THAILAND'S AGRICULTURAL HOUSEHOLD DEBT: ASSESSMENT OF RECENT TRENDS

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BOT Monthly Workshop
March 16, 2006

MOTIVATIONS

Concerns about the rise of household debt in Thailand

In 2006, the economy has been buffeted by several negative shocks

Agricultural price cycle appears stretched relative to historic norm

Agricultural households are particularly vulnerable to a downturn

Agricultural household debt sustainability has a large welfare implications

DEBT-RIDDEN FARMERS PROTESTED IN FRONT OF GOVERNMENT HOUSE (MARCH 2007)

TWO OBJECTIVES OF THIS PAPER

Review recent developments of agricultural household debt situation

Develop an estimated factor model of loans in arrears of Thai agricultural households that can be used for scenario analysis

CONTENTS

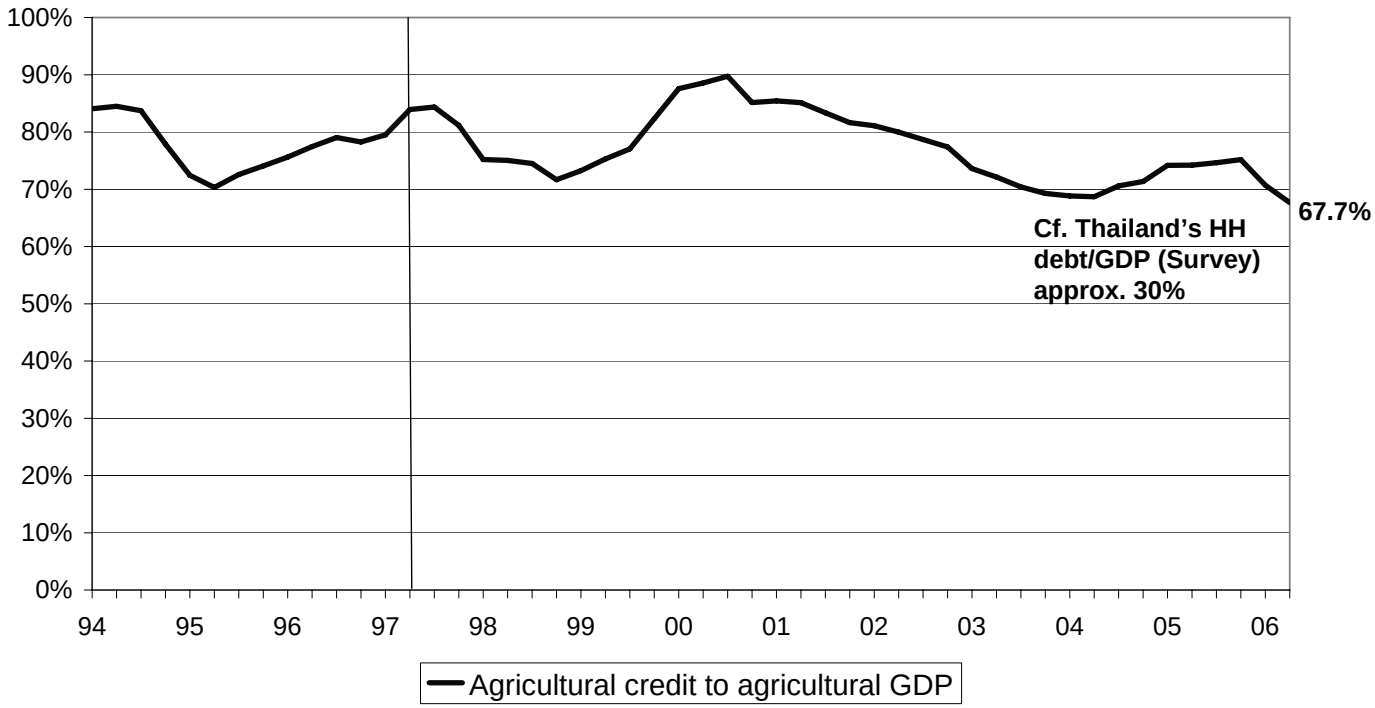
Some facts about Thailand's agricultural household debt

