

มหาวิทยาลัยเชียงใหม่  
Chiang Mai University

ภาคผนวก

## ภาคผนวก ก

## รายชื่อตัวแปร

BACBS	=	Advances that Claims on Business and Household Sector Commercial Banks (Billion Baht)
BCACBT	=	Cash and claims on Bank of Thailand of Commercial Banks (Billion Baht)
BCBS	=	Claims on Business and Household Sector of Commercial Banks (Billion Baht)
BDBCBS	=	Domestic Bills that Claims on Business and Household Sector of Commercial Banks (Billion Baht)
BDDBS	=	Demand Deposit of Business and Household Sector of Commercial Banks (Billion Baht)
BFEB	=	Discounts of Export Bills Foreign Assets of Commercial Banks (Billion Baht)
BFL	=	Foreign Liabilities of Commercial Banks (Billion Baht)
BFXEB	=	Foreign Assets of Commercial Banks excluding Export Bills (Billion Baht)
BIBCBS	=	Import bills and Trust Receipt that Claims on Business and Household Sector of Commercial Banks (Billion Baht)
BLDR	=	Claims on Business and Household Sector of Commercial Banks relative with Total Deposit of Business and Household Sector of Commercial Banks
BLOAG	=	Bills, Loans and Overdrafts of Commercial Banks of Agricultural sector (Billion Baht)
BLOC	=	Bills, Loans and Overdrafts of Commercial Banks of Construction Sector (Billion Baht)

BLOCOM	=	Bills, Loans and Overdrafts of Commercial Banks of Commerce Sector (Billion Baht)
BLOEX	=	Bills, Loans and Overdrafts of Commercial Banks of Export sector (Billion Baht)
BLOIM	=	Bills, Loans and Overdrafts of Commercial Banks of Import sector (Billion Baht)
BLOM	=	Bills, Loans and Overdrafts of Commercial Banks of Manufacturing Sector (Billion Baht)
BLOOTHER	=	Bills, Loans and Overdrafts of Commercial Banks of Other Sector (Billion Baht)
BLOP	=	Bills, Loans and Overdrafts of Commercial Banks classified by purpose (Billion Baht)
BLOPC	=	Bills, Loans and Overdrafts of Commercial Banks of Personal Consumption Sector (Billion Baht)
BLOPU	=	Bills, Loans and Overdrafts of Commercial Banks of Public Utilities Sector (Billion Baht)
BLOS	=	Bills, Loans and Overdrafts of Commercial Banks of Services Sector (Billion Baht)
BOA	=	Other Asset of Commercial Banks (Billion Baht)
BOCBS	=	Other Advances that Claims on Business and Household Sector Commercial Banks (Billion Baht)
BOTBS	=	Other Deposit of Business and Household Sector of Commercial Banks (Billion Baht)
BSDBS	=	Saving Deposit of Business and Household Sector of Commercial Banks (Billion Baht)
BTCB	=	Claims on Commercial Banks of Bank of Thailand (Billion Baht)
BTCOF	=	Claims on Other Financial Institutions of Bank of Thailand (Billion Baht)

