FINAL REPORT

THE GLOBAL FINANCIAL CRISIS 2007-2009: CONSEQUENCES TO INTERNATIONAL FINANCIAL MARKET AND IMPLICATION TO THAI ECONOMY

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EXECUTIVE SUMMARY

The global financial crisis of 2007-2009 had wreck havoc the world financial systems. It was the worst financial crisis since the Great Depression of the U.S. in the 1930s. Many western medias call it "the Great Recession"; the crisis had compelled central banks around the world to inject liquidity into the markets to alleviate global panic. Bailouts and nationalizations of both financial and non-financial institutions followed. The central idea of this report is to evaluate the impact of the crisis on Thai economy.

The report is organized into four sessions. The first session briefly reviews the origin of the crisis and presents the chronological of major events of the crisis. The global financial crisis of 2007-2009 had its root from relaxed macroeconomic policy, advanced financial engineering, lenient financial sector supervision and regulation, and reckless activities of financial institutions. The crisis was set off by the U.S. subprime mortgage crisis led to worldwide credit crunch and global panic.

Session two investigates the effects of global financial crisis to the macroeconomic situation in Thailand. The estimation results of the transmission channels of the global crisis to domestic economy indicate that the international trade channel has significant negative impacts to the economic activities while the financial linkage has marginal effect to the domestic consumption and investment. In tackling with the effects of the global crisis, the fiscal and monetary policies are employed. The transmission mechanisms of fiscal and monetary policies show that full effect of monetary policy to the real sector takes approximately 3-8 quarters. For the fiscal policy, the effect feels immediately but also vanishes quickly after the end of the stimulus packages. Therefore, the fiscal policy provides most of its effects during 2009, while the monetary policy influences economy in the second half of 2009 and the first half of 2010.

The major policy implication of these results is that Thai economy is highly dependent on the export in order to drive the GDP growth. The importance of export is not only from the direct source of demand of production but also the indirect effect via the investment decision. The export-orientated investment projects and the role of multinational companies (MNCs) have the significant effects to private investment expenditure. In addition, the size of impacts from global trade slump is estimated to be too large for the fiscal and monetary policies to offset these adverse effects. Therefore, in the future, this issue should be addressed to prevent the spillover effects of the crisis in the advanced economies to Thailand.

Session three presents the implications of the global financial crisis to financial sectors both globally and locally. For the implication to Thailand's financial sector, through Thai experts' opinions, the similar types of financial crisis is less likely to occur in Thailand because of a less complexity of the market. However, that does not mean there will not be some other types of financial crisis. To prevent or minimize the effect of the next financial crisis, Thailand must have fundamentally-sound financial market. To achieve this objective, human development and product development have to be parallel. Finally the last session provides concluding remarks.

I. ORIGIN OF THE CRISIS AND TIMELINE

Considered by many observers as the most severe financial crisis since the Great Depression of the 1930s, the global financial crisis of 2007-2009 has caused financial market mayhem around the world, resulted in the failure of many large financial institutions, and contributed in the bailout of financial institutions by many governments. The crisis also affected the real sector leading to the closure of many real crucial businesses and the contraction of the world economy. The crisis was instigated by the credit crunch in the US banks caused by the collapsed of the US housing bubbles. The results eventually lead to global panic on the financial markets.

Origin of the crisis

The origin of the crisis stems from late 1990s when the US enjoyed the "Great Moderation" period, experiencing substantially low inflation rate, low interest rate, and steady growth. During this period, the US also experienced a large foreign capital inflow, especially from Asians countries pegging the exchange rates and hedging their own currencies against the dollar. The Federal Reserve pursued lax monetary policy and maintained low interest rate. Both conditions of low interest rate and large capital inflow created a lot of liquidity in the market, encouraging credit growth and assets bubble. The credit market debt of household and non-financial business grew substantially, according to IMF, from 118percent to 173percent of GDP during 1994-2007. With ample money supply and low interest rate, borrowers are encouraged to buy homes. Low-quality mortgages, known as "subprime" mortgages emerged in response to a good prospect of business and rising property prices. Such mortgages grew considerably partly due to cheap credit and low lending standard. By 2006, subprime mortgage shared more than 20percent of annual total mortgages.

Instead of lending directly to homeowners, banks passed on the loans to other investors by securitizing them. This kind of securitization became popular since the Federal

National Mortgage Association (Fannie Mae) issued the mortgage-back securities (MBSs) in 1981. More advanced instrument that banks create is structured product called collateralized debt obligations (CDOs). The CDOs are asset-back securities that combine several types of loans such as MBSs, corporate bonds, credit card and other receivables. By slicing CDOs into different trances regarding risk quality (senior, mezzanine, and equity levels), it can be sold for different risk appetite investor groups. The investors can also managing risk by purchasing credit default swaps (CDS). The CDS acts like insurance, which buyer pays a periodic fee for a guarantee payment should there is a default of a tranche.

One problem of banks' practice is that they often use the "off-balance-sheet" vehicle by investing a long-term asset and borrowing with a short-term asset-back commercial paper. This maturity mismatch raise funding liquidity risk to banks since they have to roll over the short-term debt. Moreover, banks usually engage in high leverage. The lenient regulation helps contribute to this. For example, in 2004 the US Securities Exchange Commission (SEC) relaxed the net capital requirement for big investment banks, so they were able to leverage up to 40 times their initial investment.

The sign of the crisis started with defaults of the subprime mortgage as the interest rate climbing up. The housing market was over supplied as the homeownership reached its peak in 2004, resulting in a fall in home price. Unable to refinance, substantial subprime mortgages resulted in foreclosures. For investors of the CDOs who highly leverage their positions with short-term loans, they could lose their capital even when the default rates were low. These banks then had to seek for capital to reduce their leverage ratio or sell their assets, which further depressed the asset price and further increase the need for capital. This was a situation of full-brown liquidity crunch.

Global Financial Crisis 2007-2009 timeline of major events

The first sign of the 2007-2009 financial crisis appeared in early 2007 when an increase in subprime mortgage defaults set off the liquidity crisis. Note that at the beginning of

2007, the federal funds rate[3] was 5.25percent. In February 2007, as the subprime defaults kept increasing, the Federal Home Loan Mortgage Corporation (Freddie Mac) announced that it will stop buying any subprime mortgages and mortgage-related securities. In that same month, HSBC Bank, one of the largest banks in the world, reported losses linked to the US subprime mortgages.

A few months later, New Century Financial Corporation, a leading subprime mortgage lender, files for Chapter 11 bankruptcy protection in April 2007. On May 4, 2007, the hedge fund Dillon Read owned by the Swiss investment bank UBS was closed due to losses in the subprime mortgages. Within the same month, Moody's Investor Services put 62 tranches (asset group) based on 21 US subprime mortgage securitizations on a "downgrade reviews". This review led to price decline in the subprime-related products which further decreases the value of the products.

In June and July 2007, the three rating agencies; Fitch, Moody's, and Standard & Poor's downgraded the ratings of numerous subprime-related products. On June 7, 2007, Bear Stearns suspended redemptions from its CDOs-invested hedge fund, the High-Grade Structured Credit Strategies Enhanced Leverage Fund. Later in mid-June, Bear Stearns had to inject $3.2 billion into its two troubling hedge funds to protect its reputation. Both hedge funds, invested in the thinly-traded CDOs, were having problems meeting margin calls amid sharp decline in the subprime loans. Bear Stearns eventually had to liquidate these two hedge funds at the end of July 2007. The federal funds rate at the time was still at 5.25percent.

On July 24, 2007, a major US mortgage bank, Countrywide Financial Corporation, announced a decrease in earning and issued a warning of "difficult conditions". In mid-August, Countrywide had to borrow $11.5 billion, which was the entire available credit lines it had with other banks. Countrywide's credit rating was also downgraded by Fitch Ratings to BBB+, the third lowest investment-grade rating. At the end of July 2007 also witnessed another US mortgage lender in trouble. American Home Mortgage Investment Corp., the tenth-largest retail mortgage lender at the time, announced that it

[3] The federal funds rate is the interest rate at which depository institutions lend balances at the Federal Reserve to other depository institution overnight. The rate is the target rate voted by the Federal Open Market Committee (FOMC) at regularly scheduled meetings. Source: The Federal Reserve website, www.federalreserve.gov.

cannot finance any home loans and may need to liquidate asset. American Home Mortgage finally declared bankruptcy on August 6, 2007. During the same period, the first two European banks fail victim to the subprime crisis had emerged. The first was a small German bank, IKB. It had trouble rolling over asset-backed commercial paper in July 2007 and eventually received a rescue fund of €3.5 billion. On August 9, 2007, BNP Paribas, France's largest bank, froze redemptions on three of its hedge funds because it could not determine the values of the invested structured products.

Following those events, the Federal Reserve Board wanted to increase market liquidity prompting the Board to reduce the primary credit rate to 5.75percent, 50 basis points above the federal funds rate target on August 17, 2007. In addition, the Board also increased the maximum primary credit borrowing period to 30 days, renewable by the borrower. The Federal Reserve had hoped that the reduction and lengthening of the primary credit rate would help troubled banks; however, most banks were hesitant to borrow because that will indicate a lack of credit-worthiness to the interbank market which will lead to higher cost of borrowing.

The beginning of September 2007 saw the interbank rate or LIBOR (London Interbank Offered Rate) rose to 6.7975percent, the highest level since December 1998. The high rate, which is much higher than the Bank of England's base rate of 5.75percent, suggested that money market participants were worried about other banks solvency and reluctant to lend to each other.

The subprime crisis also spread to the United Kingdom in September 2007 when Northern Rock, the UK's fifth-largest mortgage bank was having difficulty funding its short-term finance through the interbank market. The Northern Rock bank run was the first bank run in the UK for over a century. Afterwards, on September 14, 2007 Northern Rock received liquidity support from the Bank of England authorized by the Chancellor of the Exchequer. Four days later on the 18th of September 2007, the Federal Open Market Committee (FOMC) reduced its target for the federal funds rate 50 basis points to 4.75percent and the Federal Reserve Board also reduced the primary credit rate further to 5.25percent.

October 2007 started with subprime-related losses from three major banks. First, the Swiss bank, UBS reported a loss of $3.4 billion from its subprime investments while another bank, Citigroup announced a loss of $3.1 billion. A third bank, Merrill Lynch, made a loss of $5.5 billion as a result of the subprime crisis. A series of mortgage investment write-downs also occurred in this month. On October 15, 2007 Citigroup, Bank of America, and JPMorgan Chase announced plans for an $80 billion Master Liquidity Enhancement Conduit to purchase highly rated assets from existing special purpose vehicles. At the end of October 2007, the FOMC voted to reduce its target for the federal funds rate 25 basis points to 4.50 percent. The Federal Reserve Board voted to reduce the primary credit rate another 25 basis points to 5.00 percent.

Financial market pressures intensified in November 2007 when earlier estimate of the mortgage markets total loss of approximately $200 billion had to be revised upward. This meant that many banks had to take on additional losses and write-down. The event convinced the Fed to lower its fed funds rate to 4.25percent on December 11, 2007. The primary credit rate was also lowered to 4.75percent.

On December 12, 2007 the Federal Reserve Board announced the creation of a Term Auction Facility (TAF) in which fixed amounts of term funds will be auctioned to depository institutions against a wide variety of collateral including the mortgage-backed securities. The FOMC also authorized temporary reciprocal currency arrangements (swap lines) with the European Central Bank (ECB) and the Swiss National Bank (SNB). The Fed stated that it will provide up to $20 billion and $4 billion to the ECB and SNB, respectively, for up to 6 months. The move temporarily helped calm the interbank market and lower the interbank rate.

The 19th of December 2007 witnessed the first rating downgrades of the so-called monoline insurers by Standard&Poor's. These monoline insurers specialize in one product, insuring municipal bonds against defaults. However, during the crisis, they also expanded the coverage to mortgage-backed securities and other structured finance products. The downgrades were due to concerns that these insurers were undercapitalized and may not be able to pay. The Master Liquidity Enhancement Conduit announced earlier by Citigroup, J.P.Morgan Chase, and Bank of America in

October 2007 was cancelled on December 21, 2007 citing a lack of demand and that the fund "is not needed at this time."

The 2008 was the most turbulent year which began when Bank of America announced its purchase of the troubled Countrywide Financial worth approximately $4 billion in January. In mid-January, Citigroup reported a massive amount of $18 billion wrote-down on subprime mortgage-related exposures and Merrill Lynch, in need of capital infusion, had to sell $6.6 billion stakes to foreign investors. Stock markets around the world tumbled and suffered their biggest losses since September 11, 2001.

On January 22, 2008 the FOMC voted for an emergency cut of its target for the federal funds rate to 3.5percent, a three-quarter of a percentage point – its biggest cut in 25 years. The Board also voted to reduce the primary credit rate to 4percent. By the end of January, the Fed cut its fed funds rate again to 3percent.

In February 2008, the Swiss bank UBS confirmed a subprime loss of $18.4 billion and the U.K. Treasury Department finally nationalized the troubled mortgage bank Northern Rock.

At the beginning of March 2008, Federal Reserve Broad announced $50 billion TAF auctions and would extend TAF for another 6 months. Also, they launched an initiative on a series of term repurchase which aimed to draw $100 billion. On March 11, 2008 one of the biggest interventions of the Federal Reserve was announced, the injection of $200 billion of fund for financial institutions to alleviate liquidity crunch. Three days later on March 14, with the support of the Federal Reserve Board, Bear Sterns was bought by J.P.Morgan Chase. This bailout plan caused a plummet in the company stock price and confidence. The Board also announced that there would be a close market monitoring and liquidity provisions as needed for the market. The fed fund rate was further cut to 2.25percent

In April 2008, there were the widespread write-downs and fund raisings of banks such as UBS $19 billion write-down, Deutsche Bank $4 billion write-down, Washington Mutual raising $7 billion, Merrill Lynch raising $9.55 billion, the Royal Bank of Scotland

aimed to raise $24 billion, and Citigroup stock offering of $4.5 billion. On April 8, the IMF warned that the loss from the credit crunch could reach $1 trillion worldwide. The effect of subprime extended to other sectors like commercial property, consumer credit, and commodity debt. The fed fund rate reached 2percent by the end of April.

On May 22, 2008 The Swiss bank UBS, one of the worst affected by the credit crunch, launched a $15.5 billion rights offer to cover some of the $38 billion write-down related to U.S. subprime crisis.

In the beginning of June 2008 Standard & Poor's cut the ratings of Morgan Stanley, Merrill Lynch, and Lehman Brothers and downgraded monoline bond insurers AMBAC and MBIA. The FOMC voted to maintain its target for the federal funds rate at 2.00 percent on June 25, 2008.

In mid-July, 2008 Financial authorities step in to assist America's two largest lenders, Fannie Mae and Freddie Mac. As owners or guarantors of $5 trillion worth of home loans, they were crucial to the US housing market and authorities agreed they could not be allowed to fail. The Securities Exchange Commission also issued an emergency order temporarily prohibiting naked short selling in the securities of Fannie Mae, Freddie Mac, and primary dealers at commercial and investment banks. At the end of July 2008, Merrill Lynch had $5.7 billion of write-down on CDOs and associated hedges.

