House Prices and Credit Cycles - Bayesian Regression Results

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1 Description

The following Baysian regression implementation is based on Metropolis-Hasting random walk algorithm from Chapter 5 - Applied Bayesian econometrics for Central Bankers. The posterior results are summarized from 1,500,000 iterations with the first 500,000 iterations discarded for each model.

2 REGRESSION RESULTS

Table 1: Parameters description

Description	Parameter
Log-likelihood value	llv
Credit to household	
Credit to household 1st AR parameter	ϕ_y^1
Credit to household 2nd AR parameter	ϕ_y^2
Credit to household 1st cross cycle AR parameter	ϕ_y^{x1}
Credit to household 2nd cross cycle AR parameter	ϕ_y^{x2}
S.D. of permanent shocks to Credit to household	σ_{ny}
S.D. of transitory shocks to Credit to household	σ_{ey}
Housing Price Index	
Housing Price Index 1st AR parameter	ϕ_h^1
Housing Price Index 2nd AR parameter	ϕ_h^2
Housing Price Index 1st cross cycle AR parameter	ϕ_h^{x1}
Housing Price Index 2nd cross cycle AR parameter	ϕ_h^{x2}
S.D. of permanent shocks to Housing Price Index	σ_{nh}
S.D. of transitory shocks to Housing Price Index	σ_{eh}
Cross-series correlations	
Correlation: Permanent credit to household/Permanent Housing Price Index	ρ_{nynh}
Correlation: Transitory credit to household/Transitory Housing Price Index	ρ_{eyeh}

Table 2: UK Regression Results

Description	Parameters	VAR2		VAR2 1-cross lag		VAR2 2-cross lags	
		Median	[10%, 90%]	Median	[10%, 90%]	Median	[10%, 90%]
Credit to household 1st AR parameter	ϕ_y^1	1.9827	[1.9770, 1.9898]	1.4238	[1.3585, 1.4892]	1.4354	[1.3627, 1.5080]
Credit to household 2nd AR parameter	ϕ_y^2	-1.0056	[-1.0126, -0.9985]	-0.4698	[-0.5305, -0.4090]	-0.4946	[-0.5599, -0.4301]
Credit to household 1st cross cycle AR parameter	ϕ_y^{x1}			**0.0238**	**[0.0154, 0.0319]**	0.0023	[-0.0208, 0.0257]
Credit to household 2nd cross cycle AR parameter	ϕ_y^{x2}					0.0165	[-0.0075, 0.0399]
Housing Price Index 1st AR parameter	ϕ_h^1	1.4119	[1.3987, 1.4238]	1.3173	[1.2647, 1.3701]	1.2844	[1.2233, 1.3458]
Housing Price Index 2nd AR parameter	ϕ_h^2	-0.4323	[-0.4464, -0.4227]	-0.3315	[-0.3885, -0.2746]	-0.3041	[-0.3686, -0.2409]
Housing Price Index 1st cross cycle AR parameter	ϕ_h^{x1}			**-0.0173**	**[-0.0464, 0.0062]**	0.4847	[0.2707, 0.6894]
Housing Price Index 2nd cross cycle AR parameter	ϕ_h^{x2}					-0.4960	[-0.6698, -0.3198]
S.D. of permanent shocks to Credit to household	σ_{ny}	0.1055	[0.0896, 0.1254]	0.2714	[0.2150, 0.3155]	0.0737	[0.0463, 0.0987]
S.D. of transitory shocks to Credit to household	σ_{ey}	0.8113	[0.7957, 0.8259]	0.8021	[0.7699, 0.8376]	0.6336	[0.5803, 0.6925]
S.D. of permanent shocks to Housing Price Index	σ_{nh}	0.0062	[0.0055, 0.0072]	0.0789	[0.0742, 0.0845]	0.0062	[0.0055, 0.0071]
S.D. of transitory shocks to Housing Price Index	σ_{eh}	1.8647	[1.8332, 1.8845]	1.2242	[1.1886, 1.2613]	1.5020	[1.4080, 1.6063]
Correlation: Permanent credit to household/Permanent HPI	ρ_{nynh}	0.0589	[0.0418, 0.0808]	0.0189	[-0.3049, 0.3393]	0.0150	[-0.3101, 0.3306]
Correlation: Transitory credit to household/Transitory HPI	ρ_{eyeh}	0.3373	[0.2938, 0.3485]	0.2536	[0.1713, 0.3337]	0.2533	[0.1582, 0.3426]
Log-likelihood value	llv	607.7600	[605.0700, 610.0600]	578.6200	[576.1600, 582.1500]	559.5500	[556.6400, 563.6200]

Note:

UK Bayesian regression results

Table 3: US Regression Results

Description	Parameters	VAR2		VAR2 1-cross lag		VAR2 2-cross lags	
		Median	[10%, 90%]	Median	[10%, 90%]	Median	[10%, 90%]
Credit to household 1st AR parameter	ϕ_y^1	1.4826	[1.4216, 1.5446]	1.2074	[1.1374, 1.2785]	1.2004	[1.1227, 1.2753]
Credit to household 2nd AR parameter	ϕ_y^2	-0.4887	[-0.5500, -0.4280]	-0.2483	[-0.3152, -0.1825]	-0.2554	[-0.3209, -0.1884]
Credit to household 1st cross cycle AR parameter	ϕ_y^{x1}			**0.0318**	**[0.0228, 0.0407]**	0.0380	[0.0003, 0.0732]
Credit to household 2nd cross cycle AR parameter	ϕ_y^{x2}					-0.0088	[-0.0451, 0.0297]
Housing Price Index 1st AR parameter	ϕ_h^1	1.8594	[1.8276, 1.8915]	1.8038	[1.7700, 1.8363]	1.7999	[1.7658, 1.8345]
Housing Price Index 2nd AR parameter	ϕ_h^2	-0.8728	[-0.9047, -0.8408]	-0.8261	[-0.8605, -0.7903]	-0.8316	[-0.8687, -0.7942]
Housing Price Index 1st cross cycle AR parameter	ϕ_h^{x1}			**0.0104**	**[0.0007, 0.0204]**	0.3305	[0.2535, 0.4066]
Housing Price Index 2nd cross cycle AR parameter	ϕ_h^{x2}					-0.2882	[-0.3584, -0.2163]
S.D. of permanent shocks to Credit to household	σ_{ny}	0.0942	[0.0558, 0.1285]	0.2954	[0.2312, 0.3414]	0.0853	[0.0530, 0.1136]
S.D. of transitory shocks to Credit to household	σ_{ey}	0.8282	[0.7616, 0.9059]	0.8631	[0.8287, 0.9012]	0.7278	[0.6672, 0.7955]
S.D. of permanent shocks to Housing Price Index	σ_{nh}	0.0193	[0.0150, 0.0265]	0.1390	[0.1222, 0.1618]	0.0190	[0.0147, 0.0258]
S.D. of transitory shocks to Housing Price Index	σ_{eh}	0.8360	[0.7713, 0.9111]	0.8988	[0.8641, 0.9355]	0.8001	[0.7321, 0.8735]
Correlation: Permanent credit to household/Permanent HPI	ρ_{nynh}	0.0082	[-0.3118, 0.3230]	0.0082	[-0.3117, 0.3226]	0.0167	[-0.2998, 0.3328]
Correlation: Transitory credit to household/Transitory HPI	ρ_{eyeh}	0.1000	[-0.0181, 0.2185]	0.1537	[0.0399, 0.2619]	0.1642	[0.0460, 0.2764]
Log-likelihood value	llv	197.7900	[195.5700, 201.0700]	204.9400	[202.4200, 208.4500]	187.7900	[184.8500, 192.1700]

