

## สัมมนาวิชาการประจำปี 2553

## สู่วัฏจักรใหม่ของเศรษฐกิจไทย : แนวทางพลิกฟื้นการลงทุน

มานพ อุดมเกิดมงคล สรา ชื่นโชคสันต์ และณัฐกานต์ วรสง่าศิลป์\*

สายนโยบายการเงิน ธนาคารแห่งประเทศไทย

21 กันยายน 2553

ข้อคิดเห็นที่ปรากฏในบทความนี้เป็นความคิดเห็นของผู้เขียน  
ซึ่งไม่จำเป็นต้องสอดคล้องกับความเห็นของธนาคารแห่งประเทศไทย

## บทคัดย่อ

ในระยะต่อไป เอเชียจะเป็นแรงขับเคลื่อนสำคัญของระบบเศรษฐกิจโลก โดยหลาย ๆ ประเทศในเอเชีย กำลังเข้าสู่วัฏจักรการลงทุนรอบใหม่ อย่างไรก็ตาม การลงทุนของประเทศไทยยังคงฟื้นตัวได้ไม่เต็มที่แม้ได้ผ่านพ้นวิกฤติปี 1997 มานานกว่าทศวรรษ บทวิจัยนี้ จึงต้องการตอบคำถามสำคัญว่า ประเทศไทยจะมีกลยุทธ์และนโยบายอย่างไรในการพลิกฟื้นการลงทุนให้เข้าสู่วัฏจักรใหม่พร้อมไปกับการเพิ่มขีดความสามารถการแข่งขันของประเทศ ทั้งนี้ จากการวิเคราะห์ในระดับมหภาค พบว่าปัจจัยแวดล้อมสำคัญที่ทำให้การลงทุนของประเทศต่ำกว่าช่วงก่อนวิกฤติปี 1997 มาจากการปรับตัวลดลงของทั้งอัตราการเจริญเติบโตทางเศรษฐกิจ อัตราการขยายตัวของสินเชื่อภายในประเทศ และ สัดส่วนราคาสินค้าส่งออกและนำเข้าที่ทำให้ต้นทุนของสินค้าทุนแพงเพิ่มขึ้นโดยเปรียบเทียบ นอกจากนี้ การฟื้นตัวของลงทุนภาคเอกชนในประเทศไทยมีความล่าช้ากว่าประเทศอื่น ส่วนหนึ่งเป็นผลจากการลงทุนภาครัฐที่ลดลงมากกว่าประเทศอื่น ๆ สำหรับการวิเคราะห์ระดับจุลภาคพบว่า ปัญหาเชิงโครงสร้าง เช่น ปัญหาการผูกขาดหรือการแข่งขันที่ไม่เป็นธรรม ระดับมาตรฐานสินค้า และปัญหาด้านการเข้าถึงบริการทางการเงิน รวมทั้งต้นทุนทางการเงิน ล้วนเป็นปัจจัยที่กระทบต่อโอกาสการลงทุนของผู้ประกอบการ นอกจากนี้ ยังมีประเด็นเรื่องกฎหมายในด้านต่าง ๆ ที่เป็นอุปสรรคทำให้การลงทุนของภาคเอกชนมีความล่าช้า ทั้งนี้ เพื่อขับเคลื่อนให้การลงทุนของประเทศไทยเข้าสู่วัฏจักรใหม่ รัฐบาลจำเป็นต้องดำเนินนโยบายเพื่อแก้ไขปัญหาในทุกๆ ระดับ ทั้งในระดับมหภาคและระดับจุลภาค มิเช่นนั้น ประเทศไทยมีความเสี่ยงที่จะสูญเสียความสามารถในการแข่งขันในระยะต่อไป

\* ผู้วิจัยขอขอบคุณ คุณบัณฑิต นิจถาวร คุณไพฑูริย์ กิตติศรีกังวาน คุณสุชาติ สักการโกศล และคุณทิตนันท์ มัลลิกะมาส สำหรับข้อคิดเห็นที่มีประโยชน์ต่อบทความนี้ และขอขอบคุณ คุณกอบศักดิ์ ภูตระกูล เป็นอย่างสูง ที่ได้ช่วยวางกรอบการวิจัย ทูมเทให้คำแนะนำและกำลังใจตลอดช่วงเวลาของการทำวิจัย สุดท้าย ขอขอบคุณ คุณวรรณภา คล้ายสวน จาก สศช. สำหรับการสนับสนุนด้านข้อมูล รวมทั้งเพื่อนร่วมงานทุกท่านที่ได้ให้ความช่วยเหลือและให้กำลังใจอย่างดียิ่ง

## บทสรุปผู้บริหาร

วิกฤตเศรษฐกิจโลกครั้งนี้นำไปสู่โอกาสสำหรับประเทศตลาดเกิดใหม่ในเอเชีย เนื่องจากเอเชียกำลังจะกลายเป็นศูนย์กลางใหม่ของเศรษฐกิจโลก ทำให้อาจมีการย้ายฐานการผลิตเข้ามาสู่ภูมิภาคนี้มากขึ้น ส่งผลให้การแข่งขันในภูมิภาคนี้มีแนวโน้มที่จะสูงขึ้นในระยะต่อไป จากการเปลี่ยนแปลงของสภาพแวดล้อมทางเศรษฐกิจดังกล่าว ทำให้ประเทศไทยต้องหันมามองตัวเองมากขึ้นว่ามีความพร้อมมากน้อยเพียงใดสำหรับการแข่งขันกับประเทศอื่นในอนาคต

ที่น่ากังวลใจ คือ ขณะที่หลายประเทศในเอเชียกำลังเข้าสู่วัฏจักรการลงทุนใหม่ แต่การลงทุนของไทยยังคงฟื้นตัวได้ไม่เต็มที่แม้ได้ผ่านพ้นวิกฤตเศรษฐกิจปี 2540 มาร่วมทศวรรษแล้ว งานวิจัยนี้จึงต้องการตอบคำถามสำคัญว่า ประเทศไทยจะมีกลยุทธ์และนโยบายอย่างไรในการพลิกฟื้นการลงทุนให้เข้าสู่วัฏจักรใหม่ พร้อมไปกับการเพิ่มขีดความสามารถทางการแข่งขันของประเทศ โดยในบทความนี้จะแบ่งเป็น 4 ส่วน ได้แก่

ส่วนที่ 1 ความเข้าใจว่าการลงทุนของไทยที่ไม่สามารถฟื้นตัวมาจากส่วนใด

ส่วนที่ 2 การวิเคราะห์ในระดับมหภาค (Macro analysis) เพื่อนำไปสู่แนวนโยบายของภาครัฐในระดับมหภาค

ส่วนที่ 3 Firm level analysis เพื่อวิเคราะห์ปัญหาการลงทุนในระดับจุลภาค เพื่อนำไปสู่การแก้ไขปัญหามาในเชิงโครงสร้าง

ส่วนสุดท้าย บทสรุปและข้อเสนอแนะเชิงนโยบาย

จากการวิเคราะห์ข้อมูลในอดีตพบว่า เมื่อเทียบกับจุดสูงสุดในปี 2540 การลงทุนของไทยในปี 2551 ลดลงไปประมาณร้อยละ 27.0 จากการลดลงของการลงทุนในภาคการก่อสร้างเป็นสำคัญ นอกจากนี้ การลงทุนที่ลดลงยังเป็นการลดลงทั้งการลงทุนภาครัฐและเอกชนอีกด้วย หากพิจารณาเป็นรายสาขาแล้ว การลงทุนที่ลดลงข้างต้นมาจาก 3 สาขาหลัก คือ สาขาการขนส่งและสื่อสาร สาขาบริการด้านอสังหาริมทรัพย์ และสาขาอุตสาหกรรม ตามลำดับ

การลงทุนของไทยที่ลดลงดังกล่าว นำไปสู่คำถามที่ว่า การลงทุนไทยที่ยังคงไม่ฟื้นตัวนั้น มาจากปัจจัยมหภาคใด จากการศึกษพบว่า การลงทุนของไทยที่ผ่านมามีการลดลง เนื่องจากการลดลงของการเติบโตทางเศรษฐกิจเป็นสำคัญ ประกอบกับการขยายตัวของสินเชื่อและอัตราการค้า (Terms of trade) ที่ลดลงอีกด้วย ทั้งนี้ ในระยะต่อไปภาครัฐจำเป็นต้องเพิ่มการลงทุนภาครัฐเพื่อกระตุ้นการลงทุนภาคเอกชน โดยควรเพิ่มการลงทุนในโครงสร้างพื้นฐาน เพื่อกระตุ้น crowding-in effect ของการลงทุนภาครัฐ ซึ่งจะช่วยให้ดึงดูดการลงทุนทางตรงจากต่างประเทศ (Foreign Direct Investment) อีกทางหนึ่งด้วย

อย่างไรก็ตาม นโยบายภาครัฐในระดับมหภาคเพื่อยกระดับการลงทุนของไทยยังไม่เพียงพอ ภาครัฐจำเป็นต้องแก้ไขปัญหาเชิงโครงสร้าง เพื่อก่อให้เกิดการแข่งขันที่เพิ่มมากขึ้นในภาคธุรกิจ และควรส่งเสริมการเข้าถึงบริการทางการเงินของภาคเอกชน พร้อมกับช่วยลดต้นทุนในการประกอบธุรกิจ นอกจากนี้ ภาครัฐควรมีมาตรการเพื่อเพิ่มอำนาจต่อรองให้แก่ผู้บริโภค ซึ่งจะช่วยผลักดันให้ผู้ผลิตยกระดับมาตรฐานสินค้าของตนเอง ซึ่งจะนำไปสู่การลงทุนที่เพิ่มมากขึ้นในอนาคต

มองไปข้างหน้า เพื่อยกระดับ potential growth ให้กลับเข้าสู่ร้อยละ 5.0 ภายในปี 2558 ภาคเอกชนจำเป็นต้องลงทุนเพิ่มเฉลี่ยแล้วร้อยละ 10.3 ต่อปี ซึ่งจำเป็นอย่างยิ่งที่ภาครัฐควรจะต้องดำเนินนโยบายทั้งในระดับมหภาคและจุลภาค เพื่อผลักดันการลงทุนไทยอย่างที่กล่าวไว้ข้างต้น ขณะเดียวกัน ภาครัฐต้องทำการปลดล็อกประเด็นกฎหมาย เช่น กฎหมายสิ่งแวดล้อม และกฎหมายผังเมือง ไม่ให้เป็นอุปสรรคต่อการลงทุนในอนาคต ทั้งหมดนี้เพื่อผลักดันการลงทุนไทยให้เข้าสู่วัฏจักรการลงทุนรอบใหม่ และลดความเสี่ยงในการสูญเสียความสามารถทางการแข่งขันในอนาคต

**BANK OF THAILAND SYMPOSIUM 2010**

**Investment in Thailand: How to unleash the new investment cycle?**

**Manop Udomkerdmongkol Sra Chuenchoksan Nutthikarn Vorasa-ngasil<sup>ξ</sup>**

Monetary Policy Group, Bank of Thailand

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*The views expressed herein are those of the authors  
and do not necessarily represent those of the Bank of Thailand.*

**Abstract**

The notion that Asia will be the new economic growth center for the next decade has prompted Thailand to rethink her investment strategy. We explore investment dynamics in details using both macro and micro analysis in order to formalize appropriate investment policies for Thailand. Our findings from macro analysis indicate that lower investment during post 1997 crisis were mainly attributable to lower GDP growth, lower domestic credit growth and lower terms of trade. Moreover, Thailand's relative lacks of public investment in comparison to neighboring countries were one of the reasons which caused sub-par private investment performances. At the micro level, we found that structural issues such as degree of competition, product standards, financial access and financial costs are inhibited factors affecting firm's probability of investment. Legal issues which delayed investment projects were also examined. In order to unleash Thailand's investment, the government must tackle the problems at both macro and micro levels. Not doing so would risk Thailand falling behind her competitors.

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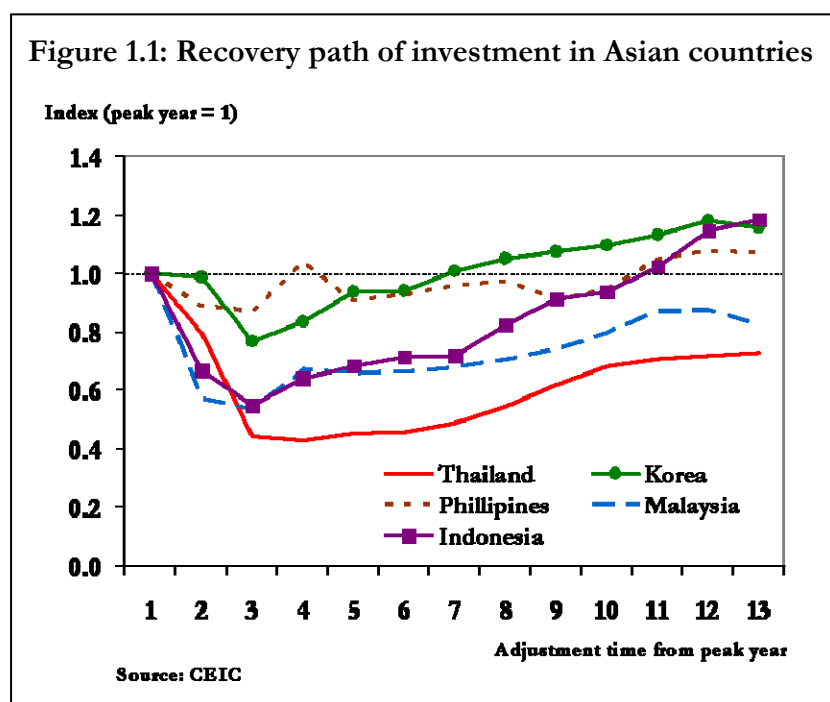
Authors' email addresses: [manopu@bot.or.th](mailto:manopu@bot.or.th); [srac@bot.or.th](mailto:srac@bot.or.th); [nutthikv@bot.or.th](mailto:nutthikv@bot.or.th)

## 1. Introduction

The recent global economic crisis has impelled Thailand to rethink her strategy for dealing with the new global economic and financial landscape. It is now a consensus that world economic growth this year will be driven by emerging economies especially in Asia, while positive talk of Asia being the new growth centre has become more and more imperative as growth in the G4 countries – the United States, the eurozone, United Kingdom and Japan – is expected to be subdued as a result of high fiscal debt burdens, fragile banking sector balance sheets and deleveraging of household sector.

Highly competitive Asian countries will benefit from this new shift in resource allocation. In fact, we already see financial resources flowing into Asia and more are expected to come. Against this backdrop, Thailand must upgrade her competitiveness through effective investment. Unfortunately, aggregate physical investment at the country level does not look so supportive. Over the past ten years, Thailand's investment has been appallingly sluggish – the present level merely accounts for 70 percent of the peak in 1996. This is despite the fact GDP had already exceeded the 1996 level eight years ago. This is analogous to saying that annual flows of national income have substantially exceeded the 1996 level, yet little of these is allocated to investment. A deeper inspection reveals that investment slumps were contributed to all parties, from both the public and private sectors.

Some may claim that the investment slumps are a structural issue springing from the 1997 economic crisis; however, even among the affected countries, Thailand's investment recovery came last in the race (Figure 1.1).

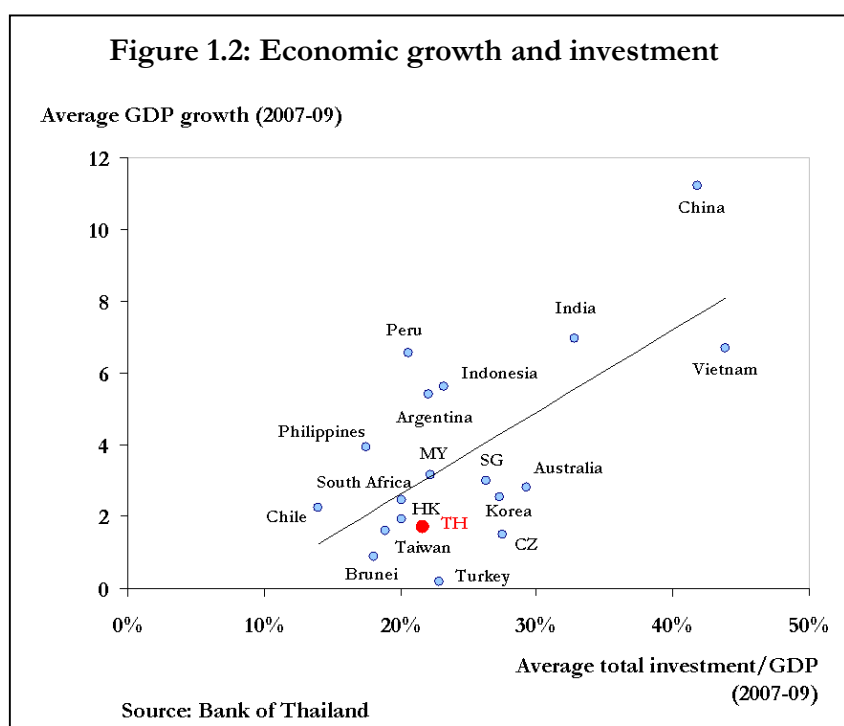


Korea, Indonesia and the Philippines already had their investment levels surpassing their peaks many years ago while Thailand still has some way to go.

It does not take an economist to say how alarming this is since everyone should know that investment is the key to economic advancement (Figure 1.2). If this trend continues, Thailand will eventually lose her competitiveness, which is now all the more significant for two main reasons – survival and opportunity reasons.

First, competition is likely to intensify as the world’s largest economic bloc wounded by the sub-prime crisis lost her consumption strengths. Countries with the most efficient production will be the winners while the less efficient ones will lose out. In this regard, Thailand is at risk of losing out.

The second reason refers to the opportunities mentioned earlier that come with Asia being the new growth centre. Thailand must invest to maintain her competitiveness in order to catch the eyes of foreign investors.



No one will want to miss the train, especially one that comes with opportunities. That is easier said than done. How to unleash investment in Thailand is indeed a daunting challenge to all policymakers.

What causes the sub-par performance of Thailand’s investment and how to promote investment will be main research question for this analysis. To formulate appropriate investment policies for Thailand, we utilize both macro and microanalysis. Our findings suggest that lower investment during post 1997 crisis were mainly attributable to lower GDP growth, domestic credit growth and terms of trade. In addition, Thailand’s relative lacks of public investment in comparison to neighboring countries were one of the reasons which caused sub-par private investment performances. At the micro level, we found that structural issues such as degree of

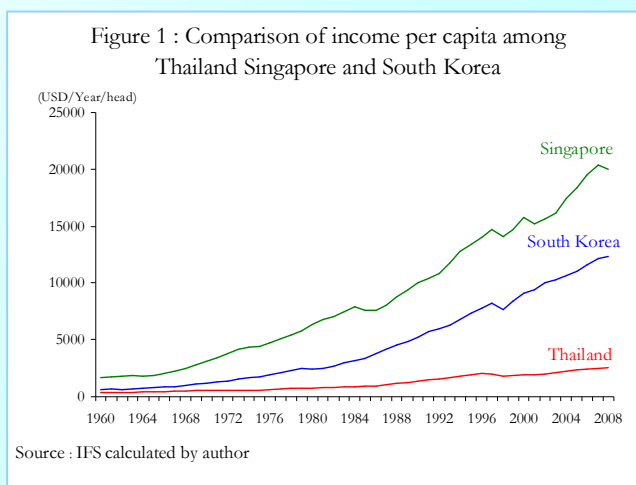
competition, product standards, financial access and financial costs are inhibited factors affecting firm's probability of investment. As a result, in order to unleash Thailand's investment, the government must tackle the problems at both macro and micro levels. Not doing so would risk Thailand falling behind her competitors which Thailand has historically experienced in the past. (See Box 1 for discussion on The Role of Timing and Positioning for Industrial Development Policies)

The rest of this paper is organized as follows. Section 2 illustrates stylized facts on investment slump in Thailand. Section 3 explains the causes of investment downfall via macroeconomic explanation, and Section 4 highlights the significance of microeconomic structure on investment. The last section concludes and offers some policy recommendations.

## BOX 1 : The Role of Timing and Positioning for Industrial Development Policies

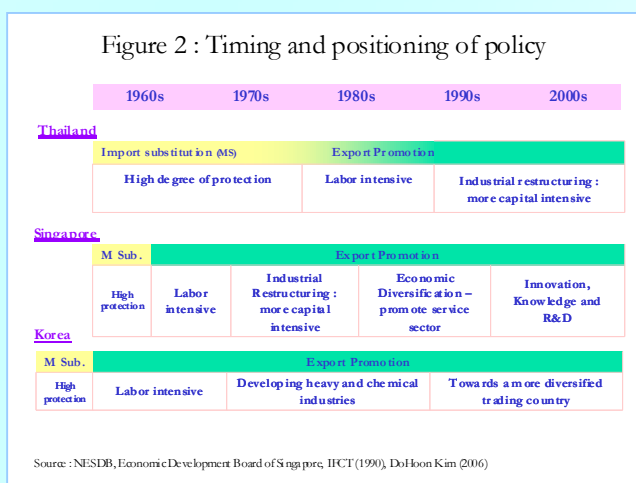
Looking back into the 1960's, Thailand, South Korea and Singapore were at the similar stage of development in terms of per capita income. Fifty years later, Thailand's per capita income fell behind South Korea and Singapore by five times and eight times respectively. (Figure 1).