BTDBS	=	Time Deposit of Business and Household Sector of Commercial Banks (Billion Baht)
BTFA	=	Foreign Asset of Bank of Thailand (Billion Baht)
BTFL	=	Foreign liabilities of Bank of Thailand (Billion Baht)
BTLC	=	Liabilities to Commercial Banks of Bank of Thailand (Billion Baht)
BTLF	=	Liabilities to Other Financial Institutions of Bank of Thailand (Billion Baht)
BTNC	=	Notes in Circulation of Bank of Thailand (Billion Baht)
BTOA	=	Other Asset of Bank of Thailand (Billion Baht)
BTOBS	=	Total Deposit of Business and Household Sector of Commercial Banks (Billion Baht)
CA	=	Current Account (Billion Baht)
CASH	=	Cash Deficit (-) or Surplus (+) (Billion Baht)
CP	=	Private Consumption (Billion Baht)
DUMMY1	=	1996-1999 = 1 , Other = 0 for Annual 1996Q1-1999Q4 = 1 , Other = 0 for Quarterly
E	=	Exchange Rate (BHT/USD)
EX	=	Total Export Goods (Billion Baht)
FSAL	=	Advance, Bill and Securities of Claims on Business and Household Sector of Finance and Finance & Securities Companies (Billion Baht)
FSBBS	=	Borrowings from Business and Household Sector of Finance and Finance & Securities Companies (Billion Baht)
FSCBS	=	Claims on Business and Household Sector of Finance and Finance & Securities Companies (Billion Baht)
FSFL	=	Foreign Liabilities of Finance and Finance & Securities Companies (Billion Baht)
FSLB	=	Claims on Business and Household Sector of Finance and Finance & Securities Companies relative with Borrowings from

		<b>Business and Household Sector of Finance and Finance &amp; Securities Companies</b>
FSOA	=	Other Asset of Finance and Finance & Securities Companies (Billion Baht)
FSSL	=	Securities loans of Claims on Business and Household Sector of Finance and Finance & Securities Companies (Billion Baht)
GFCAG	=	Gross Fixed Capital in Agricultural Sector (Billion Baht)
GFCC	=	Gross Fixed Capital in Construction Sector (Billion Baht)
GFCCOM	=	Gross Fixed Capital in Commerce Sector (Billion Baht)
GFCE	=	Gross Fixed Capital in Electricity and Water Supply Sector (Billion Baht)
GFCM	=	Gross Fixed Capital in Manufacturing Sector (Billion Baht)
GFCS	=	Gross Fixed Capital in Service Sector (Billion Baht)
IFBSD	=	Borrowing Rate of Finance and Finance & Securities Companies relative with Saving Deposit of Commercial Banks
IFBTD	=	Borrowing Rate of Finance and Finance & Securities Companies relative with Time Deposit of Commercial Banks
IIB	=	Interbank Rate of Interest among Financial Institution (Percent per Annual)
IFB	=	Borrowing Rate of Finance and Finance & Securities Companies (Percent per Annual)
IFL	=	Lending Rate of Finance and Finance & Securities Companies (Percent per Annual)
IM	=	Total Import Goods (Billion Baht)
IMLR	=	Minimum Loan Rate of Commercial Banks (Percent per Annual)
IP	=	Private Investment (Billion Baht)
ISD	=	Saving Deposit of Commercial Banks (Percent per Annual)
ISDFB	=	Saving Deposit of Commercial Banks relative with Borrowing Rate of Finance and Finance & Securities Companies

ITD	=	Time Deposit of Commercial Banks (Percent per Annual)
ITD3	=	Three Months Deposit rate of Commercial Banks (Percent per Annual)
ITD3FB	=	Three Months Deposit rate of Commercial Banks relative with Borrowing Rate of Finance and Finance & Securities Companies
IRP	=	Borrowing Rate of Finance and Finance & Securities Companies (Percent per Annual)
IUS	=	Foreign Interest Rate of Commercial Banks (Percent per Annual)
MB	=	Money Base (Billion Baht)
MDGDP	=	Real Money Supply (Billion Baht)
MS	=	Money Supply (Billion Baht)
NDF	=	Net Domestic Credit for Financial Institution (Billion Baht)
NDG	=	Net Domestic Credit for Government (Billion Baht)
NFA	=	Net Foreign Assets (Billion Baht)
NI	=	National Income (Billion Baht)
NOL	=	Net Other Liabilities (Billion Baht)
RES	=	International Reserve (Billion Baht)
WSPAG	=	Wholesale Price index of Agriculture Sector