The FOMC voted to maintain its target for the federal funds rate at 2.00 percent on its August 2008 meeting. On August 9, 2008, Investment bank BNP Paribas halt redemption on two of its funds because it could not value the assets in them – due to a "complete evaporation of liquidity" in the market. The European Central Bank (ECB) injected €95 billion in to the banking market to try to improve liquidity. It added another €108.7 billion over the next few days.

September 2008 was marked as the month of global panics and loss of confidence that began calmly when the ECB and the Bank of England kept their interest rates unchanged at 4.25percent and 5percent, respectively.

On September 7, 2008 The Federal Housing Finance Agency (FHFA) placed Fannie Mae and Freddie Mac, the US's two largest lenders worth of $5 trillion home loans, in government conservatorship. This was one of the largest bailouts in US history.

On September 15, 2008 Lehman Brothers Holdings Incorporated filed for Chapter 11 bankruptcy protection. This is the largest bankruptcy filing in the history of the United States at $639 billion. The world panics and shares in stock markets around the world plunged. On that same day, Bank of America agreed to acquire Merrill Lynch & Co. for $50 billion. The next day, the 16th of September, The Federal Reserve Board authorized the Federal Reserve Bank of New York to lend up to $85 billion to the American International Group (AIG) in return for an 80percent equity stake in the company. The FOMC voted to continue its target for the federal funds rate at 2.00percent.

As the crisis worsened, on September 17, 2008 Russia suspended its stock market trading for two days while LIBOR reached a seven-year high. Central banks around the world injected $180 billion into the international banking system in a concerted effort to end the crisis. Authorities in the US and UK banned short-sellings of financial institutions shares.

On Friday, September 19, 2008 Stock markets around the world recovered after the Federal Reserve briefed on the previous day regarding an ambitious plan to create a federal "bailout plan." Later, the Bush Administration announced the $700 billion bailout plan to confront the crisis. The following Monday, the 22nd of September Morgan Stanley and Goldman Sachs gave up their status as investment banks and became bank holding companies accepting deposits, marking a dramatic transform on Wall Street. Japan's Nomura bought Lehman Brother's Asian operations.

The end of September 2008 witnessed several incidents: Warren Buffet invested $5 billion in the much-needed-cash Goldman Sachs, Ireland became the first nation in Europe to fall into recession, Washington Mutual (the US's biggest savings and loan company) was seized by federal regulators and sold to J.P.Morgan for $1.9 billion, and the credit crisis struck Europe's banking sector causing Fortis (a leading European banking and insurance company) to be partly nationalized.

The $700 billion bailout plan was signed into law the Emergency Economic Stabilization Act of 2008, which established the Troubled Asset Relief Program (TARP) on October 3, 2008. The UK announced its own version of the bank rescue package of £500 billion on Wednesday, October 8, 2008. That same day, the Federal Reserve, the Bank of England and the European Central Bank all cut half a percentage point off their key interest rates in the first unscheduled rate move since the aftermath of 9/11. The fed funds rate was reduced to 1.50 percent. In the second half of October 2008, stock markets around the world plummeted again as the global recession was imminent. The Fed reduced its target of the fed funds rate once more to 1.00percent.

At the beginning of November 2008, the Fed announced the new formula to calculate the interest rate paid to depository institutions on required and excess reserve balances. The rate on required reserves would be calculated by averaging the target federal funds rate over the reserve maintenance period. The rate on excess balances would be set at the lowest FOMC target rate in effect during the reserve maintenance period. On November 10, Federal Reserve reported a restructuring of the support of AIG, that the treasury would buy $40 billion of preferred stocks. Part of it would be used to reduce the Fed's loan to AIG. The board also cut down the interest and lengthened the term of loan.

On November 12, the U.S. Treasury Secretary Paulson announced that the Treasury had decided not to use TARP funds to purchase illiquid mortgage-related assets from financial institutions. Five days later, three large life insurance companies: Lincoln National, Hartford Financial Services Group, and Genworth Financial, seek TARP funding. On November 20, Fannie Mae and Freddie Mac announced that they will suspend mortgage foreclosures until January 2009. On November 21, 2008 the U.S. Treasury Department announced that it would help liquidate The Reserve Fund's U.S. Government Fund. The Treasury agreed to serve as a buyer of last resort for the fund's securities to ensure the orderly liquidation of the fund. On the same day, The U.S. Treasury Department purchased a total of $3 billion in preferred stock in 23 U.S. banks under the Capital Purchase Program.

On November 23, 2008 the U.S. Treasury Department, Federal Reserve Board, and FDIC jointly announced an agreement with Citigroup to provide a package of guarantees, liquidity access, and capital. Citigroup would issue preferred shares to the Treasury and FDIC in exchange for protection against losses on a $306 billion pool of commercial and residential securities held by Citigroup. The Federal Reserve would backstop residual risk in the asset pool through a non-recourse loan. In addition, the Treasury would invest an additional $20 billion in Citigroup from the TARP.

On November 25, 2008 the Federal Reserve Board announced a new program to purchase direct obligations of housing related government-sponsored enterprises (GSEs)—Fannie Mae, Freddie Mac and Federal Home Loan Banks—and MBS backed by the GSEs. Purchases of up to $100 billion in GSE direct obligations would be conducted as auctions among Federal Reserve primary dealers. Purchases of up to $500 billion in MBS would be conducted by asset managers.

On the 1st of December 2008 the National Bureau of Economic Research confirmed the US recession. Both France and Germany announced their own stimulus packages in the first week of December 2008. Central banks around the world slashed their key interest rates.

On December 16, 2008 the FOMC voted to reduce the fed funds rate from 1.00percent to a range of between 0 and 0.25 percent to fight the recession. The US government announced that up to $17.4 billion of the $700 billion TARP fund meant for the banking sector will be used to help the distressed Big Three US carmakers: General Motors (GM), Ford and Chrysler.

At the end of December 2008 the US Treasury unveiled a $6 billion bailout for GMAC, an automobile financing arm of General Motors. Major stock markets around the world closed down for the year ranging from 30percent to more than 40percent. Some market has its largest annual drop since the index began trading.

The 2009 was the year the effects of the credit crunch crisis took place in terms of job losses and global recession. In January 2009 the Federal Reserve Bank of New York

began purchasing fixed-rate mortgage-backed securities guaranteed by Fannie Mae, Freddie Mac and Ginnie Mae under a program first announced on November, 2008. The Bank of England cut its key interest rates to 1.5percent on January 8, the lowest level in its 315-year history. The UK also reported its 2008 forth quarter economy decline of 1.5percent, the worst performance in 28 years. The US economy also slowed at the sharpest rate in 26 years.

In February 2009, the Australia government announced a stimulus program of A$42 billion ($26.5 billion). The number of job cut increased across all continents from Japan to Spain. In mid-February, the Euro-zone GDP dropped 1.5percent. Troubled US carmakers GM and Chrysler asked the US government for another $21.6billion in support, on top of the $17.4billion already received. At the end of February, Japan reported an export drop of 46percent in January 2009 while Hong Kong 2008 fourth-quarter economy contracted 2.5percent. Fannie Mae reported a full year 2008 loss of $58.7 billion.

On March 4, 2009 Australia reported a shrunk in economy, its first time in eight years. The ECB and Bank of England cut rates to 1.5percent and 0.5percent, respectively. For the UK, the interest rate was the recorded all-time low. The US jobless rate jumped to 8.1percent. Freddie Mac announced a net loss of $50.1 billion for 2008. Germany's unemployment rate rose to 8.6percent in March as the global economic downturn continued.

In April 2009, as the economic downturn continued, the Euro-zone February unemployment rose to its highest level in almost three years. The US economy continued to contract in the first quarter of 2009, led by the biggest fall in exports for 40 years.

The ECB cut interest rates to a record low of 1percent in May 2009. The Federal Reserve released the results of the Supervisory Capital Assessment Program ("stress test") of the 19 largest U.S. bank holding companies on May 7, 2009. The assessment found that the 19 firms could lose $600 billion during 2009 and 2010 if the economy were to track the more adverse scenario considered in the program. Fannie Mae reported a loss of $23.2

billion for the first quarter of 2009 while Freddie Mac made a first quarter 2009 loss of $9.9 billion. On May 21, 2009 Standard & Poor's lowered its outlook on the United Kingdom government debt from stable to negative because of the estimated fiscal cost of supporting the nation's banking system.

As part of a new restructuring agreement with the U.S. Treasury and the governments of Canada and Ontario, GM and three domestic subsidiaries announced that they had filed for the U.S. Bankruptcy on June 1, 2009. The report on June 25 showed that the US economy shrank at an annualized rate of 5.5percent in the first three months of 2009, better than previously thought. The UK economy reported at the end of June 2009, suffered a 2.4percent quarter-on-quarter fall in GDP for the first three months of 2009.

The third quarter of 2009 saw minimal activities as the global panic started to subside. Japan reported a 0.9 percent growth in GDP in the second quarter of 2009, followed by Germany and France out of recession. In October, the Dow Jones Industrial Average closed above 10,000 for the first time since October 3, 2008. At the beginning of November 2009, the Bank of England announced that a further £25 billion will be injected into the economy.

On December 1, 2009, AIG announced that it had closed two transactions with the Federal Reserve Bank of New York. This agreement reduced the debt AIG owes the Federal Reserve Bank of New York by $25 billion in exchange for preferred equity interests in newly formed subsidiaries. The Bank of America announced on the December 2, 2009 that it will pay back the entire $45 billion of TARP money. Citigroup reported similar news on December 14, 2009 that it had reached an agreement with the U.S. Government to repay the remaining $20 billion in TARP fund. These events signaled that the global recession seems to be over, for now.

II. MACROECONOMIC IMPACT OF THE GLOBAL FINANCIAL CRISIS ON THAILAND

During the current financial crisis, the emerging market economies (EMEs) suffer from a sharp decline in domestic output since the second half of 2008. Unavoidably, Thailand also confronts with the economic slowdown. Similar to other emerging countries, the significant capital outflows lead to slump in stock market and the plummet in export value during the second half of 2008 results in recession since the fourth quarter of 2008 until the end of 2009. Specifically, Thailand faces negative GDP growth in four consecutive quarters since the fourth quarter of 2008; -4.1, -7.1, -4.9 and -2.9 percent, respectively. To cushion the recession and to achieve stability, several policies are announced; running the lowest policy interest rate since the 1997 Asian crisis and implementing the largest fiscal stimulus package called "Thai Kem-Kaeng".

In this chapter, we focused on the effects of global financial turmoil to Thailand's macroeconomic condition and the effects of fiscal and monetary policy responses. Specifically, we investigate channels of crisis transmitting to Thai economy via international trade and financial linkage. In addition, the policy responses in from of the stabilizing fiscal and monetary policies are addressed to assess their impacts in stimulating economy during the recession.

2.1 Transmission Channels of the Global Financial Crisis to the Thai Economy

The global financial crisis creates the ripple effect from the US, European Union and Japan (G3) to EMEs. The transmission channels of the crisis have received attention in the literature. Some current studies have addressed the importance of the financial linkage as the transmission channel of current financial crisis. Danninger *et al.* (2009) analyzed the channels of crisis spillover by focus on both international trade and financial linkage. They found that the capital movement, especially in the international loan's market, played the crucial role in transmitting the crisis from countries to countries during the current crisis. Devereux and Yetman (2009) investigated the

importance of financial interdependence and financial vulnerabilities in transmitting shocks across countries. The results show that the financial linkage in term of the combination of portfolio interdependence and capital constraint could intensify the effect of global de-leveraging. The impact of shocks during the current crisis is examined by McKibben and Stoeckel (2009). Interestingly, they found that the shocks observed in financial markets can be used to generate the severe economic contraction in global trade and production currently being experienced in 2009. In particular the distinction between the production and trade of durable and non durable goods plays a key role in explaining the much larger contraction in trade than GDP experienced by most economies.

On the other hand, some studies have emphasized the role of the traditional international trade channel as an important route of spreading the crisis to the developing countries. IMF (2009b) studied the financial linkage and found that it has a limiting role in transmitting crisis to developing countries. As can be seen, many low income countries were fairly unaffected from the financial crisis in the early stage. However, when the magnitude of crisis is amplified, the sudden decline in the global export demand together with the shortage of remittance and foreign direct investment escorted these countries into unavoidably suffer from the global crisis. In the study of Bank of Thailand (2009), the impacts of the global financial crisis on EMEs were investigated. Both financial and trade channels were mentioned as the transmitting instruments in varying magnitudes and timing. Using the Oxford Global Macroeconomic Model, the paper found that the financial channel plays the major role for the recession in the central and eastern European economies. However, the Asia economies have been affected mostly through trade contraction, which have also led domestic demand to slow down significantly. In addition, Berkmen *et al.* (2009) found that during the current financial crisis, the EMEs with high leverage domestic financial systems and steady credit growth tend to be more severely suffered from the global financial crisis since the financial channel dominated the trade channel. However, for the other emerging countries, the trade channel is much more matter. The countries that main export products are the advanced manufacturing goods, e.g., electronic equipments, suffer more than those countries that main exports are in agricultural products. Moreover, Cheewatrakoolpong and Manprasert (2010) provided an extensively

investigation of the international trade channel using the modified GTAP model. The results showed that the effect of crisis from G3 economy were transmitted to Thai economy mainly through the indirect international trade channel due to its dependency on the international production network.

In summary, the study of the transmission mechanisms of the global crisis can be separated into financial and international trade linkages. For financial linkages, the effects of crisis transmit into the emerging countries via the capital outflow that weaken the asset prices in terms of stock market and real estates. In addition, the incredible loss from US securitized products and global deleveraging process; the bank financial positions suffer significant loss and hence affect the liquidity in credit market. The international trade channel also provides the conventional explanation for the global recession. Increasing roles of external sector as an important source of demand is found in many emerging countries. Unfortunately, the major sources of demand for final products exported from emerging countries are the G3 countries those severely suffered from the current financial crisis. Therefore, the slump in economic activities since the second half of 2008 results in the dramatically drop in global trade value and consequently lead to the recession.