The answer to the question of why developing countries that initially started approximately at the same level have ended up with different stages of development deserves some attentions. It seems apparent that not only the policy itself that plays an important role in a country's development but its timing and positioning are also important in the design for effective policy implementation, especially for Thailand.



### Sources of the difference in development

In the early stages of development, all three countries chose similar development policies-“the import substitution” strategy. However, the shift in regime towards export promotion policies differed amongst countries. In addition, the rate of adaptation and implementation of appropriate strategies for each country also varied (Figure 2). This evolution has greatly affected the process of economic developments and policy outcomes in the three countries as we have seen in the present day. The difference in each policy elements can be investigated as follows;



1. Timing of policy making: The three countries had different timing in their moves towards export promotion policies. South Korea was the first to shift towards this new orientation in the early 1960s while Singapore followed suit in the mid-1960s. In that decade, the world economic growth was spectacular with minimal barriers to trade (Narongchai, 1990). On the other hand, Thailand just started the shift towards export-oriented policies in the early 1970s but was unfortunately faced oil crisis in 1973 and 1979 which prevent the policy from being fully effective until the mid-1980s. This delayed in the shift towards export promotion policies by almost a decade could be an important factor that produced relatively slow expansion of income per capital in Thailand compared to that of Singapore and South Korea in the present days.



2. The speed of adaptation: At the beginning of the export promotion policies, all three countries exported mostly labor-intensive goods. However, the low value creation for this type of products and the rising cost of labor made it difficult to maintain the competitive advantage in terms of pricing. This indicated a need for progress and adaptation towards a more capital-intensive product. Even though capital-intensive product requires a more sophisticated production adjustment, the return in terms of value added is much higher. It took South Korea and Singapore about one decade to adjust after adapting the export promotion policies. Conversely, it took Thailand two decades to make the adjustment and yet the production has not become a fully integrated capital-intensive.

3. The implementation of appropriate strategies for development: Different countries have different strategies during the development process as follows:

South Korea saw the importance of developing the fundamental industries such as steel, machinery and chemical goods to supplement development of other industries in the 1970-80s. The government has been supporting this development through public infrastructure, including direct and indirect financing for the needed projects. This brought Korea to a higher level where they eventually became the center of commerce in the 1990s-2000s.

Singapore highlighted their production technology and domestic labor force while ridding the level of unskilled immigrant workers. The process was to motivate producers to develop a new and more advanced technology, as well as encourage businesses that are labor-intensive and those unable to adapt to relocate their investment elsewhere in another country. In addition, the location of Singapore has allowed the country to become a hub for service sector in the 1990s and is currently morphing an innovative economy for the 21st century.

For Thailand, the implementation of strategies for development remains unclear. Although the country has been able to increase the production of capital-intensive goods, it is mainly a by-product from the relocation of the production base from Japan and Taiwan in the regional production chain. Additionally, Thailand has not been successful in the expansion of domestically produced products as producers do not feel the need to leave labor-intensive production. One important reason is that they are still able to hire low-cost immigrant workers and hence keeping the cost to be comparatively competitive.

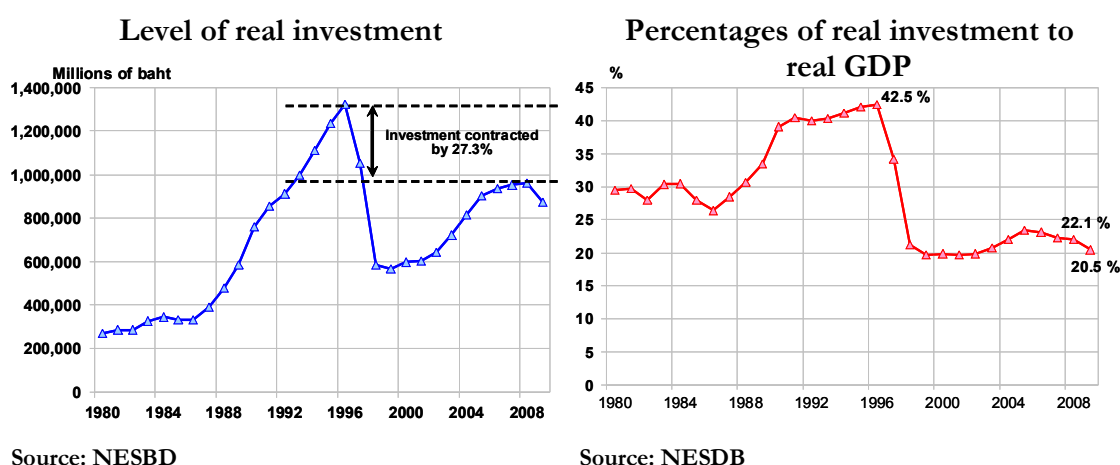
### **Implications for Thailand**

The lagging behind most regional competitors in trade patterns and production indicates the need for Thailand to put a more strategic industrial policy in place. It is not possible to unwind what has been missed in the past but policymakers have learned that timing of implementing policies, the speed of adaptation, and appropriate strategic planning for development are all imperative ingredients for the recovery of Thailand's investment. Looking ahead, as the world and regional economy is moving towards an up-cycle, strategic policy design is necessary to allow Thailand to reap the maximum benefits. If we miss the boat and fail to make necessary adaptations in time, the stage of Thailand's development may fall even further behind that of our original peers and could eventually be surpassed by countries that are currently at the same level as occurred in the past.

## 2. Stylized Facts on Thailand Investment Slump

This section presents a set of stylized facts on Thailand's investment slump. We used investment data from the National Income and the Capital Stock dataset provided by the National Economic and Social Development Board to explore the types and the sectors that contribute to investment downfalls. In doing so, we used investment in 1996, which was the pre-crisis peak level, as a reference point for comparison purposes<sup>1</sup>. Below are our lists of stylized facts.

**Figure 2.1: Levels of real investment and percentages of real investment to real GDP**

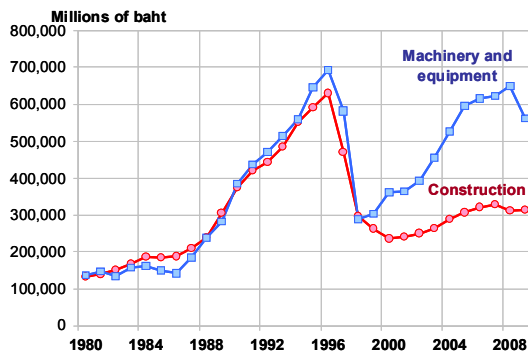


**Fact I: Comparing from the 1996 level, real investment in 2008 has declined by 27.3 percent.** This is despite the fact that real GDP has exceeded the 1996 level since 2002. That is, the flow of Thailand's annual national income has surpassed its pre-crisis level eight years ago, but little of these incomes were allocated to investment. The percentage of real investment to real GDP reflects this; it fell from 42.5 percent in 1996 to 22.1 percent in 2008 and fell further to 20.5 percent in 2009 from the global recession. Note that part of this substantial decline in investment to GDP ratio was due to higher investment deflator relative to GDP deflator. (See Box 2 for more details on this issue)

<sup>1</sup> Using the 1996 level as a reference point says nothing about the desirable level of investment. An analysis of how much investment is needed to sustain a long run GDP growth rate of 5 percent is explored in the appendix V.

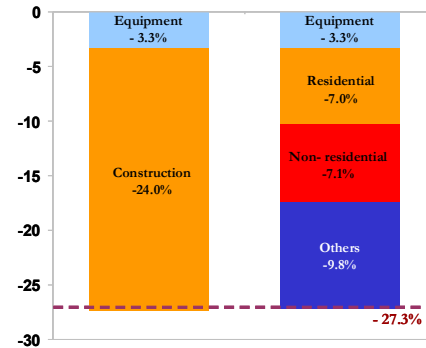
Figure 2.2: Investment divergence and contribution to investment contraction.

Level of real investment by types



Source: NESDB

Contribution to investment contraction by types



Source: NESDB, author's calculation

**Fact II: Investment slump was mainly due to the lack of recovery in construction investment.** Construction investment and machinery and equipment investment started to diverge since 1999 as shown in Figure 2.2. Out of the 27.3 percent investment contraction, construction investment accounted for 24.0 percent and a breakdown of its component revealed that the decline was contributed by all types of construction investment; out of 24.0 percent contribution, 7.0 percent came from residential construction, another 7.1 percent came from non-residential construction such as industrial and commercial construction and 9.8 percent came from other construction such as roads and dams constructions.

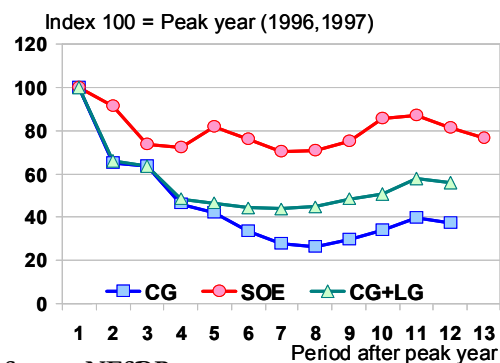
Figure 2.3: Investment contraction rate by the public and private sectors and a breakdown of the source of government investment.

% contraction in level terms and GDP terms between 1996 and 2008

% Changes between 1996 and 2008	
Aggregate investment	-27.3
Private investment	-27.1
Public investment	-27.6
Aggregate Investment to GDP	-20.4
Private investment to GDP	-15.4
Public investment to GDP	-5.0

Source: NESDB, author's calculation

Index of the sources of government investment since peak level in 1997

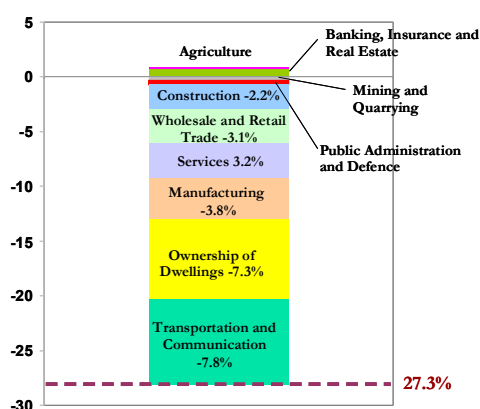


Source: NESDB

**Fact III: All parties were responsible for subdued investment.** Comparing between 2008 and 1996, private investment fell by 27.1 percent while the public investment declined by a similar rate of 27.6 percent. Contribution wise, one-fourth of the total contraction came from the public investment since the public investment share to total investment was about 25 percent. Public investments did not increase to its pre-crisis peak level in most of the sources. Investments from the Central Government (CG) were sluggish as parts of them were transferred to the Local Government category (LG). Their totals, however, remained far below the pre-crisis level. The same goes for investment from the State Owned Enterprise (SOE) which never reached its pre-crisis level.

**Figure 2.4: Contributions of investment contraction by sector and its share.**

**Contribution to contraction by sector**



Source: NESDB and author's estimates

**Shares of investment by sector**

2008 data	Share %
Transportation and Communication	22.0
Manufacturing	21.2
Ownership of Dwellings	12.9
Services	9.4
Wholesale and Retail Trade	9.2
Agriculture	8.7
Electricity and Water Supply	6.6
Construction	4.6
Banking, Insurance and Real Estate	2.0
Public Administration and Defence	1.9
Mining and Quarrying	1.5

Source: NESDB and author's estimates

**Fact IV: Investment contractions were mainly attributed to 3 sectors: transportation and communication, ownership of dwellings, and manufacturing sectors.** These three sectors have the largest share and they accounted approximately for 70 percent of the total investment contraction. Transportation and communication sector, ownership of dwellings sector and manufacturing sector contributed to 27.3 percent contraction by 7.8 percent, 7.3 percent and 3.8 percent, respectively. Note that, National Income data did not have data on investment by sector. We estimated them using the Capital Stock dataset which has a breakdown of capital stock by sectors<sup>2</sup>. We acknowledge that both accounts (National Income and Capital Stock) use different manuals with different coverage. However, we think that using capital stock dataset provides a good approximation since the contribution to investment contraction from ownership of dwellings match nicely with the contribution from residential construction.

These facts give a brief overview of the types and sector that investment slump originated from. The next section explores in detail the cause of this downfall through a macro explanation.

<sup>2</sup> We used the identity between investment and net capital stock which states that flows of investment equal to changes in net capital stock plus depreciation.

## BOX 2 : The Influence of Price Deflators and Implication for Thailand's Investment

The ratio of investment to total output (I/GDP) indicates how important investment is to an economy. The calculation of this ratio can take the form of real terms or nominal terms, which have been used for different purposes. However, when comparing these ratios with other countries in the region, the two concepts - real and nominal, lead us to different conclusions regarding the performance of investment in Thailand.

In particular, among the Asian crisis countries (Korea, Indonesia, Malaysia, Philippines, Singapore and Thailand), the real I/GDP for Thailand (22.29%) stationed below the group average (22.83%) during 2005 - 2009 while the nominal I/GDP ratio, for Thailand (27.04%) was well above the group's average (23.45%). (Figure 1)

Such differences could consequently produce entirely different implications on the country's assessment of investment, capital stocks, and its implication for domestic policies towards long-term growth. As a result, this section will provide a further investigation on sources of these differences and their implications for using the ratios as well as an assessment of Thailand's investment. (For more detail, see appendix 1)

### 1. Sources of difference

An inspection on deflator data revealed that Thailand's investment deflator has accelerated faster than the GDP deflator. The major driving factor for this development comes from acceleration in the *machinery and equipment* deflator. Regional peers, however, did not suffer from such a rapid rise in the *machinery and equipment* deflator (Figure 2). Moreover, Thailand relatively has a much larger share of machinery and equipment investment to total investment than other countries (more than 60 %, which is the highest in the group). This amplifies the high deflator problems for Thailand.

### 2. Why Thailand's machinery and equipment deflator has accelerated

Thailand's machinery and equipment deflator has accelerated continuously especially from 2003 onward. The acceleration has been accompanied by the rising producer price index and import price indices. Major components in the two indices contributing to the rise of machinery and equipment deflator are steel products, crude material, and fuel lubricants (Figure 3) which accounted for about one-third of Thailand's total imports. The price of steel products has a direct impact on the investment deflator, as purchases of steel products are counted as investment. Steel products account for as much as 16% of total investment in Thailand during 2005-2009. Although, the price of crude materials or fuel lubricants does not have a direct impact on the investment deflator, it affects the cost of producing investment items such as machinery and equipment and therefore have an indirect impact on the investment deflator. This

Figure 1 : Comparison of real and nominal I/GDP average between 2005-2009

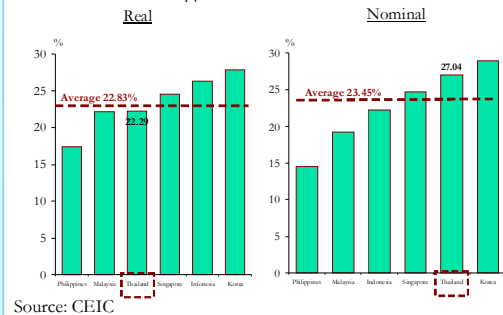


Figure 2 : Machinery and equipment deflator

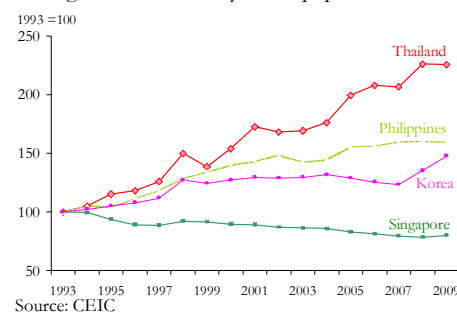
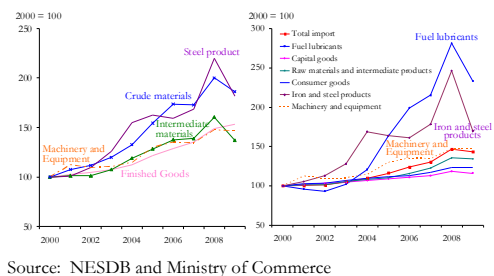


Figure 3 : Components of PPI and Import price index compared with machinery and equipment deflator (2000 = 100)





increasing investment deflator, thus, could imply that Thailand may have been importing a very large share of expensive capital compared to other countries.

Additionally, another issue concerning the use of the investment deflator is its data coverage. We found smaller *coverage of items in the machinery and equipment category for Thailand's deflator than that of Singapore and Korea*. Singapore includes software price in the machinery and equipment component while Korea separates software and patents into a component named intangible assets (accounting for about 6% of total investment). These items have become increasingly more important for investment. This incomplete collection of data may have caused the investment deflator for Thailand to be dominated by the machinery and equipment component which may result in a bias calculation.

### **3. Implication for Thailand's Investment**

Two important implications can be drawn from the high level of Thailand's investment deflator relative to the group. (1) This high capital price could partly contribute to the country's subdued investment rate since the beginning of 2000 and (2) There should be room for the reduction in capital price for Thailand.

1. Increasing efficiency of fuel usage to lower the oil intensity; The oil intensity (oil consumption/GDP) for Thailand has been the highest in the region. The imported fuel is mainly used in the transportation sector which accounts for 60% of the total energy consumption. Within the transportation sector itself, 80% of fuel usage is on the road-related transportations while the use of fuel for mass transit such as railroads and water transportations remains low. Therefore, the expansion of investment to improve the rail system and water transportation sector could lower reliance on the road transportation and help improve the efficiency of fuel usage of the country.

2. Expanding the domestic basic steel industry; Thailand is the second largest net importer of iron and steel (Iron and Steel Institute of Thailand, 2009) as the country has no iron smelting plant or basic steel production. However, Thailand has a strong automobile industry and has to rely on importing high quality hot rolled steel from Japan for production. Domestic production to supply cheaper steels will help facilitate the continuous industrial development and hence lower cost of production. Therefore, costs and benefits of having steel production should be studied. If the benefits outweigh the cost, the public and private sector may work together on the mobilization of the basic steel industry in Thailand, which will be an important fundamental to support Thailand's growth in the long term.

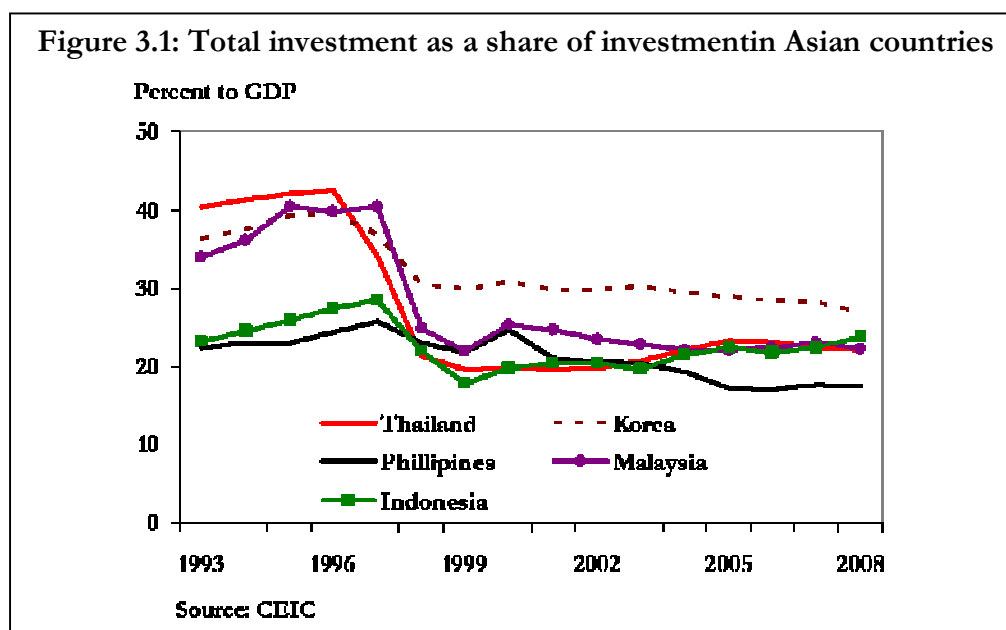
### **4. Conclusion and policy recommendation**

The relatively high investment deflator for Thailand causes real investment to appear low compared to others in the region. This is mainly contributed by acceleration in the machinery and equipment deflator (excluding the transportation component) particularly from steel products, crude material, and fuel lubricants. Moreover, the investment deflator may have been overestimated partly as a consequence of the incomplete coverage of component in the machinery and equipment category.

