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**Monetary Policy and Financial Stability:
Finding the Right Balance under Inflation Targeting**

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บทสรุป

ข้อคิดเห็นที่ปรากฏในบทความนี้เป็นความเห็นของผู้เขียน ซึ่งไม่จำเป็นต้องสอดคล้องกับความเห็นของธนาคารแห่งประเทศไทย

ประสบการณ์ที่ผ่านมาในหลายประเทศบ่งชี้ว่าความไม่มั่นคงของระบบการเงินเป็นอุปสรรคต่อการจัดสรรทรัพยากรที่มีประสิทธิภาพ และอาจส่งผลกระทบต่อเสถียรภาพราคาและความยั่งยืนในการเจริญเติบโตทางเศรษฐกิจของประเทศ การดำเนินนโยบายการเงินที่มีเป้าหมายหลักเพื่อรักษาเสถียรภาพราคาจึงควรพิจารณาประเด็นความเสี่ยงที่อาจเกิดขึ้นจากความไม่มั่นคงของระบบสถาบันการเงินด้วย บทวิจัยพบว่าการดำเนินการนโยบายการเงินอาจไม่สามารถลดการสะสมของความไม่สมดุลทางการเงินได้ทันเวลาที่ ซึ่งอาจนำไปสู่การสะสมที่เกินตัวและสร้างความเปราะบางให้กับงบดุลของสถาบันการเงิน เนื่องจากความไม่มั่นคงของระบบสถาบันการเงินสามารถส่งผลกระทบต่ออัตราเงินเฟ้อพื้นฐานได้ในระยะยาวเกินกว่า 8 ไตรมาสข้างหน้า ซึ่งเป็นระยะที่ยาวกว่าการคาดการณ์อัตราเงินเฟ้อพื้นฐาน ดังนั้น การพิจารณาความเสี่ยงต่ออัตราเงินเฟ้อในระยะต่อไปที่ครอบคลุมยิ่งขึ้นจึงเป็นสิ่งจำเป็น บทวิจัยนี้เสนอแนวทางการใช้ข้อมูลที่สะท้อนสถานะงบดุลของภาคธุรกิจ ภาคครัวเรือน และสถาบันการเงินในการประเมินความเสี่ยงต่ออัตราเงินเฟ้ออย่างเป็นระบบ โดยพิจารณาภายใต้กรอบการดำเนินนโยบายการเงินแบบเป้าหมายอัตราเงินเฟ้อของไทย

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บทสรุปผู้บริหาร

นโยบายการเงินมีวัตถุประสงค์หลักเพื่อรักษาเสถียรภาพราคา ประสบการณ์ที่ผ่านมาในหลายประเทศบ่งชี้ว่าความไม่มั่นคงของระบบการเงินเป็นอุปสรรคต่อการจัดสรรทรัพยากรที่มีประสิทธิภาพ และอาจส่งผลกระทบต่อเสถียรภาพราคาและความยั่งยืนในการเจริญเติบโตทางเศรษฐกิจของประเทศ การที่ความมั่นคงของระบบสถาบันการเงินและเสถียรภาพราคามีความเกี่ยวพันกัน การดำเนินนโยบายการเงินที่มีเป้าหมายหลักเพื่อรักษาเสถียรภาพราคาจึงควรพิจารณาประเด็นความเสี่ยงที่อาจเกิดขึ้นจากความไม่มั่นคงของระบบสถาบันการเงินด้วย

บทวิจัยนี้วิเคราะห์ว่าความไม่มั่นคงของระบบสถาบันการเงินมีสาเหตุมาจากพฤติกรรมเสี่ยงทางการเงินเกินกว่าระดับที่เหมาะสมของผู้เล่นในระบบเศรษฐกิจซึ่งก่อให้เกิดความไม่สมดุลทางการเงินในงบดุลของภาคเศรษฐกิจต่างๆ จนส่งผลกระทบต่องบดุลของสถาบันการเงิน ทำให้สถาบันการเงินไม่สามารถทำหน้าที่ตัวกลางทางการเงินได้อย่างมีประสิทธิภาพและนำไปสู่ความไม่มีเสถียรภาพระบบสถาบันการเงิน ซึ่งในที่สุดส่งผลกระทบต่อภาคเศรษฐกิจจริง

ประสบการณ์ของประเทศต่างๆ บ่งชี้ว่าสภาพแวดล้อมทางเศรษฐกิจมหภาค (ทั้งในรูปแบบของนโยบายเศรษฐกิจมหภาคและนโยบายเชิงโครงสร้าง) อาจเอื้อให้ผู้เล่นในระบบเศรษฐกิจมีพฤติกรรมเสี่ยงทางการเงินสูงใน 3 รูปแบบหลัก คือ (1) นโยบายการเงินภายใต้ระบบอัตราแลกเปลี่ยนแบบคงที่และการเปิดเสรีเงินทุนเคลื่อนย้ายระหว่างประเทศสามารถนำไปสู่การกู้ยืมจากต่างประเทศในระดับที่สูงเกินควร (2) การขาดวินัยทางการคลังสามารถนำไปสู่การกู้ยืมในระดับสูงของภาครัฐ ซึ่งสะท้อนจากการสะสมของหนี้สาธารณะ (3) นโยบายการเงินที่ผ่อนคลายเป็นระยะเวลานาน ประกอบกับนโยบายเชิงโครงสร้าง เช่น มาตรการด้านภาษี สามารถนำไปสู่การกู้ยืมเพื่อการเก็งกำไรในราคาสินทรัพย์ นอกจากนี้แล้ว ในระยะไม่กี่ปีที่ผ่านมา นโยบายอัตราดอกเบี้ยที่อยู่ในระดับต่ำต่อเนื่องและนโยบายภาครัฐได้เอื้อให้ภาคครัวเรือนสามารถก่อหนี้ได้เพิ่มขึ้น จึงเริ่มเป็นประเด็นที่ได้รับความสนใจ

ประสบการณ์ของสหรัฐฯ ในช่วงปี 1920 และญี่ปุ่นในช่วงปี 1990 แสดงให้เห็นว่าความมีเสถียรภาพของราคาไม่จำเป็นต้องนำไปสู่ความมีเสถียรภาพของระบบการเงิน ในขณะที่ความไม่มีความมีเสถียรภาพของระบบการเงินยังสามารถบั่นทอนเสถียรภาพราคาได้ ดังนั้น นโยบายการเงินแม้จะมุ่งรักษาระดับอัตราเงินเฟ้อที่ต่ำเป็นหลัก แต่ควรตระหนักถึงความเสี่ยงที่เกิดจากการสะสมของความไม่สมดุลทางการเงินภายใต้ภาวะอัตราเงินเฟ้อและอัตราดอกเบี้ยที่ต่ำนี้ด้วย

บทวิจัยจึงได้วิเคราะห์ว่าการดำเนินนโยบายการเงินภายใต้กรอบเป้าหมายเงินเฟ้อที่ใช้อยู่ในปัจจุบันจะช่วยลดความเสี่ยงต่ออัตราเงินเฟ้อจากความไม่สมดุลทางการเงินได้โดยอัตโนมัติและเพียงพอหรือไม่ โดยการศึกษพบว่าความไม่สมดุลทางการเงินตอบสนองต่ออัตราดอกเบี้ยและเคลื่อนไหวไปตามวัฏจักรเศรษฐกิจ ซึ่งสะท้อนว่านโยบายการเงินสามารถบรรเทาการสะสมตัวของความไม่สมดุลทางการเงินได้ในระดับหนึ่ง อย่างไรก็ตาม การดำเนินนโยบายการเงินอาจไม่สามารถลดการสะสมของความไม่สมดุลทางการเงินได้ทั้งหมดที่ จนอาจนำไปสู่การสะสมที่เกินตัวและสร้างความเปราะบางให้กับงบดุลของสถาบันการเงิน

แม้นโยบายสถาบันการเงินและมาตรการกำกับดูแลสถาบันการเงินจะเป็นนโยบายหลักในการดูแลเสถียรภาพระบบสถาบันการเงิน แต่เนื่องจากสถาบันการเงินที่ขาดเสถียรภาพสามารถบั่นทอนเสถียรภาพราคาและความยั่งยืนในการเจริญเติบโตทางเศรษฐกิจ การตัดสินใจดำเนินนโยบายการเงินจึงไม่ควรละเลยการพิจารณาความเสี่ยงดังกล่าว อย่างไรก็ตาม เนื่องจากเสถียรภาพระบบสถาบันการเงินยากแก่การวัดในเชิงปริมาณ ดังนั้น จึงเป็นการไม่เหมาะสมที่จะนำเสถียรภาพระบบสถาบันการเงินซึ่งเป็นตัวแปรที่ไม่สามารถวัดได้ชัดเจนเข้ามาเป็นส่วนหนึ่งในสมการเป้าหมายนโยบายการเงินโดยตรง เนื่องจากจะเป็นการบั่นทอนความโปร่งใสของการดำเนินนโยบายการเงินซึ่งเป็นสิ่งสำคัญยิ่งของนโยบายการเงินแบบเป้าหมายเงินเฟ้อ

ดังนั้น บทวิจัยนี้จึงพิจารณาต่อเนื่องว่ามีเครื่องมือใดบ้างที่จะนำมาใช้ประกอบการดำเนินนโยบายการเงิน โดยบทวิจัยสนับสนุนแนวคิดของการดูแลเป้าหมายเงินเฟ้อในกรอบที่ครอบคลุมยิ่งขึ้น ทั้งนี้ ได้เสนอให้มีการใช้ข้อมูลที่สะท้อนสถานะงบดุลของภาคธุรกิจ ภาคครัวเรือน และสถาบันการเงินในการประเมินความเสี่ยงต่ออัตราเงินเฟ้ออย่างเป็นระบบ ซึ่งสถานะงบดุลของภาคธุรกิจและภาคครัวเรือนมีลักษณะเป็นเครื่องชี้นำของเสถียรภาพระบบการเงิน นอกจากนี้ ยังเสนอให้จัดทำ Macroeconomic Stress Testing เพื่อวัดความเข้มแข็งของงบดุลทางการเงินของภาคเศรษฐกิจต่างๆ ในการที่จะรองรับปัจจัยลบที่มีความเป็นไปได้ว่าจะเกิดขึ้นผ่านความเชื่อมโยงระหว่างความไม่สมดุลทางการเงินของภาคเศรษฐกิจต่างๆ กับเสถียรภาพเศรษฐกิจมหภาค ซึ่งจะช่วยในการประเมินความเสี่ยงต่ออัตราเงินเฟ้อในระยะต่อไป

Outline

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Introduction

Achieving both monetary and financial stability has been the one of the foremost aims of central bankers ever since the dawn of central banking. In fact, the creation of central banks themselves has arguably been in response to the need of ensuring both monetary and financial stability in the evermore increasingly complex trade and commercial environments.

Yet despite being created in response to the need of ensuring monetary and financial stability, monetary and financial instability invariably occurred throughout the history of central banking, even in the most advanced modern economies. In recent years, research and accumulated knowledge gained from previous experiences have begun to shed some light on many issues of monetary and financial stability. Increasingly, it has become more recognized that, while monetary instability and financial instability are intertwined by nature, they are not necessarily synchronized, and one could lead to the other. As evidenced in Japan in the late 1980's and early 1990's, an economy could enjoy monetary stability as defined by low and stable inflation in the wake of a major financial imbalance buildup. As the financial imbalance later brought about financial instability, where the financial system could not perform intermediary functions effectively, economic activities then seized up. Monetary instability as reflected by protracted deflation ultimately resulted.

Believing that financial instability can ultimately undermine monetary stability, the primary aim of monetary policy, the paper proceeds in the following manner. First, the paper defines financial instability, examines its possible causes, and reviews the contexts through which it historically manifested. Second, the paper examines the intertwining nature of financial stability and monetary stability, the primary aim of monetary stability. Third, the paper examines whether monetary policy under inflation targeting framework in the case of Thailand can *automatically* contain the risks posed to *monetary stability* by financial imbalances via financial instability. Fourth, the paper proposes practical modifications of the current inflation targeting framework to contain risks to medium term monetary stability that may arise from financial instability. The proposed modifications include using Financial Soundness Indicators (FSIs) and macroeconomic stress testing. After also reviewing the possible interaction between monetary policy and prudential measures, the paper then concludes.

Part I Financial stability: What it is and why it is important

The primary use of monetary policy is to ensure monetary stability. As historical experiences have shown, however, financial stability is also of utmost importance. Along with inefficient resource allocation, as well as major economic and social disruptions, historical experiences have shown that financial instability can undermine price stability. Conducting monetary policy without regards to financial stability, thus, can be a grave mistake.

1. Financial stability: A spaghetti bowl of definitions

While financial stability is undeniably an important concept that policy makers aim to strive for, the term does denote different (albeit related) meanings to different commentators on the topic. Indeed, researchers on the topic have found it more useful and convenient to analyze financial stability based on its negative counter part, financial instability, as it probably is easier to identify situations of financial instability and their possible causes.

With respect to financial instability, however, the definitions proposed have been diverse, depending on the focus of the research. Focusing on the role of asymmetric information in inducing financial instability, Mishkin (1999) defines financial instability as a disruption to the efficiency of financial system in fund allocation by ways of worsening adverse selection and moral hazard. Concentrating on the balance sheet channel through the net worth positions of borrowers, Bernanke and Gertler (1990) defines financial fragility as a situation in which potential borrowers have low wealth relative to the size of their projects. Such a situation causes high agency costs and impairs performance in investment sector and in the economy as a whole. The IMF (2003), on the other hand, focus on different types of “seizures” within the financial system and takes periods of financial instability to be periods of severe financial market disruptions that the system’s ability to provide payment services, to price and transfer risk, and to allocate credit and liquidity is impaired and then potentially leads to a reduction in real activity.

While definitions above put emphasis on the underlying mechanics of financial instability, other definitions focusing on the symptoms of financial instability have also been proposed. (See Issing 2003 for discussion.) Symptoms of financial instability are often reflected by asset price volatility, distresses in financial institutions, and affected output performance. Crockett (1997) thus defines financial instability as a situation in which economic performance is potentially impaired by fluctuations in the price of financial assets or in the ability of financial intermediaries to meet their contractual obligation. Bernanke and Gertler (2000) define financial instability as being synonymous with asset price volatility, which takes price far away from its fundamental level, before finally reversing suddenly and violently in a “crash”. Ferguson (2003), on the other hand, defines financial instability as a situation characterized by three basic criteria: (1) some important set of financial asset prices seem to have diverged sharply from fundamental; and/or (2)

market function and credit availability, domestically and perhaps internationally, have been significantly distorted; with the results that (3) aggregate spending deviates (or is likely to deviate) significantly, either above or below, from the economy's ability to produce.

Our definition: it all boils down to excessive risk-taking!

While there have been many proposed definitions of financial instability that are useful in various analytical contexts, we believe that a useful and practical definition of financial instability from monetary policy decision's point of view should be framed with the root cause of the instability in mind. Although a definition based on directly observable variables (such as volatilities in asset prices) can be of great use in empirical work, it does not provide a background against which how such instability may come about. By just looking at symptoms, we may never be able to provide the right prescription. This paper believes that a definition of financial instability that is framed with its root cause in mind provides the policy maker a conceptual framework in which the effectiveness of a policy tool in dealing with the instability can be more readily assessed.

