Large Model notation:

Endogenous Variables	
Y	GDP at factor cost
P	Consumer Price Level
INFL	Percentage growth rate of P (year-on-year)
MON	Nominal Money Stock (M0)
RW	Real wages (Average Earnings/Price)
U	Unemployment
Q	Output deviation from trend (Y/YSTAR)
AFC	Adjustment to factor cost
EG	real government spending on goods and services
BDEF	interest-exclusive budget deficit (deflated by CPI)
PSBR	public sector borrowing requirement (deflated by CPI)
XVAL	real current account of balance of payments
XVOL	same, at constant terms of trade
RS(RL)	real short term (log term) interest rate
NRS (NRL)	nominal short term (long term) interest rate
M0	real money balances (M0)
G	real private stock of durable goods, including inventories
W	real private stock of wealth
FIN	real private stock of financial assets (net)
CON	real private non-durable consumption
RXR	real exchange rate (relative CPI, UK v. ROW)
RDI	real debt interest
GINV	gross private investment in durables plus stockbuilding
Exogenous Variables	
MTEM	Temporary growth of money supply
PEQ	Growth of money supply
BO	Employers national insurance contributions
UNR	Trade Unionisation rate
LO	Average amount lost in taxes and national insurance
TREND	Time trend

LARGE MODEL ANNEX

Listing of the Liverpool Model

Behavioural equations

1. $\log(EG_t)=\log(EGSTAR_t)+A39\times\log(Y_t/YSTAR_t)$

2. $XVOL_t=A40\times YSTAR_t\times\{A27\times\log(WT_t)+A28\times\log(Y_t)+A47+A29\times\{ESTAR_t+0.6\times\{RXR_t-ESTAR_t\}\}+A30\times\{XVOL_{t-1}/\{A40\times YSTAR_{t-1}\}\}\}$

3. $XVAL_t=XVAL_{t-4}+\{XVOL_t-XVOL_{t-4}\}+A31\times\{0.32\times YSTAR_t\times\{RXR_t-RXR_{t-4}-ESTAR_t+ESTAR_{t-4}\}\}+A32\times XVALres_{t-1}$

4. $\log(M0_t)=A44+A13\times\log(M0_{t-1})+A14\times\{\log(Y_t)+\log(1.-TAX_{t-1})\}+A16\times TREND_t+A17\times NRS_t+A18\times VAT_t$

5. $\log(U_t)=A42+A3\times\log(Y_t)+A4\times\{\log(RW_t)+\log(1.0+BO_t)+\log(1.0+VAT_t)\}+A5\times TREND_t+A6\times\log(U_{t-1})+A36\times Ures_{t-1}$

6. $\log(G_t)=A45+A19\times RL_t+A20\times\{\log(G_{t-1})-\log(FIN_{t-1})\}+A21\times\{\log(G_{t-1})-\log(G_{t-2})\}+\log(G_{t-1})$

7. $\log(CON_t)=A46+A22\times RL_t+A23\times\log(W_t)+A24\times QEXP_t+A25\times\log(CON_{t-1})$

8. $\log(RW_t)=A43+A7\times UNR_t+A8\times\{\log(UB_t)+\log(1.0+LO_t)\}+A9\times\log(U_t)+A37\times\log(RW_{t-1})+\{.095\}\times UNR_t\times\{-A10\}+A10\times\log(RW_{t-2})+A11\times ETA_t+A12\times ETA_{t-1}$

9. $RXR_t=A41+0.000+A1\times\{\log(RW_t)+\log(1.0+BO_t)\}+A53\times\{\log(P_t)-\log(P_{t-4})\}+\{1.+A1\}\times\log(1.+VAT_t)+A2\times TREND_t+A35\times RXRres_{t-1}$

Identities and calibrated relationships

10. $RS_t=\{RXR_t-EEX_t\}+RSUS_t$

11. $NRS_t=PEXP_t+RS_t$

12. $RL_t=\{RXR_t-EEXL_t\}/5.0+RLUS_t)$

13. $NRL_t=RL_t+PEXL_t$

14. $Y_t=GINV_t+CON_t+EG_t+XVOL_t-AFC_t$

15. $INFL_t=\log(MON_t)-\log(MON_{t-4})-\log(M0_t)+\log(M0_{t-4})$

16. $\log(P_t)=\log(P_{t-4})+INFL_t$

17. $W_t=FIN_t+G_t$

18. $BDEF_t=EG_t-2.0\times TAX_t\times Y_t+TAX0\times Y0$

19. $AFC_t=Y_t\times\{0.6588318\times\{AFC_{t-1}/Y_{t-1}\}+0.1966416\times\{AFC_{t-3}/Y_{t-3}\}+0.1454006\times\{AFC_{t-4}/Y_{t-4}\}+\}$

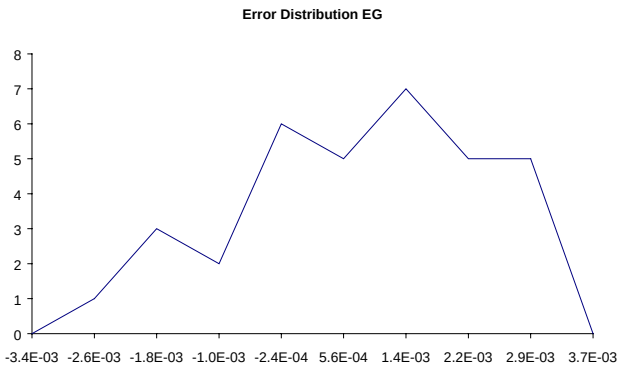
20. $PSBR_t=BDEF_t+RDI_t$

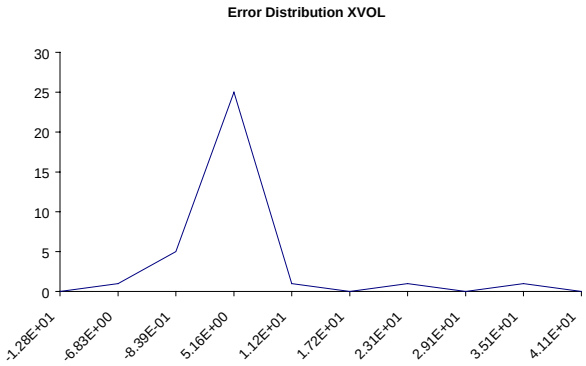
21. $RDI_t=-.5\times\{NRL_{t-1}/4.0\}\times FIN_{t-1}\times\{\{\{P_t/P_{t-1}\}\text{^}0.66\}-1.0\}+PSBR_t\times\{.32\times\{NRS_t/4.0\}+.5\times\{NRL_t/4.0\}\}+.32\times\{NRS_t/4.\}\times FIN_{t-1}-.32\times\{NRS_{t-1}/4.\}\times FIN_{t-1}+RDI_{t-1}$

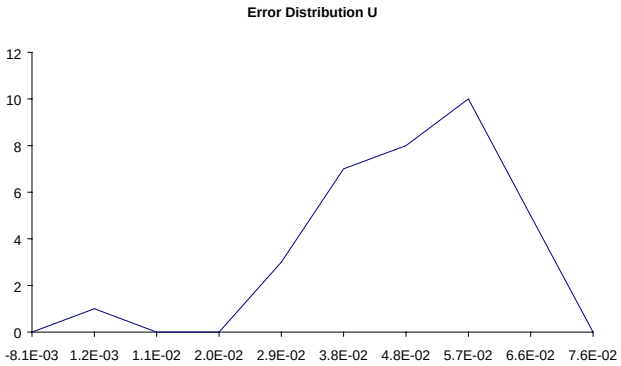
22. $GINV_t=G_t-G_{t-1}+A38G_{t-1}$

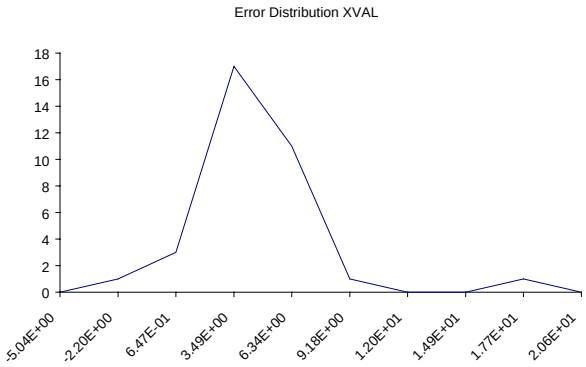
The –star variables YSTAR, USTAR, ESTAR and WSTAR are the equilibrium values of Y, U, RXR and RW respectively, found by solving equations 2,5,8 and 9 under the conditions that XVOL=0 and exogenous variables maintain their current values; EGSTAR is the value of EG that would produce a constant debt/GDP ratio with Y=YSTAR.