Note:

UK Bayesian regression results

3 Trend-Cycle Decompositon Graphs
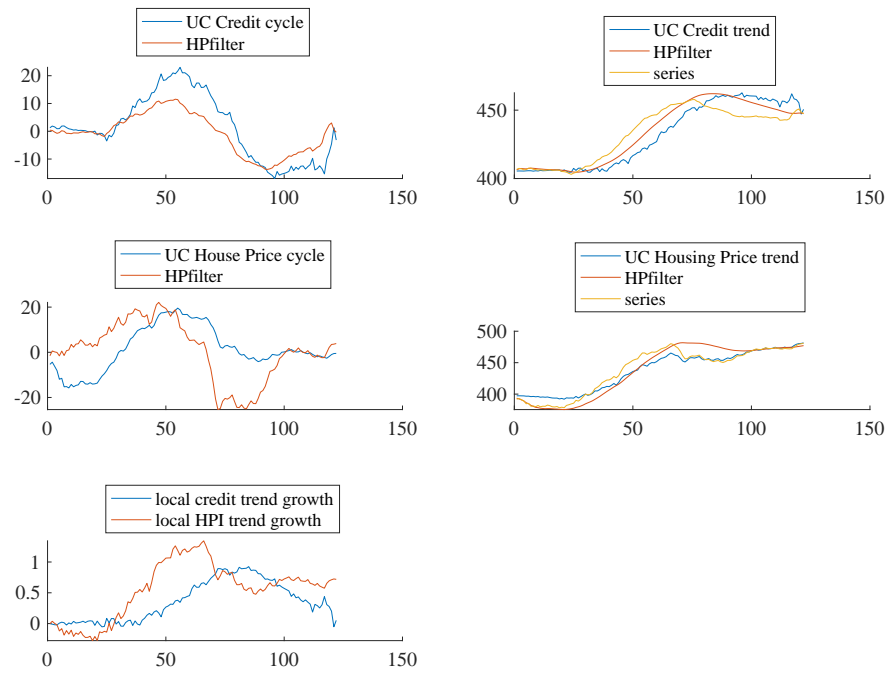
3.1 UK graphs
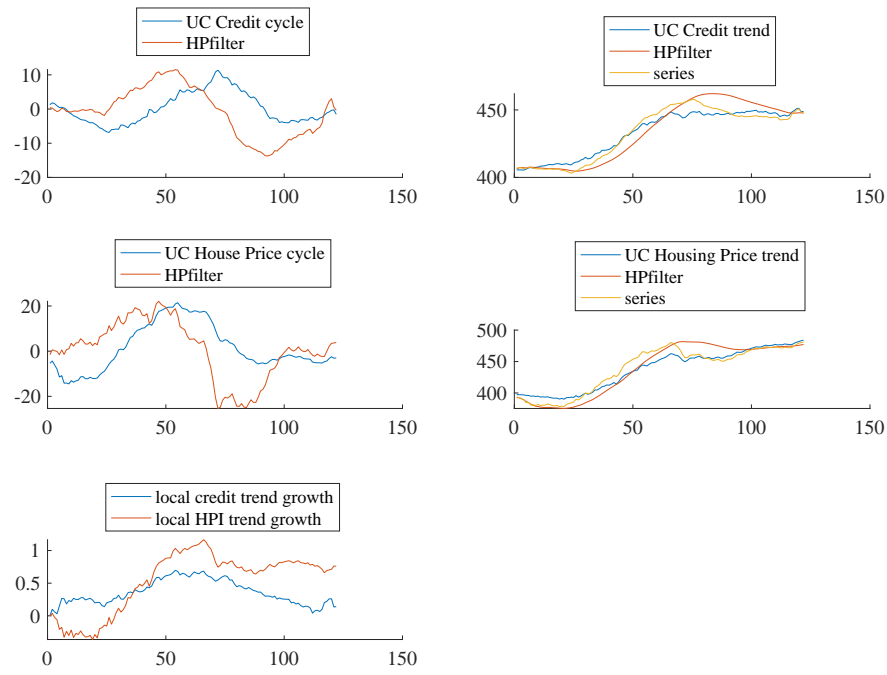

Figure 1: UK VAR(2)