The high price of fuel and steel products has great impacts on Thailand's investment deflator relative to other countries, reflecting the fact that price of investment in Thailand is comparatively high. One good reason is the lack of efficiency in fuel usage which causes more reliance on importation of crude oil. Therefore, an implication for long term investment is to increase the efficiency of fuel usage. Moreover, investment in the basic steel industry could be beneficial to Thailand's automobile industry by reducing their reliance on importations of expensive steels. In addition, relevant institutions should set a priority to increase coverage of investment data in order to improve the quality of investment statistics and provide true reflections of the country's performance.

### 3. Macro explanation: Thailand's lower private investment after the crisis

In this part, we explore the causes of Thailand investment slump via macro explanation. First, we attempt to answer the question why did private investment decline in Thailand? How much is explained fundamentally by changes in macroeconomic variables? This is done through an error correction model (ECM model). Regional wise, Figure 3.1 shows that countries in the region experienced the same fate of falling percentage of investment to GDP. It would be interesting to see whether Thailand performance is different to her peers. In particular, we want to know whether Thailand experienced a different crowding-in effect that arises from public investment and FDI investment compare to her peers. This is second part of our analysis which is done by using a panel data estimation. Finally, we conclude this section with policy implications for Thailand.



#### 3.1 Why did the private investment decline?

##### 3.1.1 Macro-econometric evidence on the investment reduction

In recent years, there have been many empirical works on the determinants of private investment for developing countries (see for example IMF (2007), Bocchi (2008) and Jongvanich and Kohpaiboon (2008)). IMF (2007) examines the cause of the slowdown in investment recovery among Asian countries. Their explanations include a riskier investment environment, weaknesses in the financial and corporate sectors, and sluggish non-tradable sectors. These factors are loosely consistent with the observed investment patterns, though none of them are strong enough to fully explain the slowdown in investment recovery on their own. Moreover, few studies present empirical evidence of the underlying cause of lower private investment.

As one of the countries that were hit the hardest by the 1997 economic crisis, Thailand offers a leading explanation and policy implication to the inert investment. Thus, we provide an empirical analysis of Thailand investment behavior over a long period of 1970-2009. Data were obtained from the International Financial Statistics (IFS), the Office of the National Economic and Social Development Board (NESDB) and the Bank of Thailand (BOT). We adopt the ECM (Error Correction Model) approach and utilize private investment to GDP as our dependent variable. For independent variables, we use economic growth, domestic credit growth, real interest rate, terms of trade and inflation volatility. Our estimated private investment function is given in full in Appendix III. We also recognize that there are various other macroeconomic variables explaining investment behavior. But due solely to data limitation and the long horizon nature of our time-series, we cannot test a wide number of other possible explanatory variables.

Using the coefficients on each of the determinants as well as their level differences yield each component contributions to the decline of private investment to GDP as shown in Table 3.1.

Econometric evidence suggests that the decline in private investment comes from the reduction in real GDP growth, domestic credit and the terms of trade. Most of the predicted decline can be explained by the fall in economic growth from 7.6 percent to 3.7 percent between the years 1995-1996 and 2007-2008. Reduction in inflation volatility over the period contributes positively. Low lending rate in recent years appears to stimulate investment, but its effect offsets that of domestic credit growth.

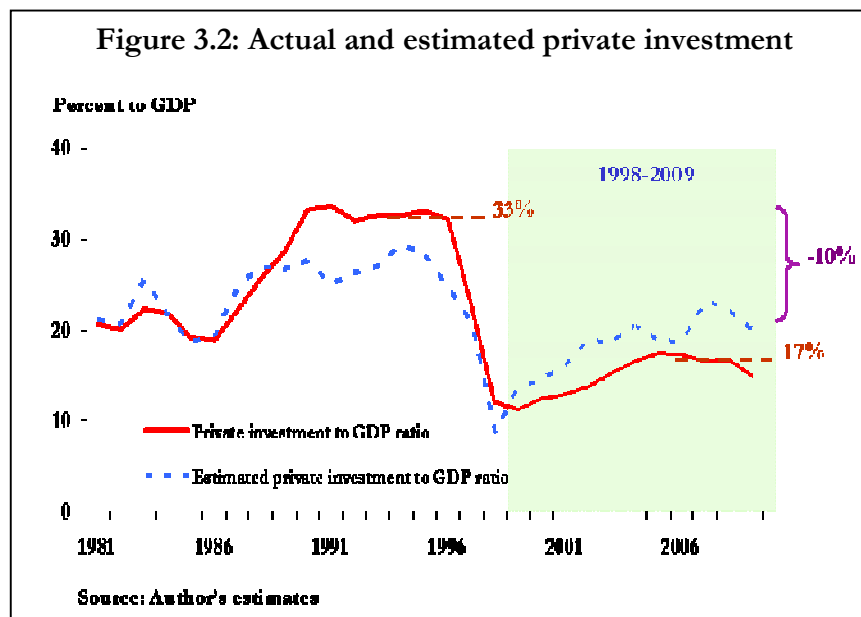
**Table 3.1: Contribution to the decline in the ratio of private investment to GDP**

Variables	Coefficient value	Level of determinants		Impacts on private investment to GDP ratio
		1995-96	2007-08	2007-08/1996-97
Real GDP growth	0.59	7.6	3.7	-7.1
Domestic credit growth	0.24	15.5	13.6	-1.4
Real interest rate	-0.12	8.2	3.3	1.8
Terms of trade	0.06	117.1	98.3	-3.5
Inflation volatility	-0.03	6.0	5.0	0.1
<b>Total impacts</b>				<b>-10.0</b>

Note that our model which captures macroeconomic fundamental factors predicts a decline in the percentage of private investment to GDP by 10.0 percent. The actual figure, however, registered a 16.0 percent reduction (Figure 3.2). These suggest that other factors such as microeconomic factors, quality of institutions and political uncertainties which are not captured by the model, are accounting for the other 6.0 percent reduction. Interestingly, the gap (the difference between actual and fitted values



of private investment to GDP ratio) became wider since 2006, which was coincidentally the period in which political uncertainties started to intensify<sup>3</sup>.



### 3.2 Macro linkages between various investments and their drivers

In this section, we attempt to examine the FDI and public investment effects on private investment in the region. To do so, we utilize a panel data estimation using the Fixed-effects model that allows for the first order autocorrelation disturbances. In line with the hypotheses, our findings suggest that FDI and public investment crowd in private investment. Their crowding-in effects nevertheless tend to decline after the 1997 economic crisis. We also find no differences in crowding-in effects between Thailand and the regional average.

#### 3.2.1 Literature review

We review several literatures on the issues of crowding-in and crowding out effects of FDI investment and public investment. Generally, the findings from previous studies are mixed in both variables.

##### The FDI impact on domestic investment

Driffield and Hughes (2003) investigate the impact of domestic investment on FDI, using the UK industry data across region. Using dynamic panel data estimation, they found that, in general, inward FDI crowds in domestic investment, especially in the vehicles sector and the transport equipment sector. They also found evidence that some domestic investments in some regions were also crowded out by the FDI.

<sup>3</sup> Although the equation cannot completely identify such effect, a BOT's internal estimation finds the relationship between business sentiment and private investment. This signifies the political uncertainty effect on private investment.

Kim and Seo (2003) used a vector autoregression model and innovations accounting techniques to provide empirical evidence on the dynamic relationship between inward FDI, economic growth and domestic investment in South Korea during the period 1985-99. They found that while the positive effect of FDI on economic growth was insignificant, economic growth had statistically significant and highly persistent effects on the future level of FDI. Despite their findings, they do not support the argument that FDI crowds out domestic investment in a developing country.

Borensztein et al. (1998) test the FDI effect on domestic investment in a cross-country regression framework, employing data on inflows of FDI from 69 developed and developing countries over the period of 1970-89. Their findings show that FDI stimulates total investment more than one for one, which implies a positive crowding-in effect for domestic investment in the developing countries (but results are not robust to model specification). Their studies also suggest that the complementarity between FDI and domestic investment in developing countries is insensitive to FDI productivity.

While many literatures are in support of crowding-in effect from the FDI, others are skeptical about such effects. Agosin and Machado (2005) developed a theoretical investment model for developing countries that explicitly introduces FDI, and the criteria used to determine the long-term crowding-in and crowding-out effect on domestic investment. They used panel data during 1971-2000 which spanned over 12 countries across three developing regions – Africa, Asia and Latin America. Their results contradict Borensztein et al. (1998), and indicate that FDI displaces domestic investment in Latin America. For Africa and Asia, on the other hand, FDI increases total investment by only the same portion i.e. a neutral effect. Moreover, if three decades are taken separately, they found that the FDI crowded out domestic investment in Latin America during the 1970s, and in Africa during the 1990s.

Mišun and Tomšík (2002) modify the Agosin and Mayer (2000)'s model so as to estimate whether FDI in Czech Republic, Hungary and Poland crowds-in or crowds-out domestic investment over the period of 1990-2000. Their results suggest that the crowding-in effect is relatively strong in Hungary and in Czech Republic while the crowding-out effect prevails in Poland.

In conclusion, previous studies express ambiguous results depending on samples, study periods, and the econometric methodology used. The positive impact of FDI on domestic investment is not assured. In some cases, total investment may increase by less than FDI, as Agosin and Mayer (2000), Agosin and Machado (2005) and Mišun and Tomšík (2002) pointed out.

### **The public investment effect on private investment**

It is a widely accepted proposition that private and public investments in developing countries are related (Balassa (1988); Laumas (1990); Cardoso (1993); Oshikoya (1994)). Their relationships can either be positive or negative, depending on the nature of public investment. On the one hand, public-sector investment that results in large fiscal deficits may crowd out private investment through high interest rates,

credit rationing, and a higher current or future tax burden on the household (Oshikoya (1994)). On the other hand, most developing countries have a large component of government investment concentrated in infrastructure projects (e.g. transport, communications and irrigation); public and private investments, in this case, are complementary (Cardoso (1993)).

The empirical studies on this issue are also controversial. Oshikoya (1994) finds a complementary relation between private and public investments; Cardoso (1993) discovers that, in Latin America, a one-percentage-point increase in the share of public investment to GDP raises the share of private investment to GDP by more than half a percentage point. However, Balassa (1988) and Laumas (1990) indicate a negative relationship between public and private investments. Note that, these arguments can be used to explain the effect of public investment on FDI inflows as well since private investment and FDI inflows bear a close conceptual relationship to each other. When the public sector invests dominantly in infrastructure, public investment and FDI inflows are complementary. By contrast, with limited physical and financial resources, an increase in public investment displaces direct investment thereby inducing a negative relationship.

### 3.2.2 Empirical Methodology and Data

We estimate the impact of FDI and public investment on private investment. We use Borensztein et al. (1998) approach with some modification from their models. Our model commences from the equation:

$$\mathbf{GFCF}_{i,t} = \beta_0 + \beta_1 \mathbf{FDI}_{i,t} + \beta_2 \mathbf{X}_{i,t} + \mu_i + \varepsilon_{i,t}$$

where  $\mathbf{i}$  denotes country,  $\mathbf{t}$  denotes time,  $\mathbf{GFCF}$  is the total investment or gross fixed capital formation as a share of GDP,  $\mathbf{FDI}$  is the direct foreign investment (net inflows) expressed as a share of GDP,  $\mathbf{X}$  is a vector capturing determinants of investment,  $\varepsilon$  is the white noise error, and  $\mu$  is a country specific time invariant effect.

The  $\mathbf{X}$  vector includes real GDP growth ( $\mathbf{GDPG}$ ), real interest rate ( $\mathbf{MLR}$ ), change in domestic credit as a share of GDP ( $\mathbf{\Delta SDC}$ ), and real exchange rate (local currency unit per US dollar deflated by the consumer price index:  $\mathbf{RER}$ ). These are similar variables used by the literatures mentioned earlier.

Subsequently, we include public investment as a share of GDP ( $\mathbf{PUB}$ ) to analyze its effect. In addition to public investment, time dummy variables and a dummy variable designed for Thailand ( $\mathbf{THAI}$ ) are added to investigate the dynamic effects of FDI and public investment on private investment and to test whether these effects on Thailand differ from the regional average or not.

We expect positive coefficients on economic growth and domestic credit as they are key factors driving the investment, as argued by Shundarajan and Thakur (1980),

Oshikoya (1984) and Agosin and Machado (2005). The interest rate (MLR) is expected to give negative effect.

However, exchange rate can either promote or retard investment; its coefficient can either be positive or negative, as indicated by Jongwanich and Kohpaiboon (2008). An exchange rate depreciation could raise the real cost of imported capital goods, which can adversely affect investment (Bleaney and Greenaway (2001)). By contrast, a depreciation raises the price of tradable goods relative to the price of non-tradable goods. Hence, this would help to stimulate investment in the tradable sector. Thus, if the positive impact from tradable sector outweighs the negative impact that could emerge in the non-tradable sector, private investment could increase (Agénor (2001)).

In this research, we are especially interested in the estimated coefficients on FDI and public investment, which can either be positive or negative, and how they are affected by inclusion of the dummy variables which can signify whether Thailand's crowding-in/crowding out effects are different to the regional average.

To examine these issues, annual data from the countries in the region - Malaysia, Indonesia, South Korea, the Philippines, and Thailand during 1981-2008<sup>4</sup> are collected from International Financial Statistics (IFS), World Development Indicators, and Everhart and Sumlinski (2001). Tables 3.2. and 3.3 provide descriptive statistics for and correlations between the variables (average values of selected countries).

**Table 3.2: Descriptive statistics**

	<b>GFCF</b>	<b>FDI</b>	<b>PUB</b>	<b>MLR</b>	<b>SDC</b>	<b>GDPG</b>	<b>RER</b>
<b>Mean</b>	27.8	1.8	7.9	5.7	73.4	5.4	2,295.1
<b>Max</b>	44.3	9.0	18.3	22.0	210.0	13.3	19,930.4
<b>Min</b>	16.5	-3.0	2.8	-25.0	11.0	-13.1	2.7
<b>S.D.</b>	6.3	1.9	3.0	5.3	45.9	4.1	4,046.5

Source: Author's calculation

<sup>4</sup> Due to data limitation, we cannot collect some data, especially public investment data, before 1981.

**Table 3.3: Correlation matrix**

	<b>GFCF</b>	<b>FDI</b>	<b>PUB</b>	<b>MLR</b>	<b>SDC</b>	<b>GDPG</b>	<b>RER</b>
<b>GFCF</b>	1						
<b>FDI</b>	0.2269	1					
<b>PUB</b>	0.3367	0.5425	1				
<b>MLR</b>	-0.0009	-0.0627	0.0733	1			
<b>SDC</b>	0.4718	0.5843	0.5195	-0.1317	1		
<b>GDPG</b>	0.3491	0.0841	0.0442	0.2453	0.0130	1	
<b>RER</b>	-0.1752	-0.3829	-0.0111	0.0468	-0.4524	-0.0802	1

Source: Author's calculation

### 3.2.3 Econometric Analysis and Results

We estimate the equations by using the fixed-effects with first-order autocorrelation disturbances technique (Baltagi and Li (1991)) since the LM test suggests that the errors estimated from (within-groups) fixed effects<sup>5</sup> estimation are not independent and identically distributed (iid) thereby generating inefficient estimators (Beck and Katz (1995)).

Table 3.4 reports estimated coefficients of the independent variable to gross fixed capital formation as a share of GDP in the Asian countries during 1981-2008. In line with the hypotheses, findings present that increase in real GDP growth and domestic credit stimulates total investment. However, higher cost of capital and local currency devaluation lower total investment. In this regards, our findings fall in line with Jongwanich and Kohpaiboon (2008). Moreover, our results demonstrate crowding-in rather than crowding-out effects for both the FDI and the public investment on private investment<sup>6</sup>. A one-percent increase in the public investment to GDP ratio and a one-percent increase in the FDI to GDP ratio on average stimulate the private investment to GDP ratio by 0.6 percent and 0.4 percent, respectively<sup>7</sup>. These results are consistent with the findings from Borensztein et al. (1998).

<sup>5</sup> In our case, the Hausman test shows a preference for the fixed effects estimation.

<sup>6</sup> Regressions show that FDI and public investment increase aggregate investment more than one for one. Since data on total investment include FDI and public investment, a coefficient greater than one would imply that FDI and public investment affect total investment.

<sup>7</sup> Note that we also undertake the t-test to check whether the crowding-in effect differs from one. The calculated test statistics appear to reject the null.

**Table 3.4: FDI and public investment impacts on private investment**  
**Dependent variable: GFCF/GDP**

<b>Equation</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Constant	<b>55.14 (0.00)</b>	<b>46.75 (0.00)</b>	<b>54.66 (0.00)</b>	<b>55.08 (0.00)</b>
GDPG	<b>0.11 (0.02)</b>	<b>0.15 (0.00)</b>	<b>0.12 (0.02)</b>	<b>0.11 (0.06)</b>
MLR	<b>-0.10 (0.01)</b>	<b>-0.10 (0.01)</b>	<b>-0.10 (0.01)</b>	<b>-0.10 (0.02)</b>
$\Delta$ SDC	<b>0.04 (0.01)</b>	<b>0.04 (0.05)</b>	<b>0.04 (0.05)</b>	<b>0.04 (0.05)</b>
RER	<b>-0.06 (0.01)</b>	<b>-0.05 (0.00)</b>	<b>-0.05 (0.00)</b>	<b>-0.06 (0.00)</b>
FDI	<b>1.38 (0.03)</b>		<b>1.21 (0.02)</b>	<b>1.13 (0.02)</b>
PUB		<b>1.60 (0.02)</b>		
FDI*PUB			<b>0.05 (0.03)</b>	
THAI*FDI				0.21 (0.15)
<b>R-squared</b>	0.29	0.31	0.33	0.25
<b>N</b>	130	130	130	130

Note: The figures in parentheses are P-values (significant coefficients in **bold**).

We also examine whether interaction between FDI investment and public investment give extra benefits on private investment. This is done by including an interaction variable (**FDI\*PUB**) in the equation. Estimated coefficient on this interacting variable is positive and statistically significant which suggests that public investment provides weight on FDI; the crowding-in effect of FDI tends to be larger in the developing country with high public investment.

In order to examine whether the crowding-in effects for Thailand are statistically different from the other Asian countries, we include two interaction variables in the equation: **THAI\*FDI** and **THAI\*PUB**. Our results give insignificant estimated coefficients, which imply that the crowding-in impacts for Thailand, do not differ from the regional average.

In addition, we find different degrees of crowding-in effects from the public investment and FDI investment for the pre and post crisis period. This is done by adding a time dummy variable (**TIME**)<sup>8</sup> and two interaction variables- **TIME\*FDI** and **TIME\*PUB**. Their estimated coefficients are significantly negative. Thus, the crowding-in effects of FDI and public investment on private investment has become lower after the 1997 crisis.

<sup>8</sup> Time dummy being 1 for 1997 - 2008 and zero otherwise.