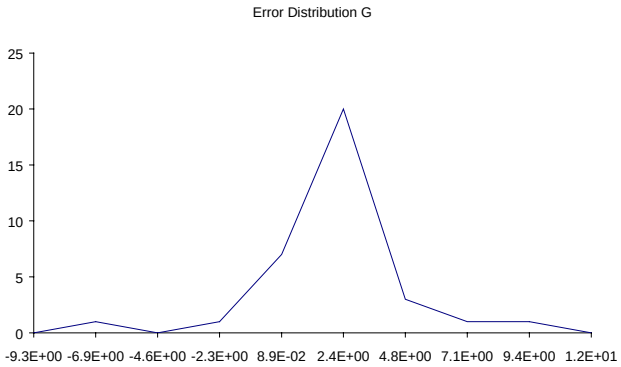
Appendix L1 Large Model Equation error distributions

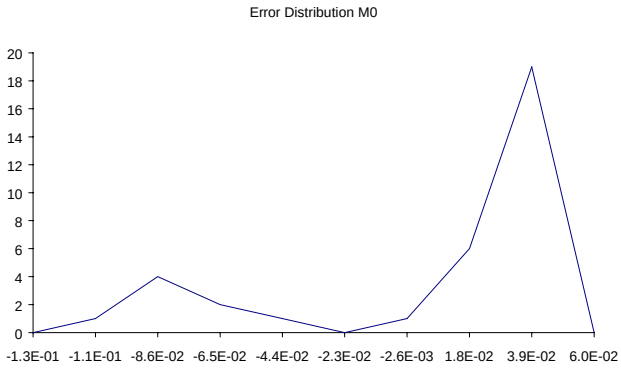


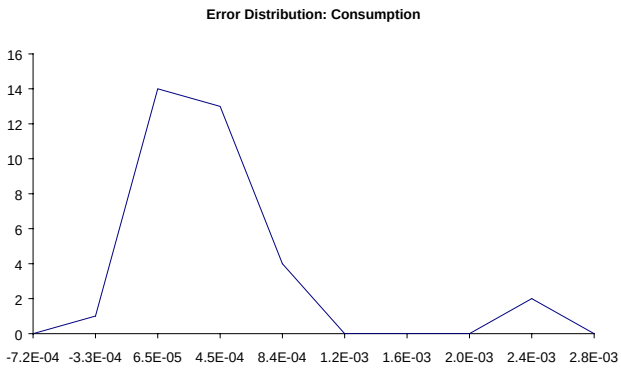


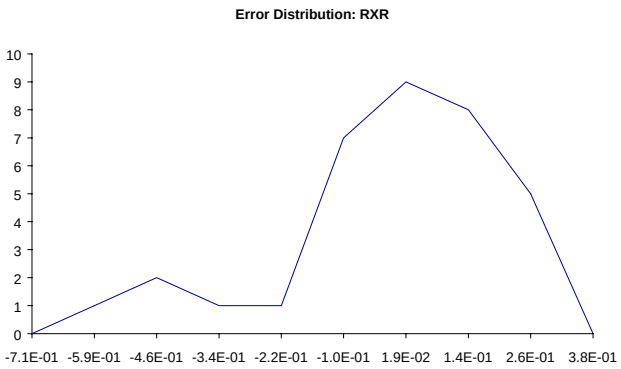









Error Distribution: Consumption
16
14
12
10
8
6
4
2
0
-7.2E-04
-3.3E-04
6.5E-05
4.5E-04
8.4E-04
1.2E-03
1.6E-03
2.0E-03
2.4E-03
2.8E-03


Error Distribution: RXR
10
9
8
7
6
5
4
3
2
1
0
-7.1E-01
-5.9E-01
-4.6E-01
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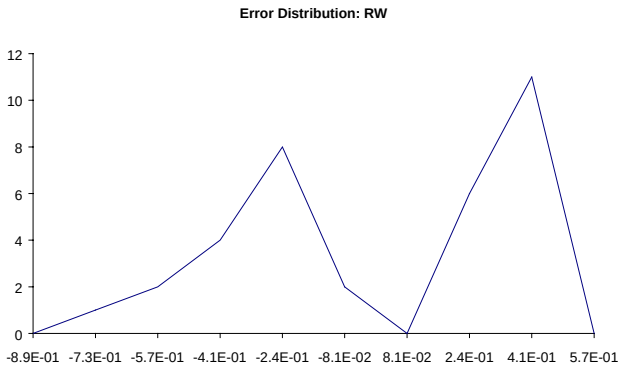
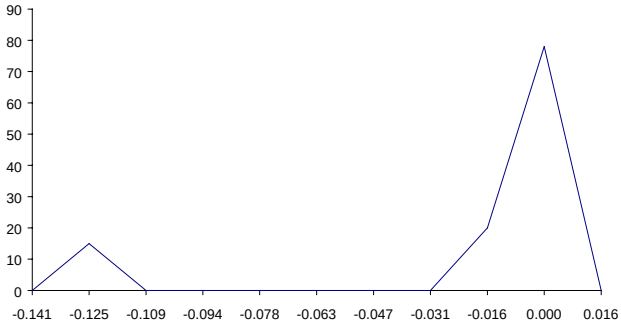
1.4E-01
2.6E-01
3.8E-01


Error Distribution: RW
12
10
8
6
4
2
0
-8.9E-01
-7.3E-01
-5.7E-01
-4.1E-01
-2.4E-01
-8.1E-02
8.1E-02
2.4E-01
4.1E-01
5.7E-01

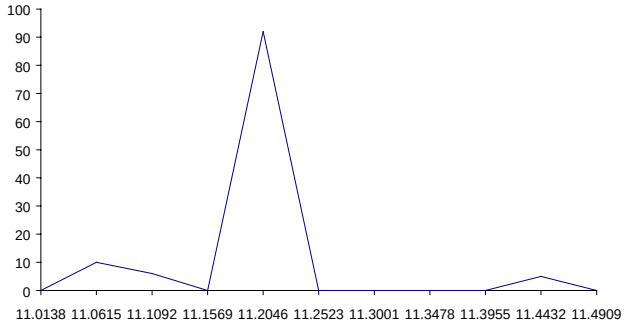
LARGE MODEL ANNEX

Appendix L2 Large Model Parameter Distributions

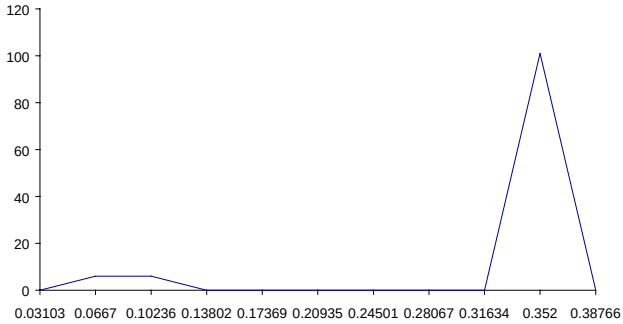
α39 EG : Y / Y*



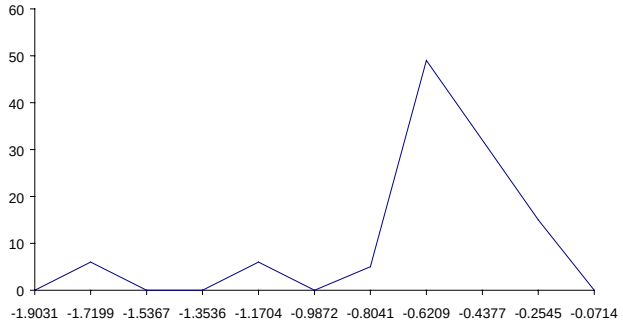
α47 XVOL : constant



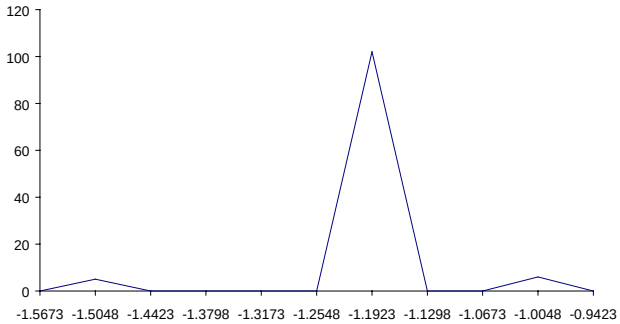
α40 XVOL : Y*



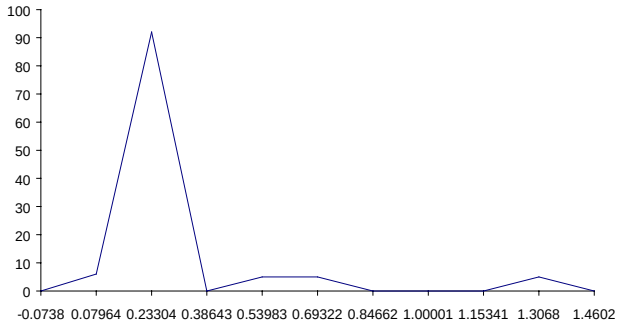
α29 XVOL : (ESEN+.6*[RXR-ESEN]



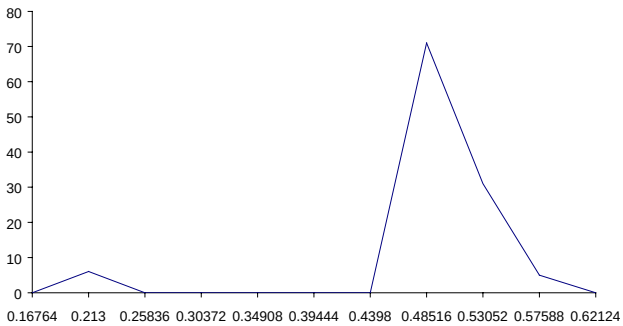
α28: XVOL : log(Y)



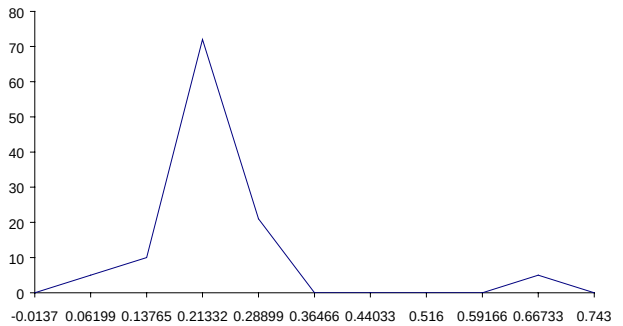
α30 XVOL : XVOL / a40 x Y*



α27 XVOL : log(WT)

