

Appendix: Macroeconometric model^{1/}

The Bank of Thailand's macroeconometric model (BOTMM) is an economic forecasting tool, consisting of 25 behavioural equations and 43 identities. The BOTMM presents to the Monetary Policy Committee (MPC) an important tool for economic forecasting. The model is used to analyze the response of the economy to various exogenous shocks and policy changes. It also assists the MPC in formulating the optimal policy to achieve the goals of price stability and sustainable economic growth in the long run.

Improving the model

In this *Report*, the BOTMM was revised by incorporating the most recently published data, particularly the quarterly GDP figures of 2007 Q1 released by the NESDB on 4 June 2007. Other notable changes made to the model since the January 2007 *Report* are as follows.

1. The identity part of the exchange rate equation (equation 3.6) was revised such that the interest rate differential term in the present quarter was replaced with that in the previous quarter. The revision was in line with the Uncovered Interest Parity (UIP) theory. Moreover, the inflation differential term was removed. The behavioural part of the equation or the RISK equation was renamed PRESSURE. Finally, the ratio of current account balance to GDP was used, instead of the ratio of balance of payments to GDP, to capture pressures on the exchange rate resulting from economic fundamentals.

2. The equation for net flows of the private financial account (equation 3.7) was adjusted to exclude the effect of BOT swaps on net private capital flows to better reflect the actual amount of inflows into the economy. Moreover, lagged net private capital flows was added as another explanatory variable. Overall, the revision resulted in a higher R^2 of 71 percent, up from 49 percent in the previous *Report*.

^{1/}The Bank of Thailand's macroeconometric model was first published in the July 2000 *Report*. Revisions to the model were noted in subsequent *Reports*.

3. In the equation for private credits (equation 4.3) non-performing loan write-offs and transfers to AMCs were added to private credits to better reflect the actual amount of credits in the economy that the private sector obtained from financial institutions. Moreover, the variable for net private capital flows was also removed, given that it was not the main source of funds of financial institutions and that it had only a small effect on private credits. The lagged private credits term was also removed and replaced with a constant term.

4. The core consumer price index equation (equation 5.1) was adjusted such that the change in the seasonally-adjusted core consumer price index over the previous quarter ($\Delta \ln(\text{COREsa})$) was replaced with its year-on-year counterpart (i.e., core inflation) as the dependent variable. The new equation contains 4 explanatory variables, namely lagged core inflation, the output gap, and the interaction terms between over-the-year change in the producer price index and two time dummies (PRE2003Q3 and POST2000Q3).

5. The import price deflator equation (equation 5.13) was adjusted such that the Manufacturing Unit Value index was included in the long-run equation in addition to Dubai oil price and non-fuel commodity price.

6. Moreover, an equation for the producer price index was added into the BOTMM as equation 5.17. In the short term, the equation consists of 3 explanatory variables, namely the retail petroleum price index, the farm price index and the import price deflator. The long-run equation consists of 4 explanatory variables: the 3 variables mentioned above plus average earnings.

Effect of variations in the exchange rate and crude oil price on the Thai economy

The model in this *Report* was used to analyse the effect of variations in the exchange rate and the crude oil price on the Thai economy. Table A.1 shows that a one per cent depreciation in the exchange rate (baht per US dollar) would increase core inflation, headline inflation, and economic growth by 0.05, 0.05, and 0.28 per cent, respectively.

Moreover, a one percent increase in the Dubai crude oil price (US dollars per barrel) would affect core inflation, headline inflation, and output growth by 0.01, 0.05, and -0.04 per cent respectively.

Table A.1 Summary of the effect of variations in the exchange rate and crude oil price		
	Effect on the Thai economy in the 4 th quarter ahead	
	A 1% depreciation in the exchange rate	A 1% increase in crude oil price
Core inflation	0.05	0.01
Headline inflation	0.05	0.05
Economic growth	0.28	-0.04

Source: Macroeconometric model, Bank of Thailand

Corporate and household sector models

The corporate and household sector models are tools developed by the BOT to help assess the financial conditions of the Thai corporate and household sectors. The assessment is part of the effort to ensure financial stability, which in turn, is closely intertwined with monetary stability and long-term economic growth - the main objectives of monetary policy under inflation targeting. In this *Report*, the BOT has revised the corporate and household sector models using the latest released data, especially those pertaining to listed companies, household credits, and GDP.