**Table 3.4: FDI and public investment impacts on private (contd)**  
**Dependent variable: GFCF/GDP**

<b>Equation</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Constant	<b>46.37 (0.00)</b>	<b>53.70 (0.00)</b>	<b>43.29 (0.00)</b>	<b>44.69 (0.00)</b>
GDPG	<b>0.15 (0.00)</b>	<b>0.11 (0.01)</b>	<b>0.12 (0.01)</b>	<b>0.14 (0.01)</b>
MLR	<b>-0.10 (0.03)</b>	<b>-0.09 (0.02)</b>	<b>-0.10 (0.02)</b>	<b>-0.09 (0.02)</b>
ΔSDC	<b>0.04 (0.06)</b>	<b>0.05 (0.00)</b>	<b>0.04 (0.01)</b>	<b>0.03 (0.02)</b>
RER	<b>-0.05 (0.00)</b>	<b>-0.06 (0.00)</b>	<b>-0.05 (0.00)</b>	<b>-0.04 (0.00)</b>
FDI			<b>1.61 (0.02)</b>	
PUB	<b>1.68 (0.03)</b>			<b>1.75 (0.02)</b>
THAI*PUB	0.43 (0.18)			
TIME		<b>-2.59 (0.03)</b>	<b>-2.11 (0.03)</b>	<b>-2.30 (0.02)</b>
TIME*FDI			<b>-0.29 (0.03)</b>	
TIME*PUB				<b>-0.33 (0.05)</b>
<b>R-squared</b>	0.26	0.30	0.33	0.32
<b>N</b>	130	130	130	130

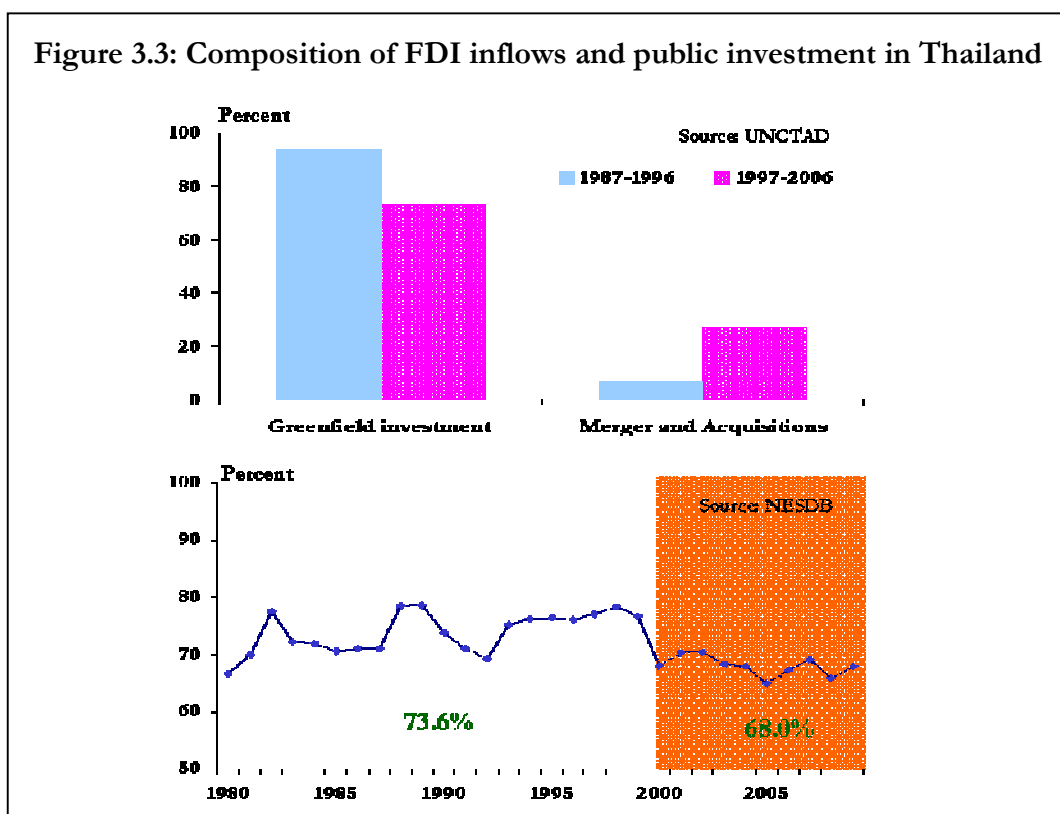
Note: The figures in parentheses are P-values (significant coefficients in **bold**).

In particular, before the 1997 crisis, a one-percent increase in public investment as a share of GDP stimulates private investment to GDP ratio by approximately 0.7 percent. Its effect post 1997 crisis yields only 0.4 percent. In the case of FDI, its effect on the investment is around 0.3 percent after the crisis, declining from 0.6 percent during the pre-crisis.

In summary, our findings suggest that FDI and public investment stimulate private investment in the selected countries; however, the crowding-in effect of public investment is greater than that of the FDI. In the case of Thailand, their impacts are not different from the region average. We also find that the crowding-in effect of FDI tends to be larger in the country with high level of public investment. Finally, the FDI and public investment impacts on private investment have become lower after the 1997 economic crisis.

Lower crowding-in effects post 1997 crisis may be the result of changes in compositions of FDI inflows as well as changes in compositions of public investment. For example, in Thailand, merger and acquisitions contribute a greater share relative to greenfield investment after the crisis (Figure 3.3) while public investment share in construction investment tends to be smaller than that of machinery and equipment investment. During 2000-2008, the construction investment accounted for 68 percent of public investment; falling from 74 percent average during 1980 - 1999 (Figure 3.3). These observations provide a policy implication for Thailand's investment, which will be discussed in the following part.

Figure 3.3: Composition of FDI inflows and public investment in Thailand



### 3.3 Policy implication

Our time-series analysis suggests that Thailand’s private investment is influenced by macro factors and other factors that is not capture in the model such as micro and institutions factors. Most of the predicted decline in private investment came from the fall in economic growth between the years 1995-1996 and 2007-2008. Terms of trade and domestic credit growth also contributed negatively while lower inflation volatility and lending rate contributed positively.

The panel data regression also provides some important findings. First, both FDI and public investment crowd in private investment. Second, the public investment effect on private investment seems to be greater than that of the FDI. Third, the crowding-in effects tend to be lower after 1997 crisis. Lastly, public investment provides weight on FDI; the crowding-in effect of FDI tends to be larger in the developing country with high public investment.

These findings suggest several policy implications.

1. The government should pursue a policy package in order to help foster potential growth.
2. Enhance efficiency of the financial sector to promote credit growth.



3. Secure economic stability i.e. reduce inflation volatility and political uncertainty. These will help contain any increase in perceived macroeconomic risks
4. Emphasis should be given on promoting investment in the public sector. Thailand is the only country compares to her peers that currently exhibits lower ratio of public investment to GDP compares to the pre 1997 crisis ratio (Table 3.5). Public investment post 1997-crisis suffers from two fates; lower government income growth due to lower GDP growth post crisis and lower capital expenditure share in the budget Thus, although crowding-in effect for Thailand does not differ from the others, lower public investments engender forgone losses of crowding-in effects from private investment.
5. Public investment should shift towards construction investment especially infrastructure investment. This may help increasing the crowding-in effect that has become lower after the 1997 crisis.
6. Although, Thailand out performance her peers in terms of FDI attraction (Table 3.5), Thailand must continue maintaining her competitiveness in order to keep attracting FDI (See Box 3 which stresses the important role of competitiveness in attracting FDI). In addition, attempt to improve crowding in effects from FDI should be pursued. We note that greenfield investment projects may be more encouraging, as they do not displace domestic firms (such as high technology industry). They also help promote the linkages between FDI and private investment depending on the availability of locally competitive manufacturing firms.

**Table 3.5: Crowding-in effects of public investment and FDI in Asian countries (2007-08/1995-96)**

unit: percent

Country	Changes in GFCF/GDP	Changes in Public investment/GDP	Public investment effect <sup>9</sup>	Changes in FDI/GDP	FDI impact
Thailand	-20.0	-4.1	-2.1	2.8	0.9
Malaysia	-17.4	0.8	0.4	-2.3	-0.7
Korea	-11.7	0.7	0.4	-0.2	-0.1
Philippines	-6.1	1.0	0.5	-0.5	-0.2
Indonesia	-3.6	0.3	0.2	-0.7	-0.2

<sup>9</sup> The effect is calculated from a formula: the crowding-in effect of public investment after crisis (0.4) times change in public investment to GDP ratio is equal to that effect. This formula can be modified to compute the impact of FDI on private investment.

### Box 3: FDI Location Decision: Approach to preserving FDI attraction

Foreign direct investment (FDI) is an important part of private investment which could spring spill-over benefits to domestic firms. Thus, the top priority for policy makers has always been to design and improve policies in order to attract more FDI flows into the country.

A glance on individual country's FDI inflows reveals that Vietnam has continuously attracted inflows of FDI to the level that surpassed Thailand for the first time in 2009.

This development has raised concerns that future foreign investors may shift their investment destination to other emerging countries such as Vietnam. As a result, for Thailand to maintain an attractive FDI destination, Thailand must provide the right incentives, fulfill critical criteria and requirements that are important to the decision of multinational enterprises (MNEs) allocation. An investigation on relative performance between Thailand and other regional countries will lead to effective guidelines and policy recommendations for the economy going forward.

#### Key determinants of FDI flows

Generally, pull factors such as macro environment, market and comparative advantage are the main factors which attract FDI flows (Table 1). The importance of each factor to the investing agents depends on the motive for investment, the type of investment, and the size of the investors (UNCTAD, 1998).

**Table 1: Host country determinants of FDI**

Macro environment	Market	Comparative advantage
Economic condition and macro policies	Local market demand/regional integration/trade policy	<ul style="list-style-type: none"> <li>- Resource abundance</li> <li>- <b>Competitiveness</b> <ul style="list-style-type: none"> <li>- Ease of doing business</li> <li>- Production and industrial policy: cost, skills, infrastructure, supplier base, technology support, intellectual property right, competition policies</li> </ul> </li> </ul>

Source: Variety sources.

From the study by the World Bank, Thailand is equipped with strong macro environment. Despite Thailand's relatively small market size, increases in the regional economic integration and trade openness have been an important factor in attracting FDI for Thailand. Furthermore, the growing economic integration and technological changes in the last decade has caused MNEs to pay less attention on the degree of resource abundance as funds and labor has become more mobile between countries in the region. However, Thailand's competitiveness has ample room for improvement.

#### Competitiveness

Major factors contributing to a country's competitiveness can be categorized into two main areas; (1) the ease of conducting business and production and (2) supporting industrial policy.

1. The ease of "doing business"<sup>ω</sup> in Thailand is rated relatively well. Thailand ranked 12<sup>th</sup> from 183 countries in the 'Doing Business Index'. Within this region, Thailand only trailed behind Singapore and Hong Kong. Comparing components in the 'Doing Business Index' to other countries<sup>τ</sup> in the region reveals that Thailand performs better than the average in 6 out of the 10 categories. These 6 categories are property registration, construction permit issuance, employing workers and Investor protection (Figure 1). However, Thailand was rated considerably lower than the average for the other four components which could hinder investment. These components include;

<sup>ω</sup> *Doing Business reports* by the World Bank provides many dimensions for benchmarking the ease of doing business ranking through various categories.

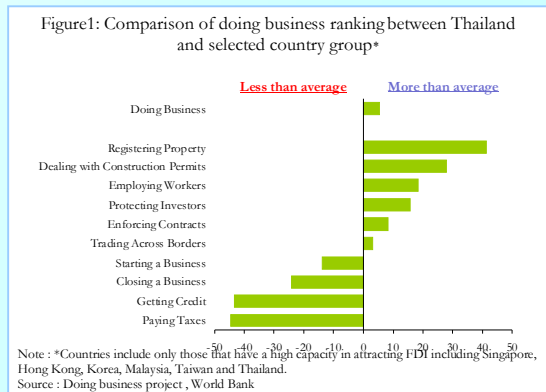
<sup>τ</sup>These countries are Singapore, Hong Kong, Korea, Malaysia, Taiwan and Thailand.

(1) **Paying Taxes Index.** This reflects higher cost of running a business both in terms of monetary and non-monetary value compares to other countries. In monetary term, the average tax rate among all tax types for Thailand is as high as 37.2% compared to the average of 32% in the selected countries. In terms of non-monetary value, Thailand requires much more time, effort and necessary information in the calculation of payable tax.

(2) **Getting credit index.** This reflects the low ability of receiving finance in Thailand as collateral and bankruptcy laws are relatively unsupportive to accessibility of financial resources.

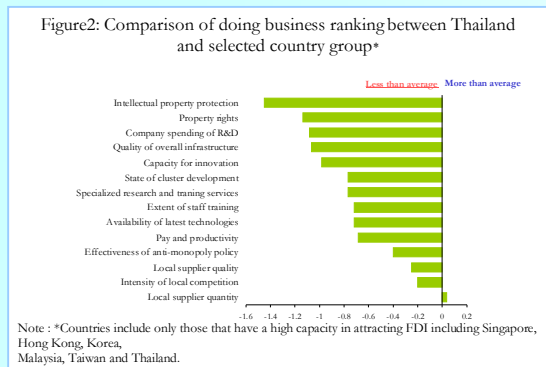
(3) **Closing a Business** in Thailand also has slower process than the average of the region by 7 months and the costs of doing so are much higher. This is contributed by the lower probability that the creditors would receive their repayment.

(4) **Starting a Business index** The average time taken to start new businesses in the region is less than 11 days while the average for Thailand is 32 days.



2. Production and industrial policies: indicators from the Global Competitiveness Index

2009-2010, indicated that local supplier quantity was the only indicator that performed higher than the average for Thailand. The other indicators including R&D, Quality of infrastructure and Capacity of innovation were ranked lower than the average, where intellectual property protection received the lowest rank amongst all (Figure 2). Under these circumstances, it appears essential that Thailand has to take significant steps towards the structural adjustments relating to competition in order to increase its ability to compete against these regional peers.



### Approach to improving FDI attractiveness

Increasing competitiveness is essential in attracting FDI, especially in the long term. Drawn from the above analysis, we deem that the public sector should streamline the processes of completing tax transactions, closing a business as well as starting a business to increase the ease of doing businesses. In accompanying such process, legal adjustments should also be made to provide more opportunities for business sectors to increase their access to credit while rules and regulations for investment should also be streamlined to be more transparent. Such improvement will greatly contribute to the investment environment for both domestic and foreign investors.

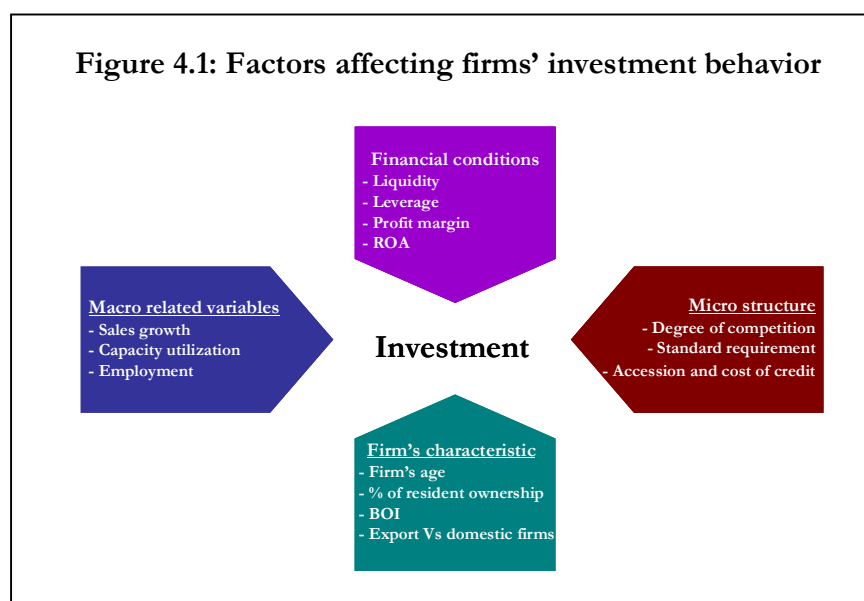
In addition, improving and enforcing the laws that protect intellectual property right is of the greatest importance, especially in attracting substantial flows of innovative FDI. The public and private sector must work hand in hand to create a strong fundamental for the industry. This can be done through the improvement of the R&D process, allocating more resource to foster the capacity of innovation, and setting a priority to improve the quality of infrastructure, which is the basis for future development.

## 4. The importance of microeconomic structure on investment

### 4.1 Framework

While the previous section highlighted the influence of macroeconomic factors on aggregate investment, little insight was given on investment mechanism at the micro level. This section attempts to complete this gap by using a firm level dataset from Productivity Investment Climate Survey 2007 (PICS 2007) to investigate the determinants of investment.

Firm level studies on investment behavior dated far back since the early 1900. Tinbergen (1938, 1939) first proposed investment as a function of profits and found a strong linkage between the two. Later works by Klein (1951) and Meyer and Kuh (1957) suggested financial constraints such as internal funds and cost of finance as the determinants of desired capital. However, Kuh (1963), Anderson (1967) and Evan (1967) all found that capacity utilization and sales output were superior determinants of investment than internal fund variables. In line with these studies, we framed our analysis into four different groups of factor affecting investment as shown in Figure 4.1: macro-related variables, financial condition variables, micro structure variables and firm's specific characteristic variables.



- (1) **Macro-related variables** such as sales growth and capacity utilization are factors influenced by the macroeconomic performance. A firm is likely to invest if 1) there are continuously sufficient demands for their products and 2) their capacity is reaching the limit. In general, we regards macro-related variables as the “*pull factor*” of investment
- (2) **Financial condition variables** such as degrees of leverage, liquidity and profit margin represent financial health of a firm which could affect investment decision. A healthy firm has higher privilege to invest due to a more availability of internal funds and easier access to credit.

- (3) **Micro structure variables** refer to structural issues that provide supportive environments to investment. These environments include the degree of competition, product standard requirements, accessibility and cost of finance. Different environments may affect investment behavior differently. We expect competitive environment, higher product standard requirement and lesser problems on credit access and lower cost of finance to be associated with higher investment. Thus, these structural issues can be regarded as “*structural inhibitors*” of investment. Note that, unlike the pull factors which fluctuate through economic cycle, structural issues are longer term problems which can provide undesirable environment that protractedly inhibit investment.
- (4) **Firm’s specific characteristic variables** such as sizes of firm, board of investment (BOI) supported firms, exports firm or multinational firms may behave differently to one another.

The conjecture is that any differences between firms’ investment behavior should arise from the differences in the pull factors, financial health, inhibited factors and the firm characters. We use a firm level dataset from Productivity Investment Climate Survey 2007 to investigate such relations.

## 4.2 Data

Productivity Investment Climate Survey 2007 (PICS 2007) is a survey collaborated and conducted by the National Economic and Social Development Board, the Productivity Institute and the World Bank. It is a survey of 1043 manufacturing firms, consisting of 4 modules: CEO, Finance Manger, Personnel Manager and Workers Survey. Thus, PICS 2007 provides rich data on perceived business climate such as firms’ balance sheet, firm’s investment condition as well as various different firms’ characteristics. Moreover, some data on the survey feature a time-series element as some questions were asked in hindsight.

In addition, the survey covers seven regions: North, Upper Northeast, Lower Northeast, Central, Bangkok and Vicinity, East and South; and spans over nine industries: Processing Food, Textile, Garment, Auto Parts, Electronics, Electrical Appliances, Rubber and Plastic, Furniture and Wood Products, and Machinery and Equipment.

Firm’s samples were fairly distributed across the nine industries with about 72 percent of the samples located in Bangkok and the Central region. Approximately, 25 percent of the samples are export oriented firms, defined by those who export more than 60 percent of their total sales. We also define both markets firms as those who export between 30 - 60 percent while domestic market firms are those who export less than 30 percent.

Overall, PICS 2007 is a rich dataset which fully allows us to construct determinant variables according to our framework.

In 2006, about 75 percent of the firm sample was investing, while 8 percent of those who didn't invest responded that they will do so in the next few years. This leaves 17 percent of the sample as non-investing firms i.e. no current investment and no future intended investment. By grouping firms into investing firms and non-investing firms, Table 4.1 summarized the core descriptive statistics of the two groups under our framework.

Mean values	Investing firms	Non-investing firms
<b>Macro-related variables</b>		
Sales growth (%)	17.8	5.5
Changes in capacity utilization (%)	3.3	0.3
Changes in employment	10.5	-6.0
<b>Financial condition variables</b>		
Changes in net profit margin (%)	0.7	0.2
Changes in quick ratio (liquidity)	-0.7	-0.3
Changes in debt to equity ratio (leverage)	-0.1	-0.3
Changes in ROA (%)	0.3	1.0
<b>Firm's specific characteristic variables</b>		
No. of worker (size of firm)	298	114
% Export firms	26.5	17.2
% Both-market firms	7.1	3.9
% BOI firms	10.9	5.6
% Resident ownership	85.8	93.9
Firm's age	14.1	15.0
<b>Micro structure variables</b>		
Herfindahl-Hirschman Index	289.4	341.9
% of firm with ISO award	41.4	23.9
% of firm with financial service problems	38.6	46.1

Source: PICS 2007, author's calculations.

At first glance, comparing mean values of the two groups reveal many relative traits between investing firms and non-investing firms. On average, investing firms have

- (1) **Better pull factors:** higher sales growth, higher increases in capacity utilization rate and higher personnel recruitments.
- (2) **Mix traits of financial health:** higher positive changes in net profit margin, higher degrees of worsening liquidity, lesser degrees of worsening leverage ratio and lower positive changes in return on asset.
- (3) **Specific character traits:** larger in size, more percentages of firms are export firms, more percentages of firms are supported by the Board of Investment, higher percentages of foreign ownership and slightly lower firm's ages.

- (4) **Lesser structural inhibitors:** higher degrees of competition, higher product standard as reflected by more ISO award and less problems on financial access and cost of finance.

These are only a quick inspection of relative traits. To properly assess the partial effect of each factor on investment, i.e. each factor individual effect after keeping other factors constant, an econometric model must be constructed. We therefore run a probit model to evaluate these determinants on the firm's probability of investment

### 4.3 Model specification

In accordance with our framework, we estimated the following function using the probit model.

$$Investment = f(\text{Macro-related variables, financial health variables, firms' characteristic variables, micro structure variables, regional and industries dummies})$$

**The dependent variable** is used to identify investing firms and non-investing firms. Its value equals to one if the firm has invested in the year 2006 or intended to invest in the next few years and equals to zero otherwise. Assigning value of future intended investment equals to one allows more flexibility for investing firms.

**The independent variables** consist of 4 groups of factor as stated in the framework section plus regional dummies and industry dummies. We used the difference terms with one lag for macro-related variables and financial condition variables to reduce biasness of the estimated coefficient and to mitigate the simultaneity problem between dependent variables and independent variables<sup>10</sup>. The firm's characteristic variables and micro structure variables were either constructed in level terms or as dummy variables. The table below shows the reference unit for every dummy variable used in the model.