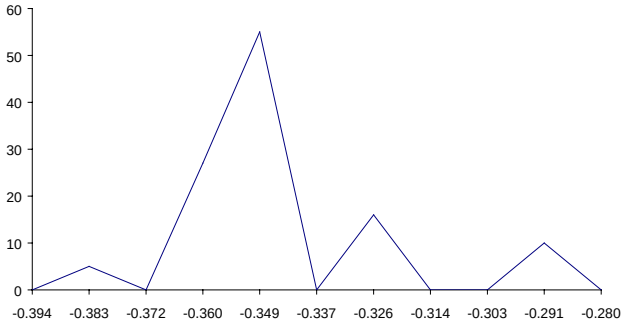


α31 XVAL : Y* x (D4RXR[-1] - D4ESEN[-1])

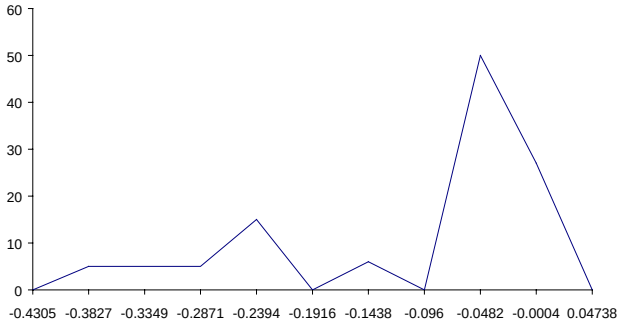


LARGE MODEL ANNEX

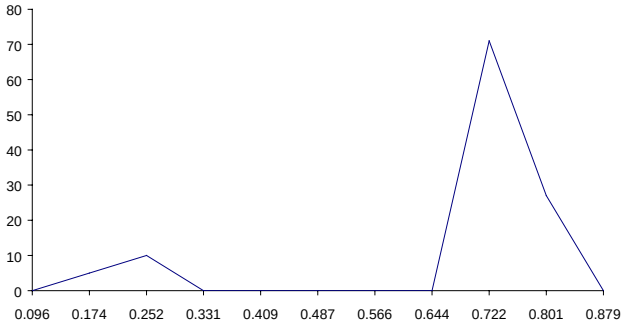
α44 M0 : constant



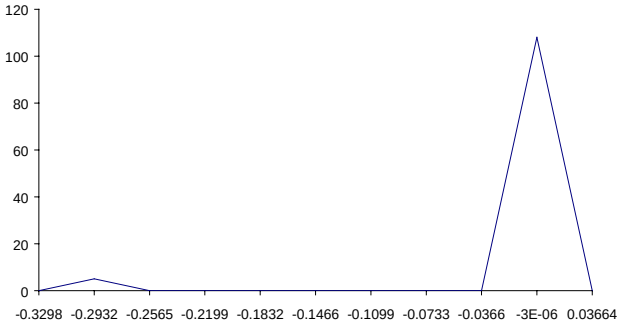
α17 M0 : NRS



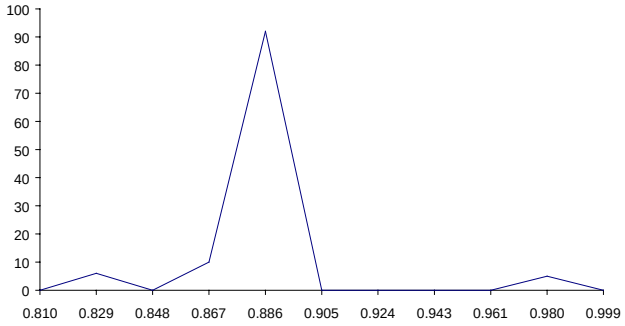
α32 XVAL : autocorrelation coefficient



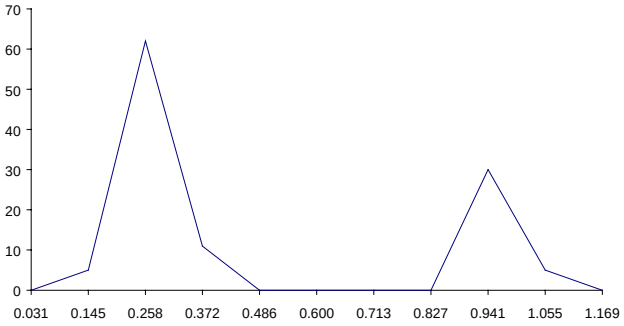
α16 M0 : Trend



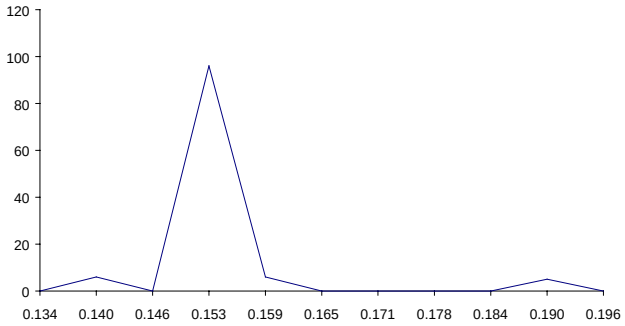
α31 M0 : log(M0[-1])



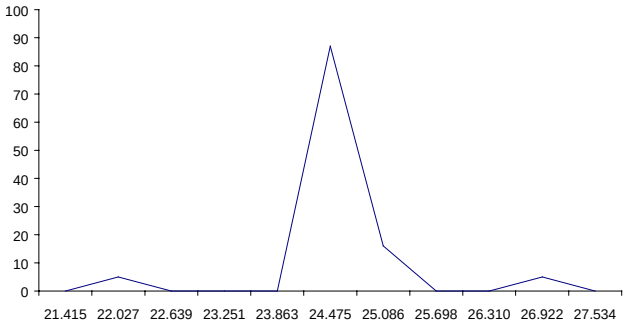
α18 M0 : VAT



α14 M0 : log(Y)+log(1-tax)

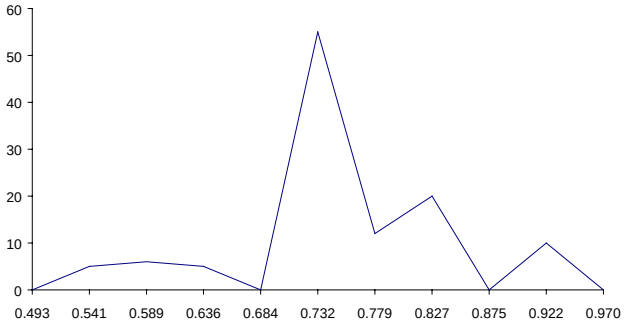


α42 U : constant

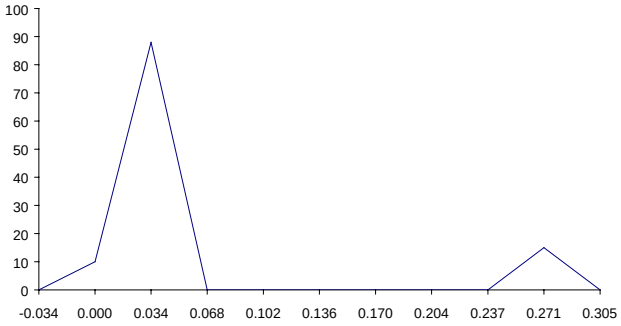


LARGE MODEL ANNEX

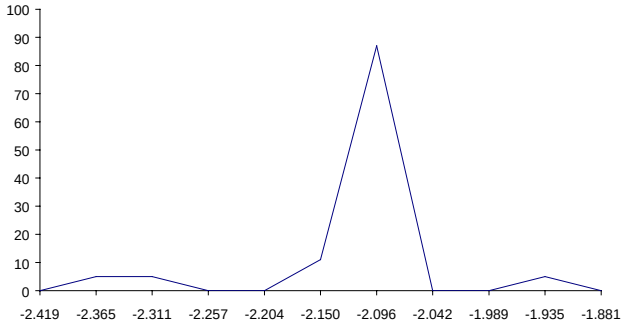
α4 RXR : log(rw)+log(1+bo)+log(1+vat)



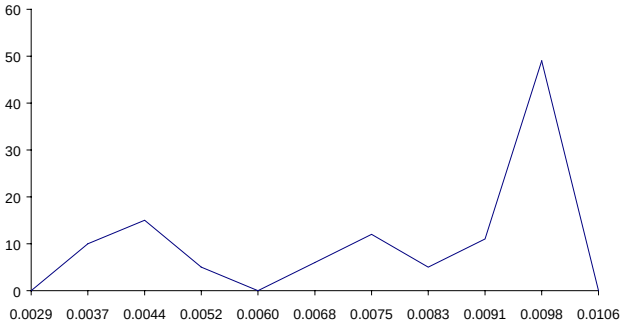
α36 U : autocorrelation coefficient



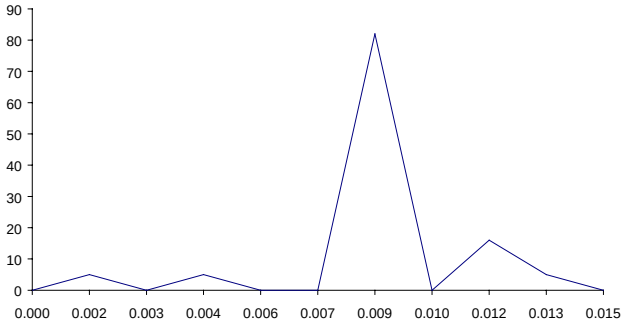
α3 U : log(Y)