1.8.1 Exports of goods at 1988 constant prices

$$XGR = RXGR * XR$$

1.8.2 Exports of services at 1988 constant prices

$$XSR = RXSR * XR$$

1.9 Imports of goods and services at 1988 constant prices

$$\Delta \ln(MRsa) = 1.136 * \Delta \ln(DDsa) + 0.594 * \Delta \ln(XRsa) - 0.219 * \Delta \ln((PM\$sa * FX88) / CPIsa) - 0.270 * ecmMR(-1)$$

(11.01) (6.36) (-3.05) (-2.95)

Adjusted R-Squared = 0.78 S.E. of regression = 0.0267 LM(2) : 0.79 (0.46)

$$ecmMR = \ln(MRsa) - (-3.619 + 1.000 * \ln(DDsa) + 0.492 * \ln(XRsa) - 0.207 * \ln((PM\$sa * FX88) / CPIsa))$$

1.9.1 Imports of goods at 1988 constant prices

$$MGR = RMGR * MR$$

1.9.2 Imports of services at 1988 constant prices

$$MSR = RMSR * MR$$

1.10 Gross domestic product at 1988 constant prices

$$GDPR = CPR + CGOVR + IPR + IPUB + (XR - MR) + OTHGDP$$

1.11 Gross domestic product at current market prices

$$GDPN = ((CPR * CPI) + (CGOVR * PGCON) + (IPR * PIP) + (IPUB * PIFX) + ((XR * PXS * FX88 / 100) - (MR * PMS * FX88 / 100)) + (OTHGDP * POTHGDP)) / 100$$

1.12 Domestic demand

$$DD = GDPR - XR + MR$$

2. Government sector

2.1 Government revenue

$$GREV = TAXREV + OTHREV$$

2.2 Tax revenue

$$TAXREV = TD + TIND$$

2.3 Direct tax

$$TD = TH + TC$$

$$TH = RH * GDPN$$

$$TC = RC * GDPN$$

2.4 Indirect tax

$$TIND = TVAT + TEXC + OTHTIND$$

$$TVAT = RVAT * (CPR * CPI / 100)$$

$$TEXC = REXC * (CPR * CPI / 100)$$

$$OTHTIND = ROTHTIND * (CPR * CPI / 100)$$

2.5 Government cash balance

$$GCB = GREV - (GCURRENT + GCAPITAL) + NONBUDGET$$

3. External sector

3.1 Current account

$$CURRENTS = (((XGR * PXG) - (MGR * PMG)) + ((XSR * PXSS) - (MSR * PMSS))) / (25.29^3 * 100)$$

$$CURRENTB = CURRENTS * FX$$

3.2 Capital and financial account

$$\begin{aligned}\text{CAPITALS} &= \text{CAPITALSPRI} + \text{OTHCAPS} \\ \text{CAPITALB} &= \text{CAPITALS} * \text{FX}\end{aligned}$$

3.3 Balance of payments

$$\begin{aligned}\text{BPB} &= \text{CAPITALS} * \text{FX} + \text{CURRENTS} * \text{FX} + \text{OTHBP} \\ \text{BPS} &= \text{BPB} / \text{FX}\end{aligned}$$

3.4 International reserves

$$\text{RESERVE} = \text{BPS} + \text{RESERVE}(-1)$$

3.5 Net foreign assets

$$\text{NFA} = \text{NFA}(-1) + \text{BPB} + \text{OTHNFA}$$

3.6 Exchange rate

$$\begin{aligned}\ln(\text{FX88}) &= \ln(\text{FX88}(-1)) + (\ln(1 + \text{FEDFUND}(-1)/400) - \ln(1 + \text{RP1D}(-1)/400)) + \text{PRESSURE} \\ \text{PRESSURE} &= 1.274 * \Delta \ln(\text{REGIONFX}) - 0.408 * \Delta(\text{CURRENTB}(-1)/\text{GDPN}(-1)) \\ \text{FX} &= (\text{FX88} * 25.29^3) / 100 \\ \text{NEER} &= \text{TPFX} * 100 / \text{FX94} \\ \text{REER} &= \text{NEER} / (\text{TPCPI} / \text{CPI} * 100 / 73.43)\end{aligned}$$