At gist, we believe that financial instability arises because of *excessive financial risk taking* by economic agents, be it consumers, investors, the government, or intermediaries themselves. As consumers, investors, or the government accumulate more debts, their ability to repay the full amount of debt diminishes, *ceteris paribus*. The inability of borrowers to repay their debt by the full amount means that lenders, often banks, will have to shoulder losses. If the banks cannot shoulder such losses using their retained profits, they will need to draw upon owners' capital. By drawing upon owners' capital to cover the losses on the balance sheets, the banks will have less capital to support other existing loans. Recalls of existing loans (possibly unrelated to those already gone sour) will be made. In that case, intermediary functions of the banks will be severely disrupted as banks start to draw back loans from the economy rather than granting new ones. The recalls of loans can make matter worse as they could instigate a disruption in real economic activities, which could result in more loans turning bad and more losses to cover. Ultimately, excessive financial risk taking that result in losses on bank balance sheets could lead to a drastic systemic disruption in the functioning of the whole banking system, and possibly later result in widespread economic failures.

Financial instability, in our view, is thus caused by buildups of financial imbalances that put great risks on the intermediaries' balance sheets to the extent that the financial system can no longer allocate funds efficiently. As such, situations of financial instability can be succinctly defined as situations where "*strains on the financial sector balance sheets prevent intermediaries from performing their intermediary functions effectively*". Defining financial instability as above and focusing mainly on banks can help the process of framing policy decision more

clear-cut.¹ First, the strains on the bank balance sheets can be reflected by the risks posed on the balance sheets. And thus, the risks of financial instability occurring are reflected on the risks present on the bank balance sheets. If we can identify and distinguish between the various contexts of excessive risk taking behaviour that contribute to the increased risks on the bank balance sheets, it should be easier for us to analyse how monetary policy may be used to reduce such risks.

2. What are the catalysts for excessive risk taking?

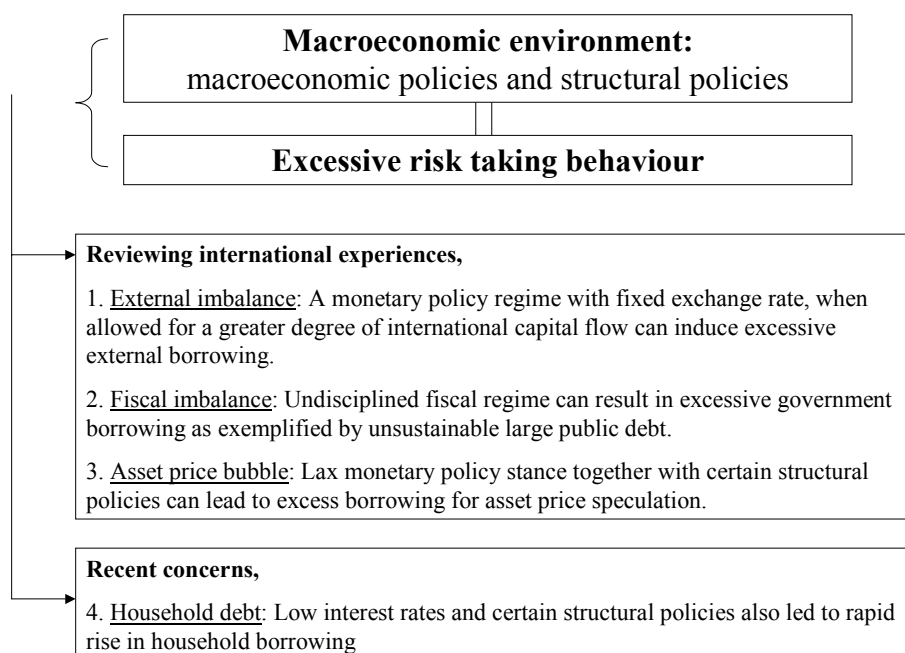
As the term suggests, “excessive” risk taking means taking risks more than “optimal”. Why would anyone take more risks than optimal to their own well-being in the first place, one is tempted to ask, unless his risk perception is wrong? Looking back into the recent international experiences, we find macroeconomic environment to be a major catalyst of excessive financial risk taking behaviour. Macroeconomic environment is typified here by the prevailing macroeconomic policies (fiscal and monetary stances or exchange rate regimes), coupled with structural policies that include laws or regulations that govern certain economic sectors.

Macroeconomic environment: Macroeconomic and structural policies

Macroeconomic environment, typified by particular frameworks or stances of macroeconomic policies together with certain set of structural policies, can induce excessive risk taking behavior by economic agents that result in excessive risks on bank balance sheets and ultimately undermine banking system’s intermediary functions. Reviewing international experiences, we find that macroeconomic environment has contributed to excessive risk taking behaviour and financial instability in three major ways. First, a monetary policy regime with fixed exchange rate, when allowed for a greater degree of international capital flow (structural policy), can induce excessive external borrowing. Second, undisciplined fiscal regime can result in excessive government borrowing as exemplified by unsustainable large public debt. Third, a lax monetary policy stance together with certain structural policies such as tax treatment can also lead to excess borrowing for asset price speculation.

¹ Note that although this paper limits its focus to only banks as Thailand is a bank-based economy, and the Bank of Thailand has the supervision mandate on the financial system, the analysis and definition here are applicable to other non-banks intermediaries.

Figure 1: Catalysts and contexts of excessive risk taking behaviour



Excessive external borrowing (External imbalance)

The Thai economic and financial crisis in the late 1990's can be traced back to excessive external borrowing. As is well known by hindsight (see, for example Allen et al., 2002), excessive borrowings prior to the crisis, was instigated by both monetary policy with a fixed exchange rate regime (a macroeconomic policy), and capital account liberalization (a structural policy). Excessive external borrowing has resulted in both **maturity mismatch** and **currency mismatch** on the bank balance sheets. Maturity mismatch arises by nature of intermediation that intermediaries tend lend long term but borrow short-term. Maturity mismatch itself should not be a problem as long as the money that intermediaries borrowed are put into well diversified, low-risk portfolios, and lenders to the intermediaries have confidence that they will get their money back. Currency mismatch, on the other hand, means that the intermediaries borrow in one currency, and lend out in another. Currency mismatch should not be a problem as long as the intermediaries hedge their exposure against exchange rate movements that might decimate the value of their lending portfolios against their debt obligation in another currency.

In the case of late 1990's Thailand, the problem was that with a fixed exchange rate monetary regime, borrowers do not have incentives to properly hedge their foreign currency exposure. When capital account is liberalized, the implicit guarantee by the authorities against adverse exchange rate movements means that people have incentives to borrow in foreign currency more than they otherwise should. Once the foreign lenders started to realize that their total exposure to Thai borrowers are very large and that the Thai borrowers might not be able to cough up enough foreign currency to pay back every lender at once, every lender has

incentives to call in his loan immediately. Thai intermediaries that borrowed short term foreign currency but lend out long term in baht, thus got caught in a squeeze. When the Bank of Thailand finally abandoned the fixed exchange regime, nightmares become realities, a number of banks and finance companies became insolvent, and financial stability ensued.

One question may be asked, if the problem was so obvious, why currency mismatch not hedged at all? Analyzing Thai bank balance sheet data, Allen et al., (2002) points out that the intermediaries' currency mismatch was indeed hedged, but *'...largely by onlending domestically in foreign currency. In total, therefore, their balance sheets' foreign currency exposure seemed limited. The quality of this 'hedge' depended critically on the quality of the domestic foreign currency claims'*. Quantitatively there seemed to be adequate hedge against currency mismatch by Thai intermediaries, but of course, qualitatively that hedge was insufficient, for it neglect macroeconomic picture at the time. Indeed, the implicit exchange rate guarantee together with capital account liberalization might have led to more foreign borrowing that optimal, as they distorted risk/return perception of such borrowings, and distorted the incentives of agents to hedge such borrowings appropriately. Note that the problem of inadequate hedging was not confined to just the intermediaries, Thai corporate sector also borrowed heavily from abroad, with inadequate hedge. Exacerbating the risks on bank balance sheets even further, the same corporate that borrowed from abroad often were also borrowers of the intermediaries.

Of course, financial instability owing to excessive external borrowing is not unique to Thailand. Other countries including Mexico, Sweden, and Turkey also underwent a similar experience in the 1990's. Examining the linkage between capital account liberalization and financial stability, Ishii and Habermeier (2002) give a good account of what happened in those countries. Indeed Ishii and Habermeier (2002) point out that excessive external borrowing, usually instigated by a fixed exchange rate regime coupled with capital liberalization, can lead to increases in all types of financial risks on bank balance sheets. Credit risks on the bank balance sheets rise as influx of money dampen returns on projects (such as real estate projects), ultimately making many of them unviable. Mismatches between the risks profile of assets and liabilities also rise. Exchange rate risks, on the other hand, heighten as external borrowing climbs against the central bank's international reserves. Interest rate risks also rise as interest rate might need to be raised to defend integrity of the exchange rate regime.

In sum, history has shown that excessive external borrowings, created partly by the macroeconomic policy (a fixed exchange regime) and intensified further by structural policy (financial liberalization), can lead to financial instability by exacerbating the risks on bank balance sheets.

Excessive government's borrowing (Fiscal imbalance)

It is well known how excessive government borrowing can affect the real economy via crowding out effects and rising inflation. Recent experiences, however, have shown that excessive government borrowing can also deal financial stability a crushing blow if it is the financial sector itself (either by choice or by coercion) that loads up much of the government securities. Torre, Yeyati and Schmukler (2002) have remarked that failure to isolate the solvency of the banking system from the solvency of the government had exacerbated the risk exposure on bank balance sheet.

At the theoretical level, the public sector that is running a large budget deficit is in fact competing with the private sector for funds. As the deficit grows, if the deficit is largely financed by debt, the government would need to offer ever-higher interests rate on its bonds to induce more investors to lend to the government. Yet, as the government is supposed to be the least risky of borrowers, interest rates charged for private borrowing would have to rise even more. (For most rating agencies, ratings given to the private sector cannot be higher than sovereign rating.) In such a situation, asymmetric information via adverse selection comes into play and may prompt the banks to effectively cease their function as intermediaries. In Turkey prior to the 2000 crisis, Arin (1999) points out that banks were buying government bonds and treasury bills instead of performing its basic function of providing credit to the businesses, partly because the *high interest rates* had disrupted their credit extensions, and as such financial stability is compromised.

While Turkish banks seemed to lend to the government by choice (albeit the adverse selection problem), in contrast, according to Blejer (2003), Argentine banks' acquisition of government securities in the late 1990s' and early 2000's appeared to be by government coercion. Coercion measures included the change in reserve requirement level and composition in such a way that the banking sector was obliged to hold excessively large government debt. Exposure of banks to government sector, measured as the share of public sector loans in relation to bank total net worth, also rose rapidly. As people started to cast doubt on the government's and the banks' solvency, large withdrawals of deposits were made. After partial withdrawal restrictions in November 2001, the new government, which took place in January 2002, declared a default on the foreign and domestic public debt. A large number of banks then turned insolvent following the decision.

Excessive borrowing for asset price speculation (Asset price bubble)

From historical perspectives, excessive borrowing for asset price speculation has often been fueled by lax monetary policy stance. Structural policies such as regulations and tax treatments can then add coals to the fire. Okina, Shirakawa and Shiratsuka (2001) viewed that emergence and expansion of the real estate and equity bubbles Japan in the late 1980s towards the early 1990s were due to the aggressive

bank behaviour, which itself was a result of gradual financial deregulation. Such behavior was further amplified by other factors, including protracted monetary easing as well as taxation and regulations biased toward accelerating the rise in land prices, not to mention the excessive optimism in Japan. In the 1980's, deregulation on interest rates on deposits proceeded gradually, forcing Japanese banks to pursue such aggressive behaviour as lending to small firms backed by property and lending to property-related projects. Meanwhile, Japanese tax rates were relatively low on the holding of land but heavy on land transactions. When a rise in land prices was anticipated, the light tax burden on holding land had the effect of increasing the incentive to continue holding it. Furthermore, the heavy tax burden on transaction gains had the effect of squeezing the supply of land by creating an incentive to delay selling for as long as possible. The rise in land prices through such a mechanism reflected the expected present discount value stemming from the above tax advantage. Expectations for a rise in land prices increased the expected present discounted value of the tax advantage, leading to a further rise in land prices.

Against this distorted structural background, the protracted loose monetary by the Bank of Japan led to a rapid increase in asset prices and credit via three mechanisms: reducing funding costs for speculators, reducing capital costs and facilitating financing in capital markets, and increasing collateral value of assets held by firms, thereby enhancing their funding ability. Thus, with the combination of structural policies such as deregulation, tax treatments, and macroeconomic policy such as loose monetary stance, Japan experienced a rapid rise in asset prices and excessive borrowing for asset price speculation. In addition, as seen in the case of Thailand in the late 1990's, the interplay among structural policies themselves can further exacerbate risks on bank balance sheet. For example, if concentration of lending to a particular sector, following a given structural policy, is intensified by large supply of credits, possibly stemming from large capital inflows following capital account liberalization, the risks posed on bank balance sheet can increase exponentially. This was actually the case for Japan as well as the case of Thailand, both during the initiation of financial deregulation and capital account liberalization. The ultimate burst in the twin bubbles of the Japanese stock and real estate markets caused deep damages to the Japanese banking system that, a decade later, the problem is yet to be resolved.

In terms of the impact on bank balance sheet, asset price bubbles in the stock and real estate markets can affect the health of the banking system through various channels. The burst of a bubble in the *real estate market* could directly lead to a rise in *credit risks* to developers and speculators. As real estate price keeps falling, the banking system will be affected by the declining value of its real estate *collateral*. Banking sector capital itself could then be in jeopardy. The effects of the burst of a *stock market* bubble on the health of banking system, however, are less clear-cut, as banks do not normally lend for stock purchases. Yet, as seen in Japan, the burst of a stock market price bubble could have a devastating effect on the banking sector, if the stocks could be pledged as collateral, or if borrowers misdirect the loans obtained to speculate in the stock markets. (We see the worst possible combination

in the Japanese case where borrowers use overvalued real estates as collaterals to borrow funds to speculate in the stock markets.)

Excessive household borrowing (Household Debt)

In the last section, we have reviewed the excessive risk taking behaviors in different historical contexts and how they posed critically higher risks on bank balance sheet, such that the financial intermediary role of banks had been disrupted. In the past few years, excessive household borrowing, i.e. household debt issue has become of another primary concern. Deregulation of financial industry means that banks have to seek new types of customers, rather than just relying on corporate customers as previously. Recent advances in risk management techniques have also enabled the banks to pursue a more aggressive strategy with regards to household lending. Global low interest rate environment, on the other hand, is a catalyst for greater household demand for debt. Although banks in general are more exposed to corporate than to household sector, excessive household borrowing that leads to household default can also pose indirect effects on bank balance sheets via the corporate sector, which constitutes the banks' major customers.

To the extent of our knowledge, we have not seen countries experiencing financial instability, in the sense that banks cannot perform their financial intermediary functions, as a result of excessive risk taking behaviors pertaining to household excessive borrowing. Nevertheless, excessive household borrowing cannot be disregarded because there exists important linkages between households and the financial system, which can increase vulnerability of banks to household lending. Household consumption behavior can influence the performance of firms, which in turn are key determinants of credit risks to banks. In addition to this indirect impact of household borrowing, household asset allocations can largely determine the volatility of the liability side of banks' portfolio, through their deposits, which constitute the most stable and low-cost source of funding for banks.