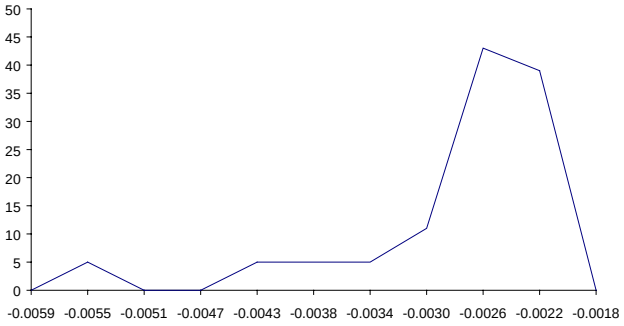
α45 G : constant



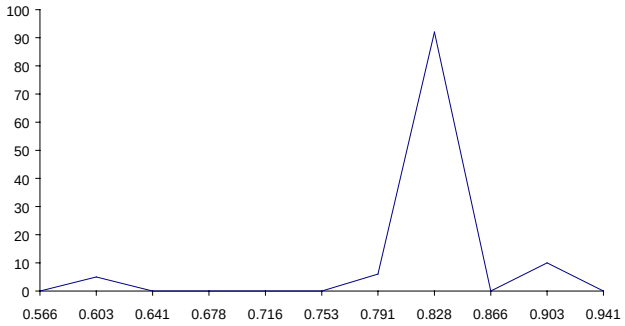
α5 U : Trend



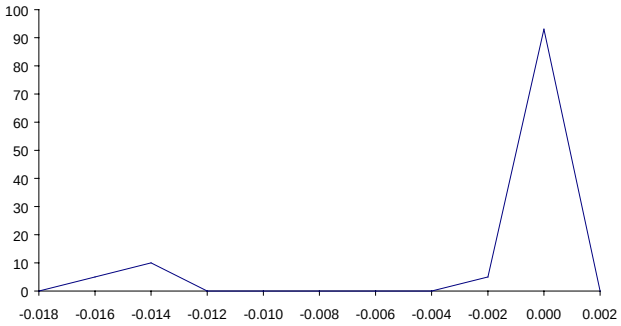
α20 G : log(g[-1])-log(fin[-1])



α6 U : lagged dependent variable

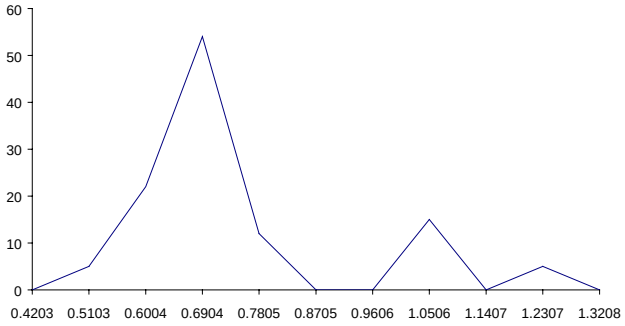


α19 G : RL

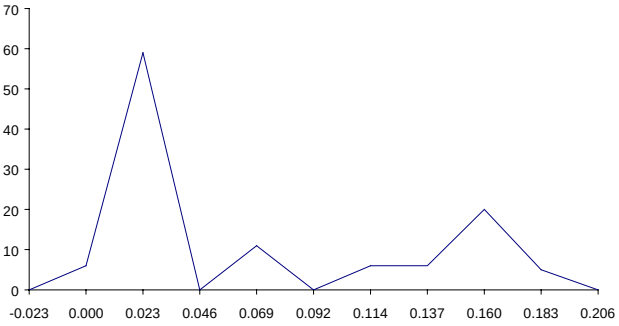


LARGE MODEL ANNEX

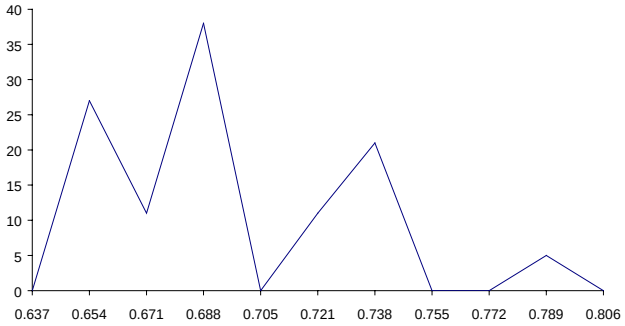
α21 G : D log(G[-1])



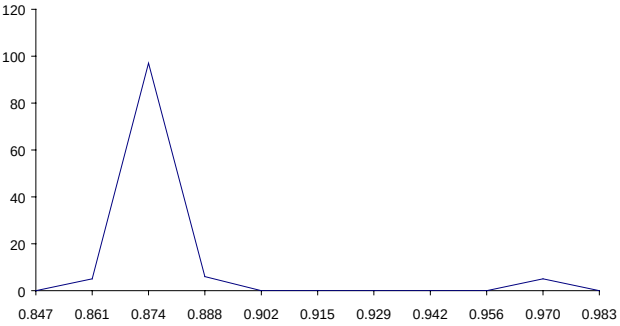
α24 CON : log(QEXP)



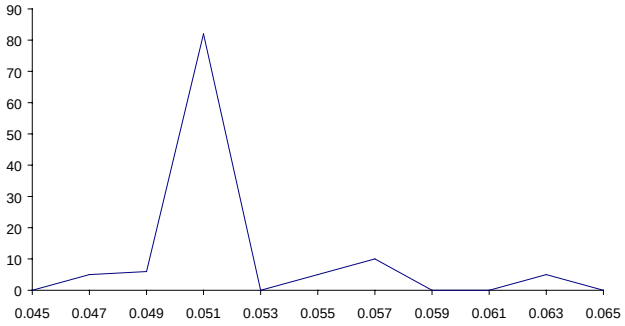
α46 CON : constant



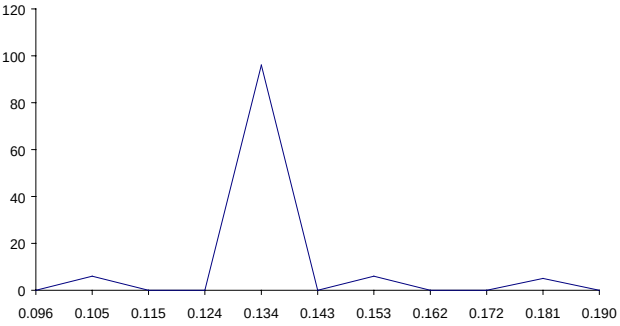
α25 CON : log(CON)



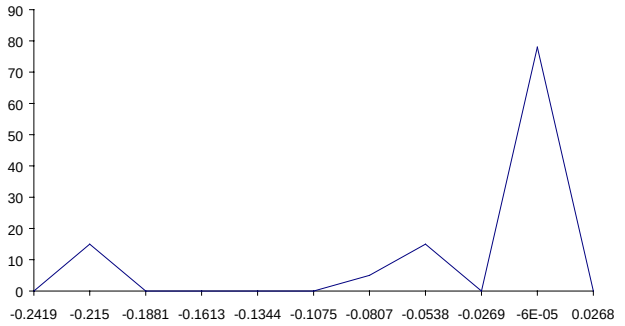
α23 CON : W



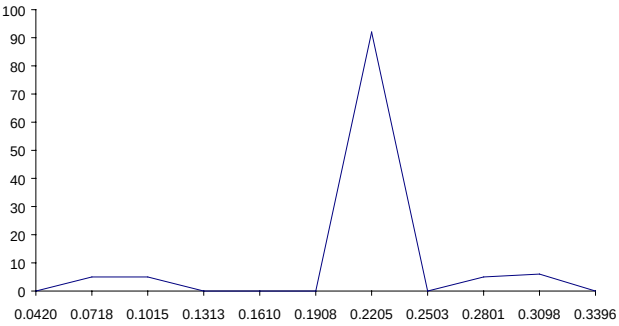
α43 RW : constant



α22 CON : RL

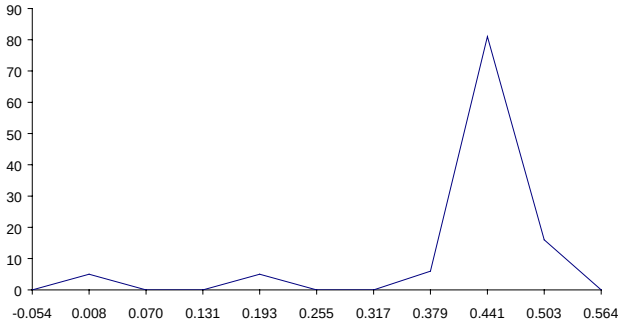


α8 RW : log(ub)+log(1+lo)