## ภาคผนวก ข

ค่าสถิติในการทดสอบ unit root,  $\lambda_{\max}$  และ  $\lambda_{\text{tracc}}$ 

## การทดสอบของ Dickey-Fuller

Model	Hypothesis	Test Statistic	Critical values for 95% and 99% Confidence Intervals
$\Delta X_t = \alpha_0 + \gamma X_{t-1} + \alpha_2 t + \varepsilon_t$	$\gamma = 0$	$\tau_\tau$	-3.45 and -4.04
	$\alpha_0 = 0$ given $\gamma = 0$	$\tau_{\alpha\tau}$	3.11 and 3.78
	$\alpha_2 = 0$ given $\gamma = 0$	$\tau_{\beta\tau}$	2.79 and 3.53
	$\gamma = \alpha_2 = 0$	$\phi_3$	6.49 and 8.73
	$\alpha_0 = \gamma = \alpha_2 = 0$	$\phi_2$	4.88 and 6.50
$\Delta X_t = \alpha_0 + \gamma X_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau_\mu$	-2.89 and -3.51
	$\alpha_0 = 0$ given $\gamma = 0$	$\tau_{\alpha\mu}$	2.54 and 3.22
	$\alpha_0 = \gamma = 0$	$\phi_1$	4.71 and 6.70
$\Delta X_t = \gamma X_{t-1} + \varepsilon_t$	$\gamma = 0$	$\tau$	-1.95 and -2.60

ที่มา : Walter Enders, 1995

หมายเหตุ : Critical values are for a sample size of 100

### Empirical Cumulative Distribution of $\tau$

Sample Size	Probability of a Smaller Value							
	0.01	0.025	0.05	0.10	0.90	0.95	0.975	0.99
Empirical Distribution of $\tau$ for $(\rho) = (1)$ in $X_t = \rho X_{t-1} + \varepsilon_t$								
25	-2.66	-2.26	-1.95	-1.60	0.92	1.33	1.70	2.16
50	-2.62	-2.25	-1.95	-1.61	0.91	1.31	1.66	2.08
100	-2.60	-2.24	-1.95	-1.61	0.90	1.29	1.64	2.03
250	-2.58	-2.23	-1.95	-1.62	0.89	1.29	1.63	2.01
500	-2.58	-2.23	-1.95	-1.62	0.89	1.28	1.62	2.00
$\infty$	-2.58	-2.23	-1.95	-1.62	0.89	1.28	1.62	2.00
Empirical Distribution of $\tau_\mu$ for $(\alpha_0, \rho) = (\alpha_0, 1)$ in $X_t = \alpha_0 + \rho X_{t-1} + \varepsilon_t$								
25	-3.75	-3.33	-3.00	-2.62	-0.37	0.00	0.34	0.72
50	-3.58	-3.22	-2.93	-2.60	-0.40	-0.03	0.29	0.66
100	-3.51	-3.17	-2.89	-2.58	-0.42	-0.05	0.26	0.63
250	-3.46	-3.14	-2.88	-2.57	-0.42	-0.06	0.24	0.62
500	-3.44	-3.13	-2.87	-2.57	-0.43	-0.07	0.24	0.61
$\infty$	-3.43	-3.12	-2.86	-2.57	-0.44	-0.07	0.03	0.60
Empirical Distribution of $\tau_\tau$ for $(\alpha_0, \rho, \alpha_2) = (\alpha_0, 1, \alpha_2)$ in $X_t = \alpha_0 + \rho X_{t-1} + \alpha_2 t + \varepsilon_t$								
25	-4.38	-3.95	-3.60	-3.24	-1.14	-0.80	-0.50	-0.15
50	-4.15	-3.80	-3.50	-3.18	-1.19	-0.87	-0.58	-0.24
100	-4.04	-3.73	-3.45	-3.15	-1.22	-0.90	-0.62	-0.28
250	-3.99	-3.69	-3.43	-3.13	-1.23	-0.92	-0.64	-0.31
500	-3.98	-3.68	-3.42	-3.13	-1.24	-0.93	-0.65	-0.32
$\infty$	-3.96	-3.66	-3.41	-3.12	-1.25	-0.94	-0.66	-0.33