Sundararajan et. al. (2002) summarize such linkages between banks and households in two aspects. From the asset side of banks' portfolios, banks are exposed to households directly, through their repayment capacity on consumer and mortgage loans, as well as indirectly, through the effect that household consumption decisions have on corporate sector financial strength. On the liability side, the decision to deposit savings in financial institutions is part of the portfolio allocation behaviour of households, which is a function of the supply and demand of assets based on current wealth, and of households' risk propensity. In summary, following Sundararajan et. al. (2002), banks are exposed to household debt in three main ways. (1) On the asset side, banks are exposed to household capacity to repay their debt, which however usually represents relatively only a small portion of banks' total assets (2) On the liability side, banks are exposed to the flow of deposits from households, which are considered to be the most stable and low-cost funding for banks and (3) Indirectly, banks are exposed to credit risks from firm performance through household consumption behaviours, an exposure which is considerably large.

In analysing possible effects of excessive household borrowing on financial stability, it might be useful to look at a country experiencing ‘unsustainable’ household debt, although not in the sense that has ultimately led to a serious disruption in the functioning of the banking system, as it can provide useful insights into the origins of excessive household borrowing, and channels through which they can undermine banks’ intermediary activities, and financial stability as a whole.

The most recent, and also one of the best-known cases of excessive household borrowing is the credit card boom in Korea in the early 2000’s.² Among the countries suffered most from the 1997 Asian financial crisis, Korean economy was the fastest to recover. Robust output growth was supported by strong export performance between 1999 and 2000 and then by an expansion in domestic demand between 2000 and 2002. However, a significant part of the increase in private consumption stemmed from the acceleration in household credit, particularly the surge in credit card lending. Quoting the figures by Morgan Stanley report (2003), household debt rose rapidly from 41 percent of GDP in 1998 to 74 percent in 2002, close to that of other advanced economies. With regard to Korean debt burden, the ratio of household debt to disposable income accelerated from 64 percent in 1998 to 117 percent in 2002. Meanwhile, Korean credit card debt was 31 percent of disposable income in 2002 compared with 9 percent and 6 percent in the US and UK, respectively.

The stimuli of excessive household borrowing demand in the Korean case can be discussed in the framework outlined earlier. Macroeconomic environment induced agents, households and intermediaries, to take excessive financial risks. Specifically, various structural policies had contributed greatly to the household debt buildup. Between 1999 and 2000, in order to stimulate domestic demand, the Korean government introduced a series of measures aiming to encourage private consumption especially through credit card usages. The measures were wide-ranging and included tax reduction, removal of constraints on cash advance, and a scheme that turned credit card slips into lottery tickets. In addition to the structural policies, low inflation and low interest rate prevailing in Korea during the time also increased households’ willingness to take on greater risks, by financing consumption through greater indebtedness, especially through credit card debt. Moreover the high credit card transaction in the form of cash advance and the relatively short maturities of household debt made the debt service requirement on household completely misaligned and inappropriate relative to their cash flows.

On the supply side, financial institutions have refocused their concentration from lending to industries to lending to household. After the Asian financial crisis, a high leverage of industrial conglomerates (*chaebol*) posed difficulties to banking sector during and following the crisis and banks were therefore forced to reform and strengthen their balance sheet, by shifting their portfolio more to households. Korean banks as well as non-banks, i.e. credit card companies, allowed themselves

² See IMF (2004) for additional details.

to become more exposed to risks as they tend to reduce interest rate and lower minimum credit standard when pressured by high competition to expand customer base.

As mentioned earlier, the buildup of household debt in the Korean case had not brought a critical disruption to the banking system although it did launch a situation which could be described as liquidity crisis, which was serious enough that the government had to step in to alleviate the situation, via a government-owned Korea Development Bank.

The household debt problem in Korea was brought into attention by the corporate scandal surfacing in March 2003 involving SK Global. This prompted investors to start selling trust funds that hold the SK Global securities. Trust funds liquidated their portfolio by selling their credit card company (CCC) bonds. Unfortunately, the prevailing high default rate on credit cards has made the CCC papers illiquid, putting strains on the capital market. The immediate problem was resolved when the credit card industry successfully convinced creditors to rollover their exposures, by promising to secure new capital. Nonetheless, bond market access remained tenuous, both from worries about corporate scandals and the continual increase in credit card delinquencies. In December of the same year, the largest credit card company, LG Card, lost access to the capital market, creating a liquidity crisis. In the end, the government-owned Korean Development Bank, which is also a major creditor, stepped in to secure the company.

The Korean experience provides us with insights into the linkage between excessive household borrowing, in this case the excessive use of credit cards, to financial instability. First, the Korean case demonstrates how the huge lending to household, although as a proportion to total loans might not be as large as corporate lending, could undermine the confidence of investors in the financial system and subsequently obstruct the sources of financing, as well as how problems exacerbated as households systemically defaulted on their debt. Second, even if creditor banks were not directly affected by the default on household borrowings, collapse in a credit card company itself could lead to a crunch in the banking system. In the case of Korea, if the Korea Development Bank had not bailed out LG, the problem could have spread through the entire (credit card) sector, as a result of the practice of 'kiting' in which one credit card is used to repay the other credit card, and could have adversely affected other creditor banks. This contagion could consequently threaten the whole banking system. Finally, although not so obvious in the case of Korea, if household consumption became relatively more constrained as creditors became more stringent on the issuing of new credits as well as on the repayment of existing credits following a credit card trouble (or a reversal of regulation), corporate sales might decline, bringing down corporate profitability, which could ultimately put higher credit risks on bank balance sheet.

Part II Monetary policy and financial stability

1. Monetary policy: aiming for monetary stability

Monetary policy, in essence, refers to the conduct of the central bank in adjusting the amount of money in the economy such that the economy as a whole achieves *monetary stability as defined by general price stability*. General price stability is important as it reduces uncertainty in the economy and allows for optimal consumption and investment decisions by economic agents, whereby long-term economic growth is more likely to be achieved. Since money serves as the medium of exchange and the unit of account whereby other goods and services are priced against, a change in the amount of money in the economy will ultimately affect the prices of goods and services. If “too much” money is injected into the economy, money will lose its value. We will need more money to buy a fixed amount of goods and services. In other words, when too much money is put in the economy, prices of goods and services in terms of money will rise. On the other hand, if “too little” money is injected into the economy, value of money will rise. We will need less money to buy a fixed amount of goods and services. In other words, prices of goods and services fall when too little of money is put in the economy.

If a central bank lets the amount of money in the economy fluctuate wildly with no guideline, prices of goods and services will also fluctuate. Excessive fluctuation in *general* price level constitutes monetary instability. To achieve monetary stability, a central bank can choose among various monetary policy frameworks as its guideline in adjusting the amount of money in the economy. The frameworks for the conduct of monetary policy that are popularly used include fixed exchange rate, monetary aggregates targeting, and inflation targeting.

Monetary policy frameworks and monetary stability

By using fixed exchange rate as its monetary framework, the central bank fixes the value of its currency to that of its large trading partner currency. With a fixed exchange rate regime, the central bank is framing its monetary policy such that the amount of money in the economy should grow in-step with that of its trading partner, whose currency value is deemed stable when measured in terms of goods and services.

By using monetary aggregate targeting as its monetary policy framework, the central bank aims to manage money as defined by monetary aggregates such that they grow at a level deemed appropriate for the economy. If money growth exceeds economic activities, price level will accelerate. If money growth does not keep up with economic activities, money will become dearer relative to goods and services (thus prices of goods and services will fall). In practice, believing that, *ceteris paribus*, a rise in money supply will mean a drop in money value relative to value of good and services (a general rise in price), the central bank in a monetary aggregate targeting framework aims to keep money supply growth in line with economic activities.

For an inflation-targeting economy, the central bank would use the consumer price index, or a variant of it, as a target to monitor. Consumer price index or its variant is often used as a target, as its change represents the change in price level experienced by everyone in the economy, and can *proximate* the general price change in the long run. In such a regime, the central bank would manage the amount of money (via the use of policy interest rate) to keep the rise in consumer price index in line with the set target.

2. The intertwining nature of monetary instability and financial instability

While the definitions of monetary and financial stability seem to be of different focus, monetary stability and financial stability are intertwined by nature. At gist, monetary stability and financial stability involves money creation and intermediation of money for use among economic agents. When excessive amount of money is created, monetary instability ensues. When intermediation of money is not effective, financial instability ensues. Ineffective intermediation of money may arise because too much base money is created. In turn, ineffective money intermediation may cause seizures in economic activities and thus price instability. Prior to the creation of central banks, many countries have found monetary instability to come hand in hand with financial instability.

If money is issued by private issuers such as in the US prior to the creation of the Federal Reserve System, when too much money is issued, both monetary stability and financial stability can be compromised. Too much money in the system creates monetary instability. On the other hand, the apparent existence of excess money issued by various entities also raises doubt on the quality of money and the health of private money issuers, creating frequent panics and bank runs. Historically, after much of the world has created central banks, both monetary and financial instability became relatively rare and occurred rather separately. First, tasked with issuing the “right” amount of money, monetary instability becomes relatively infrequent. Quality of the issued money is also implicitly ensured by the sovereign. Bank runs pertaining to doubt of money quality is thus less of an issue. Second, with heavy regulations imposed on the intermediaries in the aftermath of the Great Depression, intermediaries have less room to lend in the first place. Financial instability arising from excessive risks entailed from lending activities also diminished.

With deregulation in the financial sector occurring globally since the late 1970’s, however, financial instability occurred again relatively more frequently. With monetary stability “ensured” by the use of appropriate monetary policy, and financial instability started to occur increasingly amidst monetary stability, one may be tempted to treat financial instability and monetary instability issue as a dichotomy. Recent experiences in Japan where financial imbalances built up during the period of monetary stability, and ensuing financial instability later caused seizures in economic activities that led to monetary instability, however, should serve to remind us of the intertwining nature of monetary and financial stability.

3. Monetary policy and financial stability: the inflation targeting case

While monetary policy, by definition, if done appropriately, can ensure monetary stability rather directly, the matter becomes complicated when it comes to *also* containing risks from financial instability. As discussed above, financial instability comes from excessive financial risk taking as reflected by various types of financial imbalances, namely external imbalance, fiscal imbalance, asset price imbalance, and household debt imbalance. Since these financial imbalances can pose risks to financial stability, and ultimately undermine monetary stability, there may be a case for using monetary policy to reduce the risks of such imbalance buildups. To contain these imbalances successfully by using monetary policy under inflation targeting framework depends on many interrelated factors, not the least, whether i) the imbalance in question is interest rate sensitive, ii) the imbalance buildup is pro-cyclical, and iii) the imbalance buildup lags or at least reasonably synchronizes with the movement of the inflation measure.

Interest rate sensitivity

Under inflation targeting framework, the central bank would raise policy interest rate when there is a high probability that future projected inflation would go beyond the set target. The hike in the policy rate is often done to counter rising inflationary pressures driven by aggregate demand. Theoretically and practically, inflationary pressures from supply side, such as oil shock or farm output damages do not warrant the central bank to respond with an interest rate hike, as it will only hurt the economy further. The hike in the policy interest rate in response to demand driven inflationary pressures would work its way to the real economy via various transmission channels, including rising funding costs, balance sheet and exchange rate effects. Ultimately, by dampening aggregate demand, the interest rate hike should keep future inflation within the announced target.

Can the hike in the policy interest rate also help mitigate the risks of financial imbalances identified in this paper? As discussed in Part I above, two contexts of financial imbalance, namely asset price bubble and household debt, are likely to be interest rate sensitive. Low interest rate environment has historically contributed to asset price bubble and household debt contexts of financial imbalance. Low interest rate environment keeps funding costs of real estate and equity market investments low. Developers can borrow money cheaply to implement real estate projects. Investors can also borrow money cheaply to invest in real estate development or the stock markets. Depositors, on the other hand, have little interest to keep idly money in the bank where interest rates are low, and may prefer to switch their money into real estate and the stock market. With more and more investors moving into real estate and the stock market, sooner or later, speculation begins, and financial imbalance builds up rapidly. ***Since an interest rate hike will raise financing costs of such investment and speculation, it is likely that the hike will help dampen the buildup of asset price and household debt imbalances.***

For the other two contexts of financial imbalances identified in this paper, namely external and fiscal imbalances, the sensitivity of the imbalances to a change in interest rate is not clear-cut. As discussed above, external imbalance buildup often occurs in the fixed exchange rate regime whereby exchange rate risk is guaranteed by the government, leading to currency and maturity mismatches on the banking system balance sheets. When the exchange rate is let floating, such as in the case of an inflation targeting regime, the risk of external imbalance buildup is greatly mitigated. As the government no longer guarantees exchange rate risk, the banks, acting in their own interests, will likely see to it that their foreign exposures are appropriately hedged from the start. It is difficult to see why an interest rate hike by an inflation targeting central bank to keep projected inflation within the target range might significantly induce currency and maturity mismatches on the banking system balance sheets one way rather than the other. As for fiscal imbalance where the government borrows excessively, this often occurs when the government loses its fiscal discipline. An interest rate hike may put government borrowing costs up, but, with lax fiscal discipline from the start, there is no *a priori* reason to believe that the rate hike would deter the government from further borrowing and stop the fiscal imbalance buildup.

Pro-cyclicality

Monetary policy under an inflation targeting framework, aims, at least implicitly, to reduce the cyclicality of output. In a “strict” inflation targeting regime, where price stability is the only objective of the central bank, the central bank will raise the policy interest rate when future inflation is projected to have a high probability of rising beyond the specified target. Given that the policy interest rate should be hiked in response to demand driven inflationary pressures, monetary policy under a “strict” inflation targeting regime is implicitly counter-cyclical. Accelerated aggregate demand will put upward pressures on prices, which, in turn, will accelerate inflation. If inflation is projected to accelerate such that it has a high probability of rising beyond the announced target, the policy interest rate will be raised, which, in turn, will dampen aggregate demand.

In contrast to the central bank under a strict inflation regime, a central bank under a flexible inflation regime does not pursue just only the inflation objective. A central bank under a flexible inflation targeting regime often has other specific objectives, often output, to also consider when making monetary policy decisions. Indeed, aside from keeping future inflation within target, many central banks also have another objective of keeping output expansion near the economy’s potential. The policy interest rate will be hiked if demand driven inflation is projected to have a high probability of rising beyond target, and/or if output is projected to have a high probability of much exceeding the economy’s potential. Or in contrast, of course, if inflation is projected to be within target but if output is projected to be down below potential, the policy interest rate will be cut. As such, in the case of “flexible” inflation targeting where output is incorporated into the central bank’s reaction function,

monetary policy is even more explicitly counter cyclical than in the case of strict inflation targeting.

Considering that monetary policy under inflation targeting is counter cyclical, it is conceivable that if the buildup of financial imbalances is pro-cyclical, i.e. imbalances accumulate as the economy grows, and run down as the economy slows, the risks of financial imbalances will be automatically mitigated once the policy rate is hiked to dampen aggregate demand and slow the economy to reduce the probability of inflation rising beyond target.

Synchronization

Even when a financial imbalance is both interest sensitive, and pro-cyclical, a policy rate hike to keep future inflation within target will automatically reduce the risks of excessive imbalance buildup only if such buildup lags or reasonably synchronizes with the movement of the inflation measure. Otherwise, if the buildup of the imbalance leads the measure of inflation by a significant amount of time, the hike in policy rate to address future projected inflation might not be timely enough to also tackle the imbalance buildup. If the imbalance buildup does not lag nor synchronize with inflation measure, then we cannot expect monetary policy under inflation targeting to timely address financial imbalance issue. This case is particularly notable where, as a normal practice, inflation and output are projected for two-year ahead horizon. Two years ahead is often the horizon in which the central bank project output and inflation since that is about the time it takes monetary policy to affect future inflation and the real economy. If an imbalance buildup occurs within this two-year ahead horizon but is not expected to significantly affect inflation or output within the horizon, under the normal setting, there is no ground for the central bank to hike the policy rate to suppress the imbalance buildup.