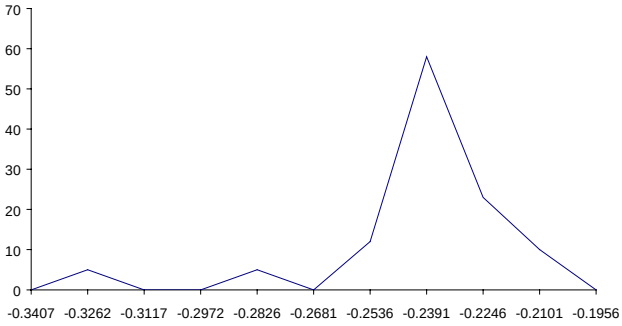


LARGE MODEL ANNEX

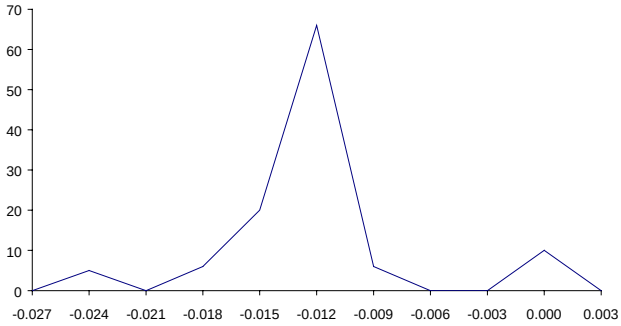
α_7 RW : UNR



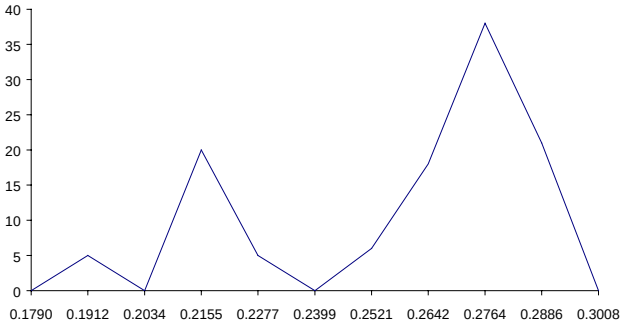
α_{10} RW : log(rw[-2])



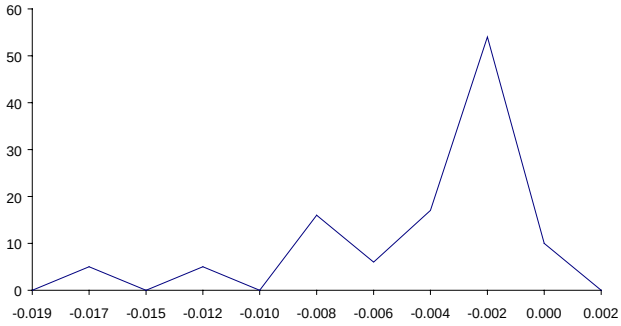
α_9 RW : log(usen)



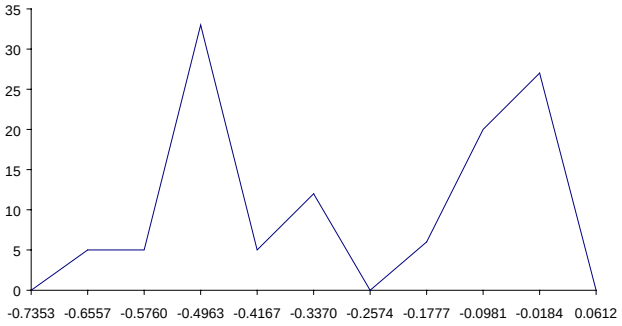
α_{12} RW : ETA[-1]



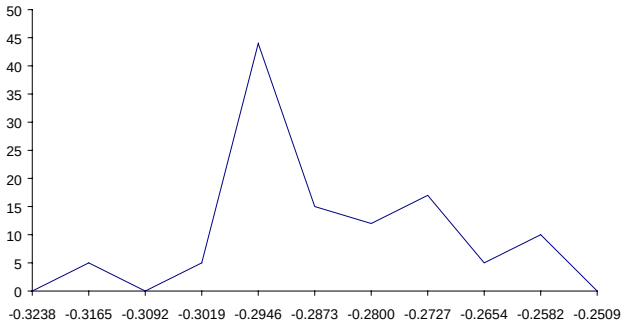
α_{37} RW : RW[-1]



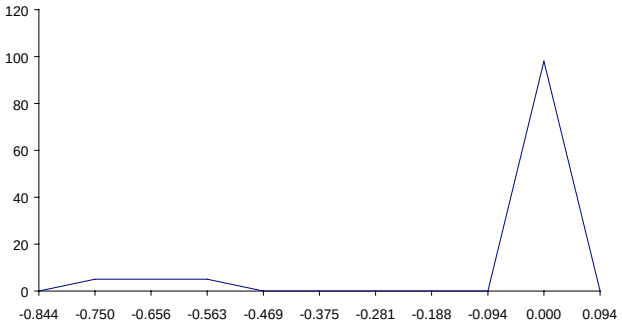
α_{41} RXR : constant



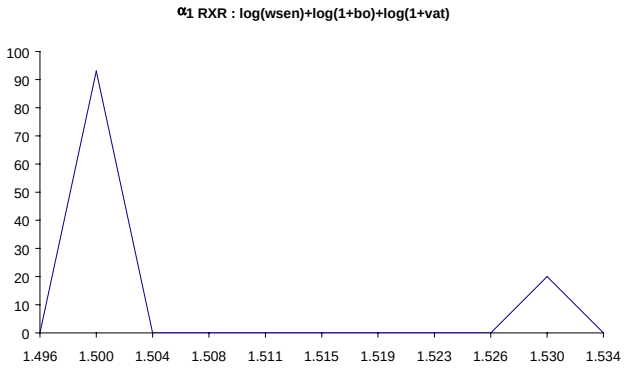
α_{11} RW : ETA

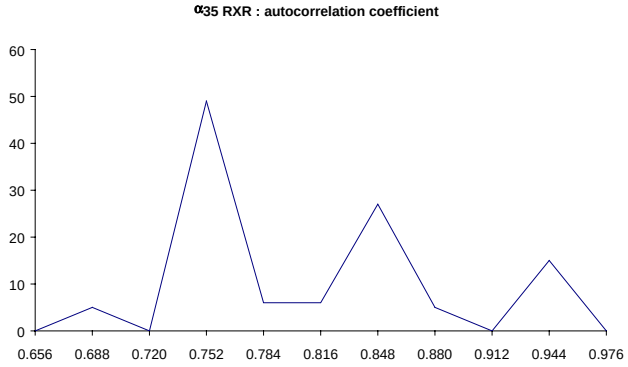


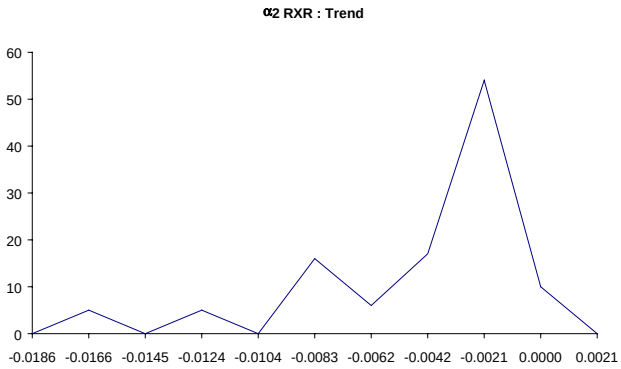
α_{53} RXR : Δ_4 log(P)