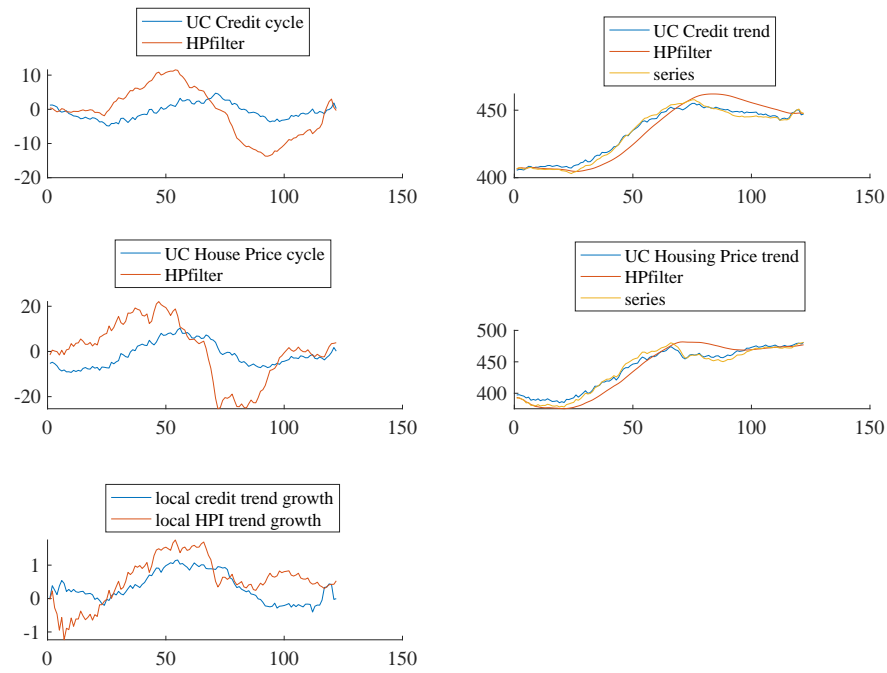Figure 2: UK VAR(2) 1 cross-lag

Figure 3: UK VAR(2) 2 cross-lags

3.2 US graphs
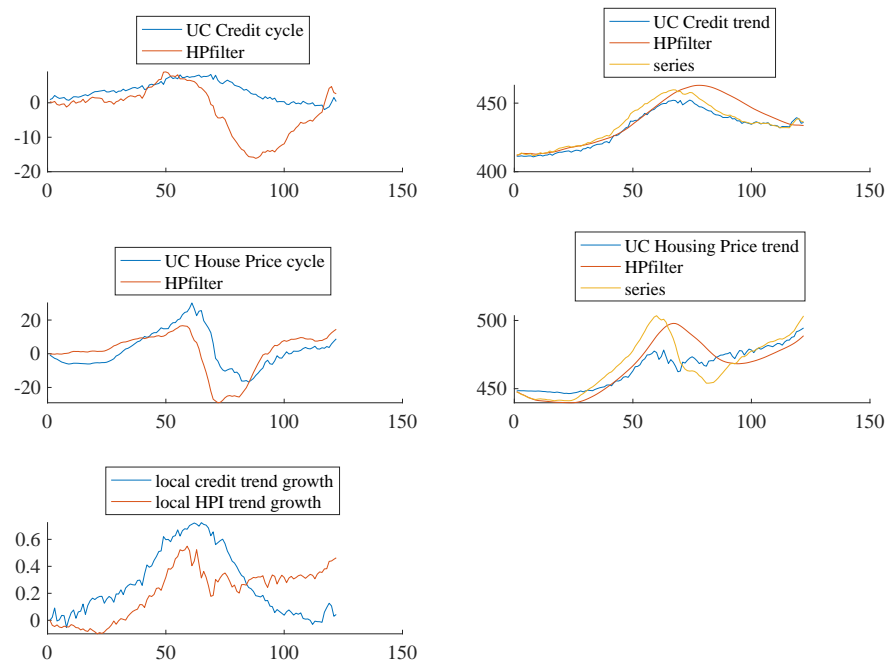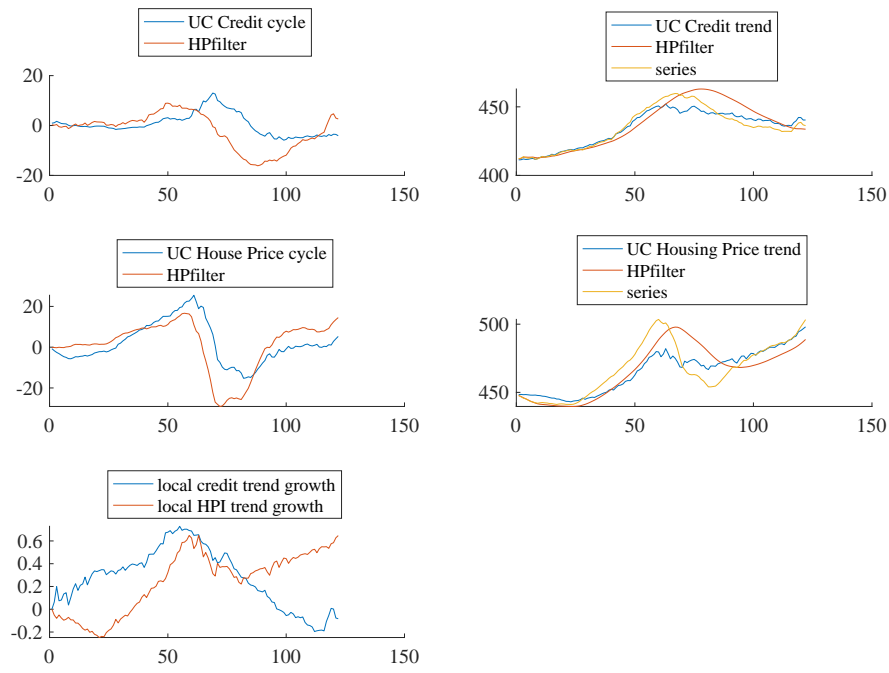

Figure 4: US VAR(2)