Part III Empirical Tests: Potential use of monetary policy under inflation targeting to address financial imbalances in Thailand

As argued above, monetary policy under inflation targeting can automatically address risks to price stability that are posed by financial imbalance buildups if such imbalances are 1) interest rate sensitive, 2) procyclical, and 3) lags or synchronizes with inflation measure. As also discussed above, the risk of excessive external imbalance is automatically mitigated under inflation targeting regime as exchange rate is allowed to float. Fiscal imbalance, on the other hand, is often caused by fiscal indiscipline, a problem, in the words of Chung (2003), ‘...*that cannot be rectified by the will of the central bank*’. When considered under our three criteria above, risks to future inflation posed by two types of financial imbalance are potentially addressable by the use of policy interest rate under inflation targeting, i.e. risks posed by asset price and household debt imbalances. The following are empirical tests done to evaluate whether monetary policy under inflation targeting can potentially address risks to price stability associated with excessive borrowing for asset price speculation, and excessive household borrowing for the case of Thailand.

Note that when we say monetary policy with a floating exchange rate regime can mitigate excessive external borrowing, we are referring implicitly that external borrowing in question is excessive with respect to exchange rate risks taken. In the case of 1997 Thailand prior to the baht floating, short-term external debt was actually larger than the country’s international reserves. A large amount of the external borrowing by the banks and their customers at the time was inadequately hedged against exchange rate movements, while large movements of exchange rate was liable to occur with the inadequate amount of internal reserves. With floating exchange rate regime, excessive external borrowing relative exchange rate risks taken is less likely, as agents have incentives to hedge themselves. Credit risks, however, still remain, if external debt is used to finance unviable projects. Indeed, as Chai-anant and Juntarung (2004) point out, external borrowing arising from persistent current account deficits may prove a medium term problem. The risks from such borrowing on the bank balance sheets, however, are less direct, and may come via other contexts of imbalances such as excessive borrowing for asset price speculation and excessive fiscal borrowing.

Note also that while fiscal indiscipline is beyond the will of the central bank to rectify, a responsible conduct of macroeconomic policies involves the right mix between fiscal and monetary policies. In practice, a policy interest rate hike to ensure monetary stability can pose higher costs to government borrowing. If the government is willing to borrow at a high interest rate, however, the central bank cannot prevent that.

Is the imbalance in question interest rate sensitive?

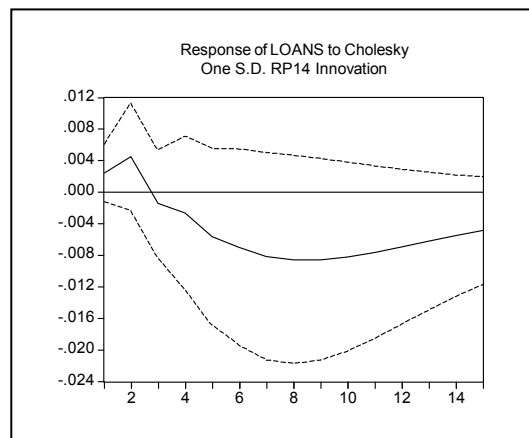
As discussed above, the symptoms of the buildup of imbalances in asset prices (particularly in the case of property prices) and household debt can be seen

through the increase in *bank credits* (personal loans, housing loans, and loans to property developers) as well as *asset price movements* (property and equity prices).

To examine if a hike in the policy interest rate will dampen credit growth as well as asset prices, in effect, is to examine transmission mechanism of monetary policy. We adopt the vector auto-regressions (VARs) model proposed by Disyatat and Vongsinsirikul (2002), which are dynamic systems of equations that examine the inter-relationships between economic variables. These include real output (GDP), consumer price index (CPI), 14-day repurchase rate (RP14), private credit (LOANS), equity price (SET), and house price as proxied by condominium price (CONDOV)³. The model is done using quarterly, seasonally adjusted data from 1993 Q1 to 2004 Q1, otherwise noted, with a lag length of two periods.

Taking the cue that *credits* are an essential fuel for asset price speculation and are themselves the direct contributor to household debt, we first examine if a change in the policy interest rate will affect credit growth. Applying the model, we find, similar to Disyatat and Vongsinsirikul (2002), that the change in policy interest rate can affect bank lending, and thus credit growth. Our VAR analysis indicates that with a policy interest rate hike of roughly 2 percent, *commercial banks' private credits* will fall with a 3-quarter lag with the maximum response of around 0.9 percent below baseline after 8 quarters. (Figure 2) This means an interest rate hike will result in the reduction in loans, mitigating excessive credit expansion to concerned sectors which, in turn, reduce financial imbalance buildups. The lag of the response is consistent with the fact that loans are quasi-contractual commitments, thus their stock is unlikely to change quickly.

Figure2: Bank lending channel



With regards to *asset price movements*, the results from the VAR analysis have suggested that policy interest rate could also potentially contain the buildup of asset price imbalances, particularly in terms of property prices. The results indicate that *condominium prices* are more responsive to a policy interest rate hike than

³ Condominium price index is based on prices of condominium in the central business district. The data is obtained from Jones Lang Lasalle Co., Ltd, starting 1994 Q1 to 2004 Q1.

equity prices as the effect on condominium prices lasts longer than that of equity prices. Figure 3 shows that a policy interest rate hike (roughly 2 percent) results in a fall of condominium price with the maximum response of roughly 4.7 percent below baseline, occurring after 8 quarters, while Figure 4 shows that equity price falls with the maximum response of around 7.9 percent below baseline, occurring after 3 quarters.

Figure 3: Effects of policy interest rate shock on condominium price

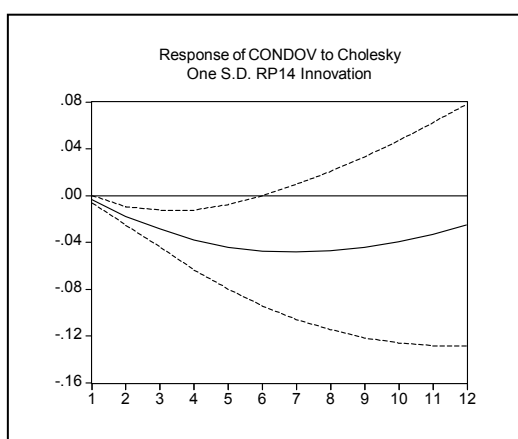
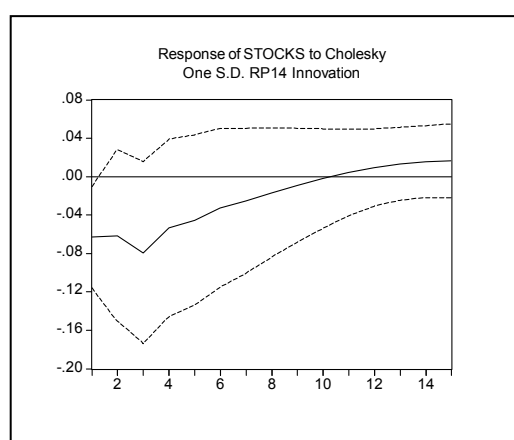


Figure 4: Effects of policy interest rate shock on equity price



Is the imbalance pro-cyclical?

Since 2000, the Bank of Thailand (BOT) has adopted “flexible” inflation targeting for its monetary policy framework. Flexible inflation targeting framework that the BOT has adopted is a counter cyclical framework as, in addition to inflation, output is explicitly incorporated into the BOT’s monetary policy reaction function. The BOT will adjust the policy interest rate to keep future inflation within target and output within a stable growth path that is consistent with Thailand’s potential output. Financial imbalance buildups will thus partially be mitigated if the buildup of imbalances is pro-cyclical. If the movements in asset prices and the run-up of consumer loans and property-related loans are pro-cyclical, when policy interest rate is hiked to ensure growth and price stability, the risks of asset price and household debt imbalances should also be contained.

To examine the cyclical behaviour of the financial imbalances for Thailand, we follow the methodology used by Mallikamas, Ahuja, and Poonpatpibul (2003). Similar to the interest sensitivity tests above, cyclical behaviours of asset price and household debt imbalances are tested via their symptoms as reflected by bank credits and asset price movements.

The examination of cyclical behaviours of the symptoms of the imbalances is done in three stages. To examine co-movement of imbalance buildups with the

business cycle, first, we remove the cyclical components of each variable by using the Hodrick-Prescott (HP)⁴ filter and calculate the deviations from its trend in terms of percentage. Second, we examine lead-lag relationship between each variable relative to the business cycle, using cross correlation test. Third, we check the amplitude of the fluctuation of variable relative to that of the business cycle, by dividing standard deviation of the variable's movement by that of the business cycle.

GDP and its components (in real terms) are obtained from the National Economic and Social Development Board (NESDB) while monetary and financial data are from the Bank of Thailand's databases. Real equity price is SET index deflated by CPI. All data used are annual data from 1970-2003, except core CPI from 1985-2003, real personal credit and real mortgage from 1981-2003, and real SET from 1975-2003. While condominium Price Index is quarterly data from 1994:Q1 to 2004:Q1, obtained from Jones Lang Lasalle Co., Ltd.

The results are shown in Table 1. The $x(t)$ column indicates the degree of contemporaneous co-movements with Thailand's business cycle, depicting the correlation coefficients between cycle deviation of each series and that of real business. A number close to 1 indicates that a series is highly pro-cyclical with real business, while a number close to -1 indicates that a series is highly counter-cyclical. The series is uncorrelated contemporaneously with real business if the number is close to 0. The other columns display the correlation coefficients when the series have been shift forward or backward relative to Thailand's business cycle. If the number in either $x(t-i)$ or $x(t+j)$ column is largest, where i and j are more than 0, we say that the series leads or lag the business cycle by $x(t-i)$ or $x(t+j)$ period, respectively.

Since credits, the fuel of asset price bubble and household debt imbalances, are found to be pro-cyclical, the results suggest that monetary policy under current regime could partially contain risks posed by financial imbalance buildups. In terms of asset price imbalances, *real mortgage and real credits to developers*, are found to be contemporaneously pro-cyclical. The amplitude of real credits related to property sector, however, are particularly larger than that of the business cycle, roughly 15-20 times as large. Pertaining to household debt imbalance, *real personal credits* for consumption is also found to be pro-cyclical and lags the business cycle by 1 year. (See Table 1 and Figure 5)

The above results are generally consistent with Borio, Furfine and Lowe (2001) in that credit expansion is highly pro-cyclical in three main ways: (1) The valuation of collateral and loan-to-value ratios are likely to generate greater pro-cyclicality to bank lending if the valuation methodologies move closely with the business cycle and the misassessment of risks in terms of loan-to-value ratios increase during the boom phase; (2) Competitive pressure could make banks' lending strategies more aggressive and loosen credit standard requirements; (3) Supervisory response can also make, even with relatively small effects, bank lending

⁴ For rationale behind the use of the Hodrick-Precott filter as a tool, see Ahuja A., Mallikamas T., and Poonpatpibul C. (2003).

behaviour more pro-cyclical. If supervisors relax their supervision vigilance during a boom, credit expansion could grow more rapidly. Similarly, if supervisors raise their supervision aggressiveness during recession and banks respond by cutting their supply of credits, credit crunch might concur. Furthermore, credits are closely linked to components of the business cycles, namely durable consumption and private construction, which tend to have larger amplitude than that of the business cycle. (Figure 6)

In terms of asset price movements, our results suggest that monetary policy could partially limit risks to price stability posed by an asset price imbalance buildup. Equity prices are pro-cycle with the business cycle and lead it by 1 year. Owing to data limitation on condominium prices, which could only be traced back to 1994, we thus conduct a cross correlation test on *quarterly* data instead. Preliminary data suggests that condominium prices are also pro-cyclical with the business cycle and their movements are found to be contemporaneous with that of the business cycle. The amplitude of equity prices appears to be roughly 9 times as large as the business cycle while the amplitudes of condominium prices are roughly 1.4 times as large as the business cycle. (See Table 1 and Figure 5)

Table 1: Cross correlation between cyclical real GDP and other variables*

Variables	code	%StdDev	$\frac{\sigma_{xi}}{\sigma_{gdpv}}$	Annual data											
				x(t-5)	x(t-4)	x(t-3)	x(t-2)	x(t-1)	x(t)	x(t+1)	x(t+2)	x(t+3)	x(t+4)	x(t+5)	
Price level															
Headline consumer price index	cpi	4.59	0.97	-0.37	-0.34	-0.34	-0.37	-0.29	-0.07	0.24	0.43	0.51	0.46	0.23	
Core consumer price index	core	2.40	0.51	-0.12	-0.25	-0.38	-0.41	-0.35	-0.21	0.33	0.68	0.73	0.65	0.40	
Real credit															
Real private credit	rprcredit	11.11	2.35	-0.17	-0.19	-0.12	0.06	0.34	0.68	0.72	0.58	0.32	0.06	-0.08	
Real personal credit	rcreprcon	12.28	2.60	-0.29	-0.25	-0.19	-0.04	0.31	0.67	0.76	0.75	0.47	0.02	-0.26	
Real mortgage	rmort	15.81	3.34	-0.35	-0.28	-0.02	0.32	0.68	0.88	0.79	0.55	0.24	-0.10	-0.31	
Real credit to developers	rcreestate	20.83	4.40	0.26	0.31	0.31	0.33	0.41	0.49	0.46	0.38	0.16	-0.19	-0.45	
Asset prices															
Real SET	rset	43.28	9.15	-0.06	0.20	0.42	0.65	0.79	0.58	0.16	-0.14	-0.32	-0.42	-0.48	
Variables	code	%StdDev	$\frac{\sigma_{xi}}{\sigma_{gdpv}}$	Quarterly data											
				x(t-5)	x(t-4)	x(t-3)	x(t-2)	x(t-1)	x(t)	x(t+1)	x(t+2)	x(t+3)	x(t+4)	x(t+5)	
Condominium Price Index**	condov	6.65	1.41	-0.12	0.00	0.21	0.44	0.61	0.72	0.69	0.59	0.54	0.47	0.31	

*GDP are obtained from the National Economic and Social Development Board (NESDB). Meanwhile monetary and financial data are from the Bank of Thailand's databases. Real equity price is SET index deflated by CPI. All data used are annual data from 1970-2003, except core CPI from 1985-2003, real personal credit and real mortgage from 1981-2003, and real SET from 1975-2003.