LARGE MODEL ANNEX

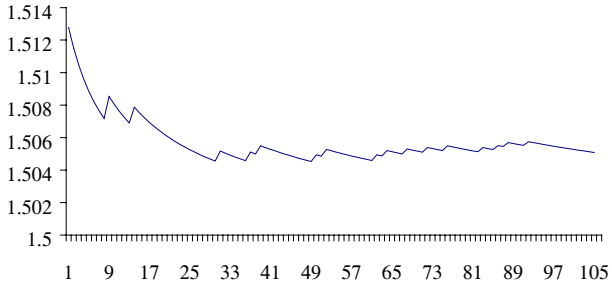




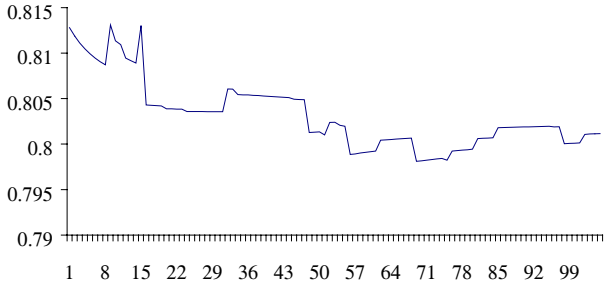


Large Model convergence of parameters as number of bootstraps increases

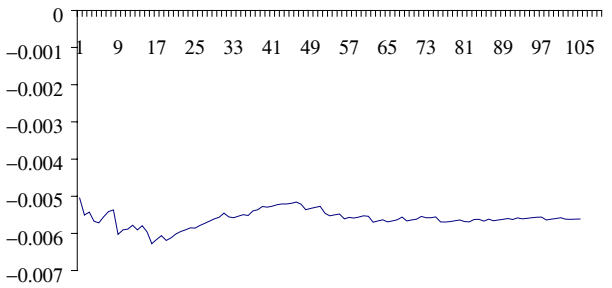
α1



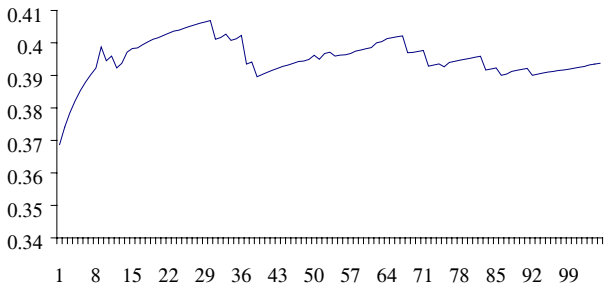
α6



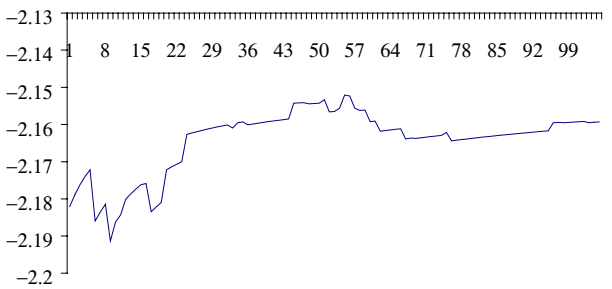
α2



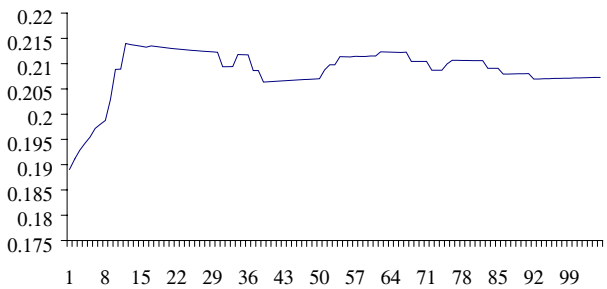
α7



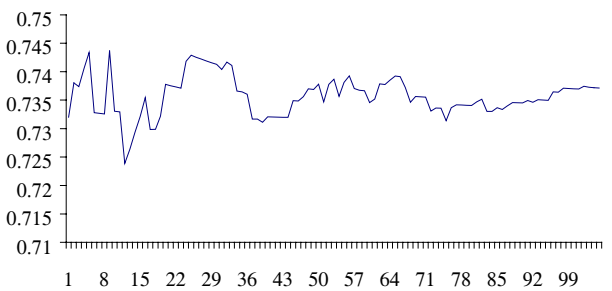
α3



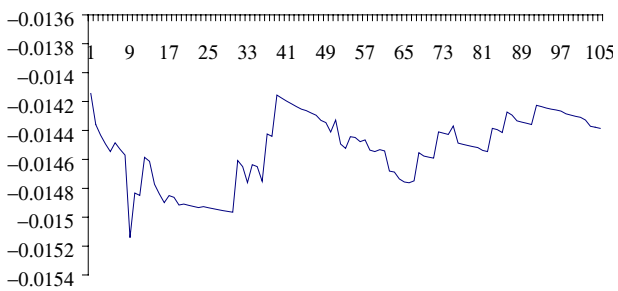
α8



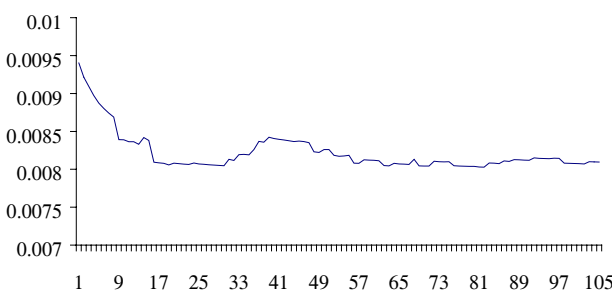
α4



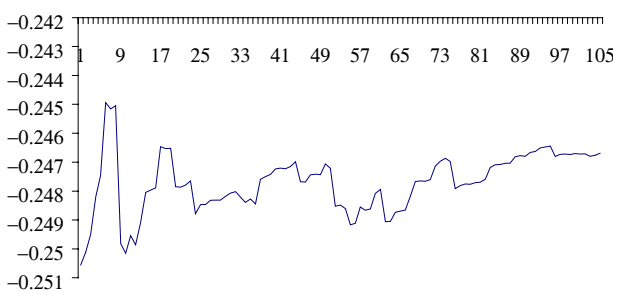
α9



α5

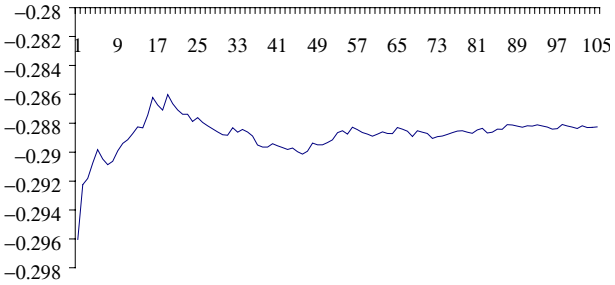


α10

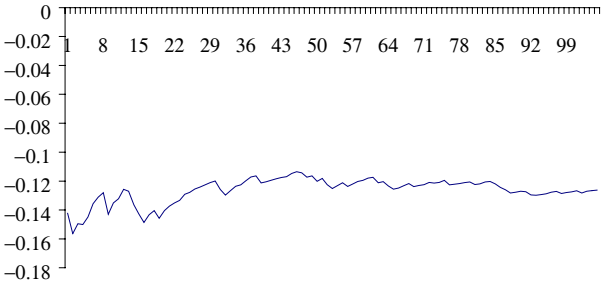


Large Model convergence of parameters as number of bootstraps increases

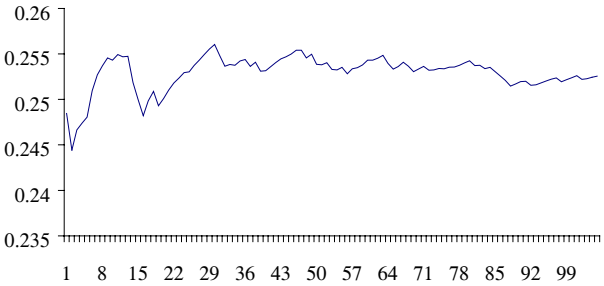
α11



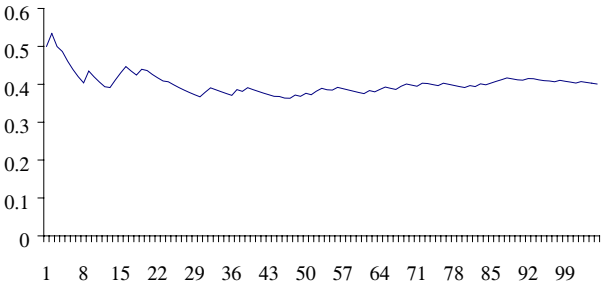
α17



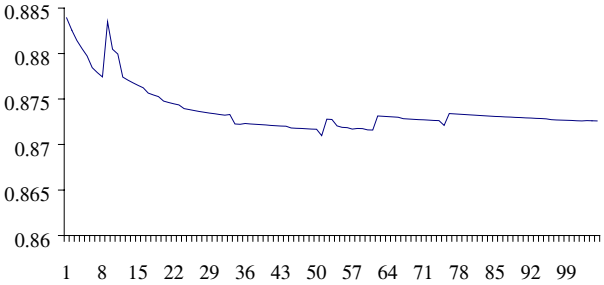
α12



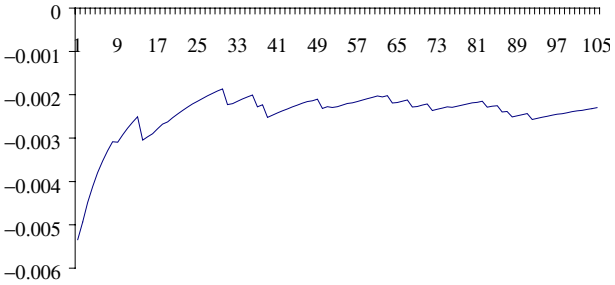
α18



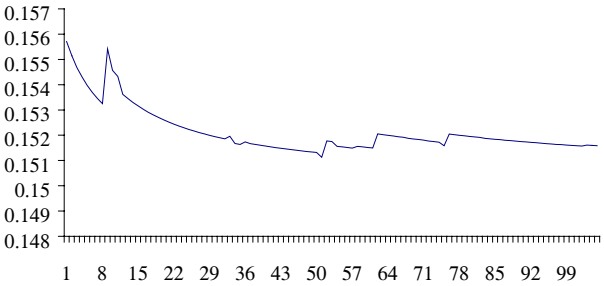