An empirical model of agricultural household loans in arrears

- **The data**
- **Econometric results**
- **Applications**

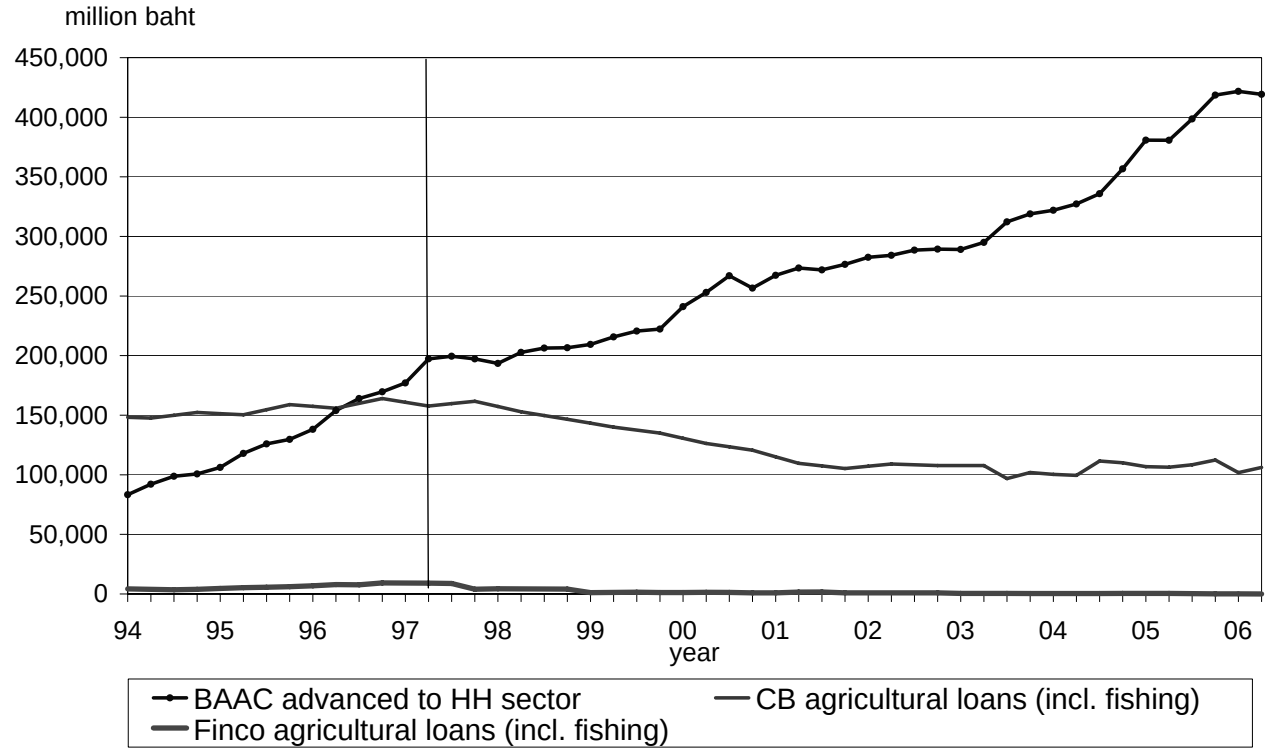
Conclusions

Agricultural credit to Agricultural GDP, 1994Q1 - 2006Q2



Source: NESDB, BOT, and authors' calculation
*** Agricultural credit = total BAAC loans + agricultural loans (loans for agriculture, hunting, forestry, and fishing purposes) extended by commercial banks and finance companies**