** Condominium Price Index is quarterly data from 1994:Q1 to 2004:Q1, obtained from Jones Lang Lasalle Co., Ltd.

Table 2: Cross correlation between cyclical real GDP and its components*

Variables	code	%StdDev	$\frac{\sigma_{xi}}{\sigma_{gdpv}}$	Annual data										
				x(t-5)	x(t-4)	x(t-3)	x(t-2)	x(t-1)	x(t)	x(t+1)	x(t+2)	x(t+3)	x(t+4)	x(t+5)
Real GDP	gdpv	4.73	1.00	-0.34	-0.21	0.02	0.33	0.74	1.00	0.74	0.33	0.02	-0.21	-0.34
Private consumption	cprv	4.80	1.01	-0.39	-0.22	0.02	0.31	0.71	0.97	0.73	0.35	0.02	-0.21	-0.31
Durable	cprvdu	15.40	3.26	-0.24	-0.09	0.10	0.34	0.71	0.88	0.54	0.14	-0.18	-0.39	-0.44
Non-durable	cprvndu	3.68	0.78	-0.43	-0.31	-0.10	0.18	0.60	0.92	0.80	0.49	0.18	-0.04	-0.16
Service	cprvser	4.70	0.99	-0.38	-0.17	0.14	0.39	0.66	0.84	0.58	0.24	-0.04	-0.22	-0.31
General government consumption	cpubv	4.84	1.02	-0.60	-0.61	-0.48	-0.32	0.02	0.27	0.37	0.42	0.39	0.26	0.19
Gross fixed capital formation	inv	16.39	3.46	-0.28	-0.18	0.02	0.30	0.70	0.97	0.69	0.24	-0.10	-0.32	-0.39
Private investment	iprv	21.03	4.44	-0.16	-0.05	0.14	0.39	0.73	0.90	0.55	0.04	-0.28	-0.43	-0.43
Equipment	ipreq	20.63	4.36	-0.14	-0.03	0.15	0.39	0.72	0.92	0.56	0.07	-0.22	-0.38	-0.40
Construction	iprcon	25.05	5.29	-0.19	-0.09	0.09	0.36	0.71	0.84	0.53	0.03	-0.31	-0.47	-0.45
Public investment	ipubv	19.82	4.19	-0.55	-0.53	-0.37	-0.18	0.14	0.47	0.60	0.63	0.47	0.24	0.07
Equipment	ipubeq	23.05	4.87	-0.40	-0.27	-0.16	-0.08	0.14	0.42	0.51	0.45	0.30	0.11	-0.02
Construction	ipubcon	20.39	4.31	-0.57	-0.59	-0.43	-0.20	0.13	0.45	0.58	0.65	0.49	0.28	0.10
Net exports	netxv	11.44	2.42	0.15	0.07	0.00	-0.10	-0.47	-0.68	-0.40	-0.07	0.15	0.24	0.18
Exports of goods and services	xgsv	7.11	1.50	-0.04	0.07	0.27	0.60	0.67	0.54	0.30	0.04	-0.03	-0.20	-0.36
Imports of goods and services	mdiv	13.83	2.92	-0.15	-0.03	0.14	0.39	0.73	0.84	0.48	0.07	-0.14	-0.30	-0.33

Figure 5: Cycles of GDP and Symptoms of Financial Imbalances

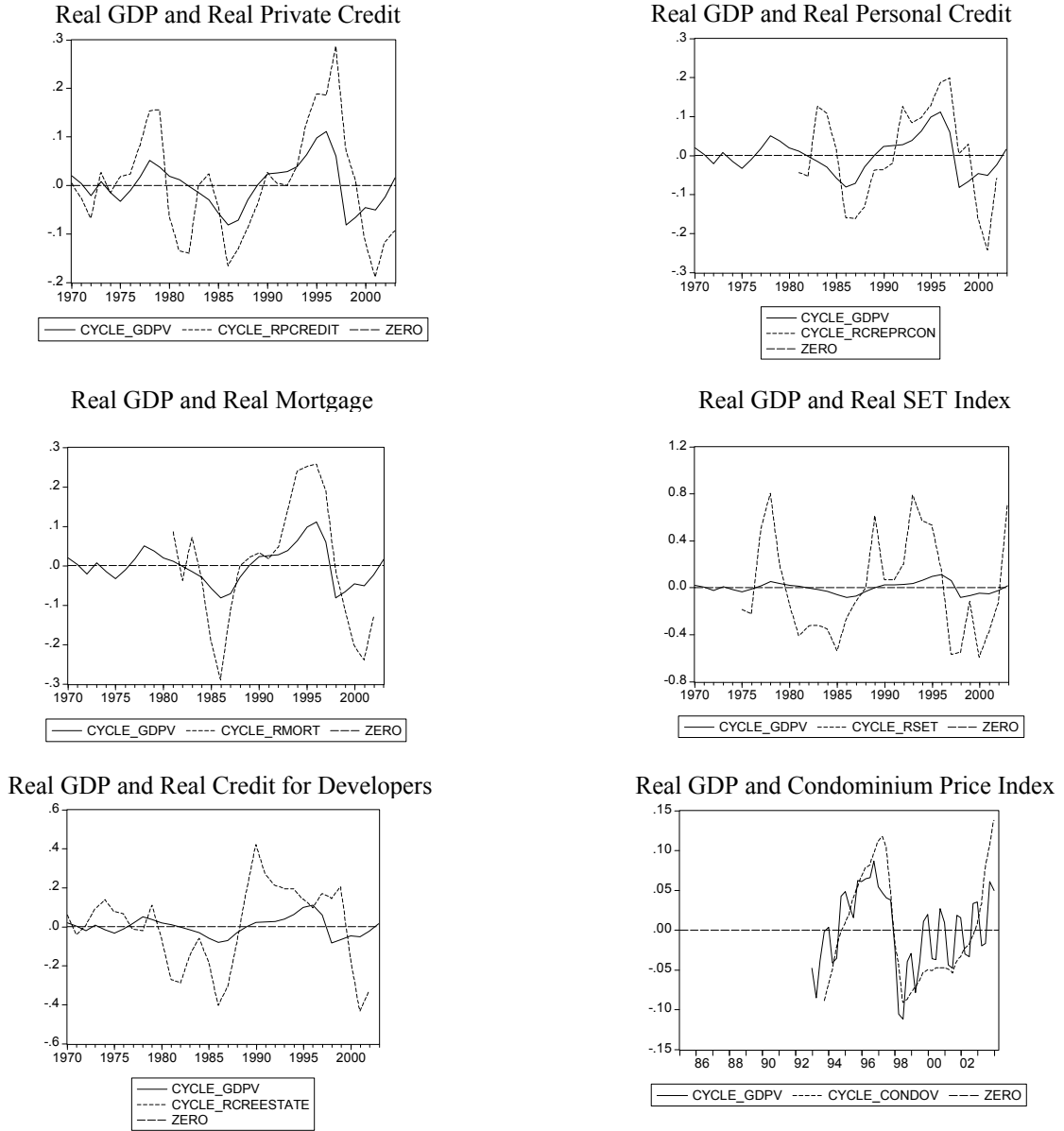
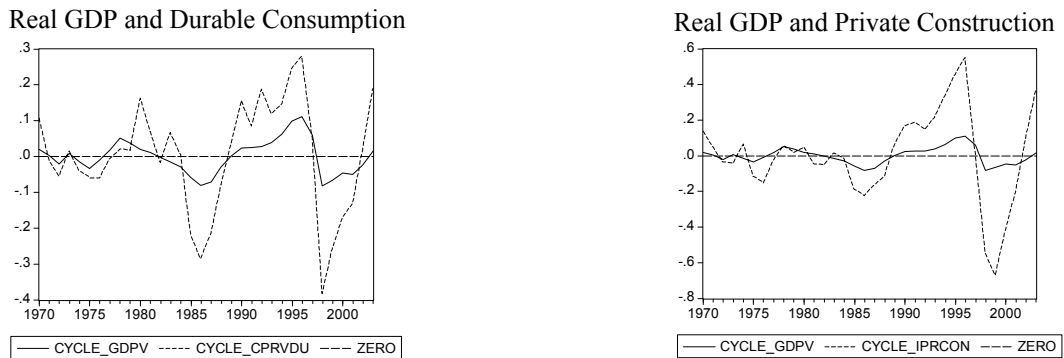


Figure 6: Cycles of GDP and its Components



And does the imbalance buildup lags or at least reasonably synchronized with the movement of the inflation measure?

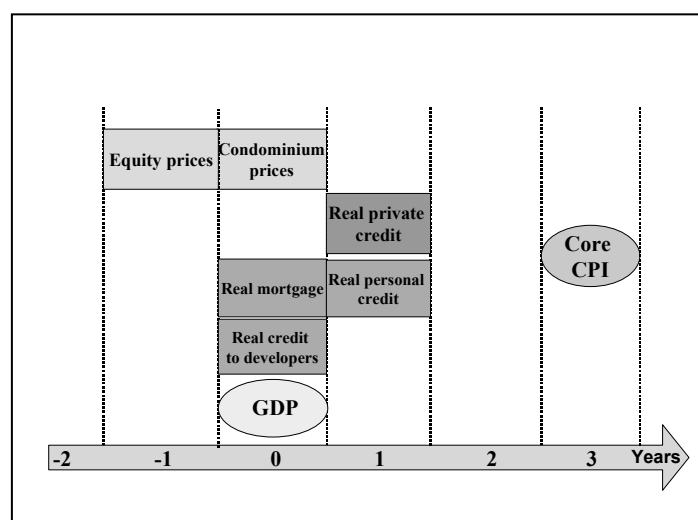
To examine whether the hike in policy interest rate to address future projected inflation can timely contain risks posed by financial imbalance buildups is to examine whether such imbalance buildups lag or at least reasonably synchronized with the movement of inflationary measure, since monetary policy decision under flexible inflation targeting is based on projected future inflation and output.

To observe the synchronization of variables' movements with that of core inflation, the policy target, we employ a cross correlation test similar to that used for testing pro-cyclicality. The results can be found in Table 1. Figure 7 summarizes the results graphically.

Since the symptoms of the imbalances are found to lead core inflation, the results suggest that monetary policy under inflation targeting may not timely address risks associated with financial imbalance buildups and thus, in turn, may unwittingly accommodate it and could undermine price stability in the future.

From Table 1, *real private credits* lead core inflation by approximately 2 years, implying that large amount of credits could be extended to agents including developers and households before pressures are reflected by rising inflation. Theoretically, monetary policy under inflation targeting that focus on 8 quarters ahead inflation should already have taken this private credit expansion into account. Still, without direct focus on credits to sensitive sectors of the economy, monetary response might be too late. Total private credit can rise only moderately while (sectoral) credits to concerned sectors already rose considerably, owing to shifts in credit concentration. With respect to asset price movements, *condominium* and *real equity prices* are found to lead core inflation by at least 3 years. Monetary policy under inflation targeting that focus on 8 quarters ahead inflation may thus not address risk posed by asset price imbalances timely enough.

Figure 7: Co-movements of GDP cycle and cycles of core CPI and financial variables



Part IV Modifying the current monetary policy framework

1. Why might the current framework need modification?

Financial instability can ultimately undermine monetary stability!

As the analysis above suggests that monetary policy under inflation targeting regime may not automatically address financial instability problem in term of timeliness, one may be tempted to resort to relegate financial stability issue to be handled by entirely other means, including prudential measures. It should be emphasized again, however, that financial instability can also seriously undermine monetary stability. If financial stability can undermine the overriding objective of monetary policy, i.e. monetary stability, it probably is unwise to ignore financial stability issues entirely in the formulation of monetary policy decision.

An oft-cited recent historical example of how financial instability could undermine monetary stability is the case of Japan in the late 1980's to the early 2000's. In the early 2000's Japan experienced a protracted period of painful deflation that was initiated by financial instability, as reflected by contraction in the banking system balance sheets. As Japanese asset price bubble that was fueled by abundant liquidity, ultimately burst in the early 1990's, many firms started to fail, at the same time that value of collaterals held by banks also started to drop drastically. The failures in corporate and household sectors and the drop of collateral value put severe strain on the bank balance sheets. The ensuing credit rationing leads to further corporate failures and further drop in collateral values. Protracted recession later turned into painful deflation, as consumers, fearing of uncertain future, consumed less and less despite price slashing, while firm profits shrink (or loss keep rising) further and further. Rounds of layoff became routine in the economy where lifetime employment was once virtually guaranteed.

The experience in Japan suggests that financial instability could ultimately lead to monetary instability. Furthermore, by allowing financial instability to occur in the first place, monetary instability that followed could be beyond the central bank's control almost completely. As seen in Japan in the early 2000's, although nominal interest rate has been cut to virtually zero, and massive amount of liquidity injected by various creative means, deflation could continue to bite rabidly. The situation was a vicious cycle as monetary instability also fed financial instability even further. With deflation, more and more firms were in risk of defaults. Firms had to repay a fixed amount of debt (often incurred during a better time) with money gotten from selling goods and services whose prices keep falling. Such a painful experience suggests that, in the conduct of monetary policy under inflation targeting, it is naïve to totally ignore financial instability. Although financial stability is importance in its own right, the failure to achieve financial stability could affect the inflation, the overriding objective of monetary policy under inflation targeting regime.

2. How could financial stability be incorporated into inflation targeting framework?

As discussed above, since financial stability can seriously undermine the overriding objective of monetary policy, i.e. monetary stability, it probably is unwise to ignore financial stability issues entirely in the formulation of monetary policy decision. How, then, can we incorporate financial instability issues into monetary policy formulation? In answering such question, one might be tempted to define financial instability as an explicit objective of monetary policy. Yet, this is easier said than done. As we have discussed above, it is very difficult to define financial stability succinctly enough for actual use. This is the same with the definition of financial instability. To put a cumbersome definition of financial stability (or instability) as an objective of monetary policy, will undermine transparency, a key pillar that supports inflation targeting framework.

With this in mind, it probably is more practical to incorporate financial stability issues into monetary policy formulation via, to use the central bank jargons, a longer time horizon for future inflation consideration, as well as a more comprehensive balance of risks in inflation consideration. It has been recognized that monetary policy would take some time before affecting the real economy and the general price level. The lag between the time a policy action is made and the time real economy and inflation are affected is usually around 6-8 quarters, although the precise timing is unknown. In other words, monetary policy is often said to have long and variable lags. With the presence of such lags, the central bank recognizes that monetary policy implemented today will not affect today's inflation but future inflation. In keeping inflation within target, any change in policy rate thus needs to be made before hand. In an inflation targeting regime, projection of future inflation is crucial. Such projection is often done with the use of a macroeconomic model. An appropriate level of policy interest rate will then be set in accordance with such projection. Currently central banks under inflation targeting regime often project inflation for the horizon of 8 quarters ahead. The 8 quarters horizon is often adopted because a projection made from a macroeconomic model for a longer period involves more uncertainty. Furthermore, 8 quarters horizon is a long enough time for monetary policy to act in a timely manner.

Recognizing that inflation projection made from a macroeconomic model involves uncertainty, the projection is often done under considerations of various pertinent risks. In the case of Thailand, understandably the risks considered often involve those likely to put impact on inflation and output, such as those regarding oil and commodity prices, as well as trading partner economies. The presence of such risks means that monetary policy decision will be made based upon the possibility that actual inflation that turns out in the future could be different from baseline inflation projected by the macroeconomic model. If the risks considered suggest a high probability that future inflation might breach the target, monetary policy stance could be changed, although baseline inflation is projected to remain within target. Such consideration with regard to risks is important since future

cannot be known with certainty, and central bankers have reasons to err on the side of caution.

Incorporating Financial Stability into Inflation Targeting Framework

As discussed above, financial stability is one of the foremost aims of central bank creation. Under the usual inflation targeting framework, however, financial stability does not enter explicitly as an objective in monetary policy formulation. The failure to take account of financial stability in monetary policy formulation could be very damaging if financial instability can undermine monetary stability, the overriding objective of monetary policy under inflation targeting framework. Recent research and comments have suggested that financial stability need not be put explicitly into monetary policy reaction function (a la Taylor's rule). This paper agrees with such suggestions. Specifying financial stability objective into the monetary policy reaction function is not practically feasible. While inflation and output objectives are readily quantifiable, financial stability is not. Worse, putting a loose measure of financial instability explicitly into the monetary policy reaction function could undermine transparency of the monetary policy, a key ingredient of inflation targeting framework.