Figure 5: US VAR(2) 1 cross-lag
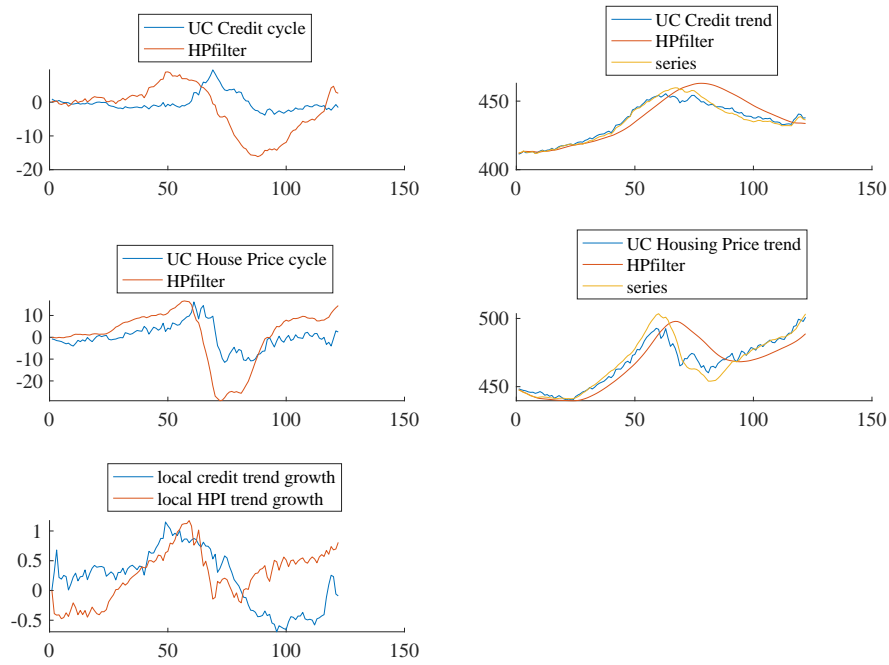

Figure 6: US VAR(2) 2 cross-lags