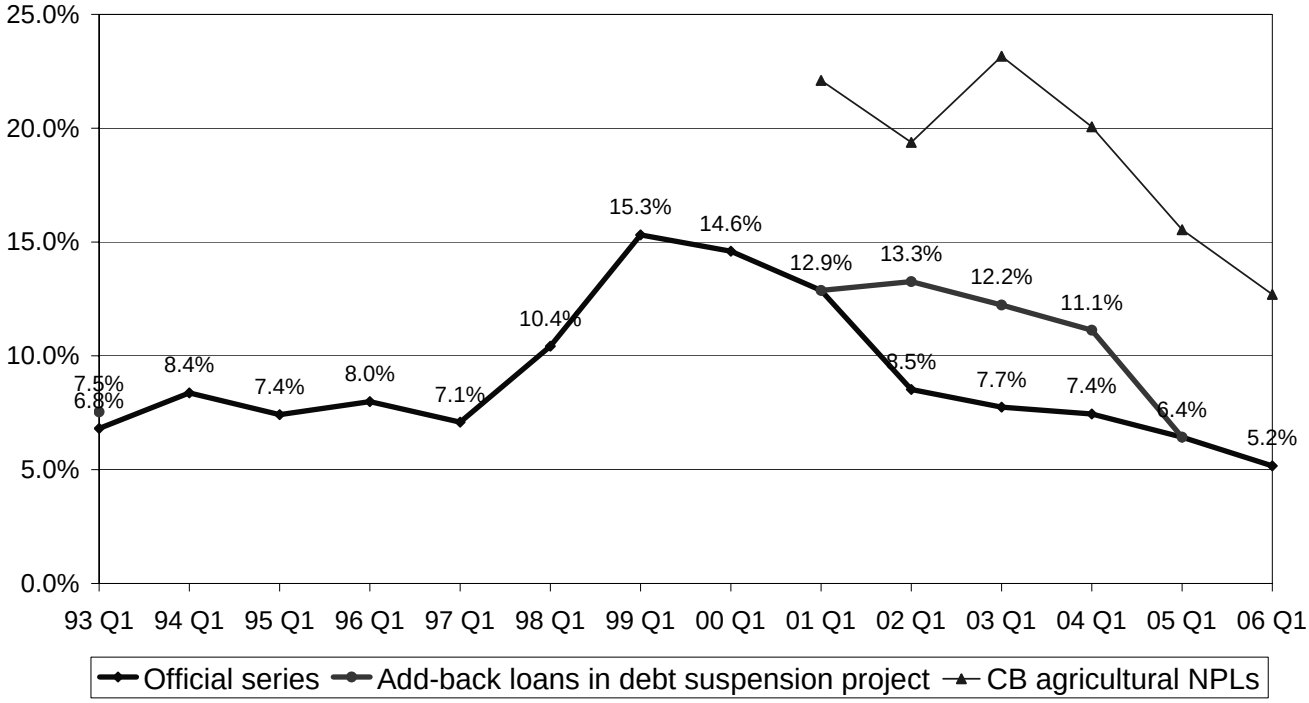
Agricultural Credit by Lender, 1994Q1 -2006Q2



	March 94	March 06
Number of BAAC branches	**304**	**848**
Number of farm households served by BAAC	**4.0m**	**5.5m**
BAAC credit per household	**20,650**	**76,119 (2.5x increase in real terms)**