On the other hand, we agree with suggestions that financial stability can be incorporated into inflation targeting framework more appropriately by modifying the concepts of time horizon of inflation forecast, and of a more comprehensive balance of risks assessment. By projecting inflation into a longer horizon, the possibility that financial instability could ultimately undermine inflation target will be more duly recognized and more systematically incorporated into inflation projection. If inflation could remain low for at least two years when financial imbalances are building up substantially, as in the case of Japan in the late 1980's and early 2000's, it is reasonable that inflation projection should be done for a horizon longer than two years. However, as Lowe (2003) suggests, inflation projection made for periods beyond two years horizon is likely to be mean-reverting. In other words, for a longer horizon, inflation projection made from historical data is likely to average out to the long-term trend. Instead of basing policy decision purely on the 8-quarter ahead inflation projection, it is probably more appropriate to base the decision on achieving inflation target over the medium term, even if such projection from a macroeconomic model is not available. On another front, by recognizing that financial instability can pose risks to price stability, risks pertaining to financial instability need to be assessed when assessing inflation outlook, whether within the 2 years horizon or beyond.

Assessing financial instability using Financial Soundness Indicators (FSIs) and Stress Testing

While the rationale for the suggestions of a longer horizon and a more comprehensive balance of risks for assessment of future inflation is quite clear, concrete measures to incorporate them into inflation targeting framework are yet to

be systematically formulated. Recognizing that international organizations such as BIS, the IMF, and the World Bank, have recently various measures and methodologies to assess and ensure stability of the financial system, this paper tries to see how such measures and methodologies can be integrated into the practice of monetary policy under inflation in a practical and systematic way. Craig and Sundarajan (2003), consider three measures and methodologies that can be used in assessing financial stability, namely: Financial Soundness Indicators (FSIs); stress testing; and Basel Core Principles (BCPs). Unlike Craig and Sundarajan (2003) who consider such measures and methodologies from the whole central banking perspective, however, *this paper bases the analysis in the context of practical monetary policy formulation under inflation targeting regime*. In particular, this paper analyses how FSIs, and *macroeconomic* stress testing, can help in assessing future inflation in a horizon longer than the customary 8 quarters ahead, and in assessing risks to future inflation as reflected by the risks of financial instability. (See details on the description of FSIs and stress testing in Box 1 and Box 2)

Box 1. Financial Soundness Indicators

FSIs refer to indicators that are compiled by *aggregating* data from individual financial institutions to produce measures that can be used to assess the financial soundness and vulnerabilities of the financial system as a whole. In FSI's terms, financial soundness refers to the capacity of the sector to absorb adverse shocks, while vulnerabilities means the sector's vulnerability to shocks. The capacity of the sector to absorb shocks can often be measured by capital adequacy, whereby capital can be drawn to cover losses. Vulnerability of the sector to shocks, on the other hand, is reflected by different types of risk (credit, liquidity, or market) on the sector's balance sheet. FSIs are developed by the IMF and a number of central banks. The choice of FSIs to monitor the financial sector depends to some extent on the structure of the financial system. Key considerations include the extent to which the system is bank-dominated or market-dominated. As discussed by Craig and Sundarajan (2003), aside from aggregating data just for the financial sector, FSIs methodology can be used to also aggregate data for the key non-financial sectors, such as the corporate sector.

In an IMF Occasional Paper, Sundarajan, et al. (2003) suggests two sets of financial indicators to be useful for the purpose of periodic monitoring and for compilation and dissemination efforts by national authorities. The core set includes indicators for the banking sector that should have priority in future compilation and monitoring of FSIs. The encouraged set includes additional banking indicators, as well as data on other institutions and markets deemed relevant in assessing financial stability. In the paper, Sundarajan, et al. (2003) suggests the corporate sector, real estate markets, and non-bank financial institutions and markets worth monitoring. Indicators of corporate health and real estate markets are pointed out as particularly important in their analytical significance for assessing financial vulnerabilities in a wide variety of circumstances. A list of indicators in the core and encouraged sets as proposed by Sundarajan, et al. (2003) is reproduced below in Table 3.

Table 3: Financial Soundness Indicators: The Core and Encouraged Sets

Core Set	
Deposit-taking institutions	
Strength	
Capital adequacy	Regulatory capital to risk-weighted assets
Earnings and profitability	Regulatory Tier I capital to risk-weighted assets
	Return on assets
	Return on equity
	Interest margin to gross income
	Noninterest expenses to gross income
Vulnerabilities	
Asset quality	Nonperforming loans to total gross loans
	Nonperforming loans net of provisions to capital
	Sectoral distribution of loans to total loans
	Large exposures to capital
Liquidity	Liquid assets to total assets (liquid asset ratio)
	Liquid assets to short-term liabilities
Sensitivity to market risk	Duration of assets
	Duration of liabilities
	Net open position in foreign exchange to capital
Encouraged Set	
Deposit-taking institutions	
	Capital to assets
	Geographical distribution of loans to total loans
	Gross asset position in financial derivatives to capital
	Gross liability position in financial derivatives to capital
	Trading income to total income
	Personnel expenses to noninterest expenses
	Spread between reference lending and deposit rates
	Spread between highest and lowest interbank rate
	Customer deposits to total (non-interbank) loans
	Foreign currency-denominated loans to total loans
	Foreign currency-denominated liabilities to total liabilities
	Net open position in equities to capital
Market liquidity	Average bid-ask spread in the securities market
	Average daily turnover ratio in the securities market
Nonbank financial institutions	Assets to total financial system assets
	Assets to GDP
Corporate sector	Total debt to equity
	Return on equity
	Earnings to interest and principal expenses
	Corporate net foreign exchange exposure to equity
Households	Number of applications for protection from creditors
	Household debt to GDP
Real estate markets	Household debt service and principal payments to income
	Real estate prices
	Residential real estate loans to total loans
	Commercial real estate loans to total loans

Source: Sundarajan, et al. (2003)

Box 2. Macroeconomic Stress Testing

Stress testing, as used in the context of assessments of financial system stability, is a generic term that refers to a range of statistical techniques used to assess the ability of the financial sector to withstand shocks to its balance sheets. Stress testing has been included in the Financial Sector Assessment Programme (FSAP)* as another surveillance and analytical tool to help assessing vulnerability of the financial system to various shocks. With recent crisis experiences highlighting the intertwining nature of financial instability and macroeconomic stability, considerable emphasis in stress testing has also been placed upon vulnerability of the financial system to macroeconomic events, i.e. macroeconomic stress testing. Deterioration in macroeconomic events can put severe strains on the banks' balance sheets via, not the least, rising household and corporate defaults rates. Instability of the financial system resulting from shocks in the banks' balance sheets, in turn, can deteriorate macro economy further, via, again not the least, credit crunch. At the extreme, financial and economic crisis concurs.

As described by Hoggarth (2003), macroeconomic stress testing involves three key elements. First, plausible “challenging” macroeconomic scenarios to illustrate possible extreme downside risks need to be specified. These macroeconomic scenarios need to be internally consistent. Second, macroeconomic shocks are mapped into their impact on individual's bank balance sheets. The size of the impact will depend on the composition and quality of bank's portfolios and the amount of capital they have to withstand the shock. Third, second round effects of an increase in bank fragility on the financial system as a whole and more generally on the macro economy are assessed. As described here, stress testing can complement FSIs in financial stability assessment in various ways. First stress testing provides information on the linkages between different FSIs. Second it helps to “benchmark” FSIs by giving an indication of the impact of a change in an FSI. Third, it provides a complementary (but more direct) way to assess certain types of risks that are hard to measure precisely using FSIs, such as the potential for contagion due to interbank exposures. Macro economic stress testing can also add a dynamic element to the analysis of FSI, i.e. the sensitivity, or probability distribution of FSI outcomes in response to a variety of macroeconomic shocks and scenarios.

* Financial Sector Assessment Program (FSAP), launched in May 1999, was a joint initiative by the IMF and the World Bank to identify financial system strengths and vulnerabilities and to help to develop appropriate policy responses.

3. FSIs and Stress Testing as tools of monetary policy under inflation targeting

This paper believes FSIs and macroeconomic stress testing can be adapted to lengthen the horizon considered for future inflation assessment as well as a more comprehensive assessment of risks to future inflation in a systematic way. Specifically, first, since corporate and household FSIs are leading indicators of financial sector soundness, monetary authority should systematically incorporate this information when deliberating policy decision. Second, by linking FSIs of financial sector and FSIs of corporate and household sector to the macroeconomic model that is the main tool in inflation and output forecast, monetary authority can perform macroeconomic stress testing procedures.

The case of FSIs

Since bank balance sheets are likely to be adversely affected when corporate and household sector financial health is in dire strait, FSIs of corporate and household sector can be considered as *leading indicators* of future shocks to financial stability. By also looking at corporate and household sector FSIs, monetary policy under inflation targeting will be taking account of the possibilities that asset price and household debt imbalances would affect financial stability, and ultimately inflation. By looking at corporate and household sector FSIs, monetary authority will get a glimpse of possibility of risks that may affect inflation in a longer term. Although 8 quarter-ahead inflation is projected to be within target, if FSIs of corporate and household sectors show signs of strain, the monetary authority will be warned that there might be inherent risks to future inflation beyond the projection period, and that there might be a case of policy action.

As discussed above, when FSIs of corporate and household sector are systematically (not on an ad hoc basis) taken into account during the deliberation of monetary policy stance, implicitly, the monetary authority will be looking beyond the customary 8-quarter ahead projection. Since linkages between the strains in corporate and household balance sheets and financial sector balance sheets are mapped out in FSIs framework, the monetary authority will be able to glimpse at what might happen to the financial sector in the future. The possibilities that asset price and household debt imbalances might affect medium term inflation via financial instability will be taken into account. With such a framework, a monetary policy decision will be made with a longer horizon consideration, and a more comprehensive risk assessment made. Note that in this case, the monetary authority is acting to achieve medium term inflation, and not financial instability per se. An advantage gained here is that the monetary authority does not have to put financial stability as an objective in monetary policy reaction function, which could be both impractical and obscure transparency. By systematically incorporating FSIs into monetary policy framework, monetary policy decision will be based on inflation, while financial stability considerations will be automatically taken into account if they are perceived to affect medium-term inflation.

Although the Bank of Thailand's Monetary Policy Committee has recently been giving much focus on the analysis of household and corporate sector financial situations when making monetary policy decision, the analysis to date has been much constrained owing to data limitation. With recent effort concentrate on systemic data collection and compilation with respect to household and corporate sector financial conditions, and in line with Financial Sector Assessment Program (FSAP) that the BOT is going to adopt, the compilation of FSIs on financial sector as well as corporate and household sectors shall continue. (Preliminary assessment of Thailand's financial, corporate and household sector using FSIs is presented in Appendix 1.) With a more comprehensive set of FSIs considered in a manner described above, a longer horizon and a more comprehensive risk assessment of inflation and output projection can be made.

The case of stress testing

By linking corporate, household, and financial sector FSI variables to the macroeconometric model, the monetary authority can assess risks to future inflation more comprehensively, we believe, even for a horizon beyond the projection of the macroeconometric model. Linking FSIs of corporate and household sector to the macroeconometric model means that risks of asset price and household imbalances as well as their interactions with other parts of the economy can be assessed and projected. In practice, the Bank of England and Bank of Norway have linked corporate and household sector FSIs to their macroeconometric models, and accordingly performed stress testing. (See, respectively Hoggarth, 2003, and Bergo, 2003, for example.) The stress tests done in both cases, however, were mainly for *financial stability* assessment per se. Here we propose that stress tests are done for *monetary policy* purposes. Results from the stress tests will suggest how plausible extreme macroeconomic scenarios might affect household and corporate sector balance sheets. With stress testing, a more comprehensive assessment of risks that financial imbalances might pose to inflation could be quantified, at least *explicitly* for the 8 quarter-ahead horizon, and *implicitly* beyond that horizon. Inflation and output projection from macroeconometric model might suffer mean-reverting issue for the horizon beyond 8 quarters, and should not be done. By means of stress testing that give out figures of financial sector's expected losses, unexpected losses, or loss given default, as well as corporate and household sector FSIs, the monetary authority will have picture of how the risks in the financial system might have already accumulated within the 8 quarters ahead, and, implicitly, how serious it can be beyond that 8 quarters, if nothing is done. Taking account of such accumulation of risks in monetary consideration would lessen the probability that financial instability will cause medium term inflation to breach the target.

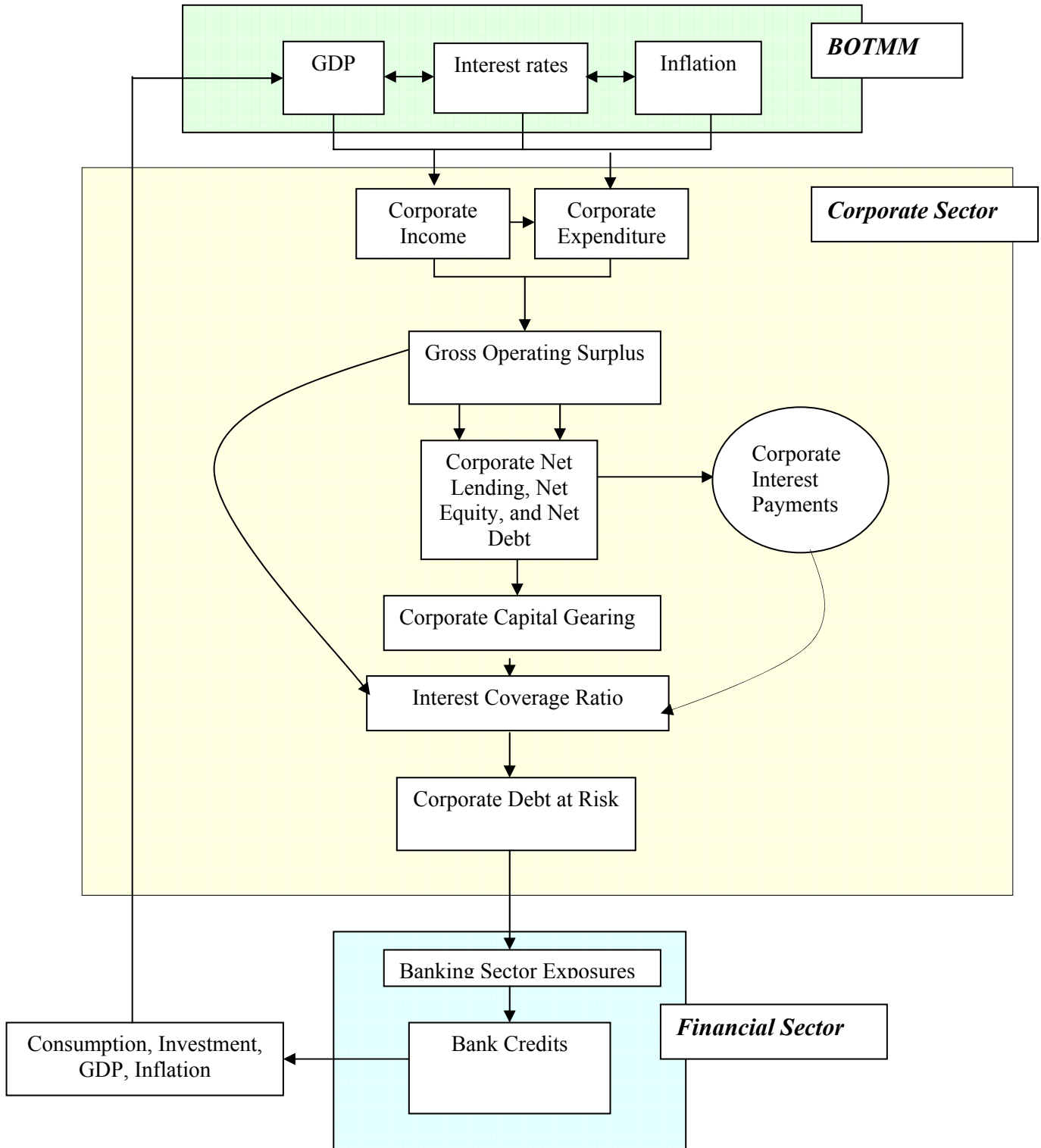
Although stress testing often means testing a system against the plausible extreme scenarios, by linking the corporate, household, and financial sector FSIs to the macroeconometric model, the monetary authority can also perform another related useful task, i.e. sensitivity analysis. Sensitivity analysis in this context can mean a procedure that seeks to identify the exposures and likely

elasticity of responses of financial institutions to relevant economic variables, such as interest rates, exchange rates, equity prices, etc. As such, the monetary authority can analyze marginal effects of monetary policy on financial instability as well as on macroeconomic variables in a consistent manner. For macroeconomic scenarios, variables to simulate may include output growth, interest rates, and exchange rates. The followings are flowcharts of one possible way to link corporate and household sector FSI's with the Bank of Thailand's Macroeconometric Model (BOTMM).