**Empirical Cumulative Distribution of  $\tau$  (continued)**

Sample Size	Probability of a Smaller Value			
	0.90	0.95	0.975	0.99
Empirical Distribution of $\tau_{\alpha t}$ for $(\alpha_0, \rho) = (0, 1)$ in $X_t = \alpha_0 + \rho X_{t-1} + \varepsilon_t$				
25	2.20	2.61	2.97	2.41
50	2.18	2.56	2.89	3.28
100	2.17	2.54	2.86	3.22
250	2.16	2.53	2.84	3.19
500	2.16	2.52	2.83	3.18
$\infty$	2.16	2.52	2.83	3.18
Empirical Distribution of $\tau_{\alpha T}$ for $(\alpha_0, \rho, \alpha_2) = (0, 1, \alpha_2)$ in $X_t = \alpha_0 + \rho X_{t-1} + \alpha_2 t + \varepsilon_t$				
25	2.77	3.20	3.59	4.05
50	2.75	3.14	3.47	3.87
100	2.73	3.11	3.42	3.78
250	2.73	3.09	3.39	3.74
500	2.72	3.08	3.38	3.72
$\infty$	2.72	3.08	3.38	3.71
Empirical Distribution of $\tau_{\beta T}$ for $(\alpha_0, \rho, \alpha_2) = (\alpha_0, 1, 0)$ in $X_t = \alpha_0 + \rho X_{t-1} + \alpha_2 t + \varepsilon_t$				
25	2.39	2.85	3.25	3.74
50	2.38	2.81	3.18	3.60
100	2.38	2.79	3.14	3.53
250	2.38	2.79	3.12	3.49
500	2.38	2.78	3.11	3.48
$\infty$	2.38	2.78	3.11	3.46

Source: Walter Enders, 1995 and David A. Dickey and Wayne A. Fuller, 1981

Distribution of the  $\lambda_{\max}$  and  $\lambda_{\text{trace}}$  Statistics

	.80	.90	.95	.975	.99
$\lambda_{\max}$ and $\lambda_{\text{trace}}$ Statistics with trend drift					
n-r			$\lambda_{\max}$		
1	1.699	2.816	3.962	5.332	6.936
2	10.125	12.099	14.036	15.810	17.936
3	16.324	18.697	20.778	23.002	25.521
4	22.113	24.712	27.169	29.335	31.943
5	27.889	30.774	33.178	35.546	38.341
			$\lambda_{\text{trace}}$		
1	1.699	2.816	3.962	5.332	6.936
2	11.164	13.338	15.197	17.299	19.310
3	23.868	26.791	29.509	32.313	35.397
4	40.250	43.964	47.181	50.424	53.792
5	60.215	65.063	68.905	72.140	76.955
$\lambda_{\max}$ and $\lambda_{\text{trace}}$ Statistics without trend or constant					
			$\lambda_{\max}$		
1	4.905	6.691	8.083	9.658	11.576
2	10.666	12.783	14.595	16.403	18.782
3	16.521	18.959	21.279	23.362	26.154
4	22.341	24.917	27.341	29.599	32.616
5	27.953	30.818	33.262	35.700	38.858
			$\lambda_{\text{trace}}$		
1	4.905	6.691	8.083	9.658	11.576
2	13.038	15.583	17.844	19.611	21.962
3	25.445	28.436	31.256	34.062	37.291
4	41.623	45.248	48.419	51.801	55.551
5	61.566	65.956	69.977	73.031	77.911
$\lambda_{\max}$ and $\lambda_{\text{trace}}$ Statistics a constant in the cointegrating vector					
			$\lambda_{\max}$		
1	5.877	7.563	9.094	10.709	12.740
2	11.628	13.781	15.752	17.622	19.834
3	17.474	19.796	21.894	23.836	26.409
4	22.938	25.611	28.167	30.262	33.121
5	28.643	31.592	34.397	36.625	39.672
			$\lambda_{\text{trace}}$		
1	5.877	7.563	9.094	10.709	12.741
2	15.359	17.957	20.168	22.202	24.988
3	28.768	32.093	35.068	37.603	40.198
4	45.635	49.925	53.347	56.449	60.054
5	66.624	71.472	75.328	78.857	82.969