3.7 Net flows of private financial account

$$\begin{aligned}\text{CAPITALSPRI} &= 0.625 * \Delta(\text{RP1D}(-1) - \text{FEDFUND}(-1)) - 0.324 * \text{CURRENTS} + 32.41 * \Delta \ln(\text{GDP} \text{Rsa}(-1)) + 0.523 * \text{CAPITALSPRI}(-1) \\ &\quad (3.26) \qquad \qquad \qquad (-3.18) \qquad \qquad \qquad (1.93) \qquad \qquad \qquad (4.99) \\ \text{Adjusted R-Squared} &= 0.71 \qquad \qquad \qquad \text{S.E. of regression} = 1.0751 \qquad \qquad \qquad \text{LM}(2) : 0.23 (0.80)\end{aligned}$$

4. Monetary sector

4.1 Three-month deposit rate

$$\begin{aligned}\Delta \text{RD3M} &= 0.257 * \Delta \text{RP1D} + 0.045 * \Delta \text{RP1D}(-1) - 0.164 * \text{ecmRD3M}(-1) \\ &\quad (8.91) \qquad \qquad (1.79) \qquad \qquad (-5.86) \\ \text{Adjusted R-Squared} &= 0.71 \qquad \qquad \qquad \text{S.E. of regression} = 0.4056 \qquad \qquad \qquad \text{LM}(2) : 0.24 (0.79) \\ \text{ecmRD3M} &= \text{RD3M} - 0.727 * \text{RP1D}\end{aligned}$$

4.2 Minimum lending rate

$$\begin{aligned}\Delta \text{MLR} &= 0.582 * \Delta \text{RD3M} + 0.411 * \Delta \text{MLR}(-1) \\ &\quad (14.42) \qquad \qquad (8.29) \\ \text{Adjusted R-Squared} &= 0.88 \qquad \qquad \qquad \text{S.E. of regression} = 0.2137 \qquad \qquad \qquad \text{LM}(2) : 2.47 (0.09)\end{aligned}$$

4.3 Private credit

$$\begin{aligned}\Delta \ln(\text{PCREDITsa}) &= 0.263 - 0.036 * \Delta \text{MLR} + 1.127 * \Delta \ln(\text{GDPNsa}) - 0.044 * \ln(\text{NPL}(-1)) \\ &\quad (3.83) \quad (-2.48) \qquad \qquad (2.38) \qquad \qquad (-4.13) \\ \text{Adjusted R-Squared} &= 0.39 \qquad \qquad \qquad \text{S.E. of regression} = 0.0293 \qquad \qquad \qquad \text{LM}(2) : 0.38 (0.69)\end{aligned}$$

4.4 Net claims on government

$$\begin{aligned}\Delta \text{CLAIMG} &= -0.407 * (\text{GCB} - \text{FINB}) \\ &\quad (-5.50) \\ \text{Adjusted R-Squared} &= 0.40 \qquad \qquad \qquad \text{S.E. of regression} = 42.54 \qquad \qquad \qquad \text{LM}(2) : 0.15 (0.86)\end{aligned}$$

^{3/} The Baht/USD exchange rate in 1988 is 25.29.

4.5 Money supply

$$M2A^S = NFA + CLAIMG + PCREDIT + OTHM2A$$

$$\Delta \ln(M2A^D_{sa} * 100 / CPI_{sa}) = 0.243 * \Delta \ln(GDPR_{sa}) - 0.006 * \Delta RD3M + 0.002 * CINFEX - 0.224 * ecmM2A^D(-1)$$

(2.73) (-2.13) (3.49) (-4.37)

Adjusted R-Squared = 0.42 S.E. of regression = 0.0118 LM(2) : 0.07 (0.93)

$$ecmM2A^D = \ln(M2A^D_{sa} * 100 / CPI_{sa}) - (4.420 + 0.539 * \ln(GDPR_{sa}) - 0.004 * RD3M)$$

4.6 Securities value

$$\Delta \ln(BMCAP) = 0.0004 * \Delta (CAPITALS * FX) + 2.325 * \Delta \ln(GDPR_{sa}) - 0.108 * \Delta (MLR) - 0.508 * ecmBMCAP(-1)$$

(1.95) (2.29) (-2.61) (-3.26)

Adjusted R-Squared = 0.34 S.E. of regression = 0.0799 LM(2) : 1.00 (0.38)

$$ecmBMCAP = \ln(BMCAP) - (-15.260 + 0.0004 * (CAPITALS * FX) + 3.543 * \ln(GDPR_{sa}) - 0.006 * MLR)$$