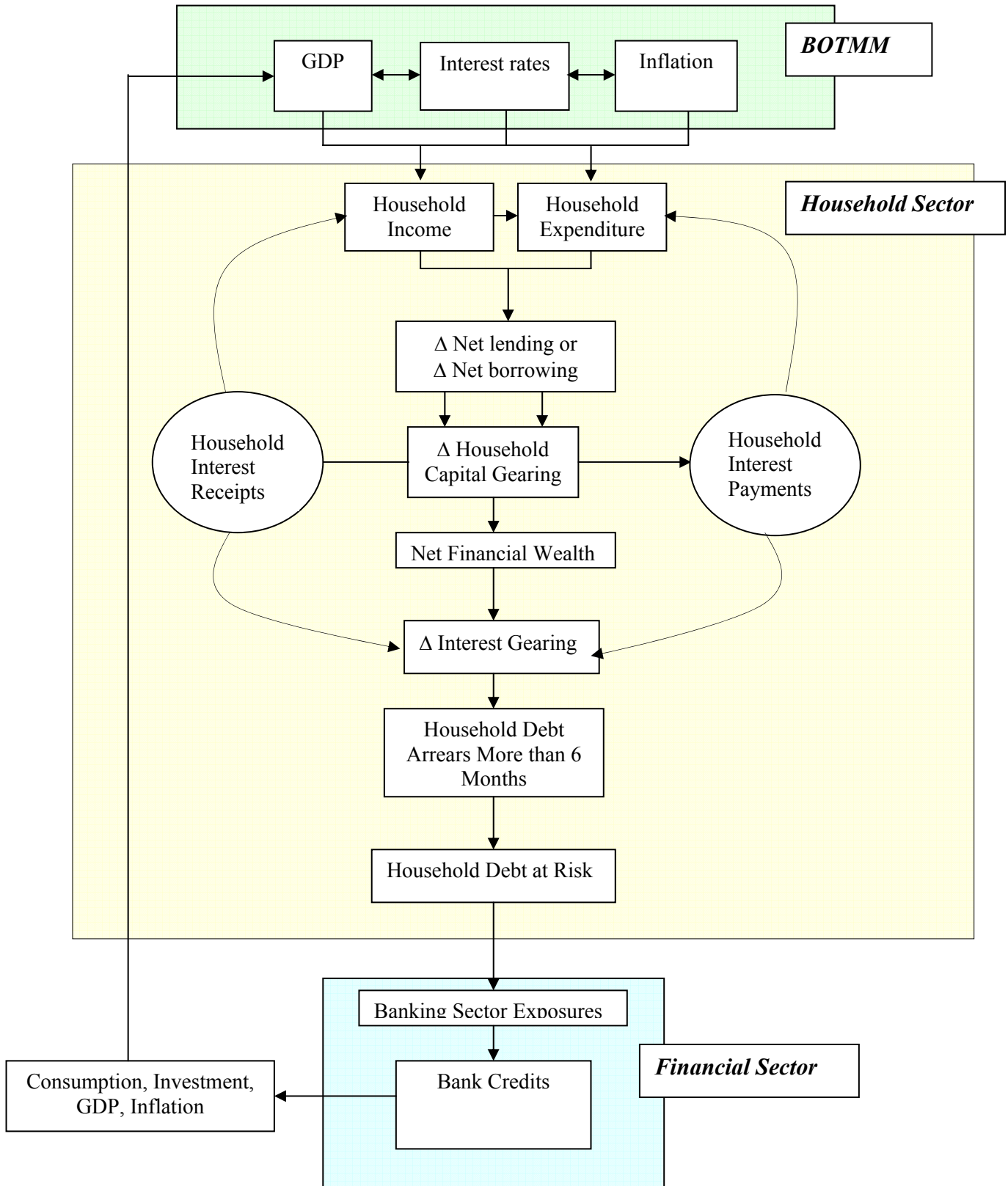
Flowchart 1 below presents one possible way of linking non-financial corporate sector and financial sector soundness with the Bank of Thailand's Macroeconometric Model. Changes in certain BOTMM variables such as real GDP, and real interest rates can affect both corporate income and expenditures, and thus gross operating surplus of corporations. Gross operating surplus of corporations, in turn, can affect corporate net lending, net equity, and net debt. Corporate capital gearing at market value and capital gearing at replacement cost can thus be affected. Corporate interest coverage ratio (interest payments v.s. earnings) and corporate debt at risk can also then be calculated, along with changes in banking sector exposures owing to changes in debt at risk.

Flowchart 2 presents one possible way of linking household and financial sector financial soundness with the Bank of Thailand's Macroeconometric Model. Similar to Flowchart 1, certain key variables from BOTMM, namely real GDP, and real interest rates can affect household sector balance sheets. Changes in real GDP and deposit rates could affect household disposable income and thus expenditures. Lending rates, on the other hand, can also affect household expenditures. The change in household income and expenditures can affect net household lending or borrowing flows, and thus affect household capital gearing and net household financial wealth. The change in net household financial wealth, on the other hand, can affect household interest gearing. The change in household interest gearing, in turn, can affect number of household loans in arrears, and thus the value of debt at risk on the balance sheets of the financial sector.

**Flowchart 1:
Linking corporate sector and financial sector with the Bank of Thailand
Macroeconomic Model (BOTMM)**

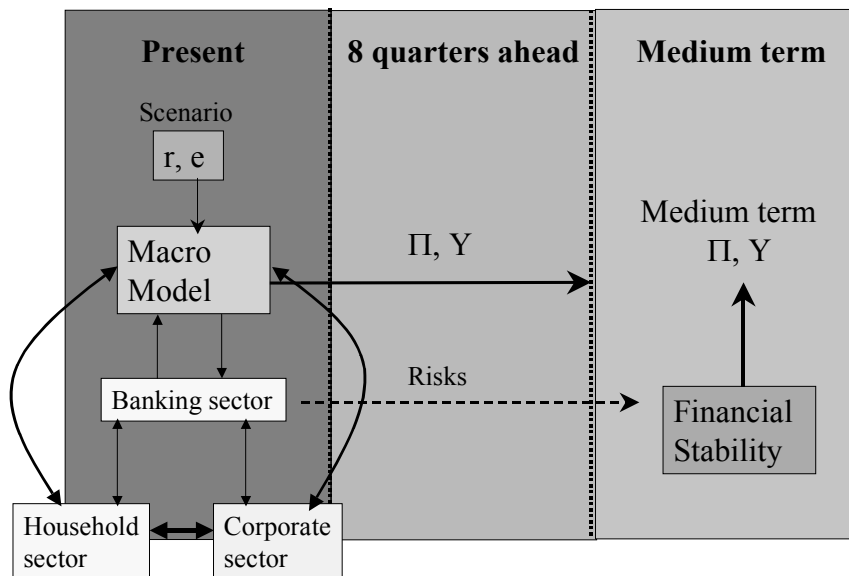


Flowchart 2:
Linking household sector and financial sector with the Bank of Thailand
Macroeconomic Model (BOTMM)



Flowchart 3 below presents the framework in which linking a certain set of household, corporate and financial sector FSIs to the BOTMM might help in determining how macroeconomic shocks could pose risks to corporate, household, and financial sector financial health. Risks to financial stability and thus to inflation and output beyond the 8 quarters forecast horizon can also be assessed by performing macroeconomic stress testing and examine accumulated banking sector exposures at the end of the forecast horizon. In addition, household and corporate debt at risk figures derived from macroeconomic stress testing or sensitivity analysis can also be used as leading indicators of financial stability per se. Completing the loop by linking household spending to corporate income (directly or indirectly via private consumption), and linking bank exposures to changes in credit, and thus private investment, a few “second round” effects can also be calculated. Ultimately, since private consumption and investment are components of GDP, the feedback to output and inflation can be calculated. Although the feedback effects are calculated only for the 8 quarters horizon, the net effects on inflation and output at the end of the horizon shall also give monetary authority a valuable (although, admittedly partial) assessment of what might happen to inflation and output in the medium term.

**Flowchart 3:
Incorporating FSI and macroeconomic stress testing with the inflation targeting framework**



Part V Synergy between monetary policy and prudential measures

We have outlined above how financial stability issues can be incorporated into the inflation targeting framework. The incorporation should *not* be done by putting financial stability directly into monetary policy reaction function but by taking into account the risks of financial instability posed on price and output stability. Prudential measures, on the contrary, serve as the *first line of defense* against financial instability. Prudential measures offer a flexible and useful channel in addressing the buildup of imbalance in question without affecting other areas of the economy.

Since financial instability raises concerns for both monetary and supervisory authorities, there is a case for synergy between the authorities, via database sharing as well as exchanges of information and analytical views on macroeconomic development and financial health. Synergy can also arise between monetary policy and prudential measures, especially when the implementations are designed by taking a forward-looking perspective. For instance, forward-looking prudential measures will encourage the build-up of cushions during good times, enough to absorb the shocks during the unwinding periods when the rule on regulatory capital might need to be relatively relaxed. This helps to alleviate the pro-cyclicality nature of the financial buildups and thereby help to reduce the risks to price stability. At the same time, while focusing on its price stability target over the relatively longer horizon, monetary policy might work to contain the risks of financial imbalance buildup that could ultimately undermine price stability, thus, limiting the risks to financial instability as a by-product. In focusing on their ultimate targets over the longer time horizon, a synergy between the prudential measures and monetary policy is created.

Part VI Conclusion

Although *monetary* stability is the primary aim of monetary policy, conducting monetary without due considerations to *financial* stability can be a grave mistake. Monetary instability and financial instability are intertwined by nature, and one could lead to the other. In this paper, we have identified the fundamental cause of financial instability as excessive financial risk taking behaviour by economic agents. We have also identified macroeconomic environment as typified by macroeconomic policies (monetary and fiscal policy frameworks and stances), and structural policies as possible catalysts for economic agents' excessive financial risk taking behaviour. Reviewing historical experiences, we found that excessive risk taking behaviour by economic agents could manifest in three contexts of financial imbalances that caused financial instability. The three financial imbalances were *excessive external borrowing*, *excessive government borrowing*, and *excessive asset price speculation borrowing*. In addition, we also found *excessive household borrowing* as another potential imbalance that could pose risks to financial instability and ultimately monetary stability, although historically the situation had yet to happen.

The paper argued that monetary policy under inflation targeting with floating exchange rate could help mitigate *excessive external borrowing* as, with no implicit guarantee on exchange rate risks by the central bank, economic agents do not have incentives to take on external borrowing excessively. The paper found, however, that focusing monetary policy mainly on just inflation means excessive borrowing for asset price speculation and excessive household borrowing could arise. Since the primary aim of monetary policy is to ensure monetary stability, the paper argued that ignoring the buildup of financial imbalance would not be appropriate. As in the case of 1990's Japan, financial instability may result in monetary instability. This paper thus suggests two modifications to the current inflation targeting regime. First, inflation assessment should be made for a time horizon longer than the customary 8 quarters ahead. Second, risks of possible financial imbalances on inflation and output should be taken into monetary policy considerations. In practice, the paper proposes the use of corporate, household and financial sector's Financial Soundness Indicators, as well as macroeconomic stress testing in assessing medium-term inflation outlook.

Appendix 1: Empirical assessment of Thailand's financial stability

In this section, we assess Thailand's financial stability using a preliminary set of Financial Soundness Indicators. Owing to current data limitations, however, we have not formally incorporated household, corporate, and financial sector FSIs into the Bank of Thailand's Macroeconometric Model the way outlined in Part IV. At the moment, in preparation to adopt the IMF's FSAP, the Bank of Thailand is in the process of compiling and constructing FSIs. The assessment done here are thus preliminary.

Recent development and potential attribution to risks of financial instability

After the crisis in the late 1990's, Thai macroeconomic policies have been on a loose stance. At the same time, the government has introduced a series of structural measures served to induce household consumption and recovery in business sector, particularly real estate and equity market. The supportive macroeconomic environment has helped induce economic growth that was reflected partly by the increase in household consumption as well as investment, which can also be catalyst for excessive risk taking behaviour by economic agents. Such behaviour is evidently reflected by the boom in the asset markets and the rise in household debt. As suggested earlier, since financial instability can undermine monetary stability, it is important that we have a clear grasp of the current financial soundness in the Thai banking system. One way to assess financial soundness is through means of assessing the degree of *vulnerabilities* to shock and *strength* of the banking system to absorb losses from such shock.

Assessment of risks

Non-financial Sector: Corporate and Household

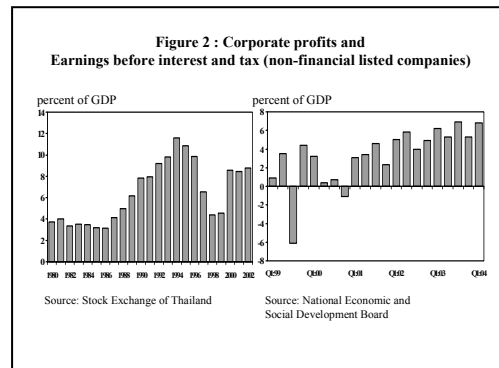
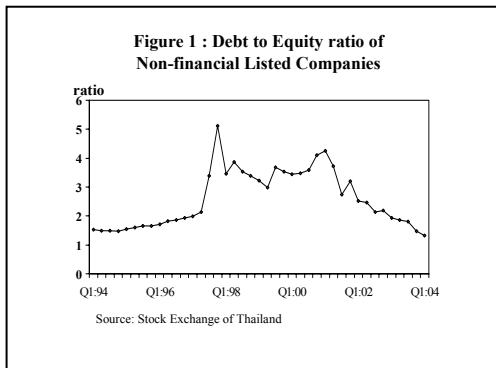
Developments in the corporate and household financial health can have direct implications on bank balance sheets. Information on corporate and household health can thus serve as good leading indicators of financial instability. By taking into account the assessment of risks posed on corporate and household balance sheet, we can better gauge the risks posed on bank balance sheet especially in terms of asset quality via credit linkages between the banking sector and their customers.