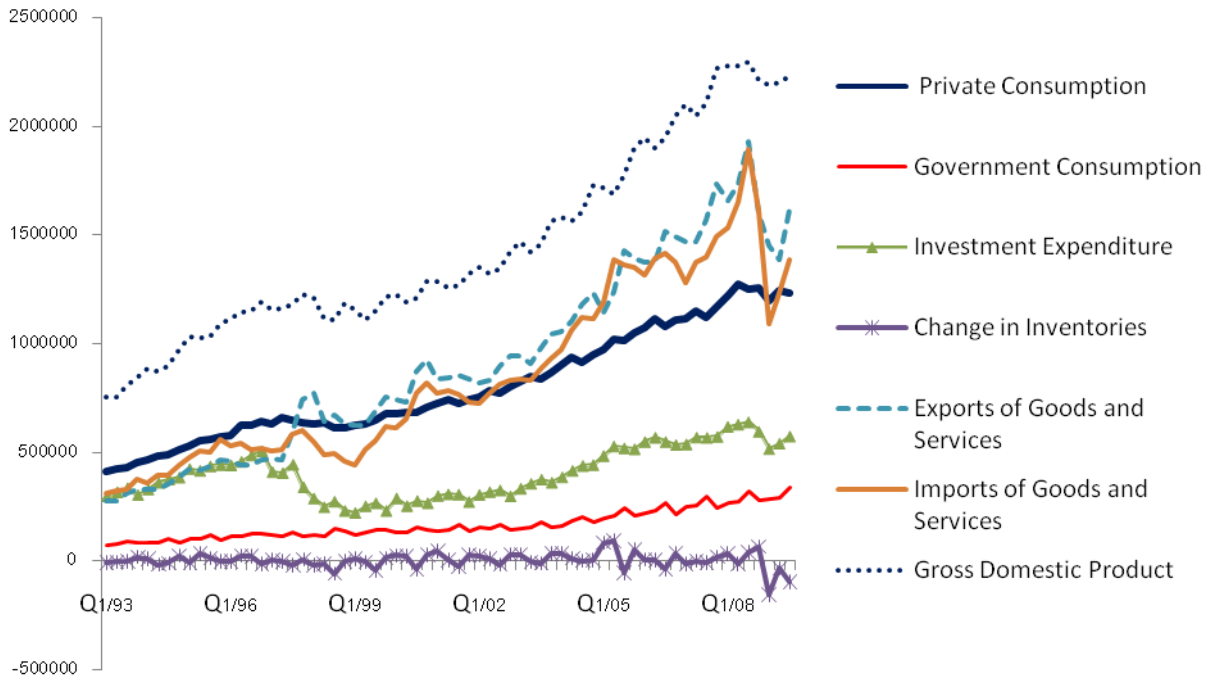
Therefore, we focus on the impacts of these two major shocks on Thai economy. In the following section, we quantify the magnitude of crisis transmission from both international trade and financial linkages using the simulation method conducted by the NIDA's Quarterly Macroeconomic Model (NIDAQMM). The Thai economy background is also provided to facilitate the crisis effect analysis.

2.1.1 Thai Economy during the Current Global Financial Crisis

At the beginning of the crisis, Thai economy was relatively in the stable condition. The output held steady growth at the rate of 5.3 and 5.8 percent during the second half of 2007 to the first half of 2008, respectively. However, when world economy have been deteriorated since the second half of 2008, Thailand has also unavoidably confronted with the economic downturn, in which the magnitude of economic fall closed to those of the Asian crisis in last decade. As can be seen in Figure 2.1, the key components of

Thailand's GDP sharply plunge in the second half of 2008. The considerably increasing in government expenditure is still insufficient to support the whole economy when private consumption, investment, export and import concurrently decline.

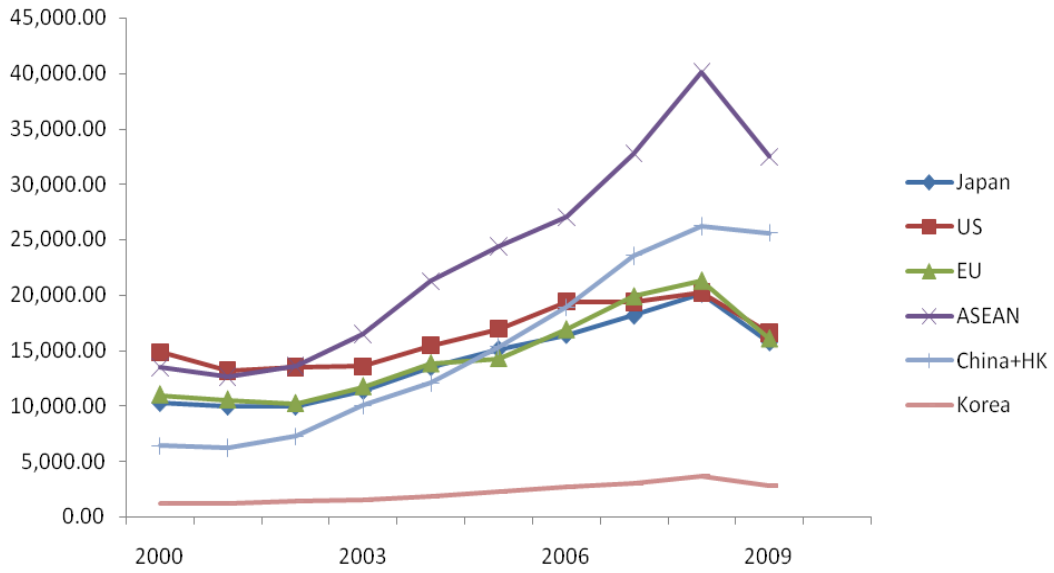
Figure 2.1 Key Components in the Gross Domestic Products in Thailand, 1993-2009



Source: National Economic and Social Development Board (NESDB)

When considering the export by countries in Figure 2.2, exports to the G3 countries have the decreasing share in Thailand's total export value. Even an increasing importance of the ASEAN and other East Asian countries in export value, it cannot decouple the Thai economy from the developed countries as the intra-regional trade is mostly based on the intermediate products where the sources of demand of final products still come from the G3 countries. Therefore, the suddenly drop in world trade volume results in a significant impact to Thai economy where export is the largest portion of the GDP. However, the slumped in export value together with the decreased in import value cannot be claimed as a main cause of recession since the net external demand (export minus import) is not significantly change. Interestingly, fallen in private consumption and investment at the same time are the main reason of current recession in Thailand.

Figure 2.2 Export of Thailand by Countries, 2000-2009



Source: Bank of Thailand

Nonetheless, the declining in internal demand could be a result of financial and international trade linkages. The weaken position of financial institutions from a global de-leveraging and a loss in investment in the US security market affect the credit availability in the market. The sharp decline in stock market also influences the domestic expenditure via wealth effect. The explanations of the linkage between international trade and private expenditure come from the fact that most of recent private investment projects in the automobile, petro-chemical or electronic sectors are export-oriented. Therefore, increasing risk in the world economy and significant decrease in global trading volume create the major uncertainty factors that direct to shrinkage in private investment and consumption. The effects of these two channels of linkage are examined as follows.

2.1.2 Methodology

In this paper, the impacts of the international trade and financial linkage on Thai economy are investigated using the macroeconometric model. The observed declining pattern in asset prices, especially in the stock market is used to characterize the impacts from financial linkage while the value reduction in external demand (proxy by the world import value) is used to represent the international trade channel. The NIDA's Quarterly

Macroeconomic Model (NIDAQMM) is employed as the main model to measure the impact from each transmission channel to economic indicators. The model consists of 23 behavior equations and 16 identities. The model is based on the Keynesian's demand-based approach that covers the main economic activities, i.e., domestic consumption and investment, international trade, price level and financial sector[4]. Moreover, we quantify the magnitude of crisis transmission from both international trade and financial linkages using the simulation method conducted by the NIDAQMM. The results are presented and discussed in next sections.

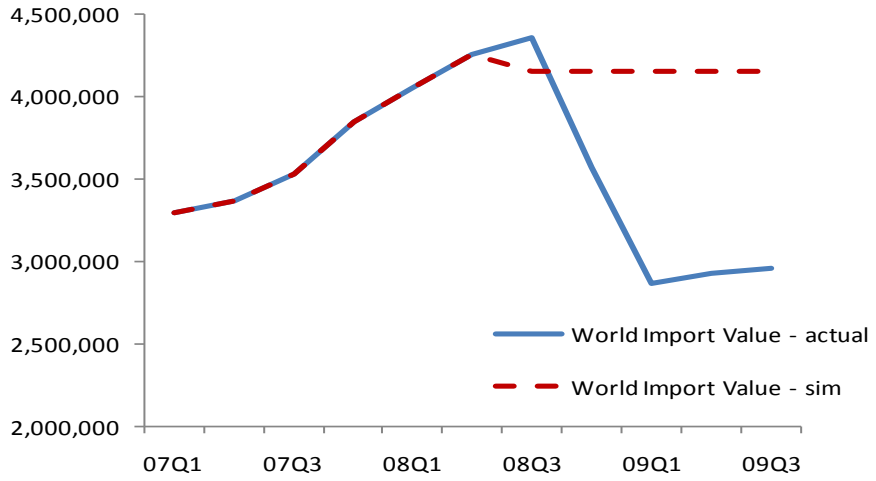
2.1.3 International Trade Channel

During the current crisis, international trade channel is the center of attention because of the big tumble in external sector. In previous section, we mention that the net export value is alone not a direct cause of GDP reduction. However, a decreasing in GDP may be an indirect effect from the international trade. Hence, the indirect relationship between the drop of the world import value and other key economic variables in Thailand is worth to investigate.

The international trade transmission channel is represented by a declining in the world import value which may affect the export, import, private consumption and investment. As can be seen in Figure 2.3, the world import value is dramatically fall since the second half of 2008. Hence, in the simulation exercise, we assume that the world import value after the second half of 2008 remains constant at the same level of the average of quarterly world import value during the first half of 2008. The simulated results from this setting are applied to compare with the simulated data that we compute based on the actual world import value. The differences between these results imply the effects of a drop off in world import value to other key macroeconomic variables. In particular, four variables are considered in this study - GDP growth, private consumption, investment and export.

[4] See Appendix for more information on the NIDAQMM. For further details; see Chintayarungsan *et al.* (2003, 2010).

Figure 2.3 World Import Value, 2000-2009



Source: International Financial Statistics Online Database

Table 2.1 The Simulation Results of the Effects from the International Trade and Financial Linkage Channel on the Key Economic Variables

	GDP	Consumption	Investment	Export	Import
Actual data					
2008 Q3 - Q4	2.25	2.26	3.14	6.94	7.79
2009 Q1 - Q3	-4.94	-1.95	-15.38	-17.71	-26.50
Simulation data					
International Trade Channel					
2008 Q3 - Q4	2.09	-0.31	-	4.08	1.75
2009 Q1 - Q3	-9.28	-3.28	-14.15	-16.15	-11.49
Financial Linkage Channel					
2008 Q3 - Q4	0.02	-0.04	-	-	-
2009 Q1 - Q3	-0.26	-0.50	-0.25	-0.001	-0.07

Source: Actual data are taken from NESDB. The simulation data are computed from the NIDAQMM.

Table 2.1 shows the simulation results in which the change in world import value could describe most of the drop in export value in 2009 (-16.15 percent compare to -17.72 percent in the actual data). Moreover, the large portion of a decreasing in private

investment and consumption is also explained by a cut off in world import. However, the simulated results underestimate the impacts on import volume (-11.49 percent compared to -26.50 percent in the actual data). These results support the argument of Cheewatrakoolpong and Manprasert (2010) who suggest that the main determinant factor of import during the GFC is the international production network. Once comparing Table 2.1 to Table 1 of Cheewatrakoolpong and Manprasert (2010), we can provide a better explanation on the decreasing in private investment and consumption during that period. Specifically, we found that such decreasing is due to the significant plunge in export and the future economic prospect. Nevertheless, Cheewatrakoolpong and Manprasert (2010)'s results are better in an explanation for the significant drop in import value. This is not surprising since the different approaches are applied. In particular, our model (NIDAQMM) is based on the Keynesian's demand-side approach while their study (GTAP model) is set up on supply-side equations.

Table 1: Simulation results for macroeconomic variables

Variables	Total Effects	Direct Effects	Indirect Effects	
			Indirect-trade linkages	Multiplier effects
GDP	-7.77%	-4.33%	-3.44%	
Export	-8.34%	-3.66%	-4.24%	-0.44%
Import	-11.21%	-4.46%	-6.38%	-0.37%
Gross output (inc. intermediate)	-6.42%	-1.16%	-5.26%	
Private consumption	-7.77%	-4.33%	-3.44%	
Unskilled workers	-5.82%	-0.83%	-4.99%	
Skilled workers	-6.27%	-0.55%	-5.72%	
Capital	-6.73%	-0.93%	-5.80%	

Note: Results indicate percentage growth subtracted from the long-term growth rate.

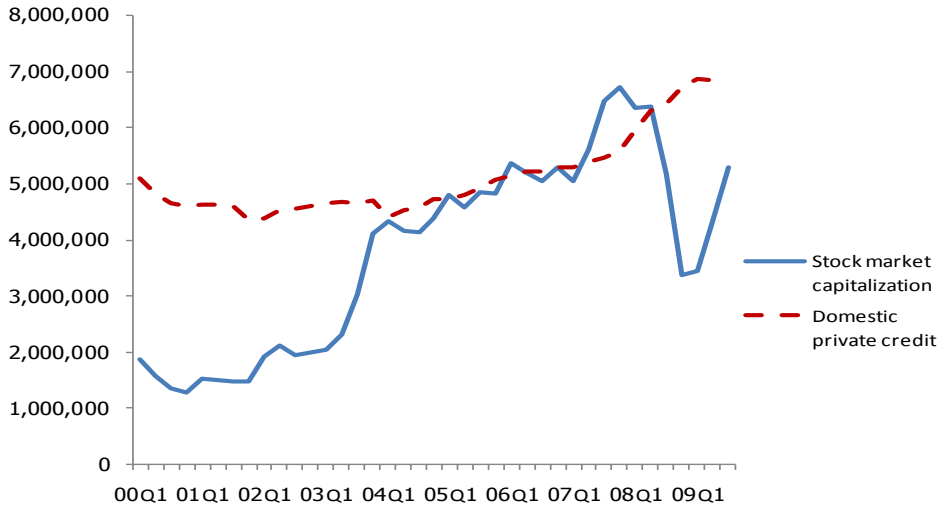
Source: Cheewatrakoolpong and Manprasert (2010)

In summary, these results support to the argument that the international trade is the significant transmitting channel of the global financial crisis to Thailand as the most of the deterioration in key economic variables could be accounted in this simulation setting. In addition, these findings also provide evidence of the closed relationship between export and investment in Thailand.

2.1.4 Financial Linkage Channel

In the literature of the current financial crisis, financial linkage channel has been discussed in several dimensions. However, in this study, we limit the scope of financial linkage in only two dimensions. The first is the adjustment of stock market in response to capital movement and the second is the change in private credit availability.