AGRICULTURAL LOANS IN ARREARS IN DOWNWARD TREND

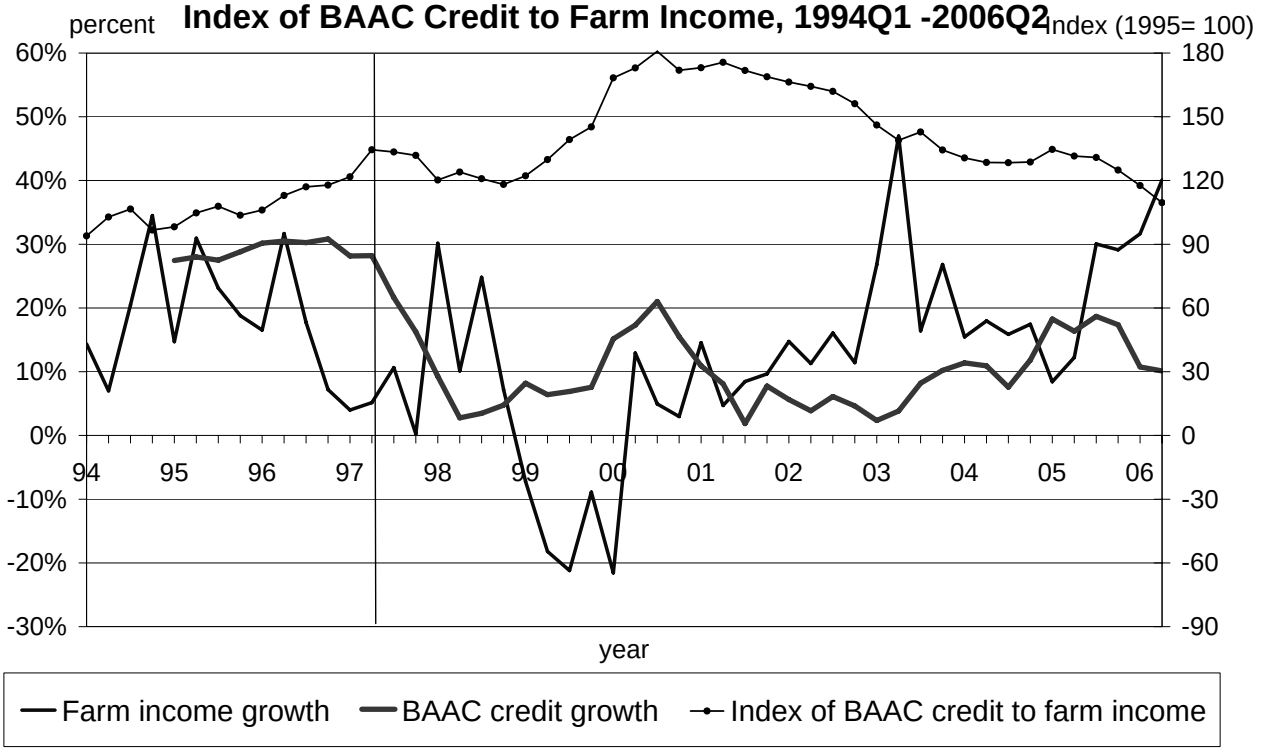
Loans in arrears to total loans of BAAC, 1993Q1-2006Q1