Dummy variables	Reference units
Export firms or both markets firms	Domestic firms
BOI supported firms	Non - BOI supported firms
8 Industries	Firms in the Northern region
6 Regions	Firms in the electrical appliance industry
ISO awarded firms	Firms without an ISO certificate
Financial service problems	Firms without financial service problems

While other variables are fairly straight forward to construct, the micro structure variables require more elaborations.

First, we used Herfindahl-Hirschman Index (HHI) as a measure of degree of competition which is the sum of squared firm market shares across all firms in an

<sup>10</sup> Using the difference term specification has been known to reduce biasness of the estimated coefficient in exchange for a loss in efficiency. It gives a more correct magnitude of the estimated coefficient but yields higher standard error. However, since the number of observation in our estimate is very large, efficiency is not a concerning issue.

industry. As a proxy for the population size, we blew the survey data using the weights given by the dataset and calculated HHI from the blew-data using the three-digit ISIC as the market scope. The higher the HHI, the lesser the degree of competition in the industry<sup>11</sup>.

Second, we believe qualities of products are associated with ISO certificate awards. We therefore constructed an ISO award dummy which equaled to one if the firm has been awarded at least one ISO and equaled to zero otherwise.

Third, the variable for financial service problems was constructed as a dummy variable, being one if the firm listed financial access and/or financial cost in any of their top three most impediment factors for doing businesses. The dummy also equaled to one for firms that use more than 75 percent of their retain earnings or internal funds as their sources of finance of new investments. The idea here is that, we want to identify firms that (1) complained a lot about financial access and financial cost and/or (2) use mainly internal funds to finance their new investment projects, in order to truly pinpoint those problematic firms.

#### 4.4 Results of Probit regression

To stress the importance of micro structure variables, we run 4 probit regressions as shown in Table 4.3. The first regression omitted all micro structure variables while the second, third and fourth regressions additionally inserted each factor into the model: the degree of competition (HHI), the product standard (ISO dummy) and the financial service problem (financial service problem dummy). Note that, by construction of the HHI variable, whenever HHI is inserted in the model, we have to drop the industry variable. This is because HHI was calculated using the three digits ISIC industry code as the reference market. Thus, the same values were assigned to firms within the defined market group which are highly correlated with the industry variable<sup>12</sup>.

Below are the key findings from Table 4.3<sup>13</sup>.

- 1. Pull factors or macro related variables are important determinants of firms' probability to invest.** All of the coefficients in this group give correct signs i.e. higher past sales growth, higher changes in past capacity utilization and higher changes in past employment tend to increase firms' probability of investment. Two out of four models suggest sales growth as a significant variable, three out of four models suggest capacity utilization as a significant variable and finally, all four models accept past changes in employment as a significant determinant.

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<sup>11</sup> As a convention, a HHI value of less than 1000 is considered to be a competitive market; a value of 1,000 - 1,800 is a moderately concentrated market and a value above 1,800 is a highly concentrated market.

<sup>12</sup> Putting industry and HHI variables simultaneously yield insignificant coefficients on most industry dummies and HHI variable.

<sup>13</sup> Table 4.3 shows only the coefficient estimates, marginal effects for model 1 and 4 can be found in the appendix IV.



2. **Financial condition variables do not seem to matter.** All of our financial variables: profit, liquidity, leverage and return on asset (ROA) were insignificant except for ROA in the first model. Our results on financial condition support the finding of Jorgenson (1971) which reviewed many econometric studies on investment behavior. He stated that,

*“Variables associated with internal finance do not appear as significant determinants of desired capital in any model that also includes output as a significant determinant”.*

**Table 4.3: Probit regression of investment on macro-related variables, financial conditions, firm’s characters and micro structure variables**

Variables	Coefficient (Model 1)	Coefficient (Model 2)	Coefficient (Model 3)	Coefficient (Model 4)
<b>Macro-related variables</b>				
$\Delta \ln(\text{sales})_{t-1}$	0.3609686**	0.3563745**	0.2557618	0.2450759
$\Delta \text{CapU}_{t-1}$	0.0091941*	0.0101036**	0.0083164	0.0089163*
$\Delta \text{Employment}_{t-1}$	0.0039331**	0.0045388***	0.0044063***	0.0043032***
<b>Financial condition variables</b>				
$\Delta \text{Net profit margin}_{t-1}$	0.0025872	-0.0002000	0.0036215	0.0041199
$\Delta \text{Quick ratio}_{t-1}$ (liquidity)	0.0081900	0.0074274	0.0085474	0.0086717
$\Delta D/E_{t-1}$ (leverage)	-0.0028124	-0.0005623	0.0006702	0.0022317
$\Delta \text{ROA}_{t-1}$	-0.0039300*	-0.0034915	-0.0025209	-0.0025207
<b>Firm’s characteristic variables</b>				
Employment <sub>t</sub> (firm’s size)	0.0008959*	0.0008780**	0.0007593*	0.0007098
Export firm	0.3088893**	0.3097513**	0.1709521	0.1746136
Both-market firm	0.2832569	0.3369903	0.3099551	0.2886425
BOI firms	0.0689090	-	-	-
% resident ownership <sub>t</sub>	-0.0014673	-	-	-
Firms age <sub>t</sub>	-0.0014239	-	-	-
<b>Micro structure variables</b>				
HHI	-	-0.0002672**	-0.0002363*	-0.0002268*
ISO award	-	-	0.2505187*	0.2578305**
Financial service problems	-	-	-	-0.2100222**
<b>Others</b>				
Industry dummies	Yes	No	No	No
Region dummies	Yes	Yes	Yes	Yes
No. of observation	933	953	910	910

\*, \*\*, \*\*\* indicates significant level at 10%, 5%, and 1% respectively

3. **Various firm’s specific characters are not significant determinants of investment.** Firm’s age (young firms or old firms), types of ownerships (foreign own or resident own) and BOI supports do not explain the different between the investing firms and non-investing firms. Inference by an F-test also suggests that these variables should be dropped in order to improve efficiencies of the model. Thus, in model 2, 3 and 4, we dropped these character variables. Note that, the

scope of our findings on BOI supports is limited to existing firms only. That is, once a BOI firm is established, investment is driven by other factor such as sales growth but not the privilege provided by BOI. Our finding says nothing about the other function of the BOI, which is to provide incentives in order to attract new entrant of investment, especially foreign investment.

4. **Micro structural variables matter for investment.** Results from model 2 to 4 all gave significant coefficient at least at the 10% level. The model suggest that lesser degree of competition (higher HHI) discourage investment, while firms with higher production standards tend to invest more and firms with fewer problems on financial access and/or lower financial cost also have higher probability to invest.
5. **Micro structural variables help explain the difference in investment probability among various firm's groups: the export versus domestic firms group, and the small versus large firms group.** Results in the first regression show that, even after controlling for the pull factors, financial conditions, firm's characters, regions and industries, export firms and large firms statistically have higher probability to invest than their domestic firms and small firms counterpart. These discrepancies disappear when we controlled for micro structural variables as shown by the regression results in model 3 and 4; export firm dummy and firm's size variable became insignificant as more and more micro structural variables were inserted into the model. **Therefore, given the same pull factors, investment probability of export firms should be indifferent to domestic firms and this should also hold true for the small and large firms group as long as these groups face the same degree of competition, the same degree of product standard requirement and the same degree of financial service problems.**

Probit analysis above stressed the importance of micro structural variables in addition to the pull factors which distinguished investing firms from non-investing firms. The fact that different firm's groups behave differently due to different degree of inhibitors as opposed to having a level playing field, should prompt corrective measures from policymakers. To complete our analysis in this section, we further examine which inhibited factors are more problematic to each firm's group.

#### **4.5 Explaining the difference in investment behavior among firm's groups**

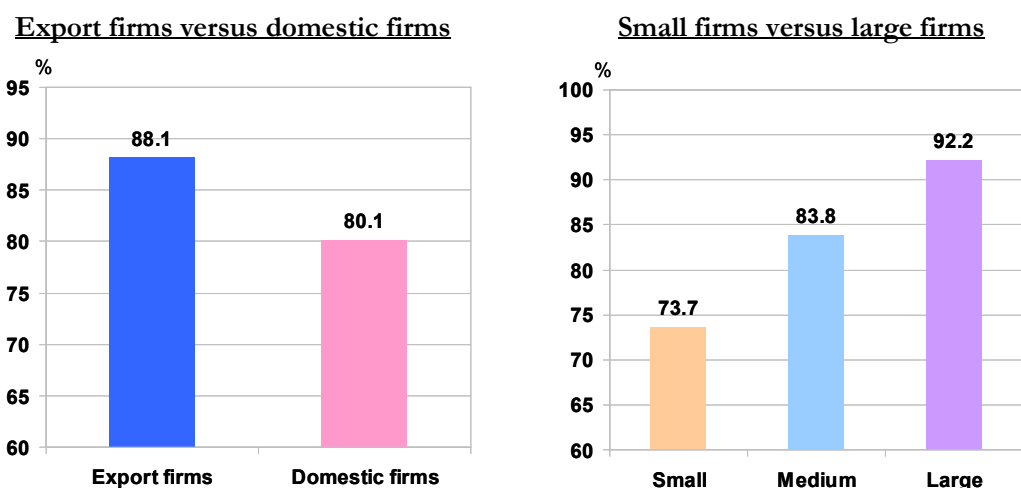
The widely accepted notion that export firms and large firms tend to invest more is supported by PICS 2007 data. Figure 4.2 shows that there is a higher percentage of firms in the export group that invested and/or reported to invest in the next few years. Similarly, the percentage of investing firm increases as firm's size gets larger<sup>14</sup>. Examining

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<sup>14</sup> Here, we defined a firm's size as small, medium and large by the number of employment; 1 - 50 employments being a small size firm, 51 - 200 employments being a medium size firm and over 200 employments being a large size firm. As a result, the full sample was split into 365 small firms, 371 medium firms and 307 large firms.

the pull factors and structural inhibitors on each of these groups helps explain why export firms and large firms have higher probability to invest than domestic firms and small firms. Below are the key findings.

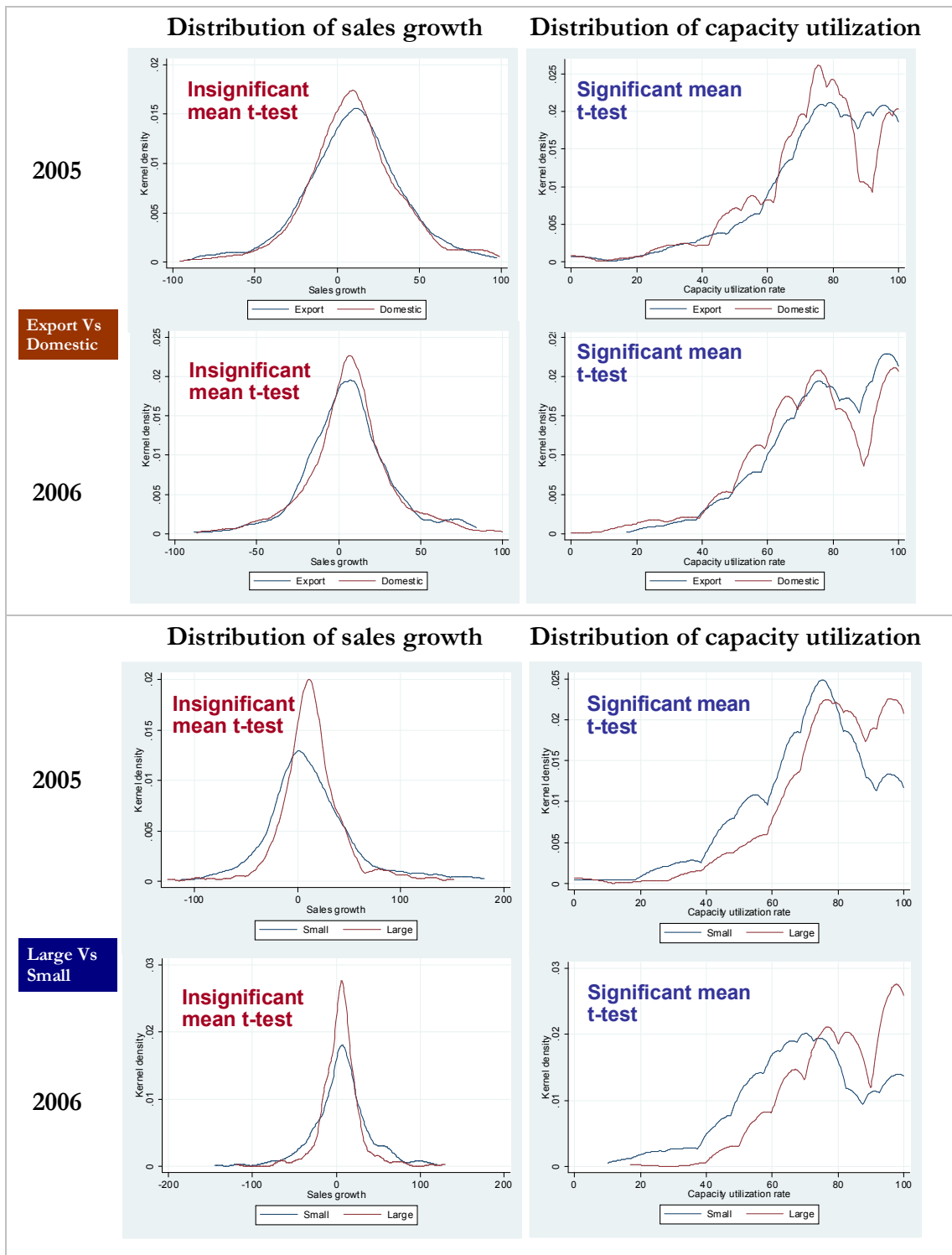
**Figure 4.2: Percentages of investing firms classified by groups**



Source: PICS 2007

1. **During 2005 - 2006, differences in the pull factors were not obvious among both groups. Thus, pull factors are less likely to be the main explanation for investment discrepancies of each group.** Figure 4.3 shows kernel density distributions of sales growth and capacity utilization rate in 2005 and 2006. The top panel makes comparison between export firms and domestic firms while the bottom panel compares these distributions of large firms against small firms. In both of the cases, there are no obvious distinct differences in the distribution of sales growth. Mean t-tests on sales growth of both groups also give insignificant results in both years. Therefore, sales growth in both groups didn't seem to be advantageous against one another. However, the distribution of capacity utilization rate for export firms and large firms seemed to be relatively more skewed to the left than their domestic firm and small firm counterparts and t-tests suggest their means to be significantly different in both cases. Overall, in terms of pull factors, export firms and large firms may have a slight advantage from having a higher capacity utilization rate.

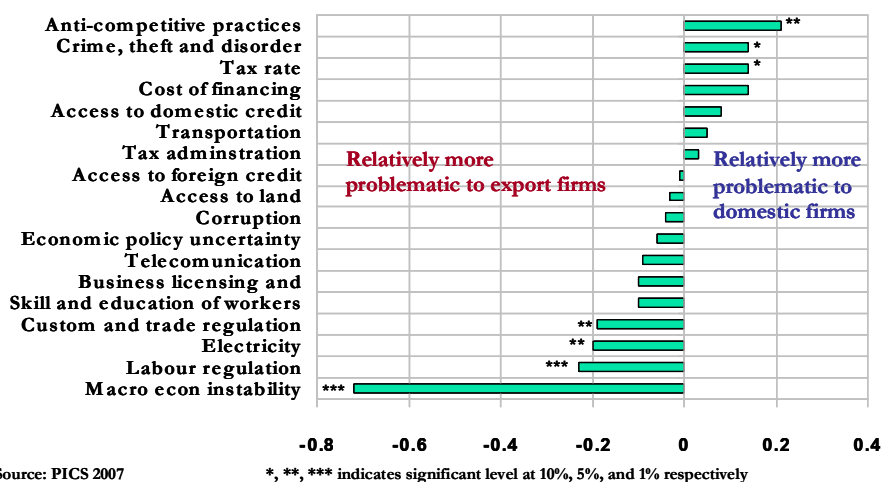
**Figure 4.3: Kernel density distribution of sales growth and capacity utilization during 2005 - 2006 classified by groups.**



Source: PICS 2007

2. **Domestic firms relatively suffer more than export firms from two inhibited factors: (1) the degree of competition and (2) product standards while problems on financial services between the two groups are not significantly different.** Including in the PICS 2007 dataset, firms were asked to rank scores on a list of constraint factors. Figure 4.4 shows the differences in mean scores of investment constraint between domestic firms and export firms. A positive value indicates a relatively more constraint for domestic firms while a negative value indicates more constraint on the export firms. Anti-competitive practices such as collusion or monopoly power came top of the list as the most relative problematic factor for domestic firms. Mean t-test also indicates that this difference is statistically significant at the 5 percent level. Other than competitions, the degree of product standard is another factor that induces export firms to invest more. In general, export firms face higher product standard requirement at the international level compare to the standard received by domestic firms at home. This is reflected by the difference in the firm's portion that receives ISO awards between the two groups. According to PICS 2007, 50.4 percent of export firms have at least one ISO certificate while only 32.8 percent of domestic firms have these awards. Moreover, 26.9 percent of domestic firms as opposed to 20.8 percent of export firms, states their inability to meet foreign standard requirement as their most important obstacle that impeded them from export. Thus, some firms opt for domestic market rather than invest to keep up with international standard. Lastly, the differences in mean scores of investment constraint on the cost of finance and access to domestic credit are positive as shown in Figure 4.4. However, t-test rejects them to be statistically significant. In addition, the proportion of firms which reports financial access and financial cost as their number one obstacles between export firms and domestic firms are statistically insignificant as shown by Table 4.4. Therefore, differences in financial service problems between the two groups remain unclear.

**Figure 4.4: Differences in score of investment constraints between domestic firms and export firms**



Our findings fall in line with the intuition that export firms which compete against other firms worldwide would have to invest in order to survive in the international arena. Moreover, higher product standard requirements from the international level such as the EU standard or the Japanese standard induce export firms to continuously upgrade themselves through investment in order to meet these standard requirements. Domestic firms, however, do not experience these distinct environments.

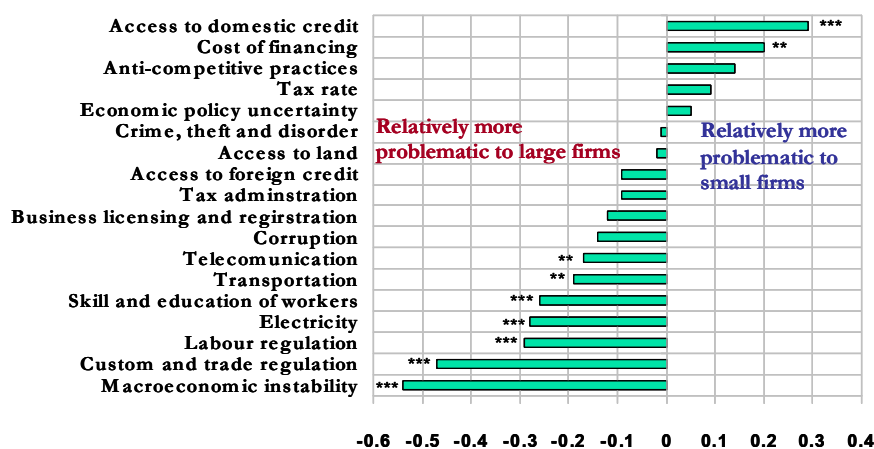
**Table 4.4: Percentages of firms report credit access and financial cost as number one obstacle classified by groups**

% of firms' report	Domestic	Export	Difference	T-test
Credit access as no. 1 obstacle	7.7	6.5	1.2	Insignificant
High interest rate as no. 1 obstacle	2.2	1.2	1.1	Insignificant
	Small	Large		
Credit access as no. 1 obstacle	11.8	4.2	7.5***	Significant
High interest rate as no. 1 obstacle	2.5	0.7	1.8**	Significant

Source: PICS 2007 and \*, \*\*, \*\*\* indicates significant level at 10%, 5%, and 1% respectively.

3. **The main inhibitors for small firms are their lesser accessibilities to credit as well as their higher costs of finance.** From Figure 4.5 which is analogous to Figure 4.4 but applies to the small firm and large firm group, access to domestic credit and cost of finance are statistically more problematic for small firms. Furthermore, Table 4.4 shows that the proportion of firms which reported financial access and financial cost as their number one obstacles between small firms and large firms are significantly different.