4 Posterior and Prior Distribution

4.1 UK Posterior and Prior Distribution

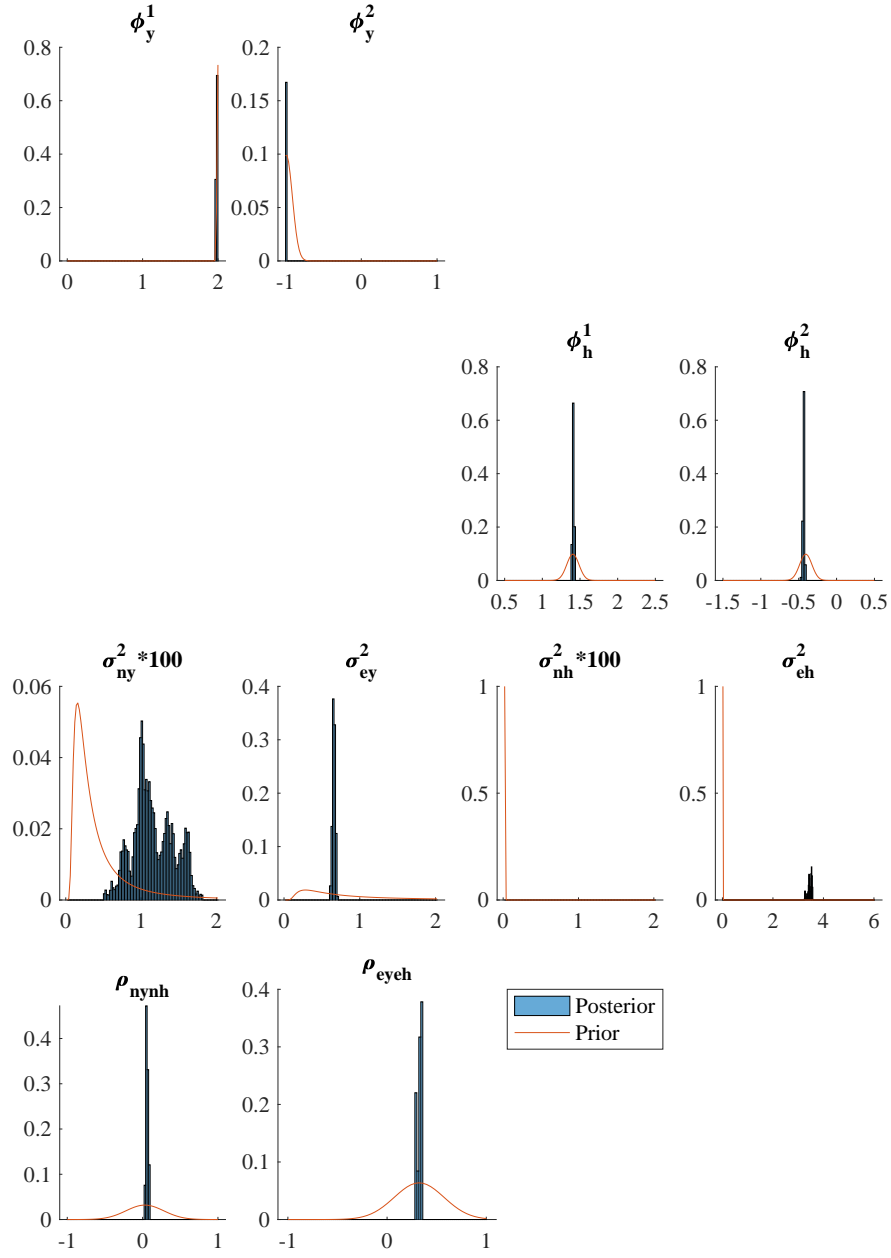