Empirical Distribution of  $\Phi$ 

Sample Size	0.01	0.025	0.05	0.10	0.90	0.95	0.975	0.99
Empirical Distribution of $\Phi_1$ for $(\alpha_0, \rho) = (0, 1)$ in $X_t = \alpha_0 + \rho X_{t-1} + \varepsilon_t$								
25	0.29	0.38	0.49	0.65	4.12	5.18	6.30	7.88
50	0.29	0.39	0.50	0.66	3.94	4.86	5.80	7.06
100	0.29	0.39	0.50	0.67	3.86	4.71	5.57	6.70
250	0.30	0.39	0.51	0.67	2.81	4.63	5.45	6.52
500	0.30	0.39	0.51	0.67	3.79	4.61	5.41	6.47
$\infty$	0.30	0.40	0.51	0.67	3.78	4.59	5.38	6.43
Empirical Distribution of $\Phi_2$ for $(\alpha_0, \rho, \alpha_2) = (0, 1, 0)$ in $X_t = \alpha_0 + \rho X_{t-1} + \alpha_2 t + \varepsilon_t$								
25	0.61	0.75	0.89	1.10	4.67	5.68	6.75	8.21
50	0.62	0.77	0.91	1.12	4.31	5.13	5.94	7.02
100	0.63	0.77	0.92	1.12	4.16	4.88	5.59	6.50
250	0.63	0.77	0.92	1.13	4.07	4.75	5.40	6.22
500	0.63	0.77	0.92	1.13	4.05	4.71	5.35	6.15
$\infty$	0.63	0.77	0.92	1.13	4.03	4.68	5.31	6.09
Empirical Distribution of $\Phi_3$ for $(\alpha_0, \rho, \alpha_2) = (\alpha_0, 1, 0)$ in $X_t = \alpha_0 + \rho X_{t-1} + \alpha_2 t + \varepsilon_t$								
25	0.74	0.90	1.08	1.33	5.91	7.24	8.65	10.61
50	0.76	0.93	1.11	1.37	5.61	6.73	7.81	9.31
100	0.76	0.94	1.12	1.38	5.47	6.49	7.44	8.73
250	0.76	0.94	1.13	1.39	5.39	6.34	7.25	8.43
500	0.76	0.94	1.13	1.39	5.36	6.30	7.20	8.34
$\infty$	0.77	0.94	1.13	1.39	5.34	6.25	7.16	8.27

ที่มา : Walter Enders, 1995 และ David A. Dickey and Wayne A. Fuller, 1981

## ประวัติผู้เขียน

ชื่อ	นายเริงชัย ตันสุชาติ
วัน เดือน ปี เกิด	1 เมษายน 2519
ประวัติการศึกษา	สำเร็จการศึกษามัธยมศึกษาตอนต้น โรงเรียนมงฟอร์ตวิทยาลัย ปีการศึกษา 2533 สำเร็จการศึกษามัธยมศึกษาตอนปลาย โรงเรียนมงฟอร์ตวิทยาลัย ปีการศึกษา 2536 สำเร็จการศึกษาปริญญาเศรษฐศาสตร์บัณฑิต มหาวิทยาลัยเชียงใหม่ สาขาเศรษฐศาสตร์ ปีการศึกษา 2540
ทุนการศึกษา	ทุนโครงการพัฒนาอาจารย์ ทบวงมหาวิทยาลัย ประจำปีการศึกษา 2544 ทุนการศึกษาสำหรับนักศึกษาบัณฑิตศึกษาจากค่าบำรุงพิเศษ คณะเศรษฐศาสตร์ มหาวิทยาลัยเชียงใหม่