Corporate sector

Strength

Corporate strength has improved continually as reflected by its leverage ratio and profitability, making them more resilient to adverse shocks and thus posing lesser degree of credit risks on bank balance sheets. ***Total debt to equity ratio*** (of non-financial companies listed in SET) has been declining due mainly to recapitalization, debt-equity swap, debt repayment, and increased corporate profits. Corporate profitability, as measured by ***corporate profits*** and ***earnings before***

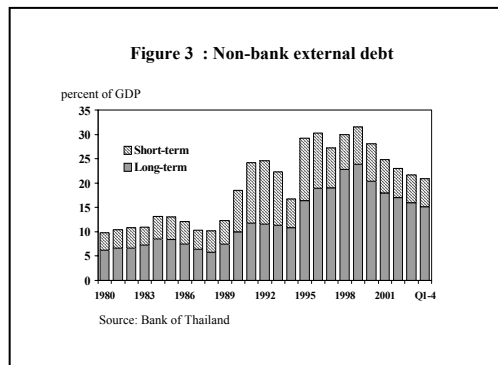
interest and tax, remained in strong positions as a percentage of GDP for the past few years.



Vulnerability

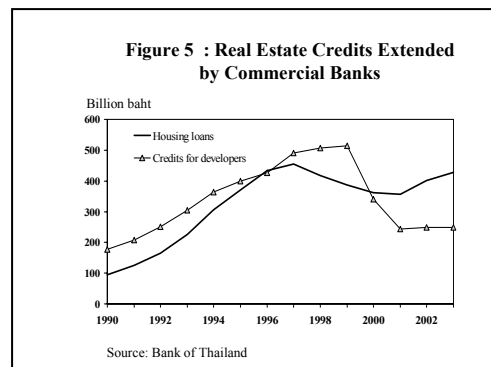
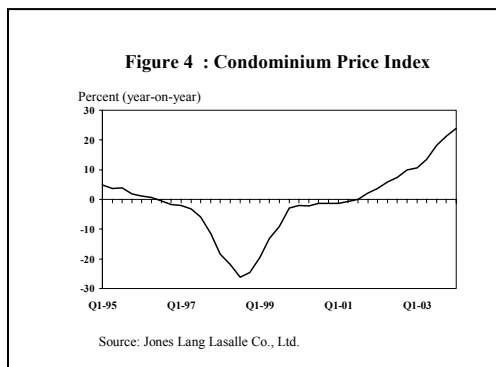
Corporate sector financial health is found to be less vulnerable to foreign exchange fluctuations. Foreign exchange exposure as proxied by the ratio of

corporate borrowing in foreign currency to total borrowing was remarkably low, at 6.7 percent as of May 2004. The overall outstanding stock of *private non-bank external debt* has declined from the peak of 32 percent of GDP in 1999 to 21 percent in 2004 Q1. In addition to the quantitative decline, firms have also significantly improved their foreign currency risk management by hedging against their foreign currency obligations.



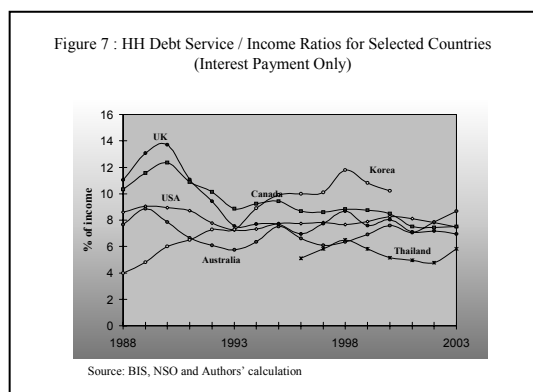
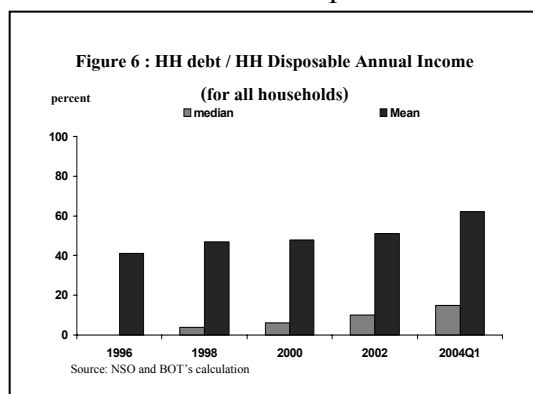
Real estate sector

Recently, real estate sector has experienced rapid growth. Land transaction value, construction area permitted as well as *condominium price index* all rose markedly. In recent years, *credits to property sector*, namely mortgage and credit to property developers, also rose considerably, providing good information on the possibility of asset price speculation, as bank lending to property sector shares cycles with property price. Such indicators might imply increased risks posed on bank balance sheet, an issue which will be discussed subsequently.



Household sector

Household debt to income ratio remains low by international standard, although household debt service ratio could rise considerably given an interest rate hike. Accelerated run-up in household debt may imply household vulnerability to



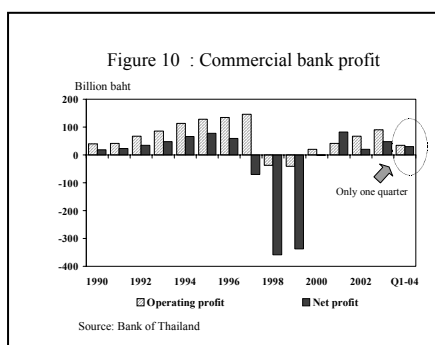
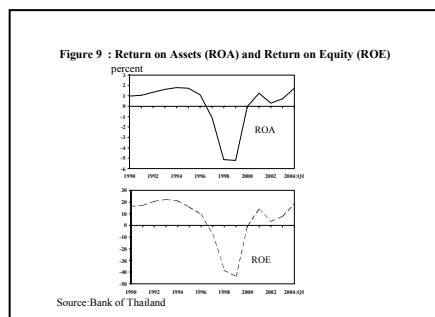
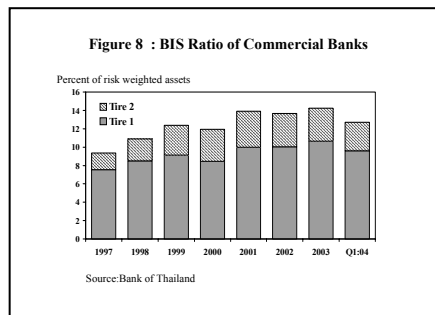
interest rate increase. According to the sensitivity analysis on interest payment by Thaicharoen, Ariyapruchya, and Chucherd (2004), under their worst-case scenario on interest rate changes, household *debt service ratio* would rise to the level beyond the historical peak, reached in 1998. However, even at that level, it still remains comparable to the level of international standard. Therefore, from a macroeconomic perspective, it is not yet a clear sign of household debt being excessively accumulated. Nevertheless, the study indicates that some groups of household, namely low income group which experiences relatively high rate of debt build up, are more vulnerable.

Although the current status of household debt has not posted any alarming signs, medium-term risk should be monitored, especially in terms of household behaviour. In the recent years, greater household borrowing capacity has facilitated faster rising consumption compared to household disposable income, as reflected by a fall in household saving rate. As debt accumulated considerably following periods of heavy borrowing, the household sector may choose to slow down their debt acquisition, at the expense of consumption expenditure. The cut in consumption expenditure, in turn, could hurt corporate profits.

Banking Sector

We have earlier assessed the conditions of the corporate and household sectors, considering them as the leading indicators of risks to financial stability. Now we turn to the health of the banking sector, assessing banking sector strength and vulnerability, to see if there is any potential risk to financial stability, which could, in turn, undermine monetary stability.

Assessing banking sector Strength



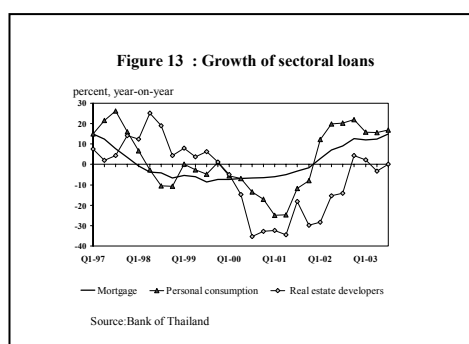
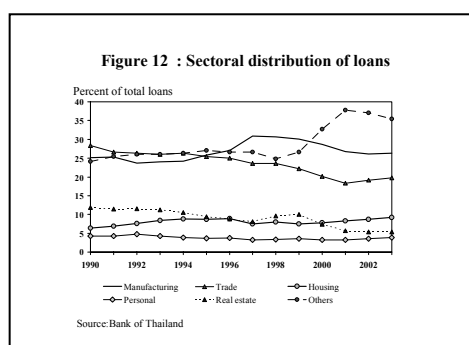
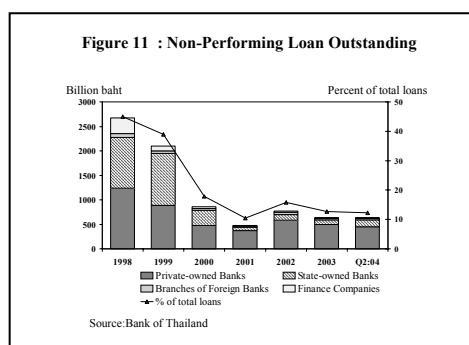
Thai banking sector is well cushioned against shocks, alleviating the possibilities of financial instability. Banks have maintained considerably higher than the minimum requirement *capital adequacy ratio* of about 14.6 percent of risk-weighted assets at the end of 2004 Q1, with a relatively higher share of their regulatory capital in high quality ‘Tier 1’ capital. At the same time, earnings and profitability—as measured by *return on assets and equity* as well as banks’ *operating profits*—could well supplement the capital cushion against shocks, strengthening the banking sector conditions and mitigating risks from financial instability.

The resiliency of the Thai banking system to shocks can also be measured using stress testing. Nakornthab, Karnchanasai, and Piamchol (2004) apply stress testing on bank balance sheet given a 30 percent fall in property prices to assess how well the Thai banking system (test conducted on Thai commercial banks only) can absorb the shock from a slowdown in real estate market. They conclude that such a fall would render the aggregate capital ratio to fall from 13.4 percent to 11.9 percent, well above the required minimum of 8.5 percent. Given the current capital position, banks appear well-placed to withstand a slowdown in property market.

Assessing banking sector vulnerability

Asset quality

The concentration of lending to real estate and household sectors has posed higher risks on bank balance sheet, and thus risks of financial instability. However, although such increase might raise bank vulnerabilities, in terms of the level, risks remain low. On the whole, the credit quality of the banking system has improved as measured by the *non-performing loans (NPLs) to total loans ratio*, declining to 12.0 percent of total loans. As for the *sectoral distribution of loans*, we see that the largest share in the Thai banking system remains to be corporate sector, mainly manufacturing and trading sectors. Given a sound financial health of corporate sector as assessed earlier, both in terms of their leverage ratio and profitability as well as their limited exposure, we can construe that risks posed on bank balance sheet on the whole, in terms of credit quality, are rather limited.



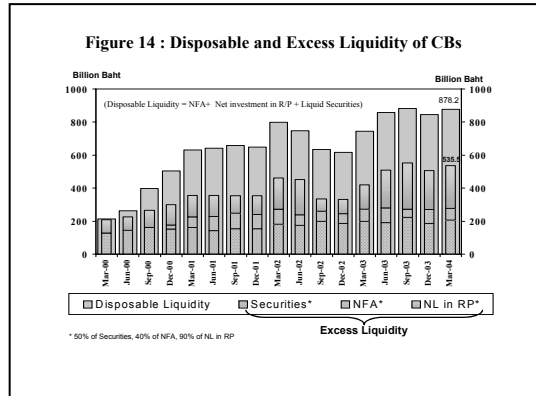
With regards to our concerns on the growing credits to household consumption, the share of total loans, however, remained relatively small. This shift of loans more towards household consumptions has in a way reflected a more diversified portfolio of loans for banks as well as more manageable cash flows for banks as consumer loans are relatively easier to predict. The increase in bank lending to households thus has only a low probability of instigating financial instability. (The impact of household consumption behaviour on other economic variables, however, needs to be monitored.)

In terms of credit to property sector, the growing credit extension both to real estate developers and to residents, has raised concerns over the vulnerabilities of bank to the fluctuations of property prices and to the concentration of loans to this sector. Again the share of credit to real estate remained relatively small. Furthermore, Nakornthab, Karnchanasai, and Piamchol (2004) suggest that banks have taken into account for future interest rate increases when they price their mortgage plans. This is done by means of ‘extra reduction’ in principal payments during the early periods of the contracts, facilitated by low and fixed interest rates.

They also point out that mortgage loans are considerably backed by collaterals, with loan-to-value ratio averaging around 80 percent.

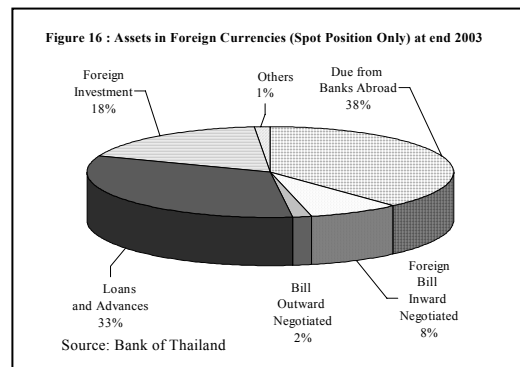
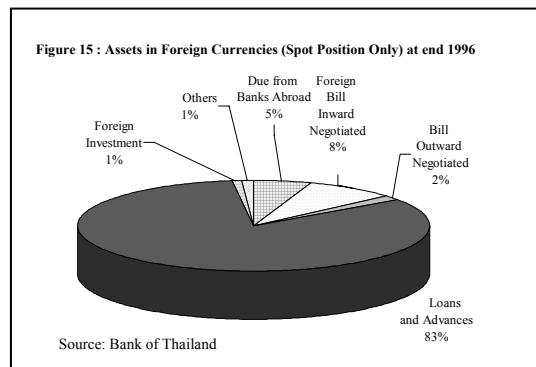
Liquidity risks

Liquidity risks posed on the Thai banking system is of no particular concern, given large amounts of disposable liquidity in the banking system. The increasing trend is partly due to the fact that, following the financial crisis in 1997, banks had cut back on credit extensions as large proportion of loans turned NPLs. Excess liquidity, on the contrary, is more of a concern as they can undermine the effectiveness of the monetary policy. Recent economic recovery that led to an increase in credit expansion, and the issuance of FIDF bonds, however, should help reduce excess liquidity in the banking system.



Excess liquidity, on the contrary, is more of a concern as they can undermine the effectiveness of the monetary policy. Recent economic recovery that led to an increase in credit expansion, and the issuance of FIDF bonds, however, should help reduce excess liquidity in the banking system.

Sensitivity to market risks



Banks are much less vulnerable to volatility in **foreign exchange**, implying less strain on the bank balance sheets. Banks have been subjected to the 15 percent (of capital) net open position rule since prior to the 1997 crisis and therefore foreign exchange exposures are limited by such ratio. Yet the quality of hedge has vastly improved in terms of foreign exchange rate risks. Prior to the crisis domestic banks that borrowed externally onlent such loans to domestic firms directly in foreign currency with a relatively lax standard. After the crisis, banks have been investing in safe assets abroad, and thereby mitigating currency risks.

Impact of **interest rate** changes, however, need to be closely monitored as there exists increased concentration to real estate sector, which have implications on credit quality of bank balance sheets. As mentioned above, recent study by Nakornthab, Karnchanasai, and Piamchol (2004) suggests that banks have taken into

account for an interest rate increase when calculating the mortgage monthly payments. A sharp increase in interest rate, however, might force some banks to renegotiate their mortgage contracts.

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