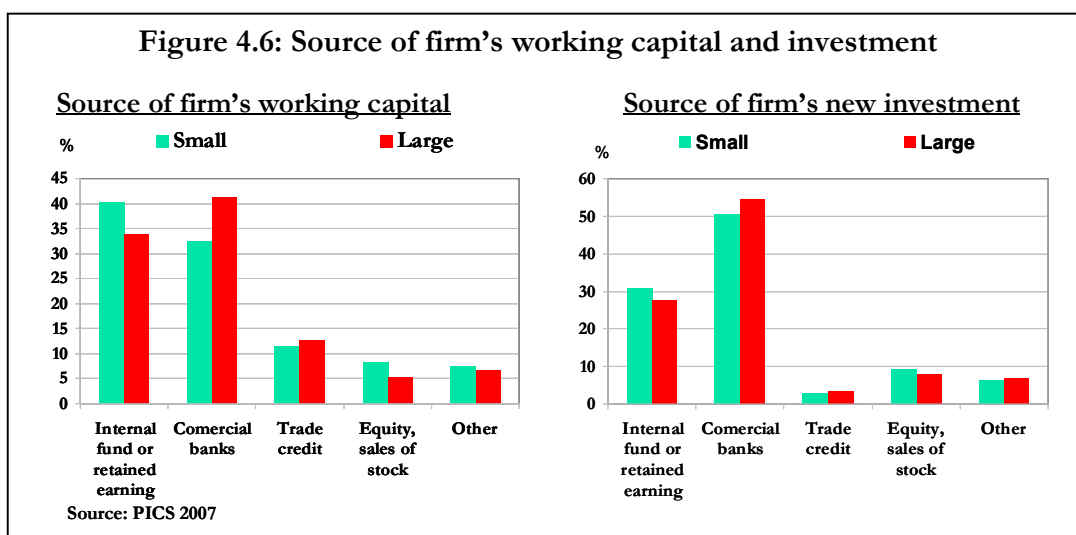
**Figure 4.5: Differences in score of investment constraints between small firms and large firms**



Source: PICS 2007

\*, \*\*, \*\*\* indicates significant level at 10%, 5%, and 1% respectively

As a result, small firms have to relatively use more of their internal funds as their sources of working capital and investment as shown in Figure 4.6. As for competition, differences in the competition practice among the two groups are unclear. Although the anti-competitive practice category in Figure 4.5 registers a positive difference, it is statistically insignificant. Lastly, product standard for small firms naturally fall behind large firms. Only 9.9 percent of small firms have ISO awards while 68.1 percent of large firms have these awards.



We summarize our identification of relative problems to each group in Table 4.5 and stress the importance of unlocking structural inhibitors for two main reasons.

**Table 4.5: Summary of relative problems on each group**

Factors	Domestic firms compare to export firms	Small firms compare to large firms
Pull factor during 2005 - 2006	Slightly lower	Slightly lower
Competition	<b>More problematic</b>	Unclear
Product standard	<b>More problematic</b>	Naturally lower
Financial service problem	Unclear	<b>More problematic</b>

- (1) **To create equal opportunities:** a good policymaker should ensure an environment of level playing field in all groups. Discrepancies in investment behavior should be eliminated by unlocking inhibited factor that creates them.
- (2) **To increase elasticity of investment to GDP:** Constant return to scale implies that doubling output requires twice the input factor of production given the same total factor productivity i.e. same technology. Thus pull factor alone may not guarantee the ability to raise the ratio of investment to GDP since both variables, investment and GDP, may increase proportionally. Unlocking structural inhibitors on the other hands can increase the sensitivity or the elasticity of

investment to GDP. This is because a higher product standard requirement, a more competitive environment as well as an easier access to credit would promote additional investment given the same output.

We end this section by touching briefly on another important structural issue, which is not captured in our model; the legal obstacles which is discussed in Box 4.



#### **Box 4 : Legal Obstacles for Investment**

For the past 4-5 years, several investment projects in Thailand have been suspended or postponed as a result of legal issues at the national level. Consequently, the legal risks have become another top concern in making investment decision for both domestic and foreign investors.

This emerging legal risk stems from the acute problems of 1) the lack of understanding and preparation for the new law, 2) unclear government policy direction, and 3) inappropriate selection of law for resolving problems. We highlight the three most notable cases as follows.

**1) Lack of understanding and preparation for the new constitution enacted in 2007:** Several businesses and investors were not aware that constitutional implementations apply immediately without the need of corresponding bill or other subsequent laws. The Map Ta Phut problem is one example in which the Central Administrative Court prohibited operations of 76 investment projects in the Map Ta Phut industrial zone on September 29, 2009. These projects were required at once to pass environmental and health impact assessments, hold public hearing and take views of independent experts into consideration. This incidence has led to the postponement of investment worth as much as 290 billion baht. As of August, 2010, the remaining projects worth 110 billion baht were still under suspension. The delay in resolving this complication has consequently damaged investment opportunities and could further undermine long-term confidence of investors.

To prevent additional complications, authorities themselves need a profound understanding and well-strategic plan to encounter the possible consequences of these new regulations especially those related to environmental and health issues as they can become more sensitive and pressing in the future. Better communication and provision of sufficient information as well as adjustment time for investors will be the best approach as the first step to encounter the issues. At the same time, investors need to also closely monitor the new laws and regulations, and be ready to perform effective and realistic assessment on the potential impacts to adjust their businesses accordingly.

**2) Unclear policy direction regarding the 3G mobile telecommunication broad band service:** The allocation of 3G mobile telecommunication broadband to potential operators has been delayed since 2007 as a result of the frequent switch in policy directions on the licensing framework and the amount of initial investment amongst the 4 different Information and Communication Technology Ministers in the past 4 years. This delay has not only caused damages to investment in telecommunication and all related industries but also affected the overall competitiveness of the country as most of our regional peers have already had this system in place. It is therefore essential to find a mechanism that can help ensure continuation and consistency of policy directions against the backdrop of changing political environment. Moreover, the government must ensure that the process of 3G licensing is consistent with the new law.

**3) Inappropriate selection of law to help small retailers in cities amidst competition from large conglomerates:** To help preserve traditional small retailers that could be affected by the expansion of modern trade conglomerates, the government has released the city planning law requiring a retail store larger than 1,000 square meters

to be situated at least 15 kilometers away from municipal areas. This decision nevertheless has produced significantly negative impacts on both types of retailers.

For those modern trade conglomerates, it has been difficult to find locations for their stores. Consequently, investment by the modern trade conglomerates declined by 5 - 10 billion baht, or 10-20 percent of their total investment in 2009.<sup>Γ</sup> At the same time, small retailers in the cities have to face competition from modern trade conglomerates which have changed their strategies by reducing the size of their outlets in order to remain well located in the cities. A clear example is the burgeoning of Tesco-Lotus express that expanded from just 11 outlets in 2003 to 490 outlets as of August 2010.<sup>Ω</sup> This issue demonstrates the need for strategic and careful design of laws and regulations as well as thorough assessment on potential adverse effects on the overall stakeholders.

In sum, to improve investment climates and to help shore up investors' confidence in Thailand, the unfinished legal issues surrounding investment conditions need to be resolved urgently. The government has to ensure that new issuance of laws and regulations would not add unexpected costs to related businesses. This requires clear and continued policy directions, thorough assessments on policy results before the enactment, and effective communications and information provision to businesses.

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<sup>Γ</sup> Interview with Chairman of Thai Retailer's Association, Thairath newspaper, 25 September 2009.

<sup>Ω</sup> Expansion of Modern Trade Table, Ministry of Commerce, August 2010

## 5. Conclusion and Policy Implications

This paper re-stresses the importance of investment to Thailand economic development in preparation for the new global economic landscape shaped by the 2009 crisis. At present, Thailand investment conditions are inadequate to secure a long-term economic prosperity in which Thailand is at risks of falling behind her competitors. In fact, we estimate that Thailand must raise her rate of investment to GDP from 20.5 percent in 2009 to 27.3 percent in order to secure a long-run potential GDP growth of 5.0 percent. To fulfill this rate by 2015, investment must grow by about 10.3 percent each year over the next 6 year<sup>15</sup>. Our study shows that investment slumps were contributed by all parties in which the problems must be tackled at both levels; the macro and micro levels. Essentially, government policies must feature two attributes. One, the policies must increase investment's worthiness for the private sector and two; they must also remove or mitigate factors that inhibits investment.

We suggest 4 core sets of macroeconomic policies direction.

**First, macro economics stability must prevail.** This includes political stability. Our study shows that macroeconomic variables only accounts for about two-third of the fall in investment to GDP. Other factors such as institutional qualities and political stabilities which are difficult to quantify must therefore partly responsible for investment slump.

**Second, more budget of government spending must be allocated to the public investment, not the public consumption.** Our study shows that Thailand is the only country compares to regional peers with foregone crowding-in losses from the private sector due to contractions of public investment. Public investment post 1997-crisis suffers from two fates; lower government income growth due to lower GDP growth post crisis and lower capital expenditure share in the budget.

**Third, public investment must gear towards higher crowding-in effect types** such as construction investments. Thailand not only suffers from the quantity aspect of lower public investment, it also suffers from the quality aspect as shown by lower crowding-in effect post 1997-crisis. We observe that public investments have been shifted towards machinery and equipment category over the past 10 years. Such types of investment are not as effective as the investment in infrastructure that de-bottlenecks the economy. Infrastructure investment will increase investment worthiness for the private sector by lowering production and logistic costs while public machinery and equipment investment may only improve the productivity of civil officer but not necessarily increase private investment worthiness.

**Fourth, Thailand must continue its performance on FDI attraction.** Our study reveals that Thailand doesn't suffer from the lower flows of FDI compares to regional peers but the crowding-in effects post 1997 crisis from FDI are lower across the

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<sup>15</sup> For details of our estimation, see appendix V.

region. We observe that the share of FDI post 1997 crisis increased towards merger and acquisition (M&A) investment while greenfield investment relatively expanded much less. In terms of investment, greenfield investments are more favourable as they should secure higher investment than M&A investment at least in the short-run since these investments are injected directly into the economy. M&A on the other hands, brings financial capital which may be not necessary lead to new investment. Note that, these sets of policies have strong linkage to one another. For example, our study finds additional benefits of having both FDI and public investment promotion.

Appropriate macroeconomic policies will not secure smooth investments if the country is plagued with various investment obstacles. Our paper picks three core micro structural factors that inhibit investment. These are competition, product standards, and financial access and cost which must be tackled to unlock investment hindrances.

**First, competitive environment must be enhanced.** We advocate the finding from previous Bank of Thailand study by Ariyapruchya et al (2006) which look at the relationship between competition and total factor productivity. Competition policy should remove any regulatory impediment to the market operation which includes price controls, price administration and rationed of business licenses. Contestability is also the key to ensure competitive environment in the industry with only a few player. This includes policy that lowers barrier to entry such as removals of licensing quotas or lower import tariffs to increase competition between domestic firms and firms from abroad. For an oligopoly market, which may have resulted from the government's concession, a policy that gears them towards price competition rather than quantity competition<sup>16</sup> should do the trick. For example, the recent effort by the government which allows consumer to switch mobile phone service providers without having to lose the original phone number is one policy example that promotes price competition. Switching costs will be eliminated whereby the service providers would have to compete aggressively by means of different promotion packages to retain old customers as well as attracting the new. In addition, enforcements of competition law are also essential to ensure fair and competitive environments.

**Second, the national product standards must be upgraded by enhancing consumer's power.** The government must pursue a policy that gives incentive to firms to upgrade their products standards. This can be done by increasing consumer's taste or consumer's power. As such, consumer protection should be enhanced in a way that is easier for consumers to make charge against firms with inadequate standard or firms that produce unsafe products. Degree of punishments must be adequate and provide enough threat to make firms invest preemptively. In this way, incentive to upgrade would be driven by the market mechanism as oppose to enforcing every producers to attain ISO awards. Eventually, Thailand must upgrade her standards to the international level.

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<sup>16</sup> An oligopoly market can achieve a competitive outcome i.e. Bertrand competition where firms undercut each other prices while Cournot competition in which firms set quantity to maximize profits would result into a collusion that could give the same outcome as a monopoly market.

**Third, financial accessibility and financial cost must improve.** On this matter, the Bank of Thailand has the responsibility to improve the efficiency of the financial sector. The Financial Sector Master Plan II (FSMP II) which is at the stage of implementation between 2010 - 2014 includes both of these issues. The key objectives in FSMP II are (1) to reduce cost of the financial system i.e. regulatory costs (2) to improve the efficiency of the financial system through increasing competition with more coverage and (3) to improve the infrastructures of the financial sector.

In addition to the above macro and micro related policies, legal issues and a clear public policy direction must also be addressed appropriately. In the past, many investment projects have been delayed either from too many changes in government administration or from a lack of understanding of the new constitution which resulted in unclear implementations of the law, all of which confuses investors. The Map Ta Phut problem resulted from unclear implementations of environmental law and regulation is one example which delays many investment projects estimated to worth about 290 billion baht. Talks of 3G licensing started since 2007 but the process has been swayed by unclear policy directions that arise from several changes in government administration. Moreover, the recent auction of 3G licensing has been filed to Administrative Court by CAT Telecom as being inconsistent with the law, posing risk to validity of the auction. The government must do everything to minimize these types of risk in the future.

Overall, Thailand's underinvestment signifies high potential with ample rooms for improvement but unleashing these investments requires all parties' efforts at all levels.

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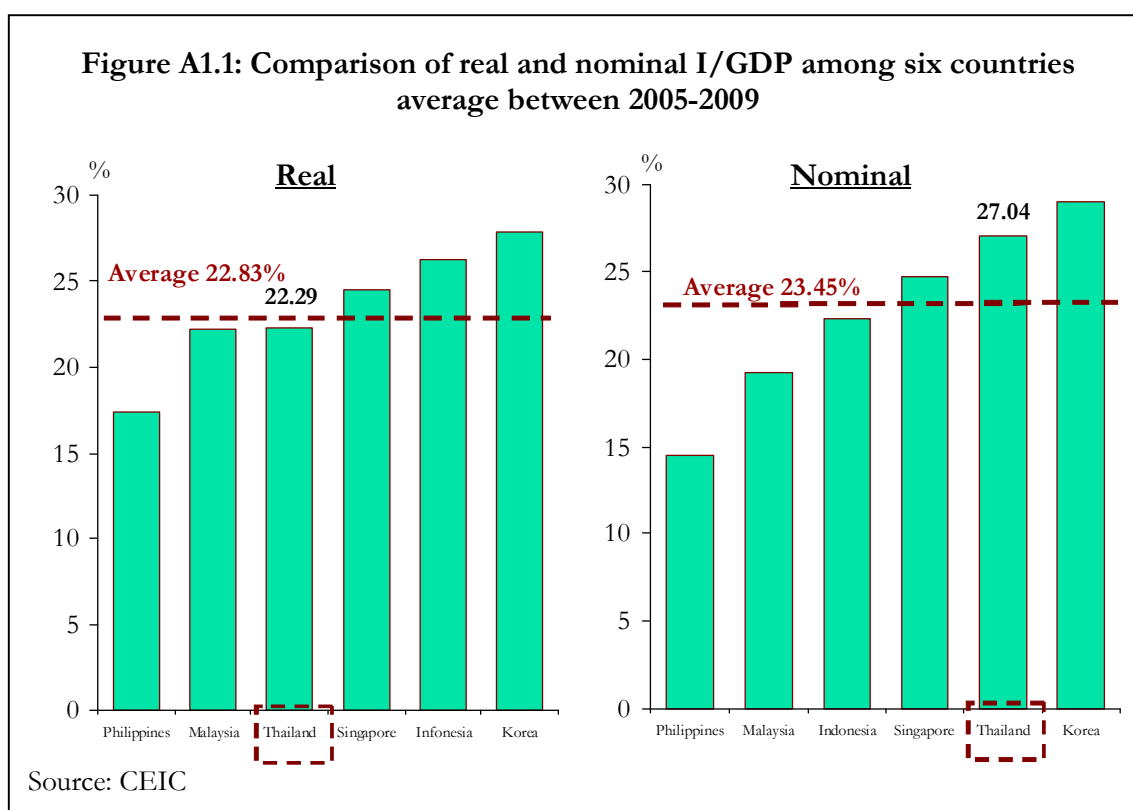


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## Appendix 1: Investigating Price Deflator of Investment

The ratio of investment to total output (I/GDP) can be computed by using real terms data or nominal terms data and have been used in different institutions for different purposes. For example, the Bank of Thailand usually uses the ratio in real terms while the IMF (Regional Economic Outlook, April 2010) uses the ratio in nominal terms. When comparing these ratios with other countries, the use of nominal terms or real terms can lead to different conclusions about the performance of Thailand's investment.



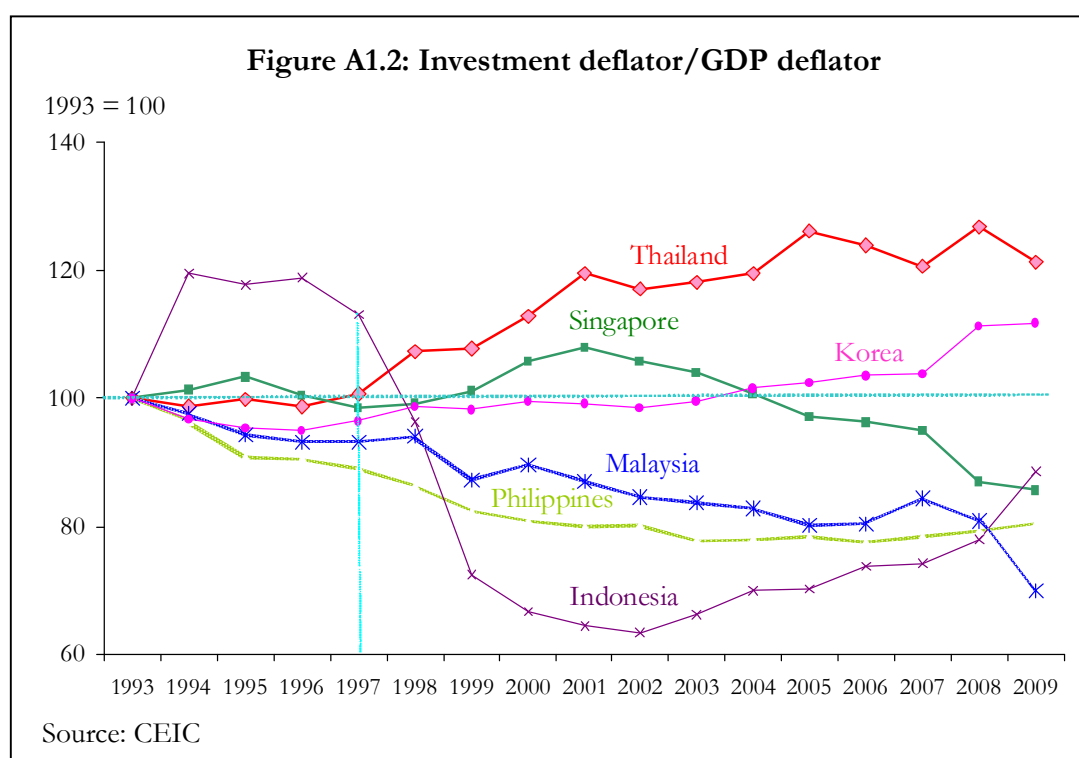
Thailand's concern regarding the level of I/GDP differs when considering data in real terms as opposed to nominal terms. The real I/GDP for Thailand (22.29%) is relatively low compared to the other countries in the region (Korea, Indonesia, Malaysia, Philippines and Singapore) and is slightly below the group average (22.83%). On the contrary, using nominal I/GDP, investment in Thailand (27.04%) is above the group average of 23.45% (Figure A1.1).

The differences between real and nominal I/GDP have different implications for Thailand's performance in terms of investment, capital stocks, and its prospect for growth opportunities. We explore the source of this difference and try to answer "why has Thailand's machinery and equipment deflator accelerated?", and "What should be done to help render less expensive investment for Thailand?"