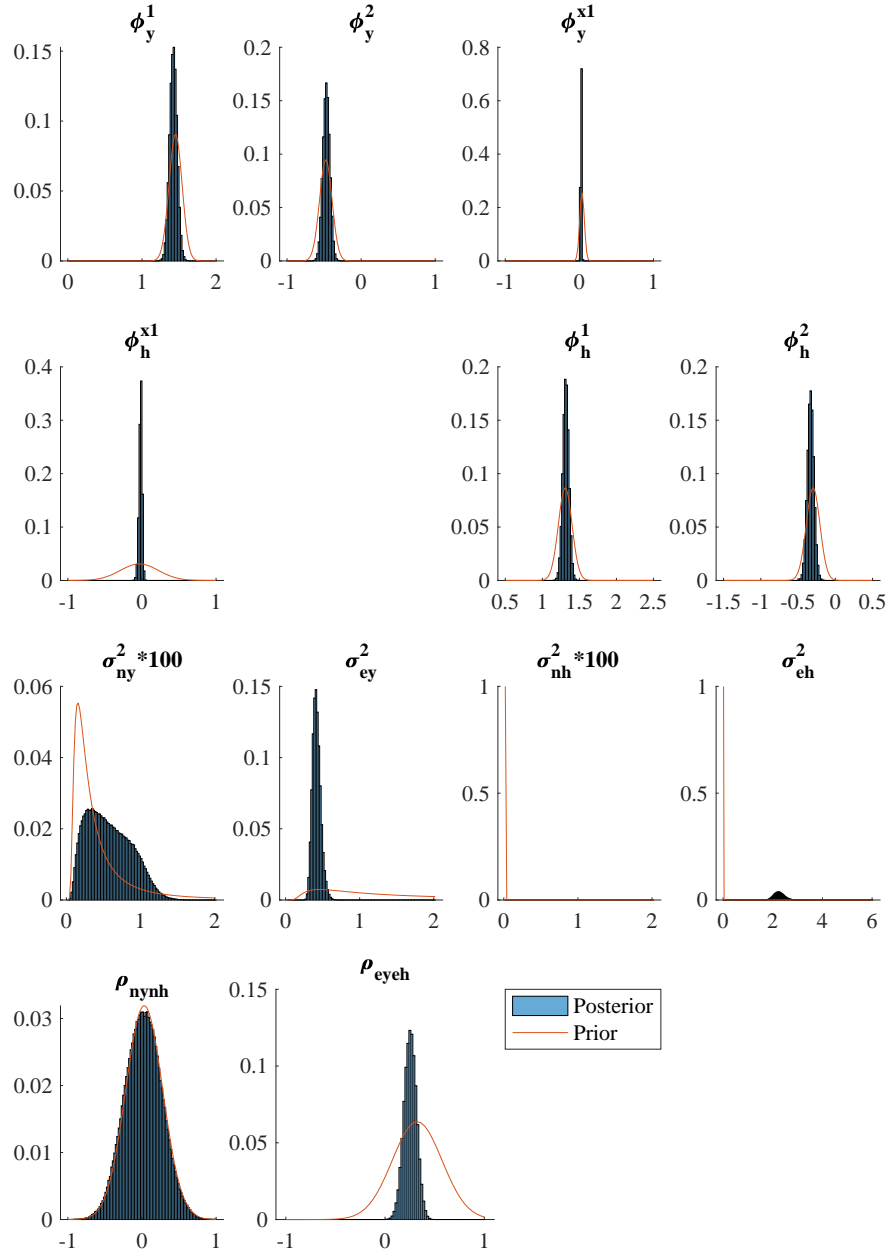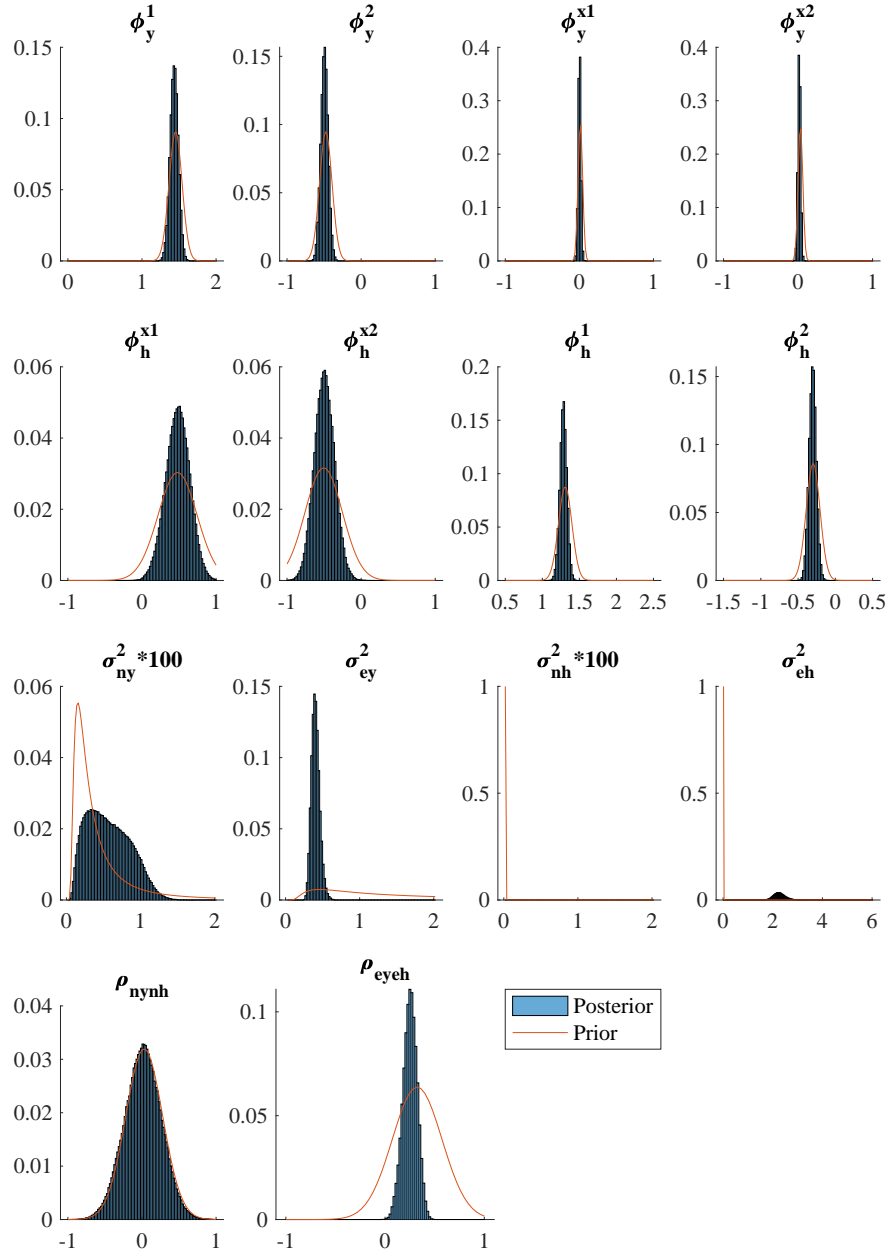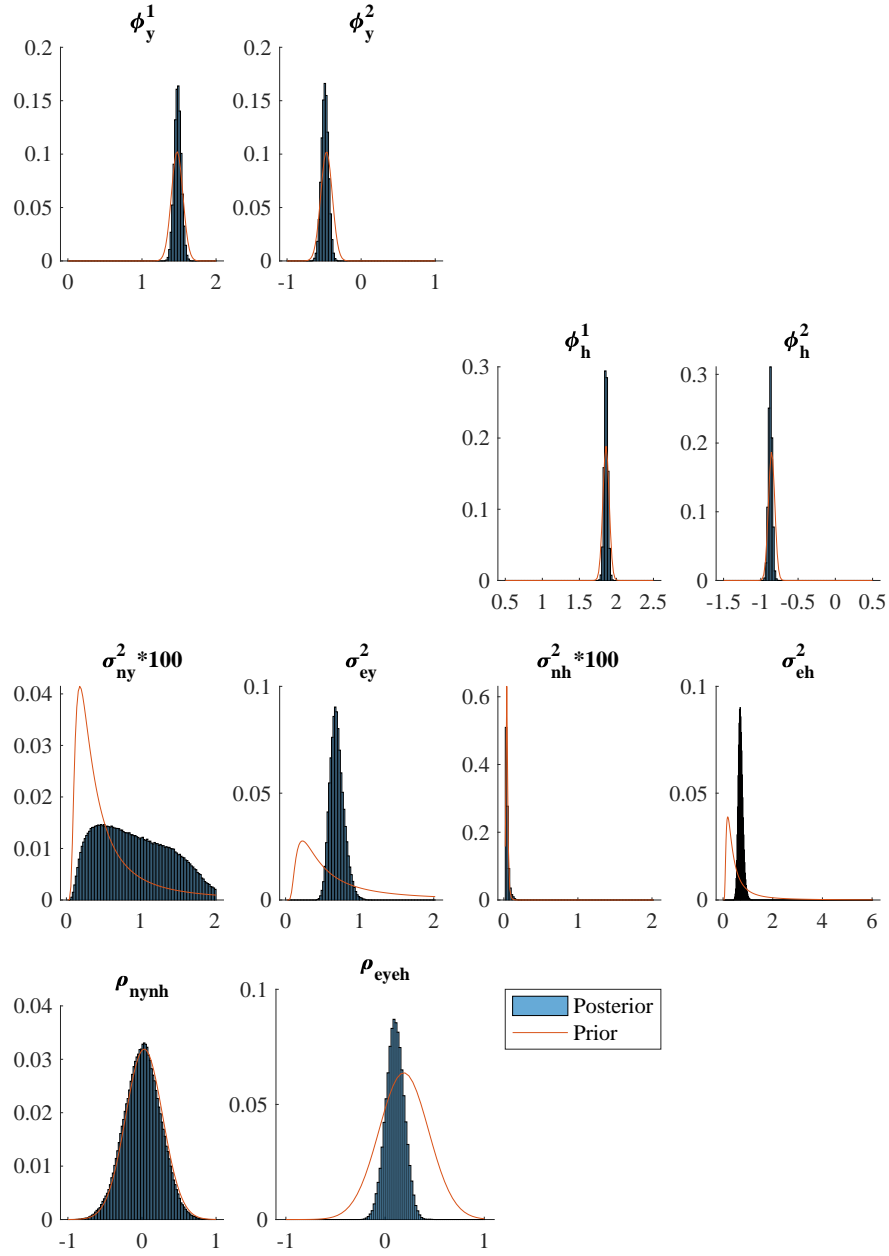