5. Price index

5.1 Core consumer price index

$$CINFLAT = 2.626 * \ln(GDPR_{sa} / GDPR_HSM) + 0.830 * CINFLAT(-1) + 0.139 * (((PPI/PPI(-4)-1) * 100) * PRE2000Q3)$$

(2.50) (30.47) (7.83)

$$+ 0.058 * (((PPI/PPI(-4)-1) * 100) * POST2000Q3)$$

(3.53)

Adjusted R-Squared = 0.96 S.E. of regression = 0.4698 LM(2) : 0.12 (0.89)

5.2 Average earnings

$$\Delta \ln(AVG EARN_{sa}) = 0.306 * \Delta \ln(MINWAGE) + 0.858 * \Delta \ln(CPI_{sa}) - 0.198 * ecmAVGEARN(-1)$$

(3.19) (5.42) (-2.35)

Adjusted R-Squared = 0.32 S.E. of regression = 0.0121 LM(2) : 0.52 (0.60)

$$ecmAVGEARN = \ln(AVG EARN_{sa}) - (2.461 + 0.756 * \ln(MINWAGE(-1)) + 0.541 * \ln(CPI_{sa}))$$

5.3 Energy price index

$$\Delta \ln(CPIEN_{sa}) = 0.563 * \Delta \ln(RPPI_{sa}) - 0.209 * ecmCPIEN(-1)$$

(14.65) (-3.15)

Adjusted R-Squared = 0.74 S.E. of regression = 0.0175 LM(2) : 0.55 (0.58)

$$ecmCPIEN = \ln(CPIEN_{sa}) - (1.117 + 0.786 * \ln(RPPI_{sa}))$$

5.4 Retail petroleum price index

$$\Delta \ln(RPPI_{sa}) = 0.356 * \Delta \ln(DUBA_{sa}) + 0.453 * \Delta \ln(FX88) + 0.177 * \Delta \ln(RPPI_{sa}(-2)) - 0.345 * ecmRPPI(-1)$$

(9.40) (6.60) (2.73) (-4.88)

Adjusted R-Squared = 0.72 S.E. of regression = 0.0291 LM(2) : 0.11 (0.90)

$$ecmRPPI = \ln(RPPI_{sa}) - (-0.361 + 0.582 * \ln(DUBA_{sa}) + 0.709 * \ln(FX88))$$

5.5 Raw food price index

$$\Delta \ln(CPIRFOOD_{sa}) = 0.007 + 0.348 * \Delta \ln(FARMPRICE_{sa}) - 0.072 * ecmCPIRFOOD(-1)$$

(2.81) (5.63) (-1.67)

Adjusted R-Squared = 0.36 S.E. of regression = 0.0176 LM(2) : 0.85 (0.43)

$$ecmCPIRFOOD = \ln(CPIRFOOD_{sa}) - (1.106 + 0.812 * \ln(FARMPRICE_{sa}(-2)))$$

5.6 Farm price index (12 main products)

$$\Delta \ln(FARMPRICE_12_{sa}) = 1.041 * \Delta \ln(WFP_12_{sa}) + 0.616 * \Delta \ln(FX88) - 0.343 * ecmFARMPRICE_12(-1)$$

(9.15) (8.08) (-3.74)

Adjusted R-Squared = 0.68 S.E. of regression = 0.0318 LM(2) : 0.59 (0.56)

$$ecmFARMPRICE_12 = \ln(FARMPRICE_12_{sa}) - (-5.478 + 1.155 * \ln(WFP_12_{sa}) + 1.048 * \ln(FX88))$$

5.7 Farm price index

$$\text{FARMPRICE} = (\text{WFARMPRICE}_{12} * \text{FARMPRICE}_{12}) + (\text{WFARMPRICE}_{\text{OTH}} * \text{FARMPRICE}_{\text{OTH}})$$

5.8 Headline consumer price index

$$\text{CPI} = ((1 - \text{WEN} - \text{WRFOOD}) * \text{CORE}) + (\text{WEN} * \text{CPIEN}) + (\text{WRFOOD} * \text{CPIRFOOD})$$

5.9 Private investment deflator

$$\Delta \ln(\text{PIPs}_a) = 1.670 * \Delta \ln(\text{CPIs}_a) + 0.110 * \Delta \ln(\text{FX88}(-2)) - 0.256 * \text{ecmPIP}(-1)$$

(5.34) (2.09) (-2.52)