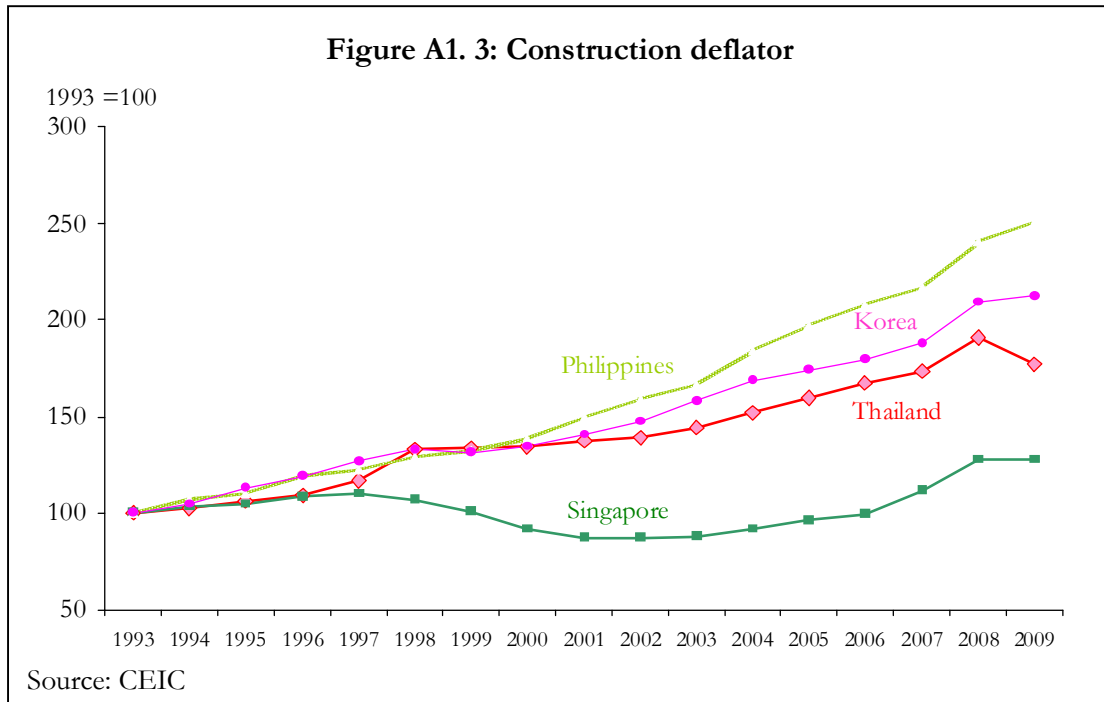
## 1. Sources for the difference between real and nominal I/GDP

The source of the difference between real and nominal I/GDP comes from the deflator used for investment and total output. Thus, we investigated the calculation of the investment and output deflator to gain insight into the issue at hand. We also examined the details in investment's components.

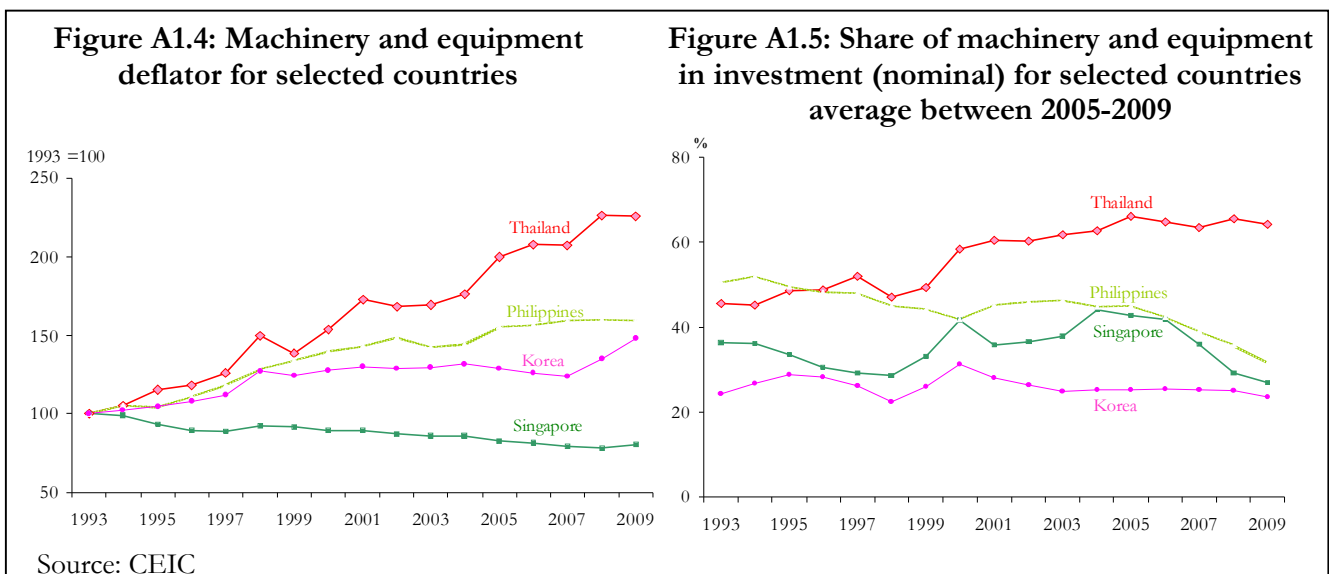
It was found that for Thailand, the investment deflator since 1997 has increased by a large amount compared to the GDP deflator, causing real I/GDP to be much smaller than nominal I/GDP. This is shown by the accelerated increase of the ratio of investment deflator to GDP deflator (Figure A1.2). Thailand's divergence pattern of relative deflator from other countries makes it imperative to study the various important components of the investment deflator.



The two components comprising aggregate investment in Thailand are construction investment, and machinery and equipment investment. A cross-country comparison of these investment components revealed that *construction deflator is not a likely cause of Thailand's high investment deflator*. Thailand's construction prices were rising in line with those of the other countries (Figure A1.3).



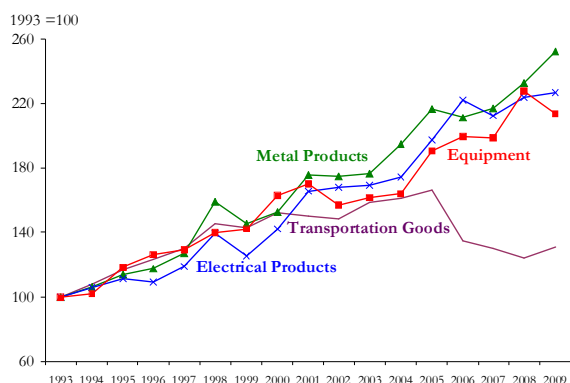
On the other hand, *the machinery and equipment deflator seems to be correlated with Thailand's high investment deflator*. Machinery and equipment deflator has accelerated faster compared to the other countries throughout 1993-2009 (Figure A1.4). Moreover, the share of machinery and equipment to total investment in Thailand is the highest compared to other countries in this study (Figure A1.5). Thus, the relatively large increase in price in addition to the large share of this component has together heightened the investment deflator/GDP deflator.



Looking deeper into the details of the machinery and equipment's components, which compose of metal products, electrical machinery, equipment, and transportation goods, it was found that the deflator of the first three items have increased considerably (Figure A1.6). Their combinations account for 60% of total investment (Figure A1.7),

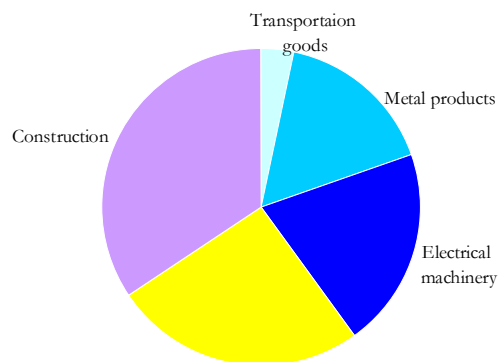
making up for the major cause of high machinery and equipment deflator. On the other hand, transportation has no significant effect in terms of price. It also holds a small share of investment.

**Figure A1.6: Machinery and equipment components deflator for Thailand**



Source: CEIC

**Figure A1.7: Share of machinery and equipment's components in total investment for Thailand average between 2005-2009**



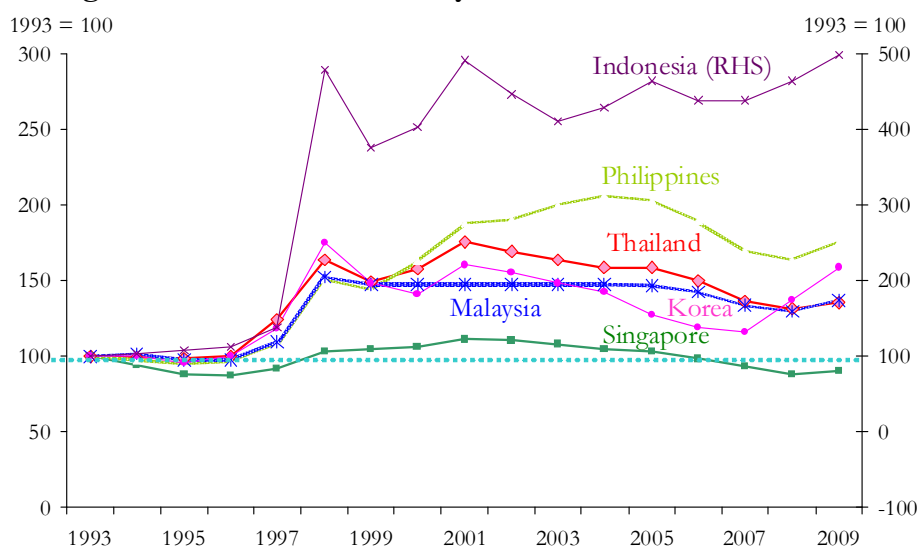
Source: NESDB

## 2. Why has Thailand's machinery and equipment deflator accelerated?

In this section, we tried to figure out why Thailand's machinery and equipment deflator has accelerated continuously since 1993. There are two important points that we considered, including the effects of the exchange rate and the various price indexes that make up the machinery and equipment deflator, as computed by NESDB.

Firstly, since machinery and equipment in Thailand is largely composed of imported goods, it is necessary to study the exchange rate using data in terms of their national currency. It was found that the *exchange rate is probably not a factor that caused the deflator to differ from other countries*. This is because the THB/USD index has been changing in the same direction and in line with the others (Figure A1.8).

**Figure A1.8: National currency / USD for selected countries**



Source: CEIC

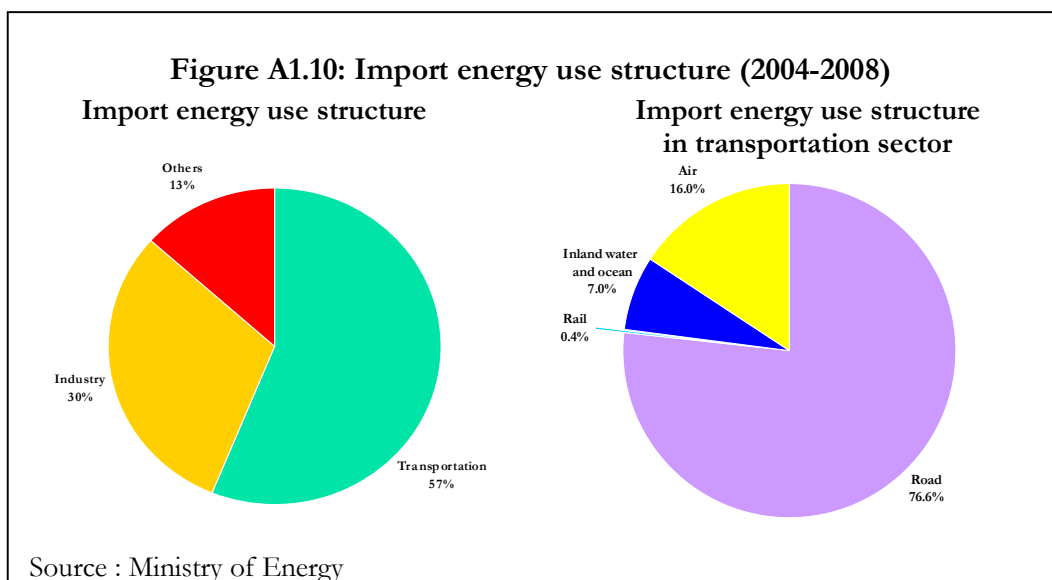
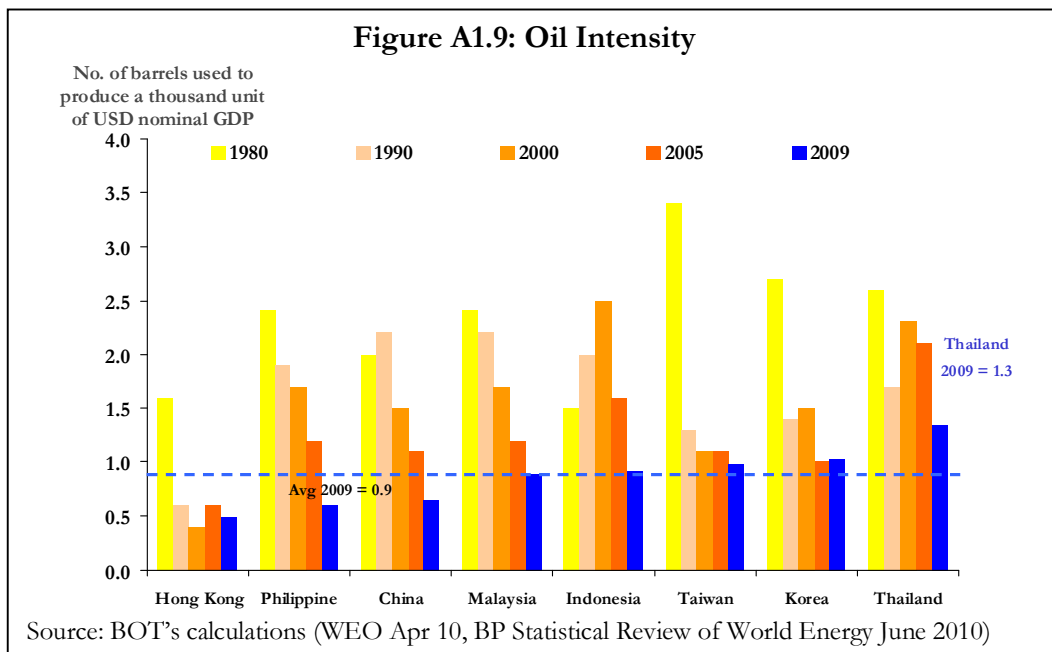
Secondly, when comparing various price indexes that were used to calculate the machinery and equipment deflator to the machinery and equipment deflator, we can, to some extent, attribute the rising deflator to the increasing price of fuel (including oil) and steel in 2003-09. This is because the import of fuel and steel has increased exponentially (see Appendix 2), causing the deflator to increase substantially during this period. This means that from 2003 onwards, Thailand has been importing capital at a price higher than other countries. However, this conclusion cannot apply to the entire time period because of the lack of data before 2000.

Additionally, another important point that should be of concern is the coverage of data. We found that *there is less coverage of items in the machinery and equipment category for Thailand than for Singapore and Korea*. For example, Singapore includes software in the machinery and equipment component while Korea separates software and patents into a component named intangible assets (accounting for about 6% of total investment). These items are increasingly becoming important for investment. Moreover, the incomplete collection of data may have caused the investment deflator for Thailand to be dominated by the machinery and equipment component.

### **3. What should be done to help render less expensive investment for Thailand?**

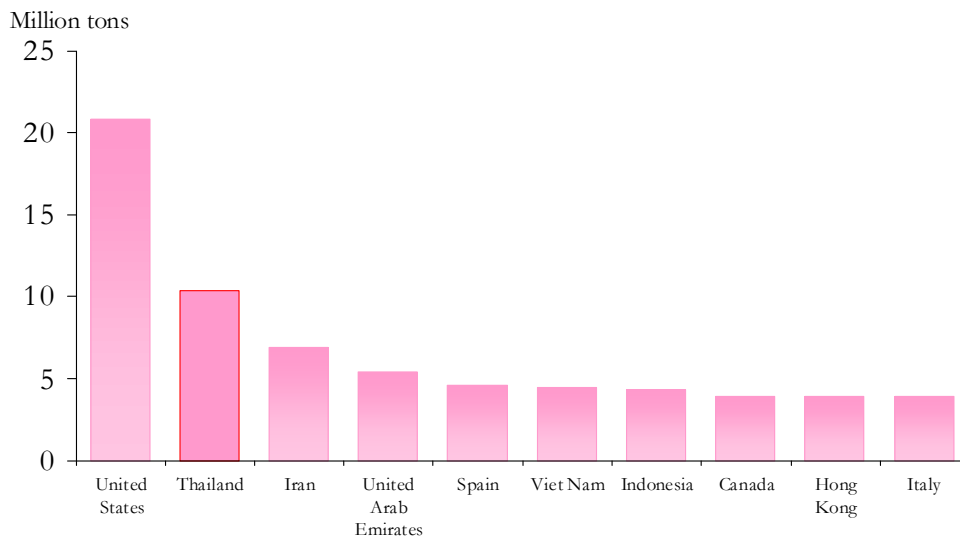
The high price of fuel (including oil) and steel products have great influence on Thailand's investment deflator which cause investment in Thailand to be relatively more expensive compared to the others. Hence, there should be rooms to reduce prices of capital goods through:

1. Increasing efficiency of fuel usage and reducing oil intensity. The efficiency of Thailand's fuel usage has been low, causing oil intensity (oil consumption/GDP) to be highest compared with other countries in this region (Figure A1.9). In Thailand, imported fuel is mainly used in the transportation sector, making up 60% of total energy consumption. Within the transportation sector, 80% of fuel usage is on road transportation while fuel usage in mass transit such as railroads and water transportations remain low (Figure A1.10). Therefore, if Thailand expands its investment in the rail system and water transportation sector, the efficiency of fuel usage could be improved.



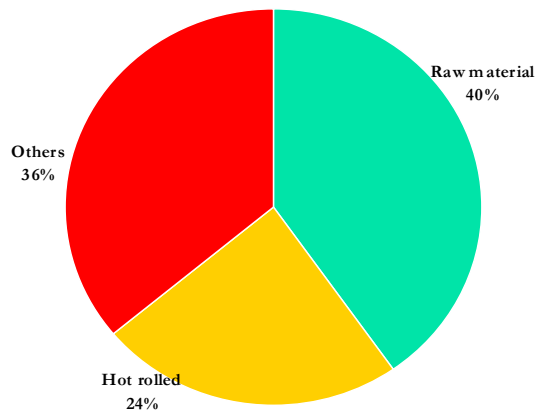
2. Expanding the domestic basic steel industry. Thailand is the second largest net importer of iron and steel (Figure A1.11). In 2005-2009, raw materials and hot rolled steel made up 40% and 24% of total imported iron and steel, respectively (Figure A1.12). The reason for the large import of raw materials is that there is no existing iron smelting plant or basic steel industry in Thailand. Moreover, since Thailand has a strong automobile industry, having a cheap supply of steel products would give much benefit. Therefore, costs and benefits of having steel production should be studied. If the benefits outweigh the cost, the public and private sector should work together to push for a strong basic steel industry in Thailand, which will be an important industrial base that can support Thailand's growth.

**Figure A1.11: Major net importers of steel (2008)**



Source : Iron and Steel Institute of Thailand

**Figure A1.12: Import of iron and steel products to Thailand (average 2005-2009)**

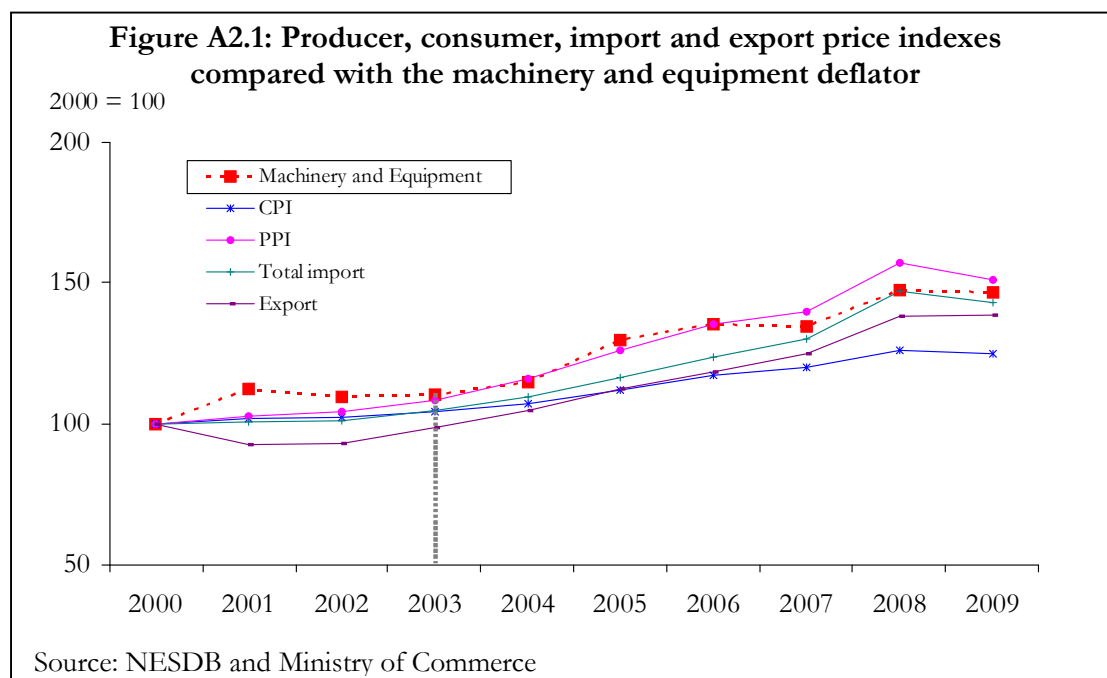


Source : Iron and Steel Institute of Thailand

## Appendix 2 : Comparison of the machinery and equipment deflator to other price indexes

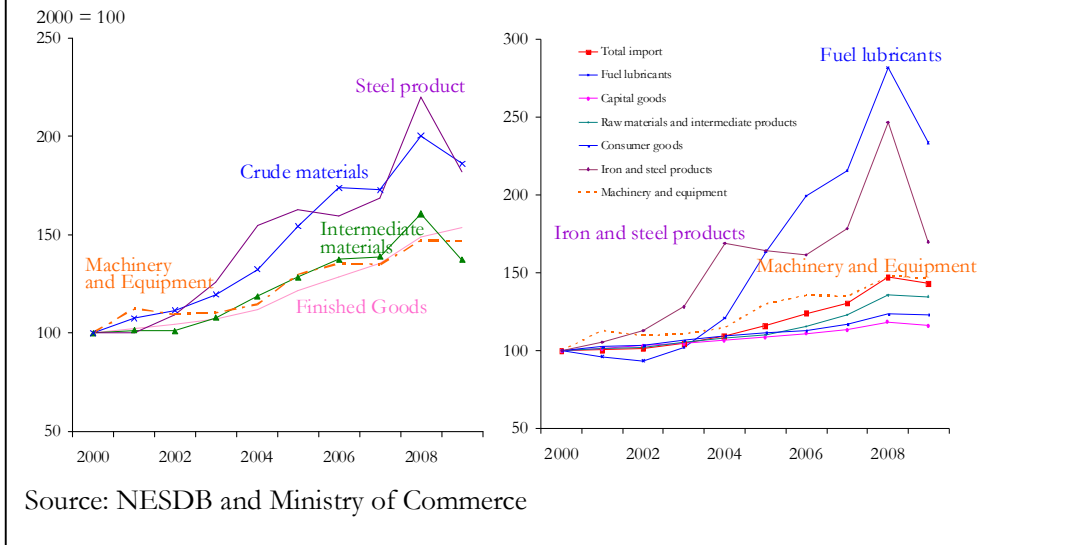
NESDB computed domestically-produced machinery and equipment using the producer price index (PPI) and the consumer price index (CPI) (data available between 1995-2009), while for imported machinery and equipment, NESDB use data from the export and import price index (data available between 2000-2009) computed by the Ministry of Commerce. Since the time period where data available differs, we only make comparison for 2000-2009 timeframe.