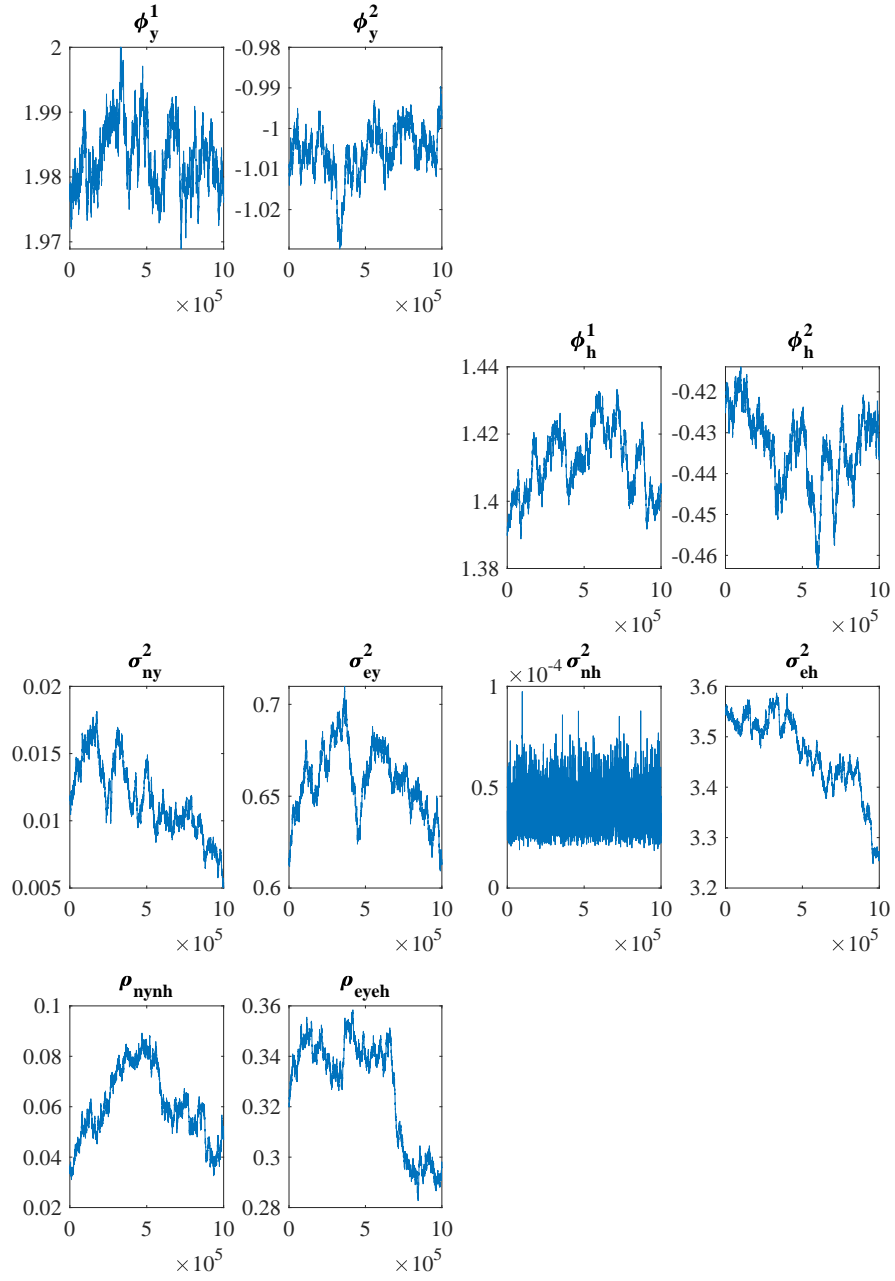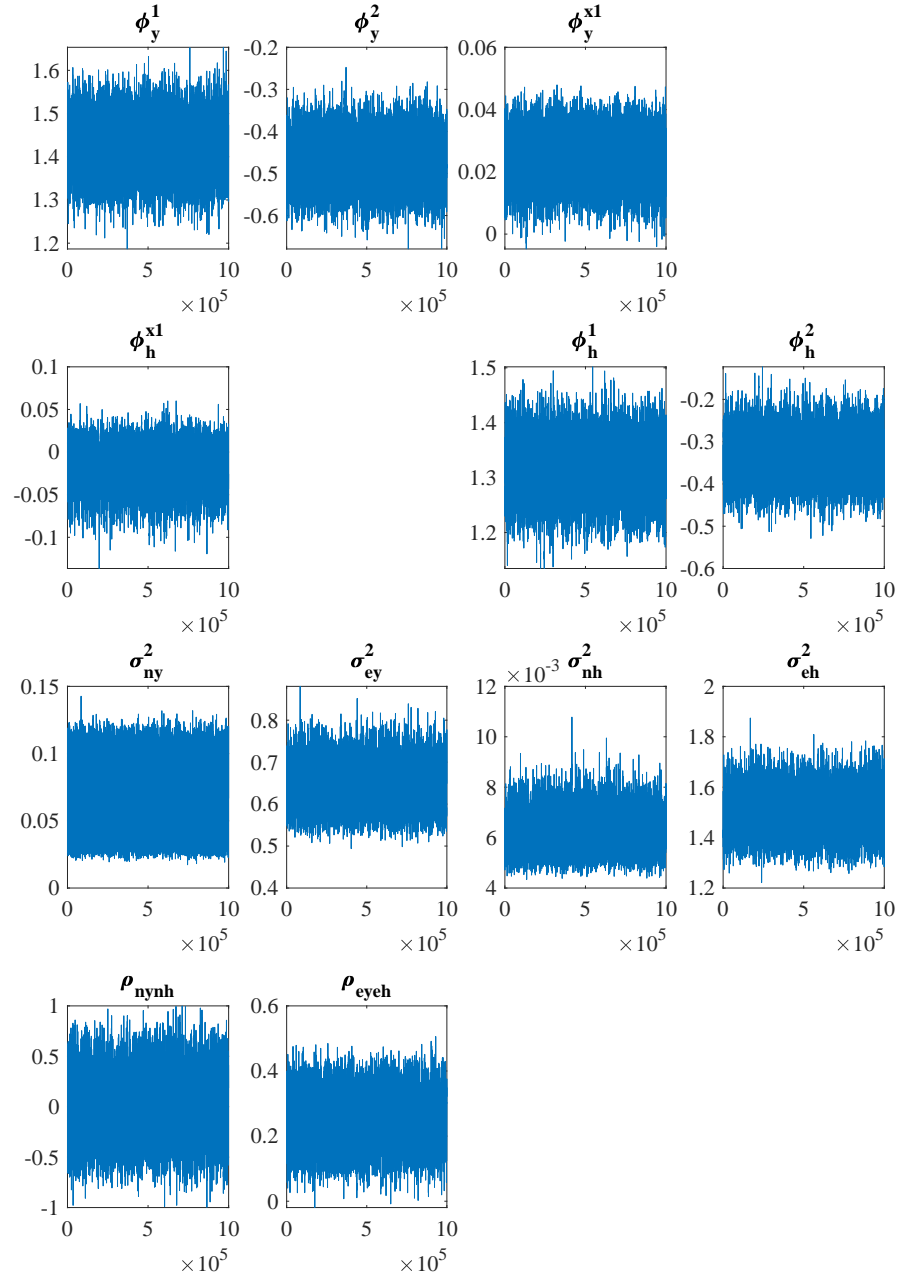Figure 7: UK VAR(2)