Figure 2.4 Private Domestic Credit and Stock Market Capitalization of Thailand, 2000-2009



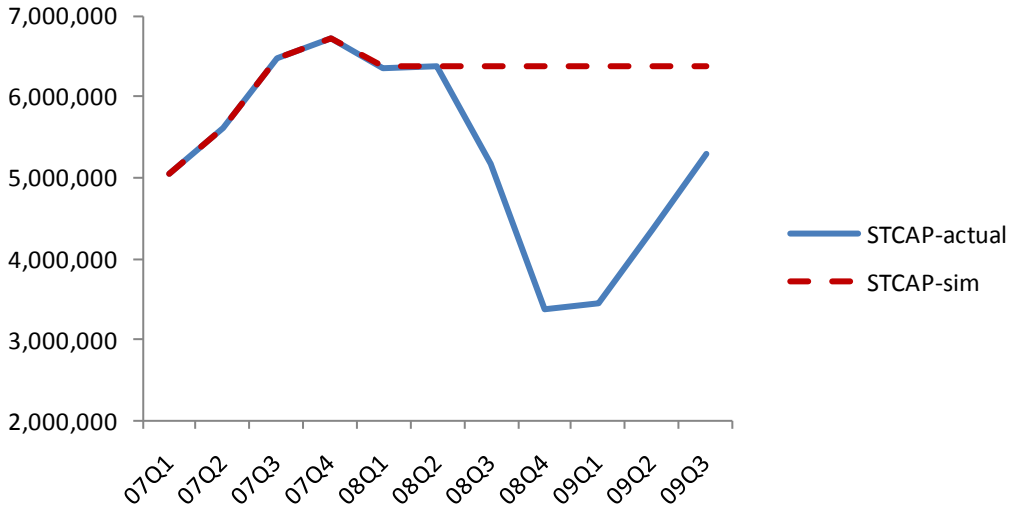
Source: Bank of Thailand (BOT) and Stock Exchange of Thailand (SET)

As can be seen in Figure 2.4, the market capitalization of Stock Exchange of Thailand (SET) is erratic movements during the development of financial crisis. The sharp decline in stock market happen in the second half of 2008 as the international financial market is in the peak of deleveraging in the aftermath of the collapse of Lehman Brother. The effects of domestic credit are also exhibited in Figure 2.4. The private credit market is in stable condition between 2007 and 2009. Only marginal decrease in private credit is found in 2009. The immunity in Thai credit market could be results of the domestic political problems. Because of the political instability, both Thai and foreign firms are in the cautious mode, especially in large investment project. Risk factors contributed by the political instability affect business confidence and also create the uncertainty in government policies. Consequently, many Thai and foreign firms delay their investment plans. Moreover, the lesson learned from the Asian financial crisis in 1997 suspends

Thai financial institutions from rapidly expand the credit market, especially for mortgage loan and complicated structured products. As a result, the domestic credit growth maintains approximately 5 percent annually during 2006 to 2007. In this section, we therefore focus only on the stock market as the key variable which is influenced by the financial linkage during the current global financial crisis.

In the simulation, the stock market capitalization is set as constant from the third quarter of 2008 to the third quarter of 2009. The average level in the first half of 2008 is used as a benchmark. The result from actual stock market capitalization is also compared the results under the simulation. The differences imply the wealth effect from the stock market to private consumption and investment. The estimated results of this scenario are displayed in Table 2.1

Figure 2.5 Stock Market Capitalization of Thailand, 2000-2009: Actual and Scenario Conditions



Source: The actual data is taken from SET and the simulated data is set as assumption

From Table 2.1, the results show that the effects of a crash in stock market provide little explanation for the drop in consumption and investment. Only -0.50 percentage change in consumption during the first to third quarter of 2009 is described by the wealth effect from stock market (the actual decrease in consumption for 2009 is -1.95 percent). Moreover, a change in investment during 2009 can be explained by the effects of stock market capitalization for only -0.25 percent compare to the actual decrease at -15.4

percent. These results provide the evidence that the financial linkage in stock market plays a minor role during this current crisis since the simulation results can explain only the small portion of decrease in either consumption or investment.

However, the above calculation results should be interpreted with caution because we only focus on stock market as a route of transmission mechanism. Although domestic credit market receives the minimal effects from the financial crisis, the international loan for investment projects could be significantly affected by the financial deleveraging process in global market. In addition, widen in the interest rate spread due to an increasing risk also discourages investment, especially from the foreign firms where sources of fund are from the international financial market. Nevertheless, there is the limitation of the model used in the study. Additionally, the NIDAQMM, which is the econometric-based model, focuses mainly on the aggregate demand factors. Therefore, the credit spread and external financing cannot take into account in the model. However, due to the facts that most of the drop in private consumption and investment can be explained by a shrink in world import value, only international trade channel provides sufficient explanation for the large decline in output. Hence, this evidence could imply that other financial linkages could provide only small portion of the effects during this crisis. The effects of the current financial crisis in Thailand are found to be dominated by the international trade linkage.

2.2 Effects of Monetary and Fiscal Policies Responses

During the current crisis, the conventional Keynesian approach gains popularity as most countries implement huge stimulus plans to increase government expenditures. In addition, the central banks also play an important role in fuel the economic activities since the policy interest rates in many countries hit the lowest level. The effectiveness of monetary and fiscal policies is of interest for economists, especially during the crisis when the private and external sector can not be counted as the major sources of aggregate demand.

Macroeconomic theories usually suggest that fiscal policy, which directly injects purchasing power into economy in form of government spending in either

infrastructure projects or transfer money, will increase domestic demand and provide direct support to output. However, the effectiveness of fiscal policy is controversial in many studies. The multiplier effect of government spending that could spread to other sectors and the crowding out effect of public spending that could substitute the private investment when sources of fund are limited could lead to the differences in the results of policy in different countries and situations.

For monetary policy, the issues on its effectiveness arise because the policy interest rate, i.e., 1-Day repurchase rate – RP1 in Thailand, has the limited effects on macroeconomy. Therefore, the main reaction channels will come with transmission of a change in RP1 that affects other market interest rates, i.e., minimum loan rate (MLR), time deposit rates or government bond yields. Other transmitting channels such as the asset price, exchange rate and expectation channels are also mentioned in the literatures.[5] The natures of monetary policy that affect the key economic variables indirectly make the patterns of the feedback different from those of fiscal policy. Monetary policy generally takes longer time to provide significant impacts but the effects should be last for longer periods than those of fiscal policy.

In this section, we focus on analyzing the effects of government policies during the current crisis. For this purpose, the transmission mechanisms of monetary and fiscal policies are calculated. Once again, the NIDAQMM is employed as the main model in generating paths that key macroeconomic variables' response to changes in RP1 and real government expenditure. These transmission channels of the effects will be compared with each others. In addition, we apply the size of an interest rate cut off and the stimulus package during this current crisis to evaluate the effects of policies to key macroeconomic indicators.

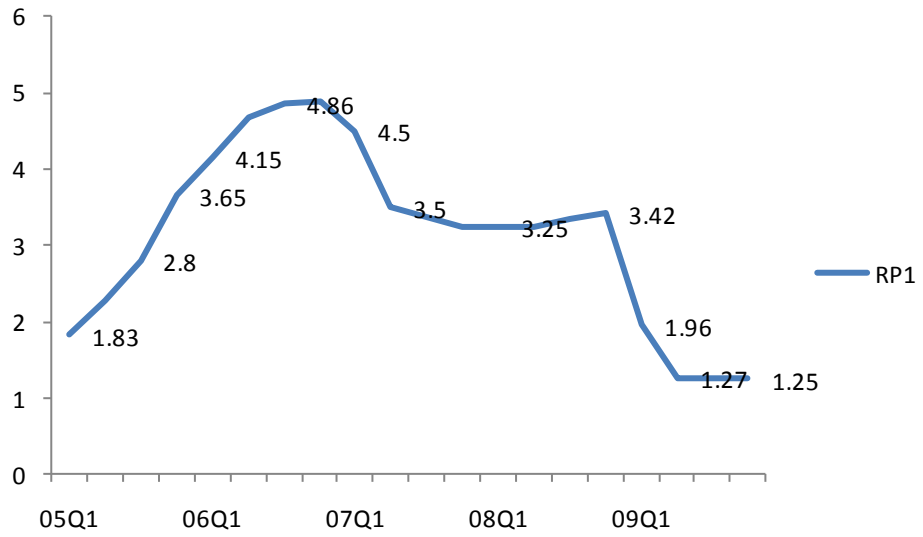
2.2.1 Monetary Policy Response during the Current Crisis

In the first half of 2008, Thailand, like other Asian emerging economy, still resilient to the effects of crisis. Therefore, Bank of Thailand (BOT) remains cautious to take any

[5] See Disyatat and Vongsinsirikul (2003) for discussion about the transmission mechanism of monetary policy in Thailand.

action in monetary policy in tackling with the sign of recession in the G3 countries. Moreover, an increasing in inflation followed by the rising and fluctuation in the world crude oil price is also the point of concern for policy maker. The policy interest rate remains constant at 3.25 between the fourth quarter of 2007 and the second quarter of 2008. Indeed, BOT raises RP1 to 3.75 during the third quarter of 2008 in reaction to an increase in both headline and core inflation due to the peak in oil price in July, 2008. However, the decline in world economy is in acceleration mode since the second half of 2008. Then, Thai economy drop in free fall mode during the fourth quarter of 2008 to the third quarter of 2009. As a result, BOT continue to slash the policy interest rate starting from a 1 percent decrease in December and another 1.5 during the first quarter of 2009. After that, the RP1 remains at 1.25 percent until now. The movement of the RP1 interest rate during 2005 to 2009 is illustrated in Figure 2.6.

Figure 2.6 Monetary Policy Interest Rate in Thailand, 2005 – 2009



Source: Bank of Thailand

Before we evaluate the impacts of monetary policy; the transmission mechanism of monetary policy will be investigated. Using the NIDAQMM, the response of key macroeconomic variables is computed. We consider seven key macroeconomic variables, i.e., real GDP growth rate (YR), private consumption expenditure (CPRT), private investment (INPR), headline inflation (PCPIH), core inflation (PCPIC), real export (XTR) and real import (MTR). The results are displayed in Figures 2.7 for

transmission mechanism up to twelve quarters ahead. In addition, the accumulate effects of the monetary policy are shown in Table 2.2. The paths of feedback of these variables are simulated based on a condition that the RP1 is set to decrease by 1 percent and stay at that level over 8 quarters periods.

Table 2.2 Cumulative Effects of Monetary Policy in Thailand

	YR	PCPIH	PCPIC	CPRT	INPR
Q1	0.01	0.01	0.01	0.00	0.00
Q2	0.14	0.04	0.03	0.17	0.15
Q3	0.30	0.08	0.06	0.35	0.52
Q4	0.39	0.14	0.10	0.45	0.74
Q5	0.47	0.21	0.15	0.52	0.93
Q6	0.53	0.29	0.20	0.56	1.03
Q7	0.60	0.37	0.27	0.60	1.10
Q8	0.67	0.47	0.34	0.64	1.16

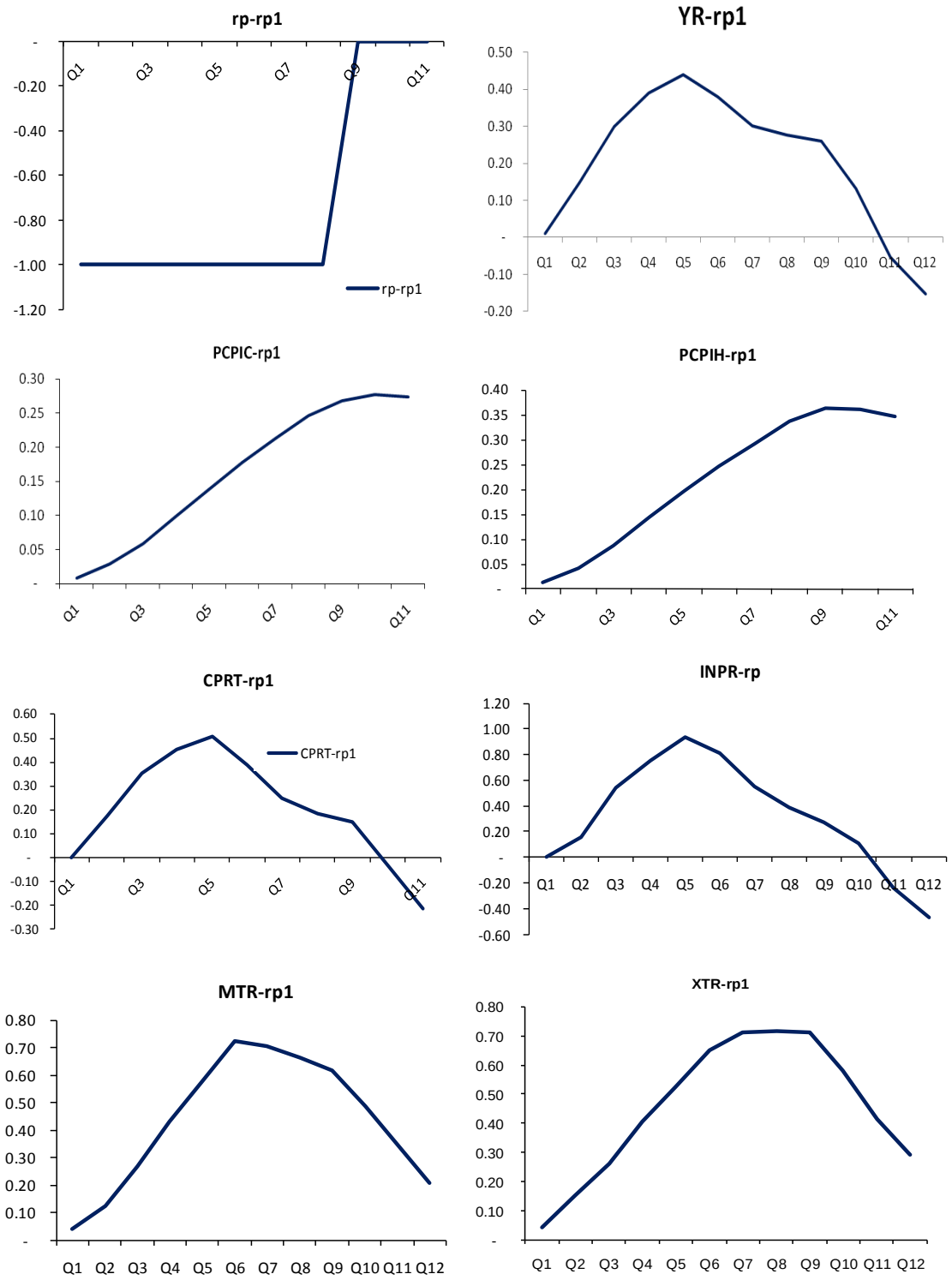
Source: Author's calculation using NIDAQMM

Table 2.3 Change in Monetary Policy Interest Rate in Thailand, 2009-2010, and the Estimated Impact

Monetary Policy Interest Rate (RP1)	
Q3 - 2008	3.75
Q4 - 2008	2.75
Q1 - 2009	1.50
Q2 - 2009	1.25
Q3 - 2009	1.25
Changes in GDP	
2009	1.024
2010	0.681

Source: Author's calculation using NIDAQMM

Figure 2.7 Transmission Mechanism of Monetary Policy in Thailand



Source: Author's calculation using NIDAQMM

The results from Figure 2.7 and Table 2.2 provide the indicators of transmission mechanism in term of size and timing of the impacts of monetary policy. The response of GDP and the key domestic demand components, i.e. consumption, investment, import and export, takes 3-8 quarters after a change in RP1 to make significant impacts. The highest responses come at quarter 4 for consumption and investment. Among all GDP components, investment is the most response variable to a change in interest rate, followed by the private consumption. Increasing in export comes simultaneously with a rise in import. Therefore, the external demand is not considerably change from the effects of monetary policy. Considering the effects of monetary policy on inflation, either headline or core inflation takes about 10 quarters to receive the maximum effects, which is significantly longer than that of GDP growth.