α13



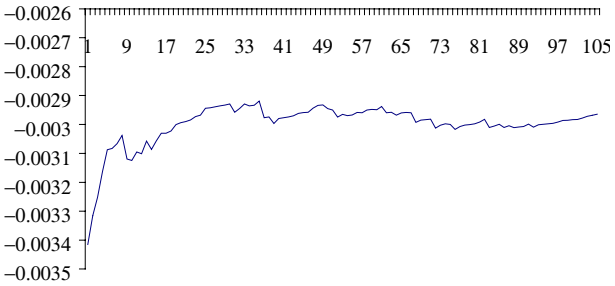
α19



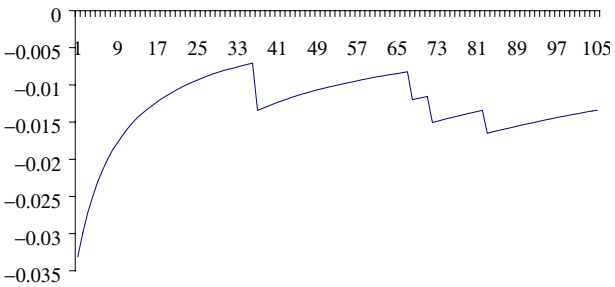
α14



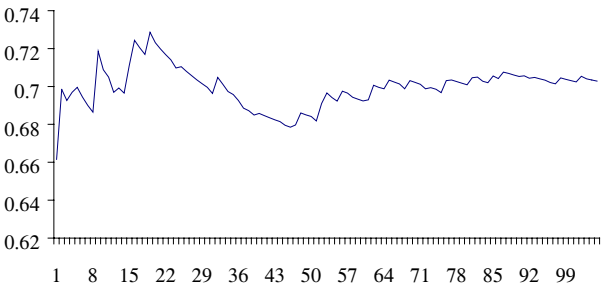
α20



α16

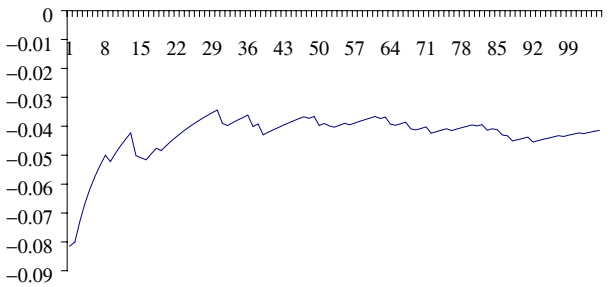


α21

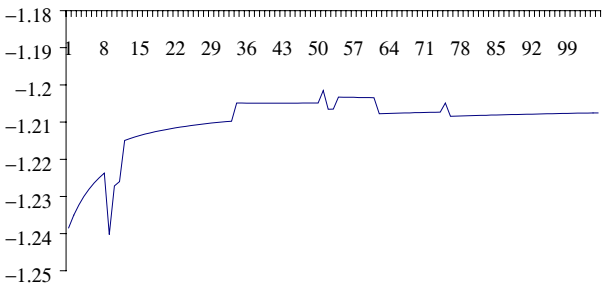


Large Model convergence of parameters as number of bootstraps increases

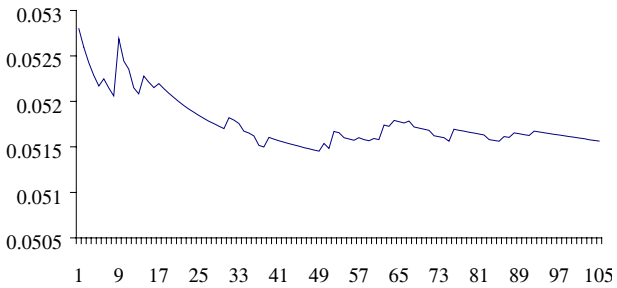
α22



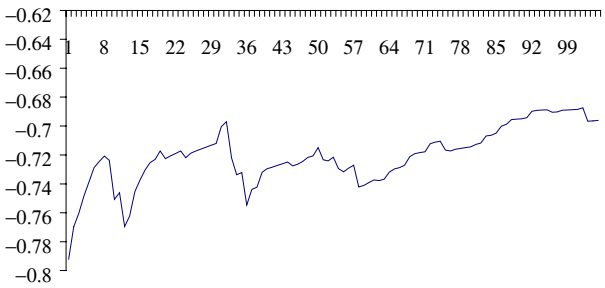
α28



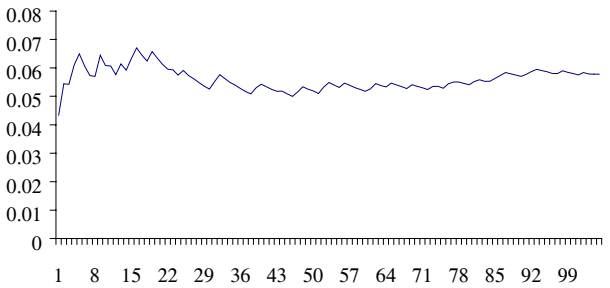
α23



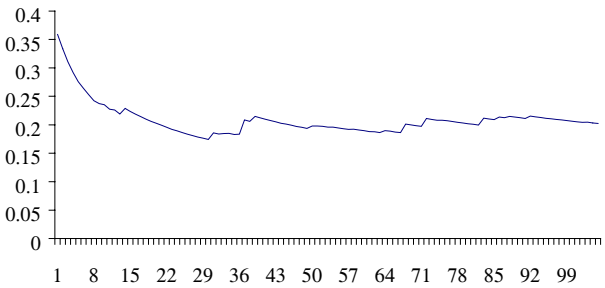
α29



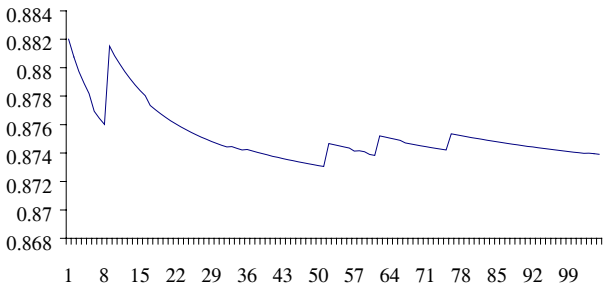
α24



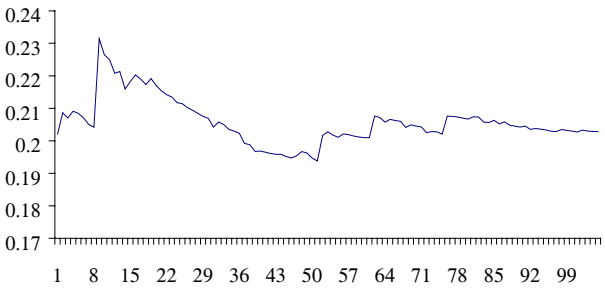
α30



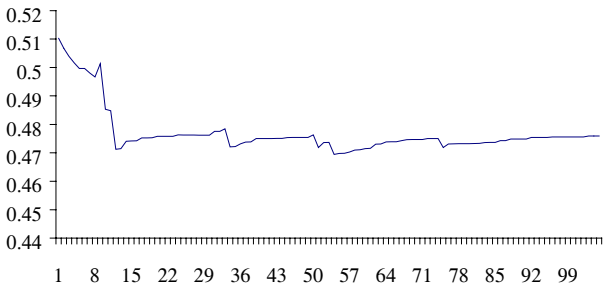
α25



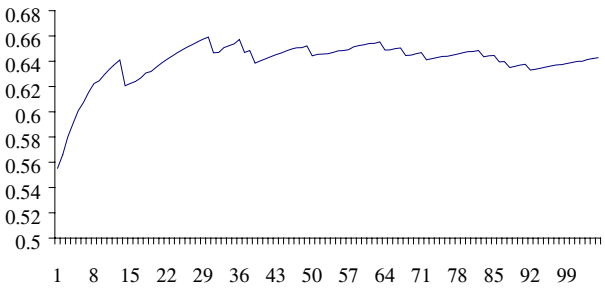
α31



α27

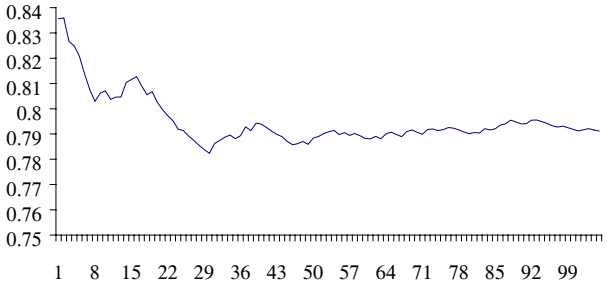


α32

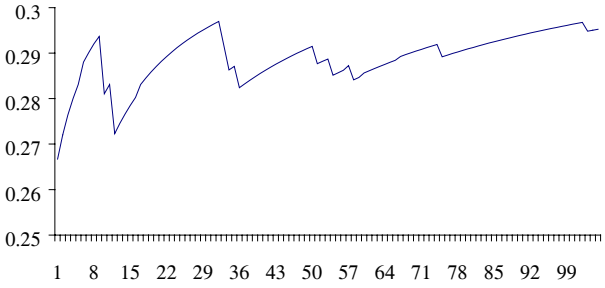


Large Model convergence of parameters as number of bootstraps increases

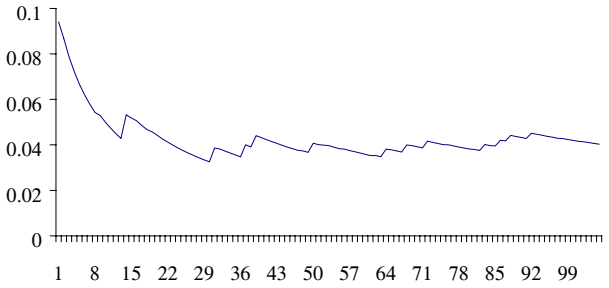
α35



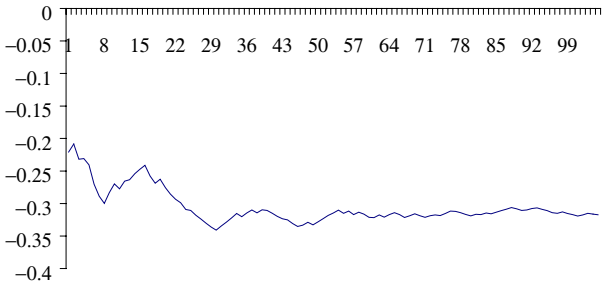