Adjusted R-Squared = 0.46 S.E. of regression = 0.0207 LM(2) : 0.19 (0.82)

$$\text{ecmPIP} = \ln(\text{PIPs}_a) - (-3.762 + 1.667 * \ln(\text{CPIs}_a) + 0.075 * \ln(\text{FX88}(-1)))$$

5.10 Public investment deflator

$$\Delta \ln(\text{PIFXs}_a) = 1.190 * \Delta \ln(\text{CPIs}_a) - 0.119 * \text{ecmPIFX}(-1)$$

(7.99) (-2.05)

Adjusted R-Squared = 0.31 S.E. of regression = 0.0130 LM(2) : 1.24 (0.30)

$$\text{ecmPIFX} = \ln(\text{PIFXs}_a) - (-1.539 + 1.295 * \ln(\text{CPIs}_a) + 0.017 * \ln(\text{FX88}(-1)))$$

5.11 Government consumption deflator

$$\Delta \ln(\text{PGCONs}_a) = 0.769 * \Delta \ln(\text{CPIs}_a) + 0.034 * \Delta \text{SALARY} - 0.131 * \text{ecmPGCON}(-1)$$

(3.98) (4.15) (-1.79)

Adjusted R-Squared = 0.19 S.E. of regression = 0.0164 LM(2) : 0.26 (0.77)

$$\text{ecmPGCON} = \ln(\text{PGCONs}_a) - (0.245 + 0.988 * \ln(\text{CPIs}_a) + 0.065 * \text{SALARY})$$

5.12 Export price deflator

$$\Delta \ln(\text{PXSs}_a) = 0.210 * \Delta \ln(\text{PMSs}_a(-1)) + 0.592 * \Delta \ln(\text{TPGDPs}_a) - 0.207 * \Delta \ln(\text{FX88}) - 0.352 * \text{ecmPXS}(-1)$$

(3.38) (2.91) (-5.15) (-4.50)

Adjusted R-Squared = 0.71 S.E. of regression = 0.0156 LM(2) : 1.74 (0.19)

$$\text{ecmPXS} = \ln(\text{PXSs}_a) - (2.336 + 0.323 * \ln(\text{PW_NONFs}_a(-1)) + 0.397 * \ln(\text{MUVs}_a(-1)) - 0.182 * \ln(\text{FX88}))$$

5.12.1 Export price deflator for services

$$\text{PXSs}_a = \text{PXSs}_a(-4) * ((\text{CPIs}_a / \text{FX88}) / (\text{CPIs}_a(-4) / \text{FX88}(-4)))$$

5.12.2 Export price deflator for goods

$$\text{PXGs}_a = (\text{PXSs}_a - \text{RXSR} * \text{PXSs}_a) / \text{RXGR}$$

5.13 Import price deflator

$$\Delta \ln(\text{PMSs}_a) = 0.373 * \Delta \ln(\text{PW_NONFs}_a) - 0.551 * \text{ecmPMS}(-1)$$

(3.54) (-4.60)

Adjusted R-Squared = 0.38 S.E. of regression = 0.0298 LM(2) : 0.55 (0.58)

$$\text{ecmPMS} = \ln(\text{PMSs}_a) - (1.406 + 0.265 * \ln(\text{PW_NONFs}_a(-1)) + 0.426 * \ln(\text{MUVs}_a(-1)) + 0.081 * \ln(\text{DUBAs}_a))$$

5.13.1 Import price deflator for services

$$\text{PMSs}_a = \text{PMSs}_a(-4) * ((\text{TPCPIs}_a * \text{FX94} / \text{NEER}) / (\text{TPCPIs}_a(-4) * \text{FX88}(-4) / \text{NEER}(-4)))$$

5.13.2 Import price deflator for goods

$$\text{PMGs}_a = (\text{PMSs}_a - \text{RMSR} * \text{PMSs}_a) / \text{RMGR}$$

5.14 GDP deflator

$$\text{PGDP} = \text{GDPN} / \text{GDPR} * 100$$

5.15 Inflation expectations

$$\text{CINFEX} = 0.25*\text{CINFLAT}(-1) + 0.25*\text{CINFLAT} + 0.50*\text{CINFLAT}(4)$$

5.16 Housing Price Index

$$\ln(\text{PLANDTHsa}) = -0.006*(\text{MLR}(-1) - \text{CINFEX}(-1)) + 0.517*\ln(\text{PLANDTHsa}(-1)) + 0.491*\ln(\text{PLANDTHsa}(-2))$$