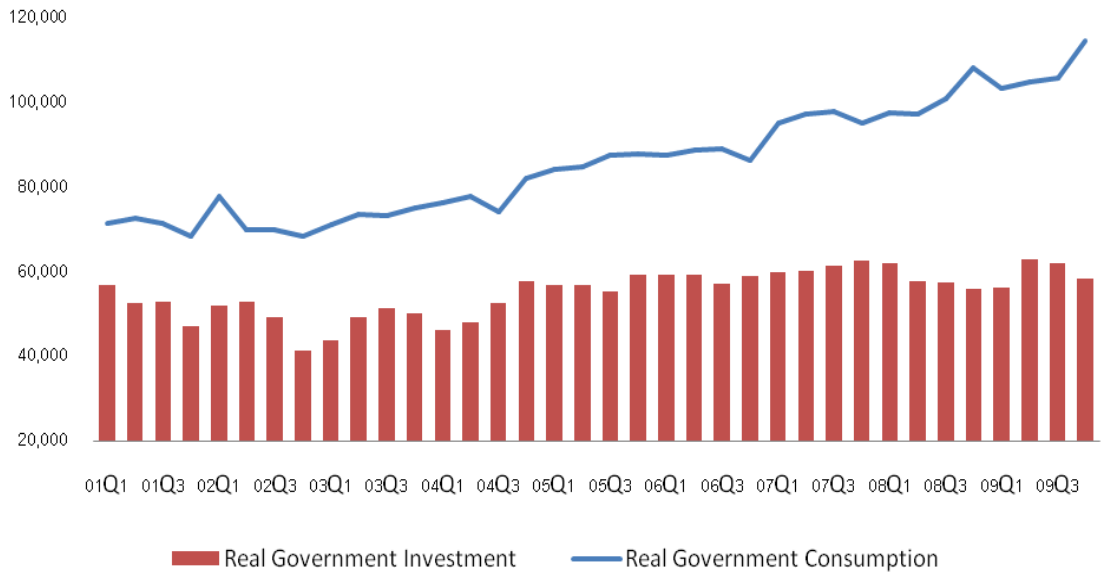
The cumulative effects of monetary are shown in Table 2.3. The sizes of interest rate change during 2008 and 2009 are used to measure the effects of change in RP1. Our results show that monetary policy provides a support to economy in both 2009 and 2010. However, the impacts are not that large compared to the degree of decreasing in global demand which left economy in severe condition. The monetary policy is expected to stimulate growth at 1.024percent and 0.681 percent in 2009 and 2010, respectively.

2.2.2 Fiscal Policy Response During the Current Crisis

Before the subprime mortgage market in the US start to generate significant problem in the world economy, Thailand is in the different economy situation with other EMEs. The political instability provides the unique risk factor that affects the confidence level of both consumer and business sectors. In addition, the regularly changes in government also provide major issues about policy uncertainty, such as the control power of foreign ownership or reserve requirement for capital inflow. Therefore, during 2005 to 2007, Thai economy depended solely on external demand and government expenditure since the private sector is in weak condition. Besides the fact that Thai economy is under government stimulus plan long before other countries, the implementation of such plan is regularly disrupted by several changes in government.

An increase in real government expenditure during 2001 to 2009 is shown in Figure 2.8. Even though, the government spending was periodically spiked before 2008. The degree of stimulus gains the significant momentum during 2008. In 2009, Thai government announces the stimulus plans that separated into two phases; SP1 and SP2. Under the SP1, government budget set to increase by 116.7 billion baht on top of the previous budget plan in 2009. The focus of the SP1 is to stimulate public and private consumption. The main components consist of transferring money program (2,000 baht per person) to support the living expenditure, offering utility subsidiaries, and providing fund for people in the rural area. In the October Report of Fiscal Policy Office (FPO), the implementation of the SP1 which set to complete in September, 2009 has distributed the budget by 81.2 percent of the target level and the FPO estimated that this spending amount could support economic growth by 0.8 percent.

Figure 2.8 Real Government Consumption and Investment, 2001-2009.



Source: The Office of National Economic and Social Development Board (NESDB), Thailand

For the SP2, the focus of the program is shift to public investment expenditure, especially in the infrastructure projects that could enhance country's competitiveness and sustainably growth. Due to the difference in nature of the investment projects, the size and length of SP2 are significantly larger and longer than those of the SP1. Under the SP2, government and public enterprise plan to spend 1.06 trillion baht between 2009 and 2012. These investment projects mainly focus on the upgrading of logistics

system; the increasing of the water supply; the improvement of the education and health care equipment; and the emphasizing in the renewable energy projects. However, the implementation of the budget plan is indistinguishable due to the uncertainty nature of the investment projects. Moreover, the government instability affects the plan in form of the delay or change the focus of the budget. Consequently, the actual spending rate could be significantly below the plan in most of the projects. In sum, the effectiveness of the SP2 is unmeasured and still in suspicion.

In order to investigate the impacts of stimulus package, the multiplier effects of fiscal policy to key macroeconomic variables are computed. The NIDAQMM is then applied to compute the effects of an increasing in government spending. The simulation results are demonstrated in Figure 2.9 and Table 2.4.

Table 2.4 Cumulative Effects of Fiscal Policy in Thailand

	YR	PCPIH	PCPIC	CPRT	INPR
Q1	1.85	0.00	0.00	0.29	0.00
Q2	1.96	0.01	0.01	0.50	2.97
Q3	2.11	0.02	0.02	0.70	3.47
Q4	2.24	0.03	0.03	0.88	4.98
Q5	2.62	0.04	0.04	1.10	5.62
Q6	2.61	0.05	0.05	1.26	7.01
Q7	2.65	0.07	0.06	1.42	7.47
Q8	2.65	0.08	0.07	1.54	8.22
Q9	1.12	0.09	0.08	1.39	8.55
Q10	1.18	0.10	0.09	1.31	6.66

Source: Author's calculation using NIDAQMM

Figure 2.9 shows the effect of a 10 percent increase in real government spending to the other macroeconomic variables. The accumulate effects of the fiscal multipliers are shown in Table 2.4. The estimated results from Figure 2.9 show that the transmitting effects of fiscal policy are different from those of monetary policy. The fiscal policy provides the quicker response in the real GDP growth and other domestic demand variables. However, the effects will evaporate quickly after the end of stimulus package.

The degree of multiplier effects in Thailand is not that high as the 10 percent increase in real government spending follow by the 2.24 percent increase in the real GDP growth during the first year and the effects will decrease to 0.41 percent for the subsequent year. Using the size of the increasing in real government expenditure in Table 2.5 together with the degree of accumulative effects in Table 2.4, an increasing in fiscal budget during 2008 and 2009 provide only injection of GDP growth approximately at 1.0 and 0.70 percent in 2009 and 2010, respectively. These results come from two important facts.

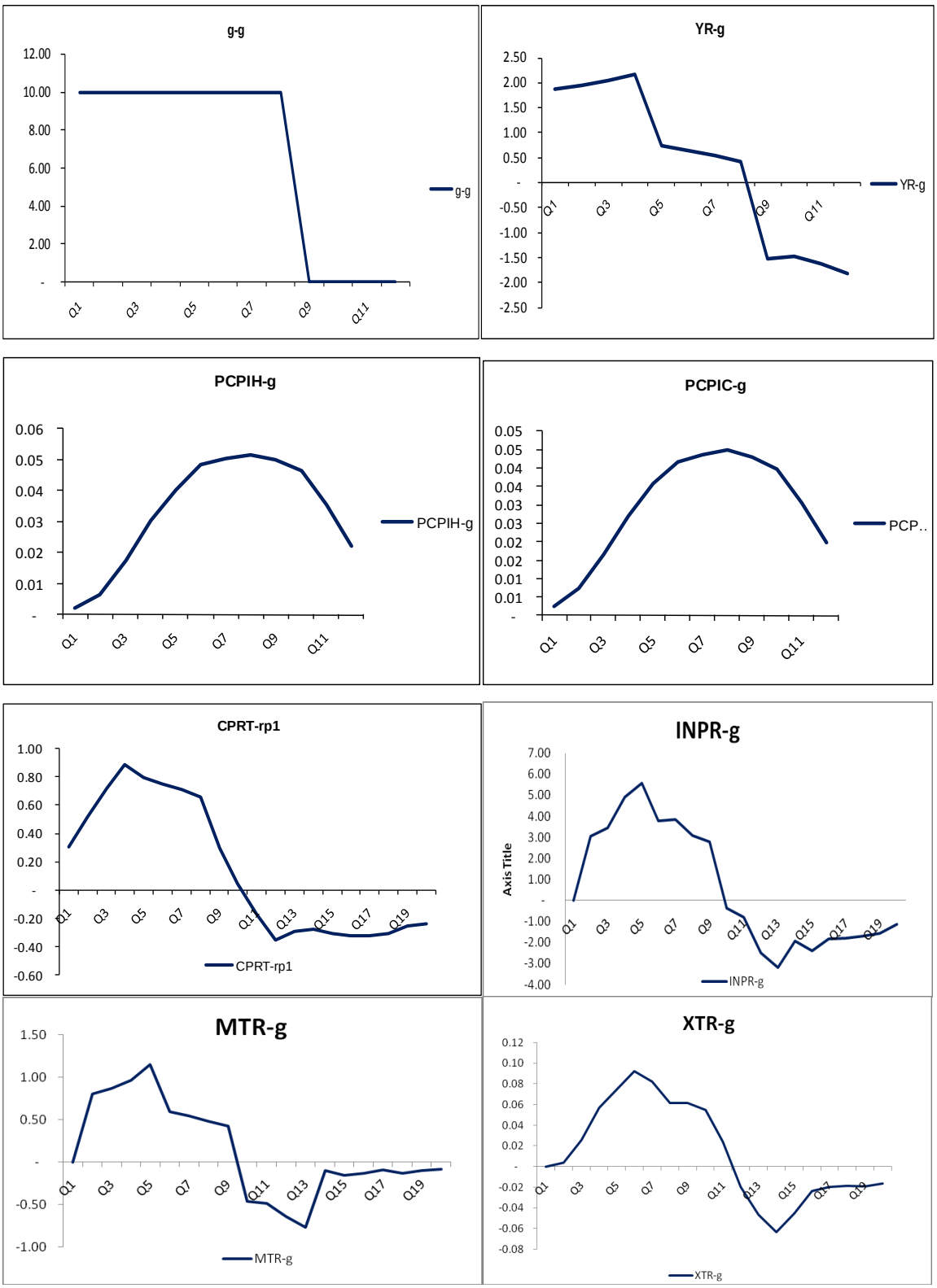
Table 2.5 Estimated Impacts of Fiscal Policy in Thailand, 2009-2010

Real Government Spending Growth	
2009	4.67
2010	2.28
Changes in GDP	
2009	1.043
2010	0.697

Source: Author's calculation using NIDAQMM

First, the actual change in real spending do not provide significantly increase in total spending due to the implementation problem in many projects. Therefore, there is a difference between the government budget plan and the actual implementation, especially in the large investment projects. Second, the effectiveness of fiscal policy depends on the size of incremental government spending compared to that of the previous expenditure. To make the policy noticeable, the size of package must be larger than those of previous program. However, the continuity of government stimulus would create the problems on fiscal debts and their sustainability. Thus, the impact of the fiscal stimulus plan in 2009 is much smaller effects than that in on-shoring economy beyond that period.

Figure 2.9 Transmission Mechanism of Fiscal Policy in Thailand



Source: Author's calculation using NIDAQMM

Finally, the impacts of monetary and fiscal policies responses in Thailand are compared. The results show that the effects of monetary policy provide greater support to macroeconomy in either 2009 or 2010 than those of fiscal policy. Alas, the size of impacts of both policies is still inadequate to support Thai economy during the crisis in 2009. In particular, the effects of the monetary and fiscal policy responses are considerably smaller than those of the slump in global trading value.

2.3 Policy Implication

The major policy implication of this study consists of two aspects. First, the results from transmission channel of global financial crisis suggest that Thai economy is highly dependent on the export in order to drive the GDP growth. The importance of export is not only from the direct source of demand of production but also the indirect effect via the investment decision. The export-orientated investment projects and the role of multinational companies (MNCs) have the significant effects to private investment expenditure. In addition, the simulation results show that private consumption is more stable than other sources of total expenditure (investment, change in inventory, exports). Private investment and exports are shown to be the volatile during the crisis. Therefore, the focus of government policy should be shifted towards private consumption in order reduce export dependence and rebalance economy. In the demand side, government policy should provide incentive to consumer to increase their spending. For example, the social security reform could encourage people to increase their spending rather than to save for future costs of healthcare and pension. In the supply side, the investment incentives for export-oriented industry provide the main influence on pattern of production in Thailand. The more balanced incentives should be considered to promote the service sector that relies on domestic demand. For example, the effective incentive programs should be implementing to promote research and development (R&D) and labor training in service sector, such as information technology and creative economy. In addition, infrastructure development may be required to strengthen transportation and logistics sectors.

Second, the impacts of monetary and fiscal policies in stimulus economy during the period of crisis are inadequate to substitute the drop in external demand. The size of

impacts from global trade slump is estimated to be too large for the fiscal and monetary policies to offset these adverse effects. To make fiscal policy effective, the size of government spending should be flexible to change when it is required to stimulus economy. The public debt ratio could be maintained in low level during the normal economic condition to provide room to increasing borrowing when it is needed.

III. IMPLICATIONS TO FINANCIAL SECTOR

After the impact of the crisis on Thailand's real sector is analyzed in the previous session, in this session the implication of the financial crisis to global financial sector is discussed followed by the characteristic of Thai financial market. Next, the implication of the financial crisis to Thai financial sector is observed through key points of Thai experts' opinions obtained via interviews. Finally, discussions of developing sustainable financial system for Thailand are presented.

3.1 The Implication to Global Financial Sector

The global financial crisis of 2007-2009 has led to consensus recommendations on restoring the financial system. The recommendations come from the "Squam Lake Report". Authors of the report are fifteen leading academic economists from renowned institutions: Brookings Institution, the University of Chicago, Columbia University, Harvard University, Ohio State University, Princeton University, Stanford University, and Yale University.

The essences of the "Squam Lake Report" recommendations are listed below:

A central regulator should oversee the health and stability of the whole financial system. The central bank is best qualified to perform this super-regulatory function. This central super-regulator would have the authority to gather detailed financial information from all concerned parties in the financial system, including banks, investment banks, bank holding companies, insurance companies, broker-dealers, and, most crucial, hedge funds.

Capital requirements for financial institutions should be strengthened.

Capital requirements should depend on the liquidity of assets being held by the institution (the less liquid the assets, the more capital needed), and also on the proportion of the institution's debt that is short-term (the more it relies on short-term debt, the higher its capital requirements would have to be).

Executive compensation should be subject to "holdbacks."

Major financial institutions need structural reform on the levels of executive compensation. The recommendation proposed that executive compensation be withheld -- placed in a figurative lockbox -- for a set number of years, to be paid out only if and when the institution manages to get through that period without having gone bankrupt or been bailed out by the government. In addition, the executives' incentives should be aligned with those of the taxpayer. If the taxpayers have to pay to bail out a company due to the unwise risks its executives took, all those executives have to reimburse taxpayer (for a set number of years) as well.

