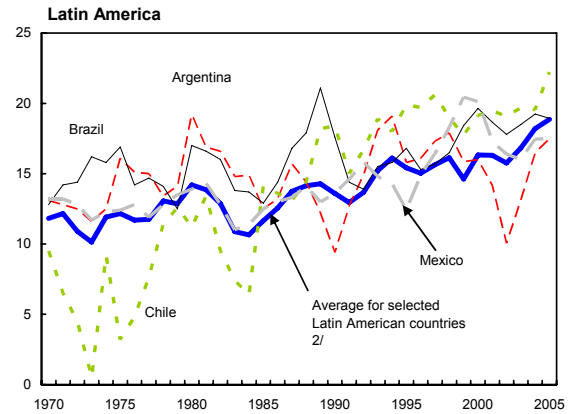
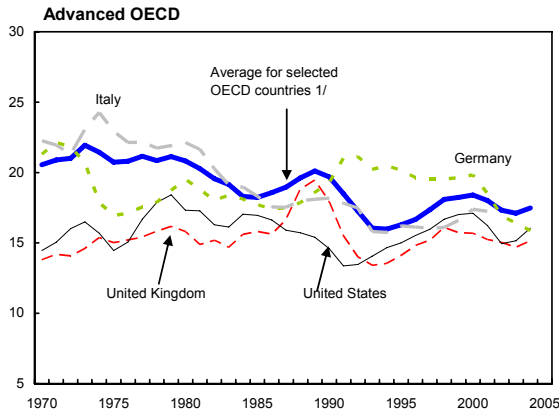
50. **In the baseline scenario, the public debt-to-GDP ratio inclusive of the megaprojects continues to decline over the medium term.** Owing to strong growth and continued primary surpluses, public debt is projected to decline to about 33.5 percent in

**Figure 2. Investment Trends in Advanced OECD and Latin American Countries, 1970–2005  
(In percent of GDP)**

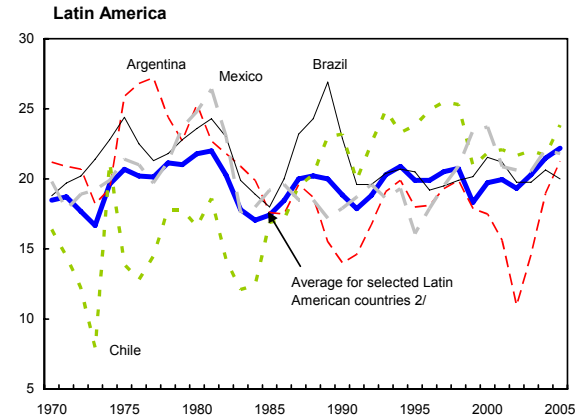
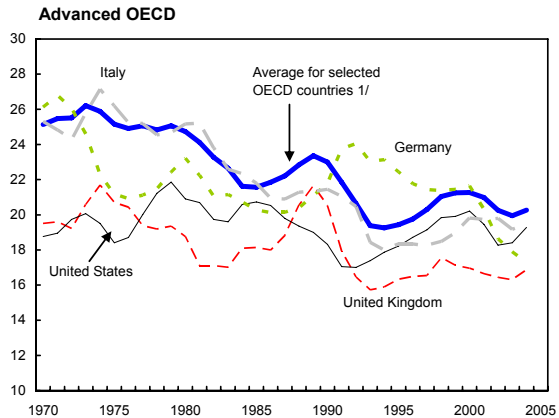
**Public Investment**



**Private Investment**



**Total Investment**



Source: International Finance Corporation, OECD and WEO database.

1/ Unweighted average for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Norway, Portugal, Spain, Sweden, United Kingdom, and United States.

2/ Unweighted average for Argentina, Brazil, Chile, Colombia, Ecuador, and Mexico.



































