When comparing data in 2000-2009, it was found that from 2003 onwards, the machinery and equipment deflator has been rising due to the acceleration of the PPI and import price index (Figure A2.1). The components of PPI and the import price index that caused the machinery and equipment deflator to accelerate are steel products, crude material, and fuel lubricants (Figure A2.2). The price of steel products has a direct impact on the investment deflator. This is because the purchases of steel products are counted as investment and account for as much as 16% on average of total investment in Thailand during 2005-2009. Although, the price of crude materials or fuel lubricants does not have a direct impact on the investment deflator, it affects the cost of producing investment items such as machinery and equipment and therefore has an indirect impact on the investment deflator.



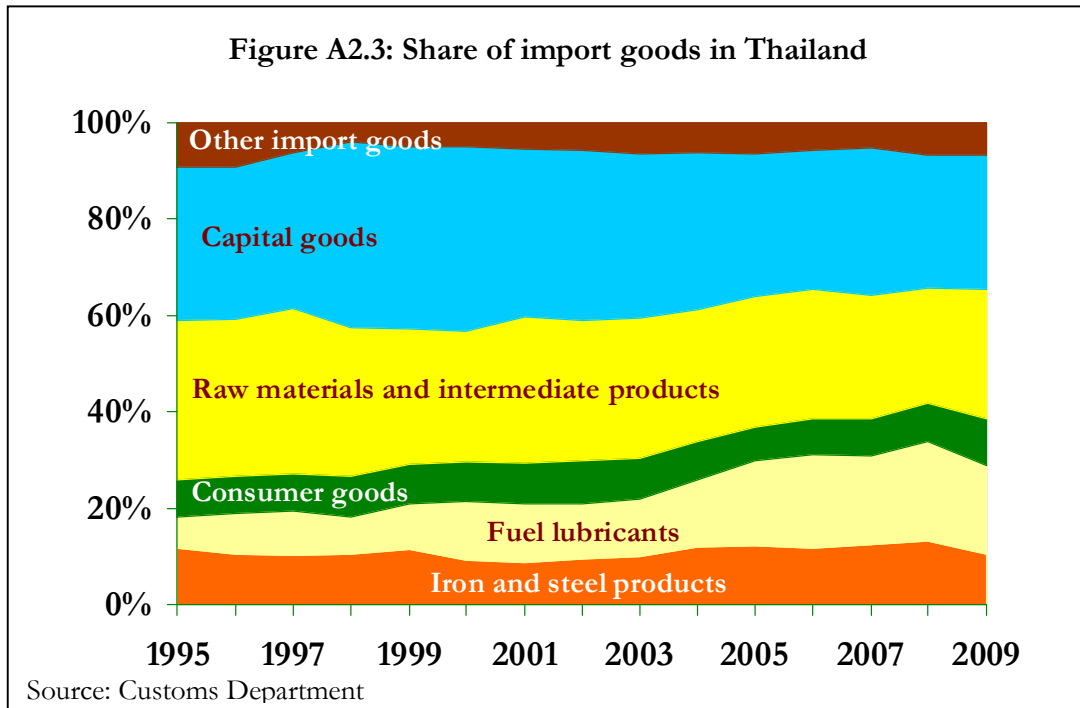


**Figure A2.2: Components of PPI and import price index compared with machinery and equipment deflator**



Moreover, fuel lubricants, iron and steel products hold a share of almost one-third of total import (Figure A2.3). The majority of imported fuel lubricants are crude oil, making up 19% of total imports during 2005-2009 while iron and steel products make up 12% of total imports. Therefore, these imported products have dominated the acceleration of the machinery and equipment deflator especially from 2003 onwards. As a result, Thailand may have been importing a very large share of expensive capital compared to other countries since 2003 (Figure A1.4).

**Figure A2.3: Share of import goods in Thailand**



## **Appendix III: Private investment in Thailand: Macroeconomic evidence**

### **Empirical method**

In this study, we investigate the determinants of private investment in Thailand based on Servén (2003) model, with some modifications taking into consideration the relevant structural features of Thailand. Servén (2003) suggests the model to be estimated is of the form:

$$\text{private investment} = f(\text{private investment determinants}) + \text{random disturbance}$$

As argued in previous studies, private investment determinants depend on economic factors. In the context of the developing countries, these factors are as follows:

#### **1. Market size/ potential**

According to Cardoso (1993), Oshikoya (1994) and Agosin and Machado (2005), market size (domestic demand) or market potential (economic growth) would be a key factor influencing private investment in developing countries. Its effect on private investment is expected to be positive. When actual output increases, this would indicate growing demand and encourage firms to expand their capacity so as to capture the increased demand. The opposite happens in the case of the decreasing domestic demand. Cardoso (1993) documents that real output growth encourages private investment in Latin America over the period 1970-85, using a panel data analysis. In addition to Cardoso (1993), using OLS estimation Oshikoya (1994) shows that private investment is stimulated by the growth of real output in Africa over the period 1970-88.

#### **2. Cost of capital and Availability of financing**

Previous studies argue that higher cost of capital discourages private investment (see Agosin and Machado (2005) for example). In addition, according to Jongwanich and Kohpaiboon (2008), the availability of financing would be a key factor affecting investment behavior. Available bank credit to private sector tends to be one of the important factors in determining the amount of actual investment in developing countries as equity market has not been well developed and excess demand for credit typically exists. As a consequence, firms depend on bank credits for both the working capital and the long-term financing of capital accumulation. In general, an increase in available credit to private sector will stimulate private investment.

#### **3. Terms of trade**

Kinkyo (2007) indicates that terms of trade (the ratio of unit value of exports to unit value of imports) are an important determinant of private investment in developing countries. An improvement in terms of trade may have a positive influence on firm profits by increasing the relative prices between export products and imported production inputs. Terms of trade effects seem to be significant for Thai economy where export sector plays an important role in driving economic growth of Thailand and the

degree of import dependence for the supply of key production inputs including fuels and intermediate materials.

#### 4. Economic uncertainty

Economic uncertainty can also have an effect on desired investment. An investment decision contains the irreversibility property. Investment costs of setting up plants and installing equipment can be considered as sunk costs if capital (once installed) is industry specific and cannot be put to productive use in a different production or if secondary markets are not efficient. The presence of a high degree of economic uncertainty can lead to an increase in opportunity costs (the cost of waiting for new information before making an investment decision), resulting in a reduction of private investment (Jongwanich and Kohpaiboon (2008)).

By and large, the discussion so far implies that the empirical model of private investment is the following.

$$\mathbf{PRIS}_t = \beta_0 + \beta_1 \mathbf{GDPG}_t + \beta_2 \mathbf{GDC}_t + \beta_3 \mathbf{RINT}_t + \beta_4 \mathbf{TOT}_t + \beta_5 \mathbf{VINFL}_t + \epsilon_t$$

where **PRIS** is the ratio of private investment to GDP (real term), **GDPG** is the real economic growth, **GDC** is the domestic credit growth, **RINT** is the real minimum lending rate (as a proxy of cost of capital), **TOT** is the terms of trade, **VINF** is the inflation volatility<sup>17</sup> (as a proxy of economic uncertainty), and  $\epsilon$  is the error term. To estimate the equation, we collect annual data representing those variables from 1970-2009 from NESDB, the Bank of Thailand and International Financial Statistic (IFS).

#### Econometric analysis and results

In line with the standard practice in time series econometrics, the time series properties are tested on the outset using the Augmented Dickey-Fuller (ADF) test. The test results are reported in Table A3. According to the results, the variables all are non-stationary. As a result, the two-step residual-based procedure (Engle and Granger (1987)) is utilized to estimate long run and short run equations by the ECM approach in order to remedy the spurious problem. Subsequent, ADF tests indicate that the variables are cointegrated and present stationary property in the first difference form. After taking into account the unit root problem, our estimated equations are the following<sup>18</sup>.

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<sup>17</sup> It is conditional variance of inflation rate, using GARCH (1,1) model with AR(1).

<sup>18</sup> **EC** and **CRISIS** represent error correction term and a dummy for the economic crisis in 1997, which is one if the year is 1997-1998 and zero otherwise. In the short run equation, all explanatory variables are lagged by at least one year to partially account for endogeneity problem and allow for the independent variables taking time to influence private investment (behavior).

$$\text{PRIS}_t = 24.5 + 0.59\text{GDPG}_t + 0.24\text{GDC}_t - 0.12\text{RINT}_t + 0.06\text{TOT}_t - 0.03\text{VIN}_t + \varepsilon_t$$

(2.40)\*\*\* (0.23)\*\*      (0.08)\*\*      (0.04)\*\*      (0.03)\*\*      (0.01)\*\*

**Adjusted R-squared = 0.60   LM (2) = 0.35 (0.71)   F-statistic = 12.54 (0.01)**

$$\Delta\text{PRIS}_t = 0.42 + 0.43\Delta\text{GDPG}_{t-1} + 0.07\Delta\text{GDC}_{t-2} - 0.15\Delta\text{RINT}_{t-1} + 0.05\Delta\text{TOT}_t$$

(0.29)   (0.13)\*\*      (0.02)\*\*      (0.06)\*\*      (0.02)\*\*

$$- 0.01\Delta\text{VIN}_{t-1} - 0.04\text{EC}_{t-1} - 8.62\text{CRISIS} + \varepsilon_t$$

(0.01)\*\*      (0.02)\*\*      (1.62)\*\*\*

**Adjusted R-squared = 0.70   LM (2) = 1.30 (0.28)   F-statistic = 17.18 (0.00)**

Regression results demonstrate that the estimated coefficients for all explanatory variables take the expected signs and are statistically significant. All else equal, higher growth rates of GDP and domestic credit as well as terms of trade lead to higher private investment to GDP ratio. On the other hand, higher lending rate deters private investment. In addition to cost of capital, our findings suggest that the crisis and volatile inflation lower the investment. Lastly, we undertake the LM test to check for the presence of (second-order) serial correlation; and, the test indicates residuals are independent and identically distributed.

**Table A3: Unit root tests<sup>19</sup>**

Variable	Test specification	ADF statistics
<b>PRIS</b>	C,T	-2.53
<b>ΔPRIS</b>	C,T	-4.26**
<b>GDPG</b>	C,T	-3.21
<b>ΔGDPG</b>	C,T	-6.42**
<b>GDC</b>	C,T	-3.27
<b>ΔGDC</b>	C,T	-7.02***
<b>RINT</b>	C,T	-2.85
<b>ΔRINT</b>	C,T	-7.68***
<b>TOT</b>	C,T	-2.92
<b>ΔTOT</b>	C,T	-6.82***
<b>VINF</b>	N	-3.12
<b>ΔVINF</b>	N	-11.76***
<b>EC</b>	N	-10.24**

<sup>19</sup> In the test specification column, the symbol indicates whether a constant (C), a trend term (T) or none of the above (N) is included in the ADF specification; \*\*\* and \*\* denote statistical significance at 1 and 5 percent, respectively.

## Appendix IV: Marginal effects of probit regression for model 1 and 4

**Table A4: Marginal effect of probit regression in model 1 and model 4 evaluated at their mean values.**

Variables	Marginal effect (Model 1)	Marginal effect (Model 4)	Mean values
<b>Macro-related variables</b>			
$\Delta \ln(\text{sales})_{t-1}$	0.076057**	0.049460	0.14283
$\Delta \text{CapU}_{t-1}$	0.001937*	0.001799*	1.53123
$\Delta \text{Employment}_{t-1}$	0.000829**	0.000869***	4.80707
<b>Financial condition variables</b>			
$\Delta \text{Net profit margin}_{t-1}$	0.000545	0.000832	0.45932
$\Delta \text{Quick ratio}_{t-1}$ (liquidity)	0.001726	0.001750	-0.02187
$\Delta D/E_{t-1}$ (leverage)	-0.000593	0.000450	-0.12816
$\Delta \text{ROA}_{t-1}$	-0.000828*	-0.000509	0.32135
<b>Firm's characteristic variables</b>			
$\text{Employment}_t$ (firm's size)	0.000189*	0.000143	274.121
Export firm	0.059500**	0.033504	0.24866
Both-market firm	0.051696	0.050109	0.06860
BOI firms	0.014068	-	0.09861
% resident ownership <sub>t</sub>	-0.000309	-	87.1773
Firms age <sub>t</sub>	-0.000300	-	15.0536
<b>Micro structure variables</b>			
HHI	-	-0.000046*	291.012
ISO award	-	0.050567**	0.40220
Financial service problems	-	-0.043419**	0.40330
<b>Industry dummies</b>			
Food processing	0.085797	-	0.10182
Textile	0.058464	-	0.13612
Garment	0.066775	-	0.14791
Auto parts	0.129216***	-	0.10825
Electronics	0.129799***	-	0.05895
Rubber and plastic	0.147345***	-	0.24545
Furniture	0.082627	-	0.09539
Machinery and equipment	0.101913**	-	0.08039
<b>Region dummies</b>			
Central	0.122148***	0.091019**	0.26688
Bangkok and vicinity	0.106935**	0.069356	0.46088
East	0.078525	0.060782	0.09968
Upper Northeast	0.088820	0.106117***	0.02251
Lower Northeast	0.099579*	0.116985***	0.03644
South	0.002422	-0.008725	0.07931
No. of observation	933	910	

\*, \*\*, \*\*\* indicates significant level at 10%, 5%, and 1% respectively

Note that, mean values for dummy variable represent proportion.

## Appendix V: Estimation of required investment

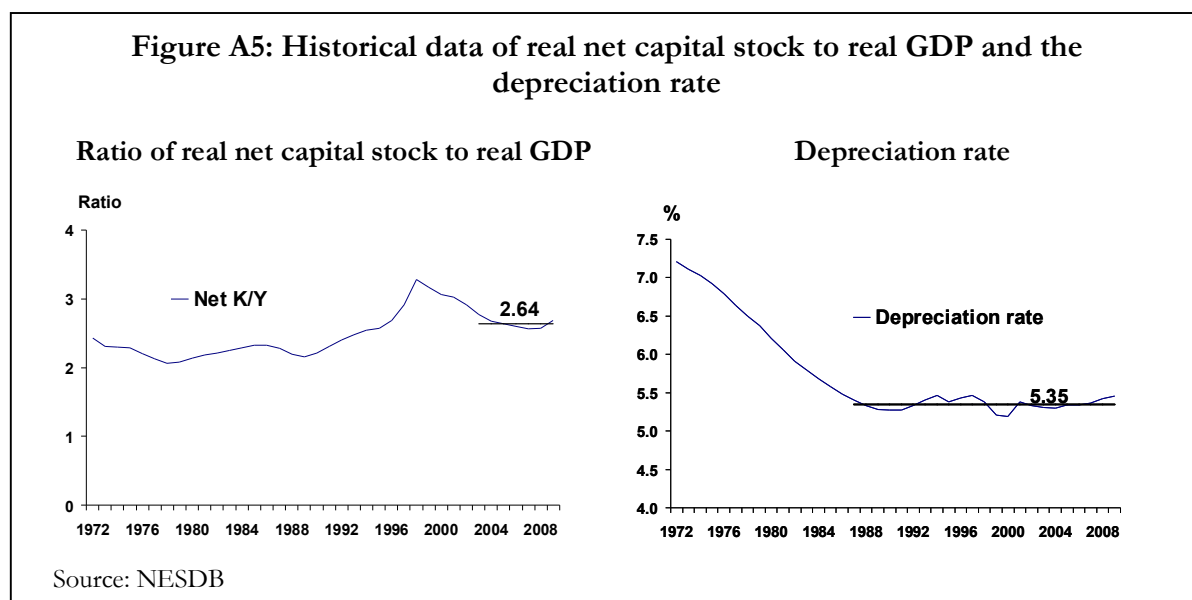
We estimated the required percentage of investment to GDP using the relation between gross fixed capital formation ( $I_t$ ), net capital stock ( $K_t$ ) and depreciation ( $\delta K_t$ ) as shown below.

$$I_t = K_t - K_{t-1} + \delta K_t \quad [1]$$

Equation [1] states that the current flow of investment is equaled to changes in the net capital stock from last period plus the current period depreciation (or the current consumption of capital). Dividing equation [1] by the current GDP ( $Y_t$ ) on both sides would approximately transform equation [1] into the following relation:

$$\frac{I_t}{Y_t} = \frac{K_{t+1} - K_t}{K_t} \frac{K_t}{Y_t} + \delta \frac{K_t}{Y_t} \quad [2]$$

Therefore, investment to GDP ratio should equal to the growth rate of net capital stock multiplies by the current ratio of net capital stock to GDP plus the current ratio of depreciation to GDP. In the long-run when the economy operates at the steady state, the growth rate of net capital stock would be the same as the GDP growth rate which also implies a constant ratio of net capital stock to GDP. Thus, under the steady state assumption, we can find a matching investment to GDP rate for any particular GDP growth using information from the ratio of net capital stock to GDP and the depreciation rate. The Figure A5 below shows the historical data of these variables.



Assuming that the ratio of net capital stock to GDP is constant at around 2.64 with an annual depreciation rate of 5.35 percent, a 5 percent GDP growth requires the matching investment to GDP rate of 27.3 percent. For a 6 percent GDP growth, the investment to GDP rate must be 30.0 percent. The Table A5 below summarizes the require investment rate for a given GDP growth.

**Table A5: Require investment rate at the steady state for a given GDP growth rate**

<b>GDP growth (%)</b>	<b>Require I/Y (%)</b>	<b>Approximation of required average annual investment growth rate during 2010 - 2015 (%)</b>
6.0	30.0	12.7
5.0	27.3	10.3
4.0	24.7	7.8

Author's calculation

The last column of Table A5 was calculated as follows. First, we assume that the gap between the required investment to GDP rate and the current 2009 rate (20.5%) would be closed by 2015. Second, we assume this “closing the gap” process to be linear i.e. the investment to GDP rate increases by the same amount each year. Third, for the year 2010 and 2011, we assume GDP to grow at a rate consistent with the Bank of Thailand’s forecast from the Inflation Report, July 2010 while the rest of the period is assumed to grow at a constant rate according to column one of the Table. The level of investment for each year is then calculated and its average annual growth rate across the period is extracted.

We can also project the total value of addition investment needed to close the gap. This can be done by comparing the case between keeping investment to GDP rate constant at 20.5 percent through 2015 against the closing gap case. For example, in the case of 5 percent GDP growth, a lump sum of 966, 005 million baht of real investment is required to be spent additionally over the 2010 - 2015 period which translates into about 160,000 million baht in real term per year. Using the 10 years average (2000 - 2009) annual investment deflator growth rate of 4.1 percent as an assumption for investment deflator during 2010 - 2015, Thailand would require additional 1.2 trillion baht of nominal investment or about 200,000 million baht in nominal term per year.