(-2.73) (3.02) (2.85)

Adjusted R-Squared = 0.96 S.E. of regression = 0.0128 LM(2) : 0.92 (0.41)

5.17 Producer Price Index

$$\Delta\ln(\text{PPIsa}) = 0.142*\Delta\ln(\text{RPPIsa}) + 0.226*\Delta\ln(\text{FARMPRICEsa}) + 0.077*\Delta\ln(\text{PMSsa}*FX88) - 0.248*\text{ecmPPI}(-1)$$

(5.50) (5.96) (2.82) (-2.88)

Adjusted R-Squared = 0.67 S.E. of regression = 0.0106 LM(2) : 1.08 (0.35)

$$\text{ecmPPI} = \ln(\text{PPIsa}) - (0.148*\ln(\text{RPPIsa}) + 0.245*\ln(\text{FARMPRICEsa}) + 0.147*\ln(\text{PMSsa}*FX88) + 0.135*\ln(\text{AVGEARNsa}))$$

6. Corporate Sector Model

6.1 Sales, cost of goods sold, profits

6.1.1 Sales

$$\ln(\text{SALESsa}) = -2.365 + 0.583*\ln(\text{GDPNsa}) - 0.021*(\text{MLR} - \text{CINFEX}) + 0.731*\ln(\text{SALESsa}(-1))$$

(-2.30) (2.68) (-4.29) (8.20)

Adjusted R-Squared = 0.99 S.E. of regression = 0.043 LM(2) : 0.034 (0.97)

6.1.2 Cost of goods sold

$$\ln(\text{COGSsa}) = -1.83 + 0.934*\ln(\text{SALESsa}) + 0.424*\ln(\text{PPIsa})$$

(-3.86) (25.39) (2.88)

Adjusted R-Squared = 0.99 S.E. of regression = 0.0344 LM(2) : 0.64 (0.53)

6.1.3 Operating profits

$$\text{EBIT} = \text{SALES} - \text{COGS} - \text{OTHER}$$

6.1.4 Net profits

$$\text{NI} = \text{EBIT} - \text{INT} - \text{TAX} - \text{EXTRA}$$

6.2 Assets, equity, liabilities

6.2.1 Assets

$$\ln(\text{ASSETsa}) = 0.225*\ln(\text{GDPNsa}) + 0.841*\ln(\text{ASSETsa}(-1)) - 0.067*\ln(\text{FX88}(-1))$$

(6.44) (25.89) (-2.93)

Adjusted R-Squared = 0.99 S.E. of regression = 0.0286 LM(2) : 0.67 (0.51)

6.2.2 Equity

$$\Delta\ln(\text{EQUITYsa}) = 0.730*\Delta\ln(\text{GDPNsa}(-2)) - 0.616*\Delta\ln(\text{FX88}) + 0.001*\Delta(\text{NI}) + 0.036*\text{DUM01Q4} - 0.171*\text{ecmEQUITY}(-1)$$

(2.13) (-4.61) (7.35) (2.69) (-2.55)

Adjusted R-Squared = 0.63 S.E. of regression = 0.0528 LM(2) : 1.19 (0.31)

$$\text{ecmEQUITY} = \ln(\text{EQUITYsa}) - (1.661*\ln(\text{GDPNsa}) + 0.403*\text{DUM01Q4} + 0.015*(\text{MLR}(-1) - \text{FEDFUND}(-1)) - 1.077*\ln(\text{FX88}))$$

6.2.3 Liabilities

$$\text{DEBT} = \text{ASSET} - \text{EQUITY}$$

6.3 Debt burden and debt-service ability

6.3.1 Debt to equity ratio

$$\text{DE} = \text{DEBT}/\text{EQUITY}$$

6.3.2 Interest expenses

$$\ln(\text{INTsa}) = -7.371 + 1.377 \ln(\text{DEBTsa}(-1)) + 0.028 \text{MLR}(-2) - 0.489 \text{DUM01Q4}$$

6.3.3 Interest coverage ratio

$$\text{ICR} = \text{EBIT}/\text{INT}$$

7. Household Model

7.1 Liabilities

7.1.1 Banks' lending to household

$$\Delta \ln(\text{LOANHHTsa}) = -0.009 \Delta \text{MLR}(-1) + 0.356 \Delta \ln(\text{CPRsa}(-4)) + 0.813 \Delta \ln(\text{LOANHHTsa}(-1))$$