Source: Various issues of BAAC annual reports; BOT; authors' calculation

SINCE 2001, GROWTH IN FARM INCOME HAS OUTPACED BAAC LOAN GROWTH

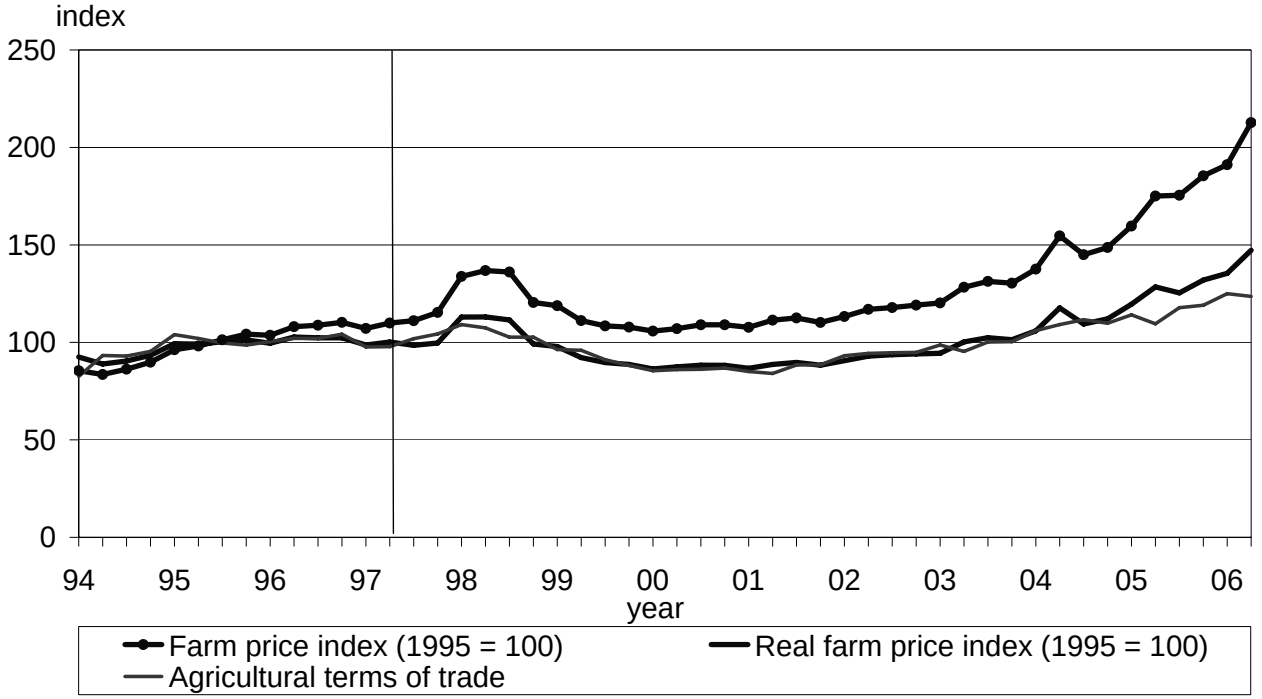
Growth of Farm Income and BAAC Credit vs. Index of BAAC Credit to Farm Income, 1994Q1 -2006Q2



Source: BOT; authors' calculation

DRIVEN LARGELY BY CONTINUOUS RISE IN FARM PRICES

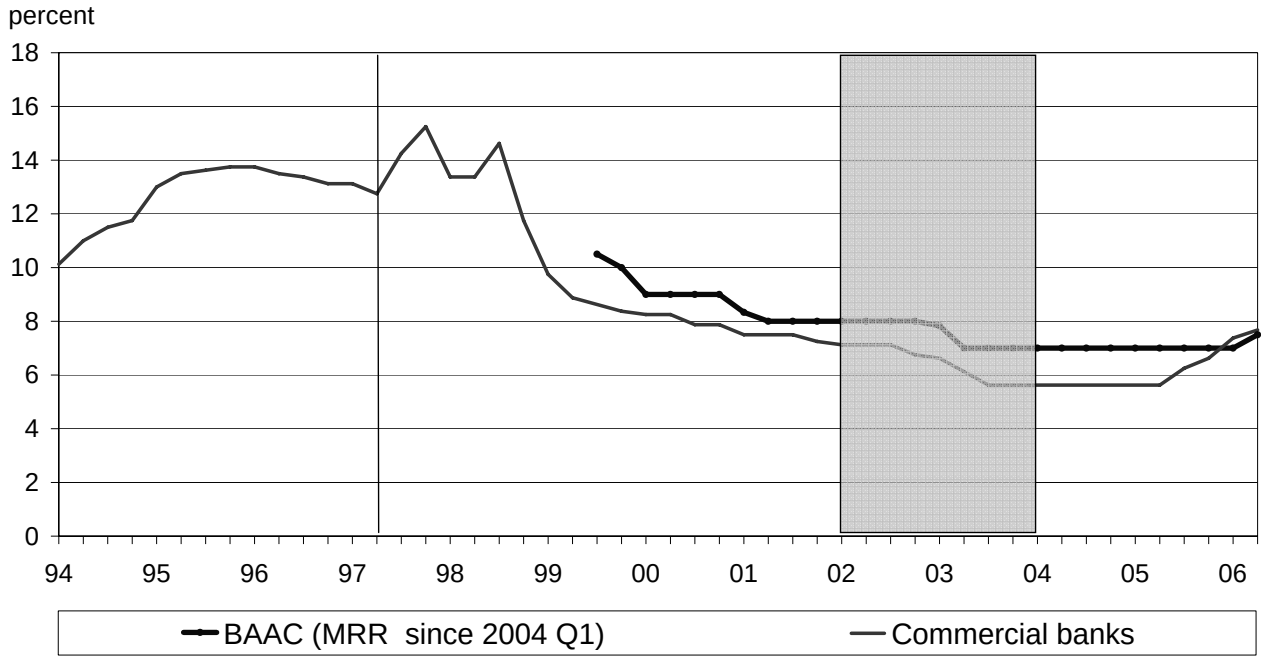
Agricultural Prices and Agricultural Terms-of-trade, 1994Q1 -2006Q2