α40



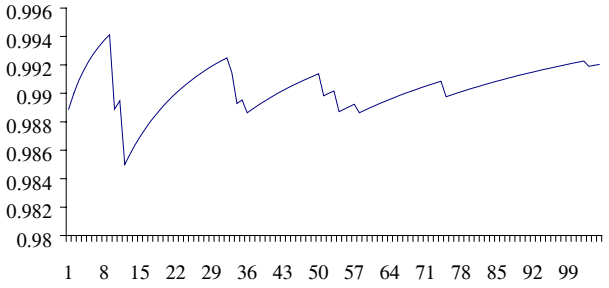
α36



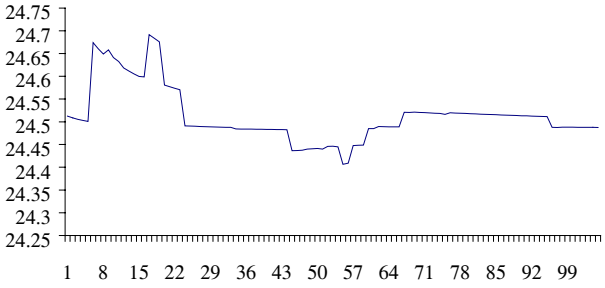
α41



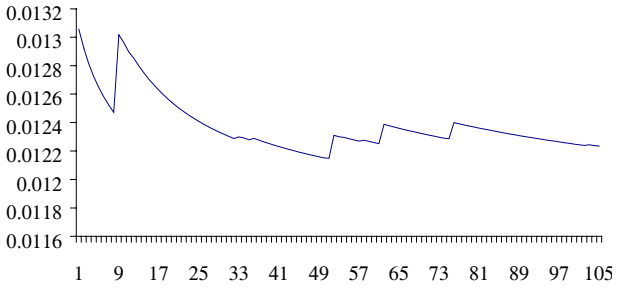
α37



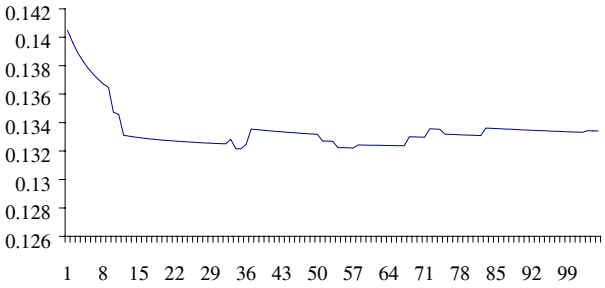
α42



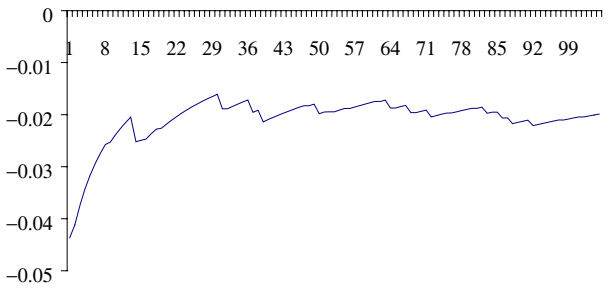
α38



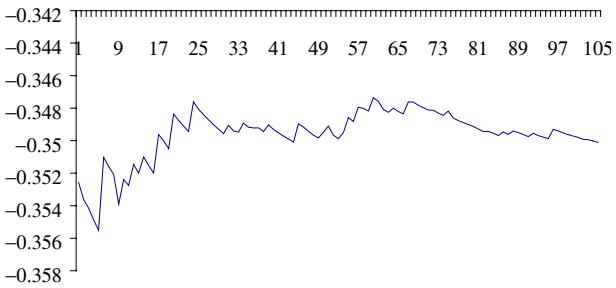
α43



α39

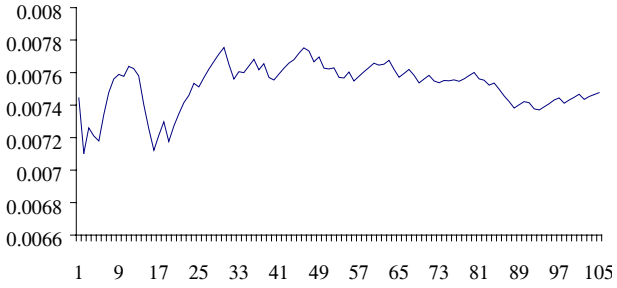


α44

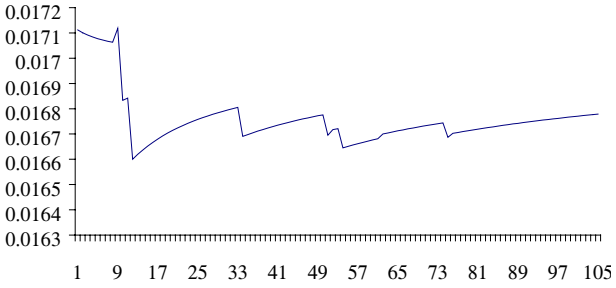


Large Model convergence of parameters as number of bootstraps increases

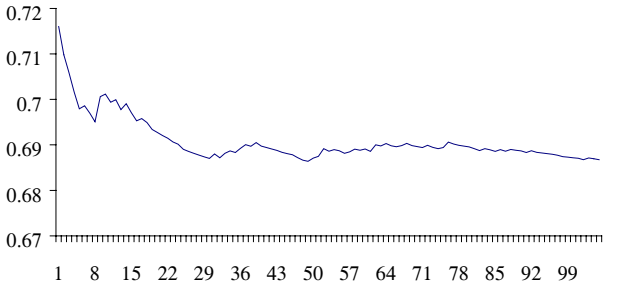
α45



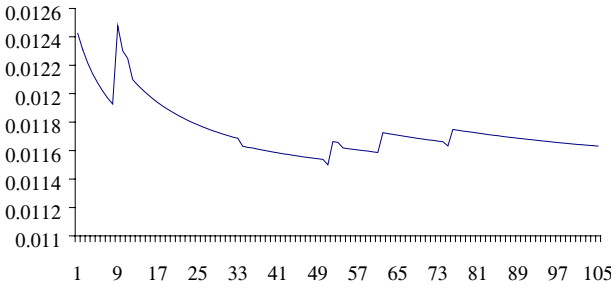
α50



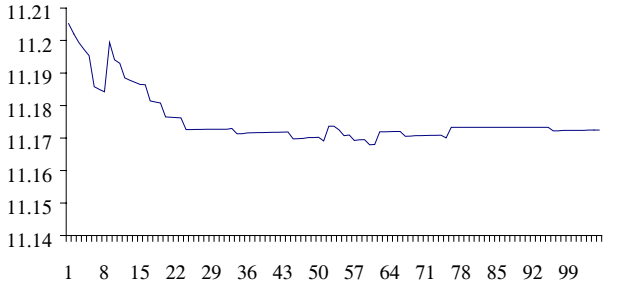
α46



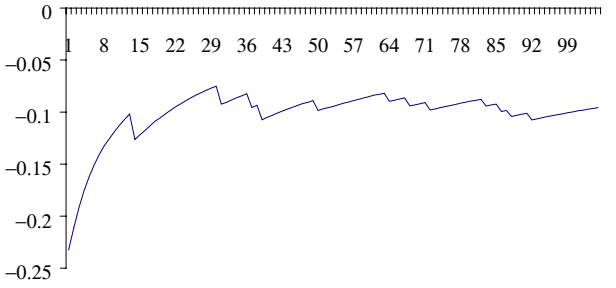
α51



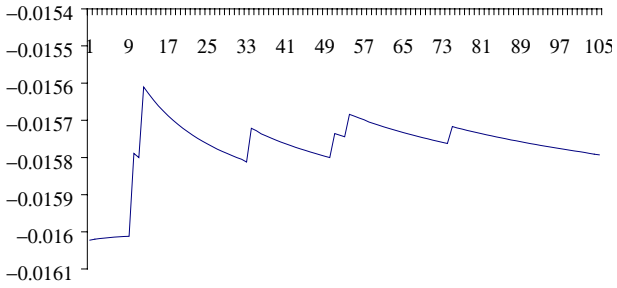
α47



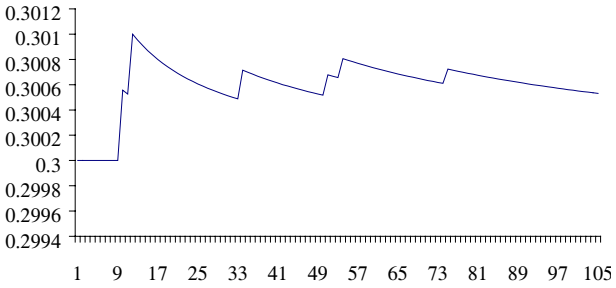
α53



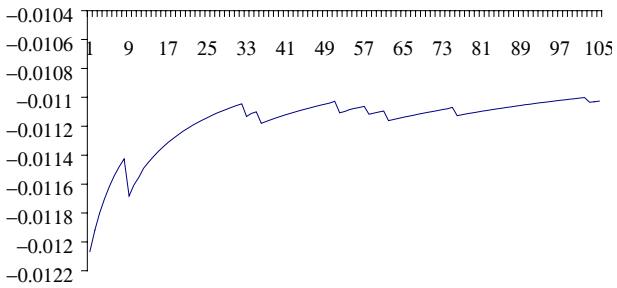
α48



α54

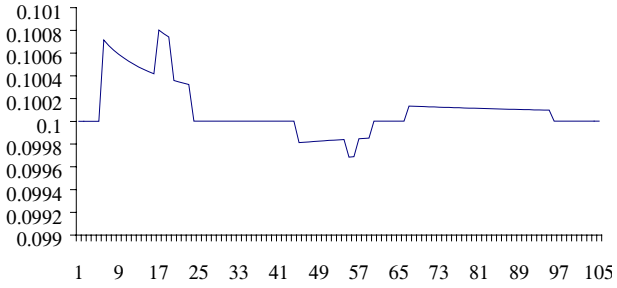


α49



Large Model convergence of parameters as number of bootstraps increases

α55



α58