Financial institutions should invest in "contingent capital."

Regulators should "aggressively encourage" key financial institutions to invest in what they call "regulatory hybrid securities." These would be long-term debt obligations that automatically convert into equity in the event that both the institution and the economic system reach a certain defined level of financial stress. The idea is to force the institution to pay in advance of setting up an automatic recapitalization mechanism that it can draw upon in times of need.

Regulators need expanded "resolution" authority over financial institutions.

Regulators must have the authority to put troubled non-bank financial institutions into an orderly resolution process such as a bankruptcy.

Financial institutions should execute "living wills."

The “living will” would be a document, updated quarterly; explaining to the responsible authority the procedures in details on how to proceed in the event of the worst-case scenario and the institution must be seized.

3.2 Thailand Financial Market

Thailand's financial market has been weighted more heavily on the money market; however equity market has gradually become more significant with economic development. Money market via commercial banks has been crucial source of fund for business for a long time. In 2007, Deposit in Bank and other financial institutions shared 74percent of total financial market. Other long-term capital market, i.e., insurance, mutual fund, pension fund and private fund, shared 36percent of total financial market. However, equity market tends to gain more importance overtime. The development in equity market could be measured by market capitalization of the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI) and their total turnover. As can be seen from Figures 3.1 and 3.2, total market capitalization and turnover of equity market continues to rise during 2006-2009. However, in 2008, the slump of stock price resulted from the capital outflow during the peak of the global financial crisis make the value of equity market drop temporary. In 2009, equity market start to pick up loss of 2008, total market capitalization and turnover are equal to 5,912,232 and 4,428,979 million baht, respectively.

In bond market, we also observed the similar growth pattern as the size of bond market continued to grow during 2006-2009 in both total outstanding value and number of listed issues. Impact of the global financial crisis is minimal in bond market as the total outstanding value still rise in both corporate and government bond in 2008. In 2009 Total outstanding value of Thailand bond market is equal to 3,977,425 million baht, which are about 67 percent of the total market capitalization of equity market in the same time. However, the size of the worldwide bond market (total debt outstanding) is an estimated $82.2 trillion, which is about 186 percent of the world stock market value (Asset Allocation Advisor, 2009). These figures raise the concern about development of bond market as source of fund in financial market, especially in corporate side.

Table 3.1 Total Assets in Money Market and Financial Market, 2006-2007

(unit: in millions of baht)	2006	In percent of total financial assets	2007	In percent of total financial assets
Deposit-taking financial institutions				
Banks	8,653,000	62	9,006,000	60
Private banks	5,691,000	41	5,981,000	40
3 largerst private banks	3,407,000	24	3,680,000	25
Others privately owned	2,284,000	16	2,301,000	15
State-owned	1,835,000	13	1,823,000	12
Foreign-majority owned	1,127,000	8	1,202,000	8
Subsidiaries	12,000	0	12,000	0
Branches of foreign banks	1,115,000	8	1,190,000	8
Specialized Financial Institutions (excluding state AMCs) 1/	2,015,000	14	2,075,000	14
(in percent of total financial sector assets)	14.4			
of which deposit-taking SFTs (4 + SME Bank)	1,947,000	14	2,075,000	14
- Taking deposit currently	1,891,000	14	1,961,000	13
- Non deposit taking	56,000	0	114,000	1
Finance Companies	81,000	1	47,000	0
Credit Fonciers	2,000	0	0	0
Non-Bank Financial Institutions				
Insurance companies	833,000	6	953000	6
Life	700,000	5	816000	5
Mixed	0	0	0	0
Nonlife	133,000	1	137000	1
of which: state-oened	0	0	0	0
Mutual Funds 2/	1,050,000	8	1437000	10
Securities dealers (brokers)	123,000	1	142000	1
Pension Funds 3/	667,000	5	755000	5
of which: state-oened	276,000	2	313000	2
Leasing Companies	n.a.	...	n.a.	...
Venture Capital Companies	1,000	0	n.a.	...
Asset Management Companies (AMCs)	540,000	4	509000	3
State-owned	461,000	3	437000	3
Privately-owned	79,000	1	72000	0

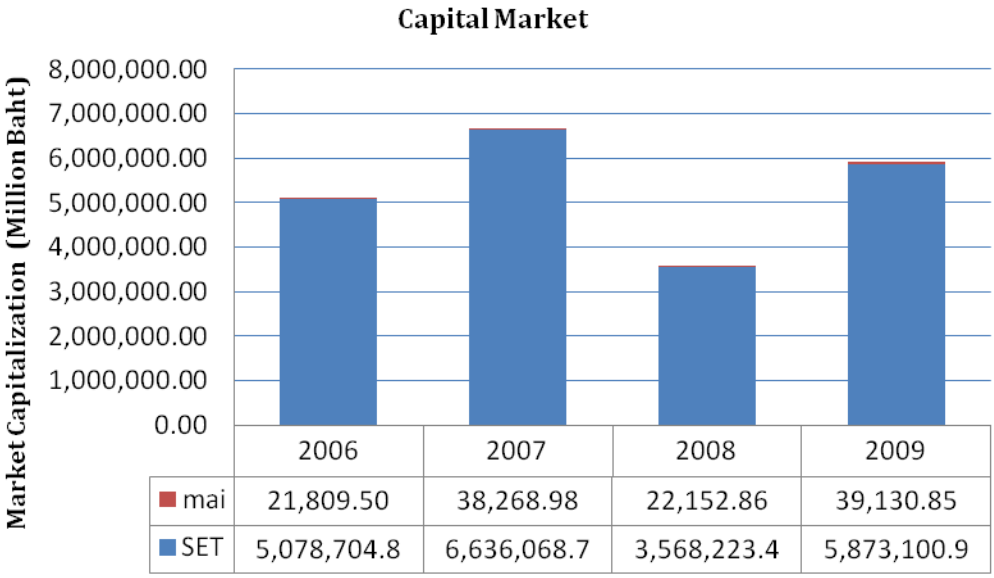
Source: International Monetary Fund

1/ Including deposit and non-deposit taking SFIs

2/ Including Property Funds for public but excluding special funds

3/ Including provident funds and governmnet pension fund

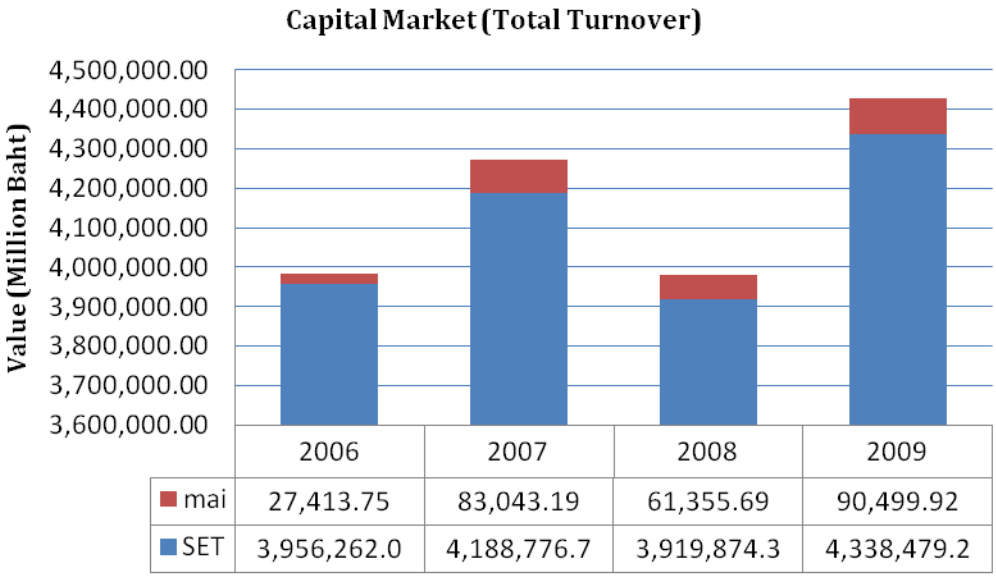
Figure 3.1 Total Market Capitalization of Thailand Equity Market, 2006-2009



	2006	2007	2008	2009
mai	21,809.50	38,268.98	22,152.86	39,130.85
SET	5,078,704.8	6,636,068.7	3,568,223.4	5,873,100.9

Source: Stock Exchange of Thailand

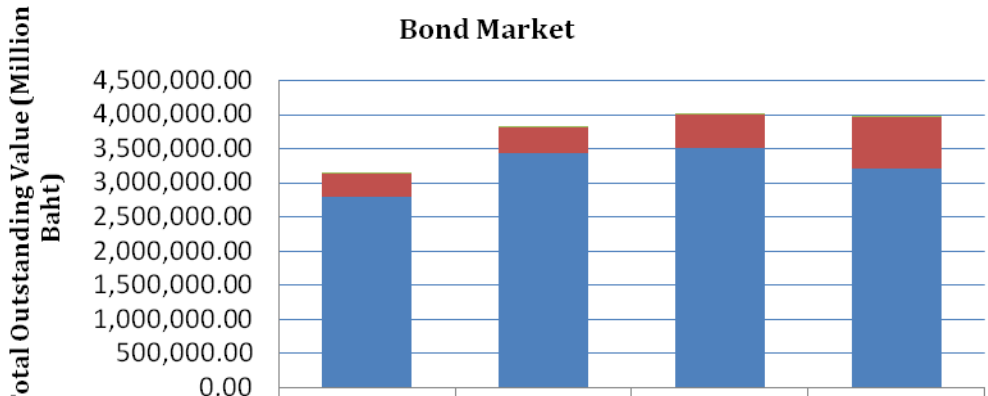
Figure 3.2 Total Turnover of Thailand Equity Market, 2006-2009



	2006	2007	2008	2009
mai	27,413.75	83,043.19	61,355.69	90,499.92
SET	3,956,262.0	4,188,776.7	3,919,874.3	4,338,479.2

Source: Stock Exchange of Thailand

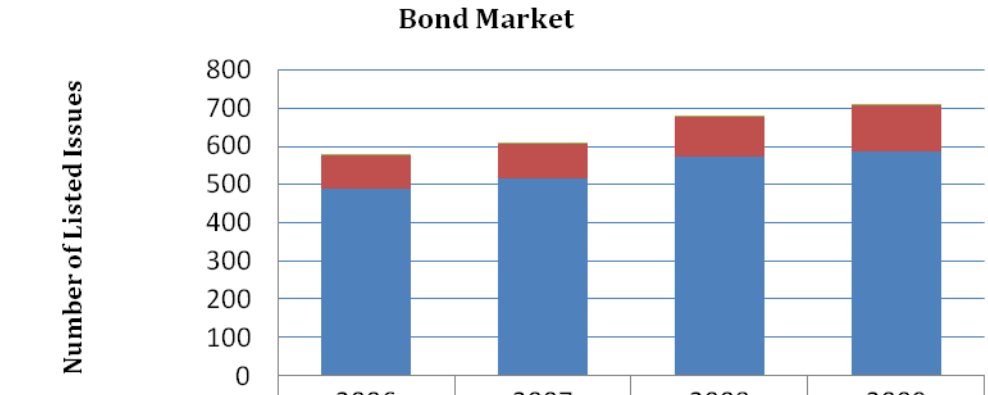
Figure 3.3 Total Outstanding Value of Thailand Bond Market, 2006-2009



	2006	2007	2008	2009
Bond-related Notes	5,575.55	5,575.55	4,755.55	4,605.55
Corporate Bond	337,929.08	387,068.36	511,524.60	766,865.08
Government Bond	2,794,928.4	3,421,792.9	3,498,700.3	3,205,954.7

Source: Stock Exchange of Thailand

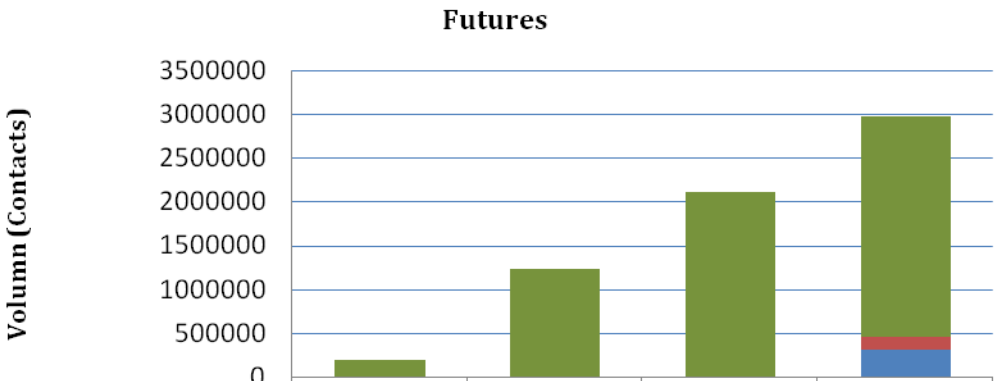
Figure 3.4 Number of Listed Issues of Thailand Bond Market, 2006-2009



	2006	2007	2008	2009
Bond-related Notes	1	1	1	1
Corporate Bond	88	94	106	123
Government Bond	490	515	571	585

Source: Stock Exchange of Thailand

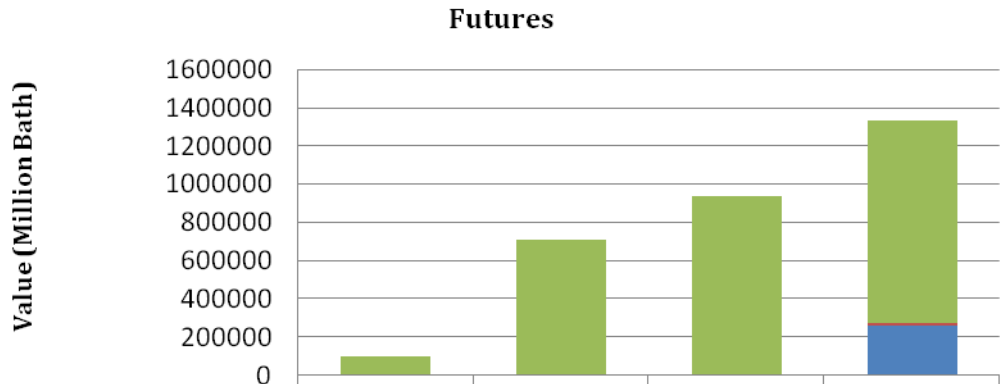
Figure 3.5 Trading Contract Volumes in Thailand Future Exchange (TFEX), 2006-2009



	2006	2007	2008	2009
SET50 Index Future	198,737	1,228,238	2,099,098	2,522,465
Single Stock Futures			3,838	145,758
Gold Futures				311,591