Source: BOT; NESDB; authors' calculation

LOW INTEREST RATES HAVE HELPED INDEBTED HOUSEHOLDS TO REMAIN AFLOAT

MLR of BAAC and Commercial Banks, 1994Q1 -2006Q2



Source: BOT; BAAC

SUMMARY OF SELECTED FACTS

The increase in agricultural credit is largely a result of the expansion of BAAC loan book.

In absolute terms, agricultural households now carry much more debt than before.

In relative terms, however, Thailand's agricultural household debt situation at 2006Q2 was at its best in the past twelve years as measured by

- **The ratio of agricultural credit to agricultural GDP**
- **The index of BAAC credit to farm income**
- **The ratio of BAAC's loans in arrears**
- **Farmers' interest burden**

CONTENTS

THEORETICAL BASIS OF THE EMPIRICAL MODEL

A life-cycle model with an option to default developed by Lawrence (1993) and later extended by Rinaldi and Sanches-Arellano (2006)

Probability of default = function of

the amount of loans borrowed (+)

income net of other expenses (-)

wealth (-)

the borrowing rate (+)

the state of the economy (-)

Table 1 Contemporaneous and lead correlations of potential explanatory variables with the ratio of loans in arrears**, quarterly data, 1994Q1-2006Q1 (49 quarters)**

Variable	Correlation with	
	Loans in arrears$_t$	Loans in arrears$_{t+1}$
Loans in arrears	100%	95%
Real debt stock	18%	18%
Debt-to-farm-income ratio	67%	63%
Agricultural terms of trade	-62%	-57%
Real farm income	-29%	-30%
Real farm price	-58%	-56%
Real interest rate	26%	36%
Headline inflation rate	-65%	-53%
Real GDP	-25%	-34%

For description of each variable, see Appendix A

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AN ERROR CORRECTION MODEL (ECM) SPECIFICATION EMPLOYED IN EMPIRICAL ESTIMATION

The ADF test reveals that the ratio of loans in arrears is non-stationary.

ECM circumvents the unit root problem and allow estimation of both short-run and long-run effects of explanatory variables.

In this paper, we adopt the Engle-Granger (1987) procedure of first estimating the long-run equilibrium relationship (the cointegrating regression) and then using its residuals as an explanatory variable in the short-run dynamic regression equation.

Estimated error correction model of the ratio of agricultural household loans in arrears

$$\Delta \ln(\text{loans in arrears ratio}_t) = \underset{(1.97)*}{0.439}*\Delta \ln(\text{debt to income}_{t-1}) + \underset{(3.63)***}{1.040}*\Delta \Sigma_{i=0-3}(\text{real reference rate}_{t-i})$$

$$\underset{(-4.10)***}{-0.007}*\Delta(\text{real farm price}_{t-1}) - \underset{(-3.27)***}{0.262}*\text{ecm}_{t-3}$$

Adjusted $R^2 = 0.50$ S.E. of regression = 0.067 Breusch-Godfrey LM(2) : 1.3 (0.29)

$$\text{ecm}_t = \ln(\text{loans in arrears ratio}_t) - (\underset{(9.78)}{0.802}*\ln(\text{real debt}_t) + \underset{(5.69)}{0.981}*\Sigma_{i=0-3}(\text{real reference rate}_{t-i})$$

$$- \underset{(-10.81)}{0.528}*\ln(\text{real GDP}) - \underset{(-8.83)}{0.013}*\text{real farm price}_t)$$

Adjusted $R^2 = 0.81$

Note: Number of observation = 46 after adjustments (1994Q4 – 2006Q1)
t-statistics are in parenteses.
***, **, * denote significance at 1%, 5%, and 10%, respectively.