(-1.91) (2.35) (10.76)

Adjusted R-Squared = 0.64

S.E. of regression = 0.0194

LM(2) : 2.43 (0.10)

7.2 Debt Repayment Capacity

7.2.1 Household Interest Payments

$$\text{INTHH} = (\text{MLR}/100) * \text{LOANHHT}$$

7.2.2 Ratio of Interest Payments to Income after Tax

$$\text{IGEARHH} = \text{INTHH}/(\text{GDPRsa} * (1 - \text{RH})) * 100$$

List of variables

Dependent variables

AVGEARN	Average earnings (baht/month)
BMCAP	Securities value (billion baht)
BPB, BPS	Balance of payments (billion baht, billion US dollars)
CAPITALB, CAPITALS	Capital and financial account (billion baht, billion US dollars)
CAPITALSPRI	Net flows of private financial account (billion US dollars)
CGOVR	Government consumption at 1988 constant prices (billion baht)
CINFEX	Inflation expectations
CLAIMG	Net claims on government (billion baht)
CORE, CINFLAT	Core consumer price index (CPI excluding raw food and energy prices) (2002 = 100), Core inflation (per cent)
CPI	Headline consumer price index (2002 = 100)
CPIEN	Energy price index (2002 = 100)
CPIRFOOD	Raw food price index (2002 = 100)
CPR	Total private consumption at 1988 constant prices (billion baht)
CPR1	Private durable goods consumption at 1988 constant prices (including transport equipment, electrical machinery, machinery and equipment, furniture, rubber products, and glass and plastic products) (billion baht)
CPR2	Private non-durable goods consumption at 1988 constant prices (including food products, beverages, energy, and services) (billion baht)
CURRENTB, CURRENTS	Current account balance (billion baht, billion US dollars)
DD	Domestic demand at 1988 constant prices (billion baht)
FARMPRICE	Farm price index (1995 = 100)
FARMPRICE_12	Farm price index (12 main products of Thailand) (1995 = 100)
FX	Exchange rate (baht/US dollar)
FX88	Exchange rate index (1988 = 100)
FX94	Exchange rate index (1994 = 100)
GCB	Government cash balance (billion baht)
GDPN	Gross domestic product at current market prices (billion baht)
GDPR	Gross domestic product at 1988 constant prices (billion baht)
GDPR_HSM	Gross domestic product trend at 1988 constant prices, estimated from Hodrick-Prescott and exponential smoothing methods (billion baht)
GREV	Government revenue (billion baht)
IPR	Private investment at 1988 constant prices (billion baht)
IPUB	Public investment at 1988 constant prices (billion baht)
M2A ^D , M2A ^S	Money supply (M2 + finance companies' promissory notes) (billion baht)
MGR	Imports of goods at 1988 constant prices (billion baht)
MLR	Minimum lending rate (per cent per annum)
MR	Imports of goods and services at 1988 constant prices (billion baht)
MSR	Imports of services at 1988 constant prices (billion baht)
NEER	Nominal effective exchange rate (1994 = 100)
NFA	Net foreign assets (billion baht)
OTHTIND	Other indirect taxes (billion baht)
PCREDIT	Claims on private sector (including securities holdings by the private sector) (billion baht)
PGCON	Government consumption deflator (1988 = 100)
PGDP	GDP deflator (1988 = 100)
PIFX	Public investment deflator (1988 = 100)

PIP	Private investment deflator (1988 = 100)
PLANDTH	Townhouse (including land) price index (1991 = 100)
PMS	Goods and services import price index (US dollars, 1988 = 100)
PMGS	Goods import price index (US dollars, 1988 = 100)
PMSS	Services import price index (US dollars, 1988 = 100)
PPI	Producer price index (2000 = 100)
PRESSURE	Pressure on exchange rate
PXS	Goods and services export price index (US dollars, 1988 = 100)
PXGS	Goods export price index (US dollar, 1988 = 100)
PXSS	Services export price index (US dollars, 1988 = 100)
RD3M	Three-month deposit rate (per cent per annum)
REER	Real effective exchange rate (1994 = 100)
RESERVE	International reserves (billion US dollars)
RPPI	Retail petroleum price index (1996 = 100)
TAXREV	Tax revenue (billion baht)
TC	Corporate income tax (billion baht)
TD	Direct tax (billion baht)
TEXC	Excise tax (billion baht)
TH	Personal income tax (billion baht)
TIND	Indirect tax (billion baht)
TVAT	Value added tax (billion baht)
WEALTH	Asset value (M2A and securities value) (billion baht)
XGR	Exports of goods at 1988 constant prices (billion baht)
XR	Exports of goods and services at 1988 constant prices (billion baht)
XSR	Exports of services at 1988 constant prices (billion baht)