Source: Stock Exchange of Thailand

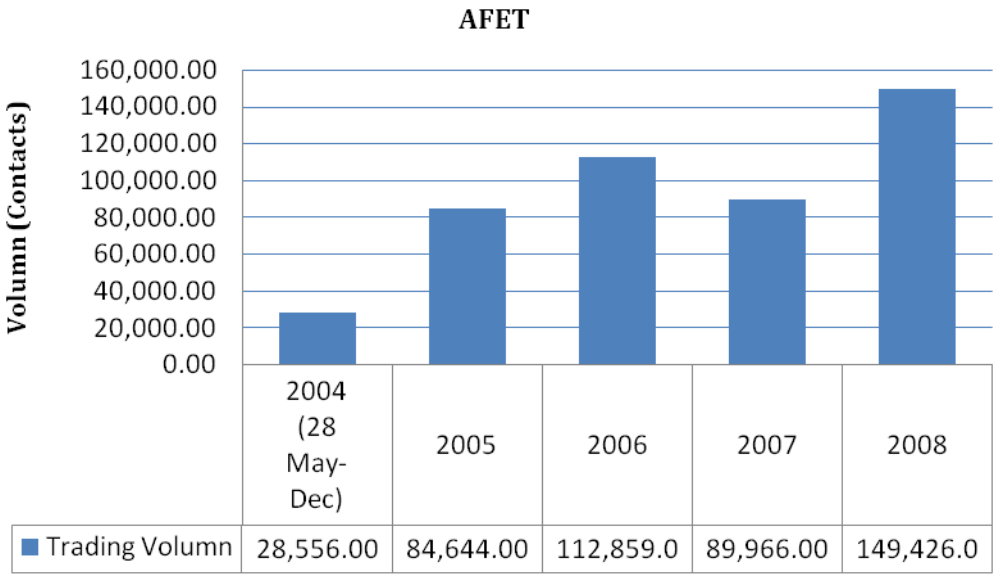
Figure 3.6 Total Value in Thailand Future Exchange (TFEX), 2006-2009



	2006	2007	2008	2009
SET50 Index Future	97,898.96	706,286.01	937,194.11	1,062,509.49
Single Stock Futures			383.97	7,134.35
Gold Futures				264,428.77

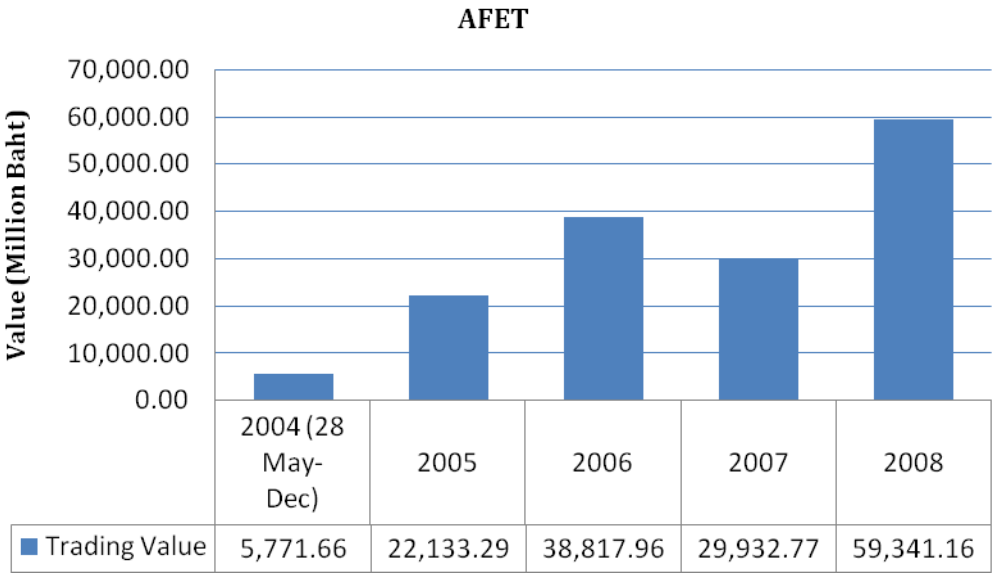
Source: Stock Exchange of Thailand

Figure 3.7 Trading Contract Volumes in Agricultural Futures Exchange of Thailand, (AFET), 2006-2009



Source: Agricultural Futures Exchange of Thailand

Figure 3.6 Total Value in Agricultural Futures Exchange of Thailand, (AFET), 2006-2009



Source: Agricultural Futures Exchange of Thailand

In derivative market, contracts are traded in the Thailand Future Market (TFEX) for SET50 index future, single stock future and gold futures. Agricultural Futures Exchange of Thailand (AFET) provides trading contracts on agricultural products (smoked rubber, rice and cassava shredded). Even though total trading contract volumes in both TFEX and AFET increase significantly during 2006-2009. Total values of future in contract (TFEX+AFET) are still equal to 1,393,414 million baht in 2009, which is approximately 23 percent of the total market capitalization in equity market. The most important product in derivative market is SET50 index future (76 percent of total derivative market value in 2009). The gold future contracts, which just launch in 2009, become instantly popular as the total contract value are larger than other future contracts except SET50 index future.

Comparison to the product traded in TFEX and AFET, the contract value in TFEX market are far more popular than those in AFET. Consider the nature of future market that should be relied on the underlying asset. Agricultural sector in Thailand is important in employment, export and output, especially compare to gold retail market. However, total contract value of gold future are larger than total contract value on agricultural products traded in AFET. Therefore, the dominance of SET50 index future and gold future in Thailand reflects speculative nature of investors in derivative market. The products that suitable for hedger in either portfolio management (single stock futures) or agricultural business (AFET) are not as well-liked as the SET50 index future and gold future.

3.3 Implication to Thailand's Financial Market

In this section, the focus is on the implications of the financial crisis to Thai financial market. Opinions from leading Thai experts regarding the issue were obtained via interviews. The interviews come from three concerned parties: (1) the regulators--the Bank of Thailand (BOT) and the Security Exchange Commission (SEC); (2) the financial institutions--the MFC Asset Management Plc. and the CIMB Thai Bank Plc.; and (3) the academics--Thammasat University and Kasetsart University. The interviews emphasized on the issues of obstructions in development of Thailand's financial market

and some practical solutions, and the lessons learned from the financial crisis 2007-2009 that Thailand should be aware of.

The summary of the experts' interviews

Kobsak Pootrakool, Ph.D., Division Executive, Monetary Policy Strategy Division, Monetary Policy Department, Bank of Thailand

Dr. Kobsak stated that Thai market has several problems from all concerned parties. For individual investors, one of the major problems is that they are not sufficiently educated, especially in new finance products. He mentioned that market development is an on-going process, which means derivatives markets are necessary as they provide tools to manage risks. However, many individual investors only trade derivatives for speculation and Thai derivatives markets have low liquidity resulting in poor risk management mechanism. Another problem stems from the financial brokers. In the Thai stock market, many brokers lack integrity and encourage individual clients to trade as much as possible (the brokers incentives are based on commission fees) without considering any sustainable long-term plan.

There are also many problems coming from the responsible authorities. One predicament that hinders sustainable growth in the market is that one of the objectives of the Stock Exchange of Thailand is to increase market capitalization by raising the numbers of listed firms. Such an objective can attract low quality firms leading to, among other things, stock manipulations and frauds. Problems There are also problems concerning rule and law enforcement by regulators. These problems are usually difficult and take time to prosecute those who commit financial crimes. In addition, regulators should encourage more liberalization in the financial market as this will lead to more competition, resulting in better service and recommendation from brokers.

Finally, Dr. Kobsak listed three crucial elements needed for sustainable development of Thai financial markets. The first and most important element of all has to do with educating individual investors. The next element has to do with the broker firms, they must be knowledgeable and have integrity in providing sound financial advices. The brokers should help educate and facilitate investors. Last, the regulators must stay

abreast of new products and transactions. The regulators must acknowledge that the severity of the crisis is subjected to the vulnerability of the financial market. Therefore, regulators have to be proactive in preventing and reducing the risks that can lead to a crisis, even though these actions might compromise economic activities. The regulators still need to design preventive mechanisms that are not too sensitive to economic activities.

Don Nakornthab, Ph.D., CFA, FRM, Team Executive, Macro Surveillance Team, Monetary Policy Department, Bank of Thailand

From Dr. Don's perspective, the role of the central bank should not be limited to only setting a policy interest rate but also providing regulations on financial institutions. Credit expansion and credit quality are the main concerns. He predicted that the World Economy will recover in 2011 but the strength of the recovery is still uncertain. A major effect of the recovery will be the change in the world economic condition that will make Thailand less reliable on the export. In addition, Chinese economy is still in risky condition and could affect Thailand via exchange rate instability and exports. Dr. Don emphasized on the role of domestic demand in supporting the economy, private spending for consumption should provide increasing role in macro-economy, especially when the external demand is weak. Finally, government policy should provide incentive to consumers to increase their spending.

Tipsuda Thavaramara, Assistant Secretary General, Security Exchange Commission

Khun Tipsuda indicated that the positive list policy is suitable for Thai market than the negative list. Practicing the negative list approach has several disadvantages, for examples: it is difficult to change the list; the regulator must stay abreast of product innovations. On the other hand, employing positive list with speedy authorizing process is more efficient.

Moreover, Khun Tipsuda said that Thai market suffers from a lack of "investment culture" – Thai citizens are either of the saving type, primarily put their money in the banks, or of the gambling type. Thai citizens need to know that there are other types of

investment opportunities, implying that they have to be educated on the issues. One structural problem is that Thailand lacks the legal foundation for developing and issuing novel financial products. Therefore, to issue and to legalize a new product, the process needs long periods of time, especially the legislation periods. Another cause of slow development of new financial instruments stems from not enough initiative from the SET and broker firms. Instead, several products were developed by the regulators, which is not the standard practice. Some derivative instruments, for example a credit derivative, cannot be launched because of the illiquidity in the spot market.

Lastly, Khun Tipsuda specified that the main policy of the SEC is to provide more financial products for investors while minimizing the cost of capital accessible by businesses. The SEC aims to improve the working process and to keep up with new products.

Anya Khanthavit, Ph.D., Professor of Finance, Department of Finance, Faculty of Commerce and Accountancy, Thammasat University

Professor Anya expressed that derivative securities, by their own functions, serve as tools for risk management. However, the crisis stems from the problem of trading the derivative securities in speculative manner. Hence, one needs to be clear that the cause of the problems comes from practicing risky business using derivatives. At the minimum, the market needs a certain fundamental financial models to price assets. After that it is important to assess the risk that comes with financial instruments and evaluate how much risk the investor can afford. In addition, regulators must be well versed, unbiased and open-minded. The development of derivative products and transactions has to be gradual and initiated by public sector. Finally, Professor Anya noted that the failure of commodity derivatives in Thailand stems from the lack of research and proper products traded in the market.

Boontham Rajitpinyolert, Ph.D., Lecturer, Faculty of Economics, Kasetsart University

From the interview with Dr. Bootham, he anticipated that in 2011, the US economy will continue to suffer from problems in the financial institutions. The problem of liquidity

shortage has yet disappeared and financial institutions in the US still need new capital injections. Also, there is the lack of coordination between government and regulators. Therefore, macroeconomic policies (monetary & fiscal policies) need to focus on supporting the US economy.

As for the lessons for Thai financial institutions, Dr. Boontham said that Thai market needs more innovations especially in the bank capital, e.g., convertible bonds (from debt instrument to classes of capital). These instruments can provide flexibility during crisis.

In his last remarks, Dr. Boontham emphasized that regulators in financial markets should be more coordinated, especially the BOT, the SEC, and the insurance department. The Bank of Thailand should be more open to the public in both the monetary policy and the regulations enforced on financial institutions (increasing transparency).

Bunluasak Pussarungsri,Ph.D., Research Head, Risk Management Group, CIMB Thai Bank

Dr. Bunluasak believed that Thailand is unlikely to face the same type of crisis due to less-developed financial market. He mentioned that Thailand currently practices positive list policy, which is suitable because Thai market is yet fully developed. The positive list policy does not render lengthy time frame for regulators to authorize a product. This is the benefit since a delay in approving new product hinders development. He added that one solution to reduce risk for a derivative investor, as noted by Jim Walker, is to allocate sufficient capital for the investor's net position.

Pichit Akrathit, Ph.D., President, MFC Asset Management Public Company Limited

Dr. Pichit explained that derivative instrument is an efficient tool in managing risk, especially in large portfolio management. However, the problem arises from misusing it. From the financial institutions' point of view, more risk-management financial products are preferred. Nevertheless, this means more burdens for Thai regulators to keep up with the new products. As a result, there are limited risk-management products authorized by Thai regulators. Furthermore, regulators should do a complete study and analysis (including any long-term plan) before introducing new financial product to the market, as oppose to the costly "trial-and-error" method used in the past. In terms of

issuing new policy, regulators must fully understand and be aware of its impacts on all concerned parties.

Dr. Pichit concluded that limited financial instruments add more cost to investors. He also believed that Thai market is less-developed with limited financial instruments; therefore, a financial crisis similar to the one caused by such subprime mortgage is less likely to happen.

Experts' opinions, implication to Thailand financial market and next steps

Thai financial market is in the developing stage. Financial instruments and transactions are still limited. All experts agree that developments of derivatives instruments are essential for the progress of the Thailand's financial sector, which in turns facilitates the real sector. However, from the market's point of view, the development of new product is considered too slow. This is partly due to the positive list policy that only allows certain products in the list to be operated. Lack of legal foundation regarding financial innovation also contributes to the delay. In Thailand, issuing and legalizing each new financial product will require additional legislation.

At present, the practice of positive list approach may be suitable for Thai market considering the market environment. Even though, regulators still need to catch up with financial innovations, more speedy authorizing process is required to fill the need in financial market. To facilitate the development of financial instruments, legislation for developing and issuing novel financial products must be improved. For this purpose, Thailand should have a main legislation on all types of financial products to shorten the authorizing period. This is a more efficient way to product development.

However, the slow development in financial innovations during the current global financial crisis may be fortunate for Thailand because Thai financial market is not much complex and very restricted. Such problems-caused by financial products like CDOs and CDS do not exist. For this reason, experts believed that the likelihood of a similar financial crisis (caused by subprime mortgages, CDOs and CDS) to happen in Thailand is

very small. Although, that does not mean Thailand will not experience some other types of financial crisis.

To prevent or to minimize the effect of the next financial crisis, Thailand must have a fundamentally-sound financial market. To achieve this objective, human development and product development have to go hand-in-hand. Human development is three-folds: investors, financial institutions and regulators. Individual investors have to be aware that there are other channels of investment other than putting their savings in banks. They must also be educated on financial management and those who invest in the equity market should have knowledge about basic risk management. For financial institutions, their main objective should not be the bottom line "profit". Rather, it must be "profit" for all stakeholders. They should have social accountability and integrity. It is equally important that the regulators must be well versed in their responsible functions. They should be proactive and vigilant in monitoring risk. For example, in addition to setting the target interest rate, the central bank should help monitor credit quality and expansion, which could cause financial instability and crisis. Last but not least, coordination and communication among these three parties are very crucial in developing a strong financial market.

Along with human development, the market needs to develop a mixture of financial products for managing risk. However, that does not necessarily mean more products are better. For example, issuing several new derivatives without a complete study and proper product design can lead to low transaction, which sometimes implies that the derivatives cannot be used as a tool for managing risk. On the other hand, introducing one well-studied (e.g. what the market wants, whether it has price control or not) product at a time is better.