CONTENTS

POLICY QUESTION: WHAT WOULD HAPPEN TO BAAC'S LOANS IN ARREARS IF REAL FARM PRICE FALLS BY 20% IN ONE YEAR?

Real farm price appears susceptible to a downturn of the global economy.

A fall in real farm price would have a negative impact on agricultural households by lowering their capacity to service debt which would in turn hurt BAAC's loan book.

20% fall in real farm price in one year happened before between 1998 and 1999. Thus it is an exceptional but plausible event.

The empirical model provides a sound factor model to conduct a high-level stress test of a collapse in farm price.

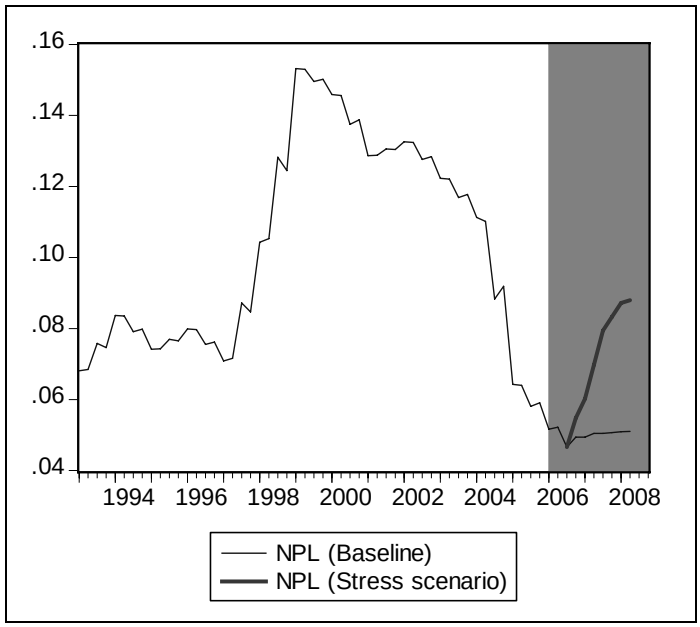
BASELINE VERSUS STRESS SCENARIOS ASSUMPTIONS

Forecast period 06Q3-08Q2

		Baseline	Stress scenario
•	**Real stock of debt**	**Same as 06Q2**	**Same as 06Q2**
•	**Real reference rate**	**Same as 06Q2**	**Same as 06Q2**
•	**GDP growth**	**5% annual rate**	**5% annual rate**
•	**Real farm price**	**Same as 06Q2**	**Drops 20% linearly btw 06Q3-07Q2 then stabilizes**
•	**Debt-to-farm income**	**Same as 06Q2**	**Rises 25% linearly btw 06Q3-07Q2 then stabilizes**

BAAC'S LOANS IN ARREARS PROJECTED TO NEARLY DOUBLE UNDER THE STRESS SCENARIO

Figure 8 Dynamic forecasts of BAAC's loans in arrears ratios, 2006 Q2- 2008 Q2



CONTENTS

CONCLUSIONS

At present, Thailand's agricultural household debt situation appears sustainable.

Some caveats

- **BAAC's definition of loans in arrears understates the risk profile of the bank.**
- **BAAC and commercial bank loans are only a part of total agricultural household debt.**
- **Agricultural loans in arrears are highly dependent on the future of farm price.**

The paper recommends

- **beefing up of BAAC's risk management to better quality of its loan books**
- **water resource management, crop diversification, and some form of insurance to smooth fluctuations in farm income, and**
- **Promotion of off-farm work to reduce dependence on farm price**