Independent variables

CPIUS	Consumer price index of the United States (1990 = 100)
CGOVN	Government consumption at current prices (billion baht)
DUBAI	Dubai crude oil price (US dollars/barrel)
FARMPRICE_OTH	Other items of farm price index (1995 = 100)
FEDFUND	Federal funds rate (per cent per annum)
FINB	Government bond issuance for financial sector restructuring (billion baht)
GCAPITAL	Government capital expenditure (billion baht)
GCURRENT	Government current expenditure (billion baht)
IPUBN	Government investment at current prices (billion baht)
MINWAGE	Minimum wage (baht/day)
MUV	Manufacturing unit value index (2000 = 100)
NONBUDGET	Government non-budgetary balance (billion baht)
NPL	Non performing loans (billion baht)
OTHBP	Other items of balance of payments (billion baht)
OTHCAPS	Other items of capital and financial account (billion US dollars)
OTHGDP	Other items of gross domestic product at 1988 constant prices (billion baht)
OTHM2A	Other items of M2A (billion baht)
OTHNFA	Other items of net foreign assets (billion baht)
OTHREV	Non-tax revenue (billion baht)
PW_NONF	World non-fuel commodity price index (1995 = 100)
POTHGDP	Other items of gross domestic product deflator (1988 = 100)
RC	Corporate income tax rate (per cent)

REGIONFX	Regional exchange rate index (China, Singapore, Indonesia, Korea, the Philippines) (1994 = 100)
REXC	Excise tax rate (per cent)
RH	Personal income tax rate (per cent)
RMGR	Imports of goods to imports of goods and services ratio
RMSR	Imports of services to imports of goods and services ratio
ROTHTIND	Other indirect tax rate (per cent)
RPID	1-day repurchase rate (per cent per annum)
RVAT	Value added tax rate (per cent)
RXGR	Exports of goods to exports of goods and services ratio
RXSR	Exports of services to exports of goods and services ratio
TPCPI	Trading partners consumer price index (Asian region economies, United States, Japan, euro area economies, and United Kingdom) (1994 = 100)
TPGDP	Trading partners gross domestic product index (Asian region economies, United States, Japan, euro area economies and United Kingdom) (2002 = 100)
TPFX	Trading partners exchange rate per us dollar (Asian region economies, United States, Japan, euro area economies, and United Kingdom) (1994 = 100)
WEN	Energy weight in CPI basket (proportion)
WFARMPRICE_12	Weight of 12 main products in farm price index basket (proportion)
WFARMPRICE_OTH	Weight of other items in farm price index basket (proportion)
WFP_12	World farm price index (12 main products of Thailand) (1995 = 100)
WRFOOD	Raw food weight in CPI basket (proportion)

Dummy variables

POST2000Q3	represents periods since 2000:Q3 where 2000:Q3 onwards = 1, other = 0
PRE2000Q3	represents period before 2000:Q3 where 2000:Q3 onwards = 0, other = 1
SALARY	represents periods where there were changes in the civil servants' salary structure, where 1994:Q4 and 2004:Q2 = 1, other = 0

Corporate variables

ASSET	Assets (billion baht)
COGS	Cost of goods sold (billion baht)
DE	Debt to equity ratio (times)
DEBT	Liabilities (billion baht)
DUM01Q4	Represents debt restructuring period, where 2001 Q4 to present = 1, other = 0
EBIT	Profit (Loss) before interest and income tax expenses (billion baht)
EQUITY	Shareholders' equity (billion baht)
EXTRA	Other expenses (billion baht)
ICR	Interest coverage ratio (times)
INT	Interest expenses (billion baht)
NI	Net profit (loss) (billion baht)
OTHER	Other expenses (billion baht)
PPI	Producer price index (2000 = 100)
SALES	Revenue from sale of goods (billion baht)
TAX	Corporate income tax (unit: billion baht)

Household Model

LOANHHT	Banks' lending to households (billion baht)
INTHH	Interest payments (billion baht)
IGEARHH	Ratio of interest payments to income after tax (per cent)