There is no end stage for financial market development; it is an on-going process. To achieve a fundamentally-sound financial market, both human and product developments have to carry on continually. Such financial market will well serve its functions and most importantly, it should reduce the chance of future crisis from happening.

IV. CONCLUDING REMARKS

The global financial crisis of 2007-2009 has caused financial market turmoil around the world, resulted in the failure of many large financial institutions, and contributed in the bailout of financial institutions by many governments. The crisis also affected the real sector leading to the closure of many real crucial businesses and the contraction of the world economy. The crisis was originated by the credit crunch in the US banks caused by the collapsed of the US housing bubbles and eventually led to global financial panic. Four possible causes behind this crisis are relaxed macroeconomic policy, advanced financial engineering, lenient financial sector supervision and regulation, and reckless activities of financial institutions.

In the macroeconomic aspect, the transmission channels of global crisis to domestic economy are examined. The results indicate that the international trade channel has significant impact to the economic activities, while the financial linkage provides only marginal effect. Most of the drop in export, investment and consumption could be explained by a shrink in world import value. In addition, the effects of policy responses are investigated. The results show that the impacts from the monetary and fiscal policies responses are considerably smaller than those of the slump in global trading value.

For the implication to global financial sector, certain rules and regulations are needed. The practical recommendations of the “Squam Lake Report” are the followings:

(1) a central regulator should oversee the health and stability of the whole financial system,
(2) capital requirements for financial institutions should be strengthened,
(3) executive compensation should be subject to "holdbacks,"
(4) financial institutions should invest in "contingent capital,"
(5) regulators need expanded "resolution" authority over financial institutions,
(6) financial institutions should execute "living wills."

Implication to Thailand's financial market in minimizing chances of financial crisis is that the market has to be fundamentally-sound and the regulators have to be proactive and vigilant in monitoring risks.

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Appendix

The NIDA's Macroeconometric Model (NIDAQMM)

National Institute of Development Administration National Institute of Development Administration (NIDA)'s Quarterly Macroeconometric Model – NIDAQMM had been developed since 2003. This model is used as the main tool in the construction of macroeconomic forecasts of NIDA. In addition, the model is also applied in other empirical researches.

The NIDAQMM consists of 23 behavior equations and 16 identities. The model is constructed based on the Keynesian's demand-side approach. The supply constraint is proxy by the output gap variable defined as the ration between actual and potential output. The model includes six main economic sectors shown as follows.

i) Private and public expenditure,
ii) Price level
iii) Domestic financial market
iv) International financial market
v) International trade,
vi) Aggregate demand and output gap.

We estimate behavior equations by taking into account the nonstationary in variables. Therefore, the Error-Correction Model (ECM) is used as the main method. Moreover, the AutoRegressive Integrated Moving-Average (ARIMA) and regression with first differences data are applied when there is no existence of cointegration relationship in variables.

The linkage between sectors in the model and the details of the variables in the aggregate demand, international trade and international financial market sectors are displayed in Figures A.1 to A.4.

In Figure A.2 and A.3, the transmission channel of GFC to Thai economy can be explained. The decline in world trading volume affected exports of goods and services, which provide linkage to import and aggregate demand determination. Domestic consumption, investment and price level are influences by weaker demand, which provide indirect impacts of the international trade channel. For financial linkage channel, the capital outflow via foreign portfolio investment affected financial market (stock, bond). These effects transmit to real sector via consumption and investment. The consumption are influenced by wealth effect and the effects on investment can be come by credit constraint and weak economic outlook of the income and widen of output gap.

The further details of the NIDAQMM are explained in Chintayarungsan, et al. (2007) and Chintayarungsan, et al. (2010).

Figure A.1: Overview of NIDA's Quarterly Macroeconometric Model (NIDAQMM)

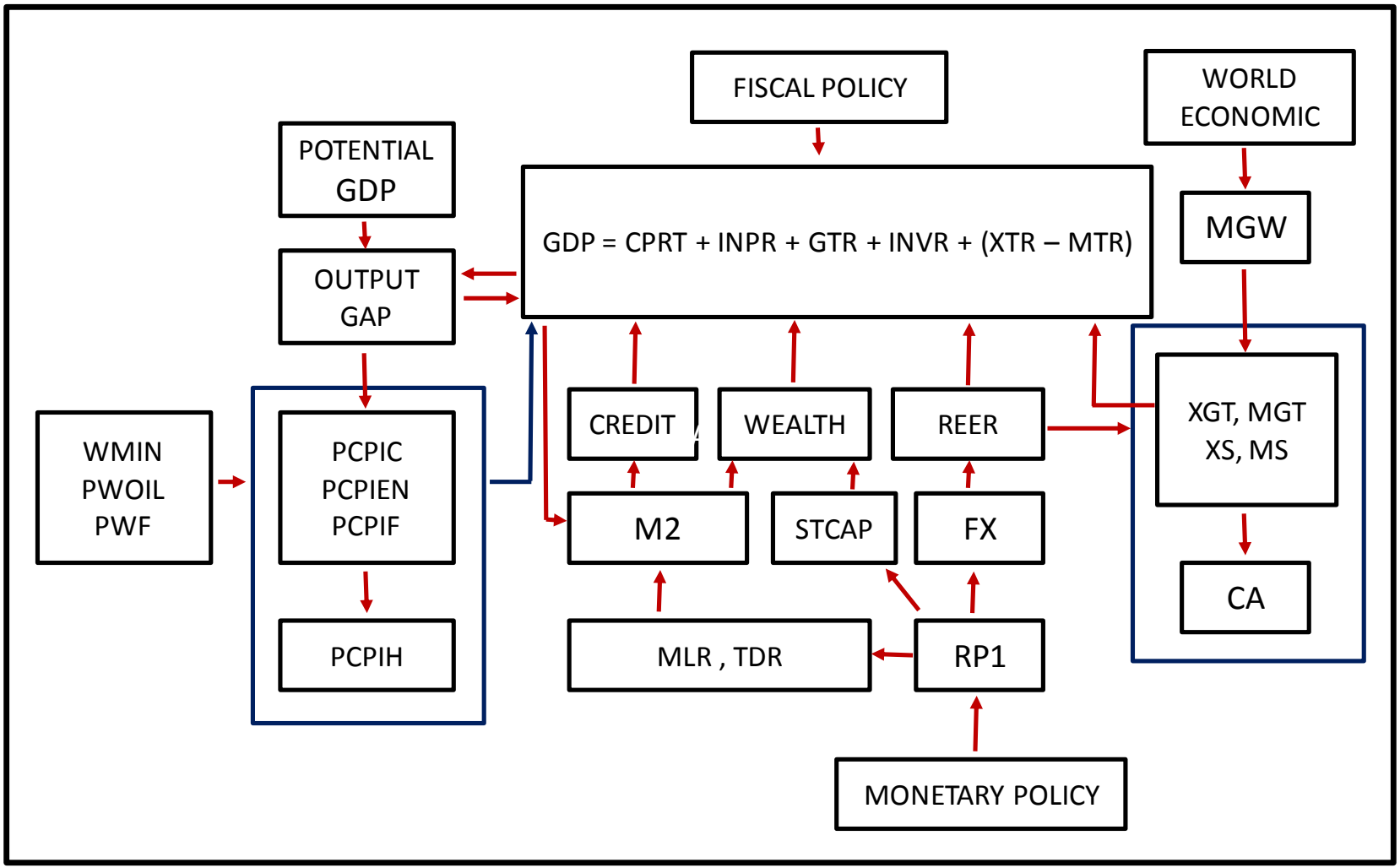

Figure A.2: Flow chart of aggregate demand sector

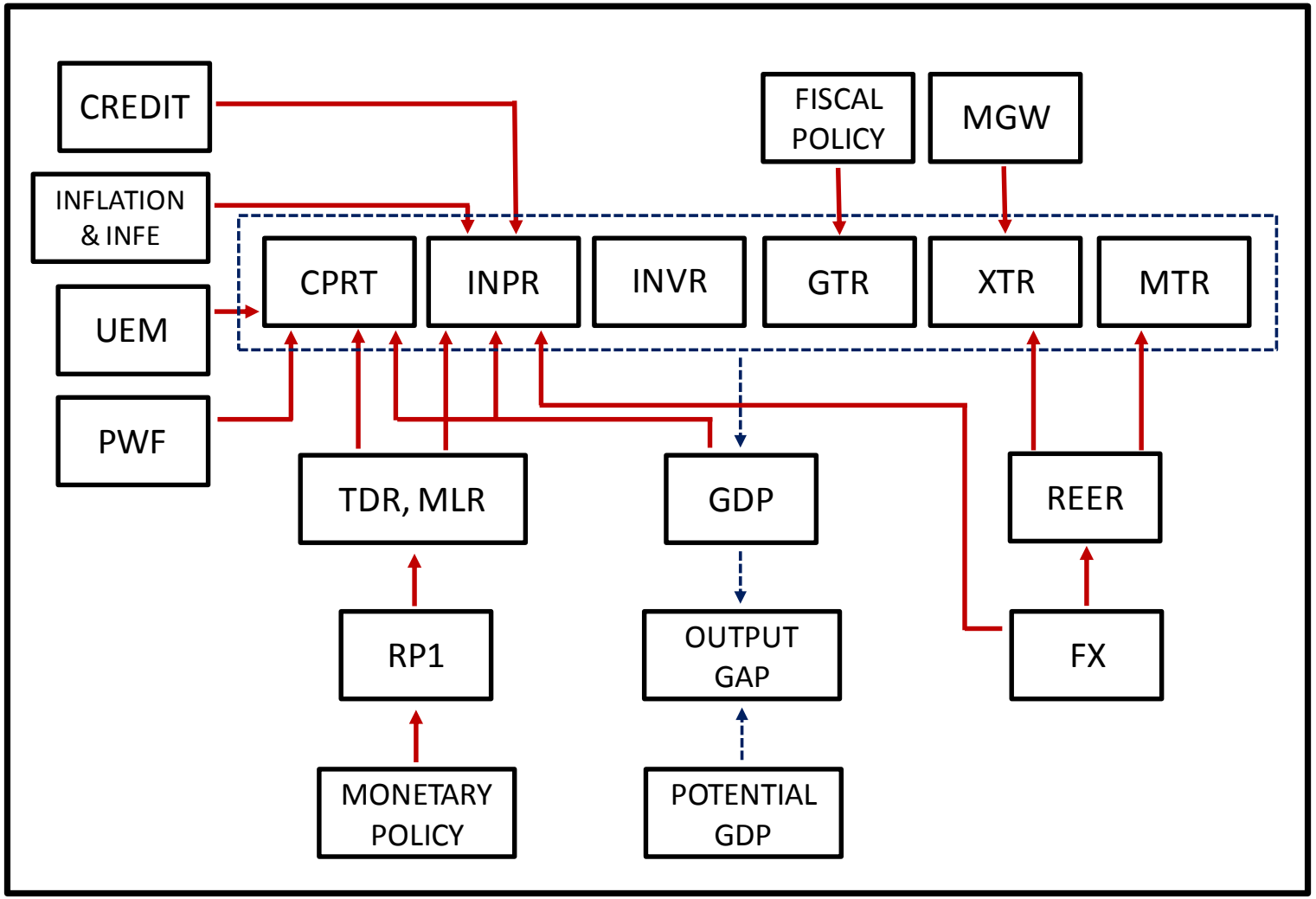

Figure A.3: Flow chart of international trade sector

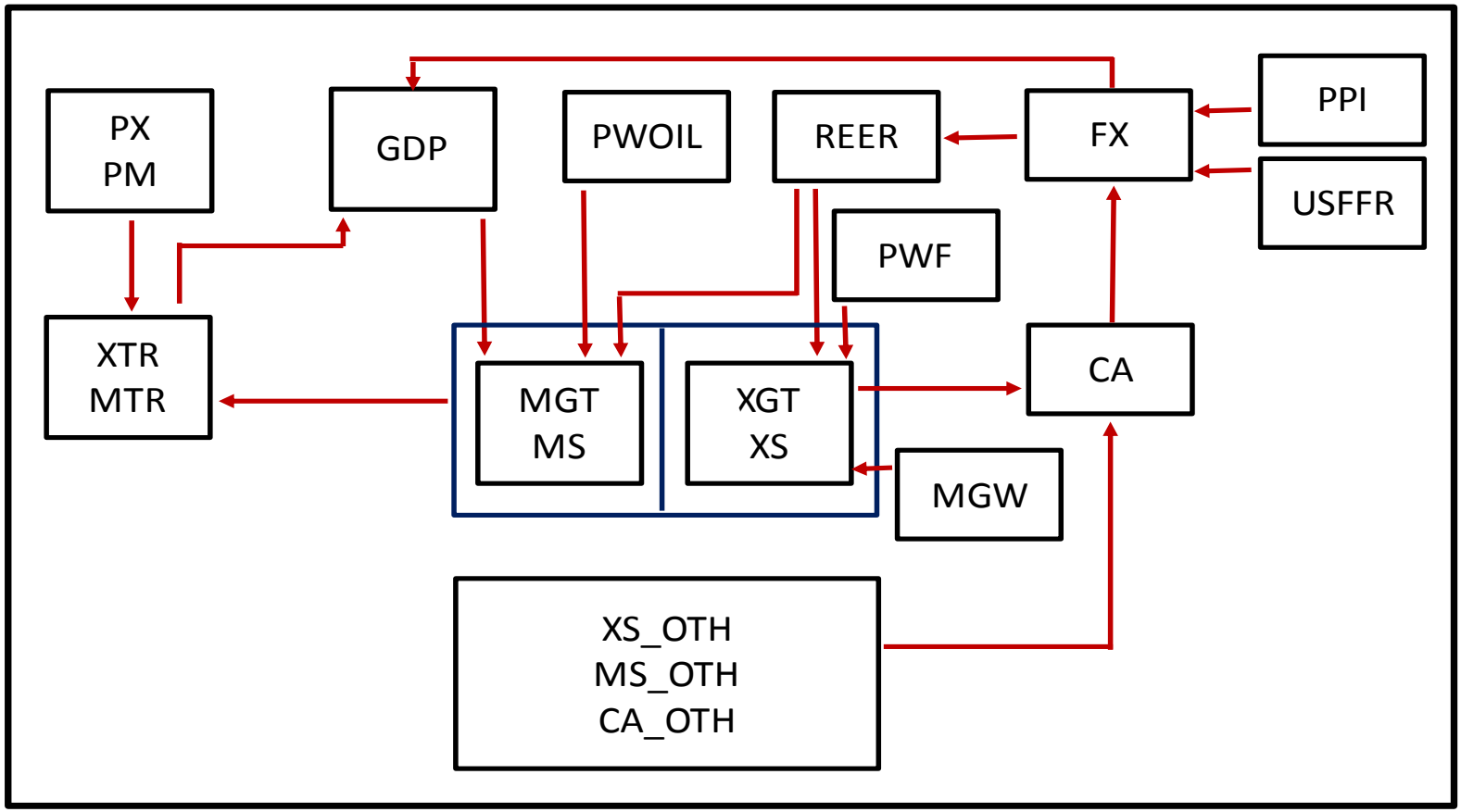

Figure A.4: Flow chart of international financial market sector