Figure 8: UK VAR(2) 1 cross-lag

Figure 9: UK VAR(2) 2 cross-lags

4.2 US Posterior and Prior Distribution

Figure 10: US VAR(2)
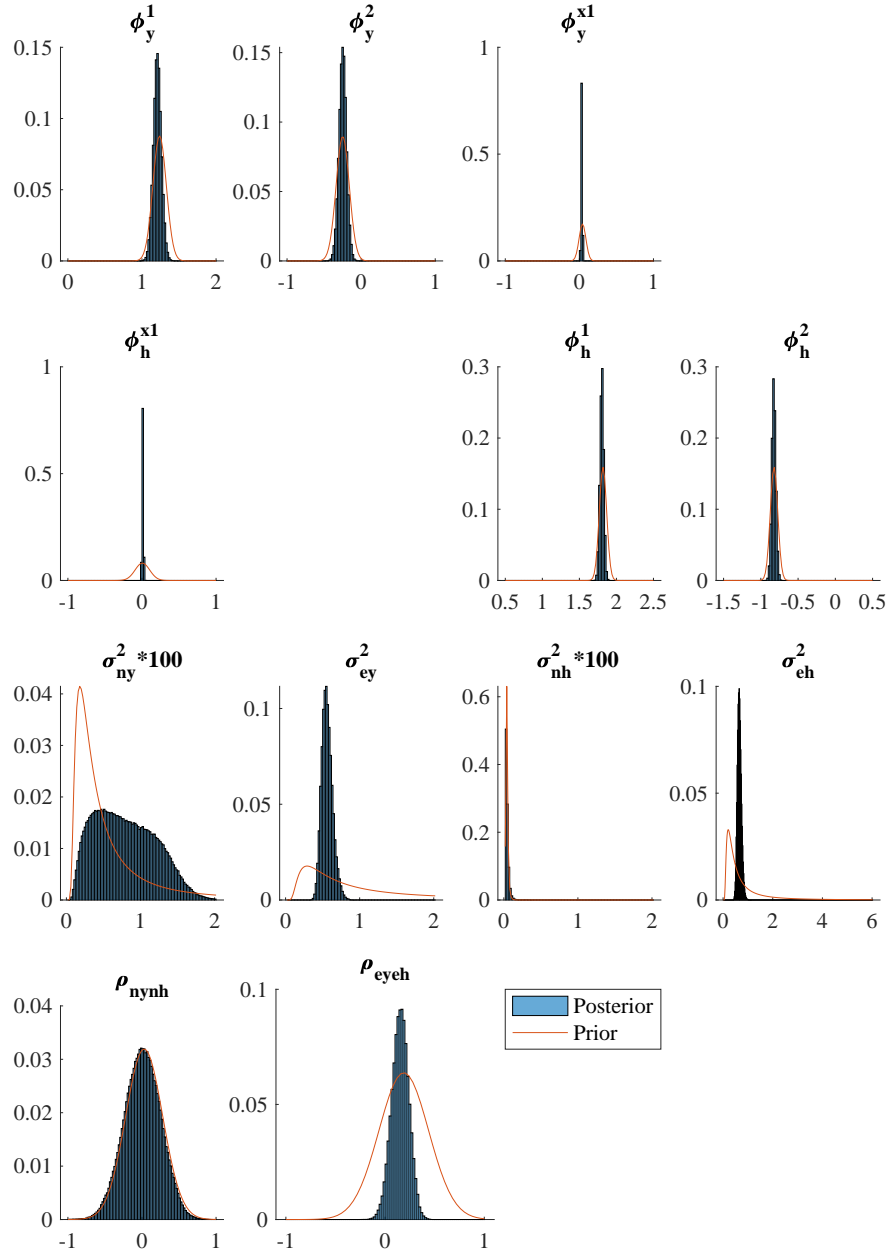
Figure 11: US VAR(2) 1 cross-lag
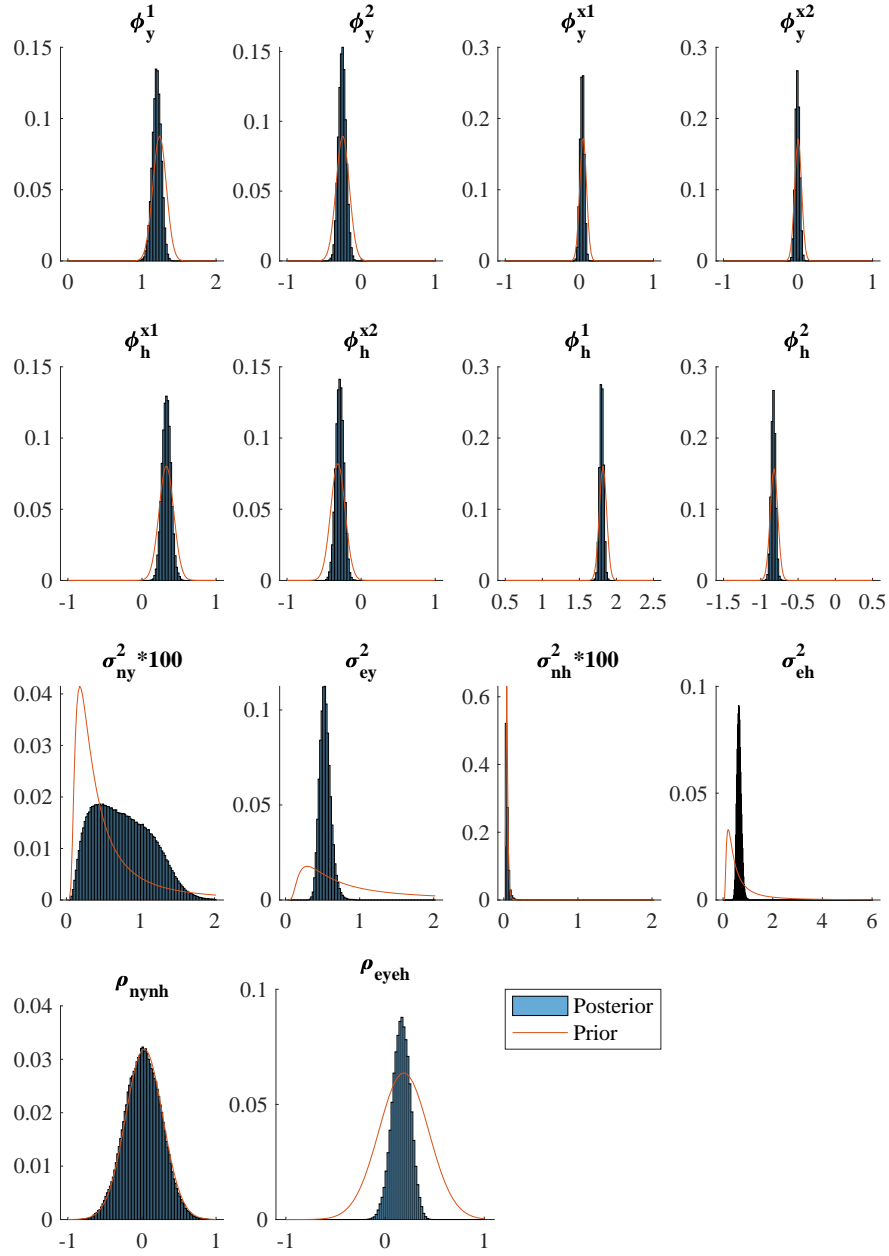
Figure 12: US VAR(2) 2 cross-lags

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5   Posterior chain

5.1   UK Posterior chain
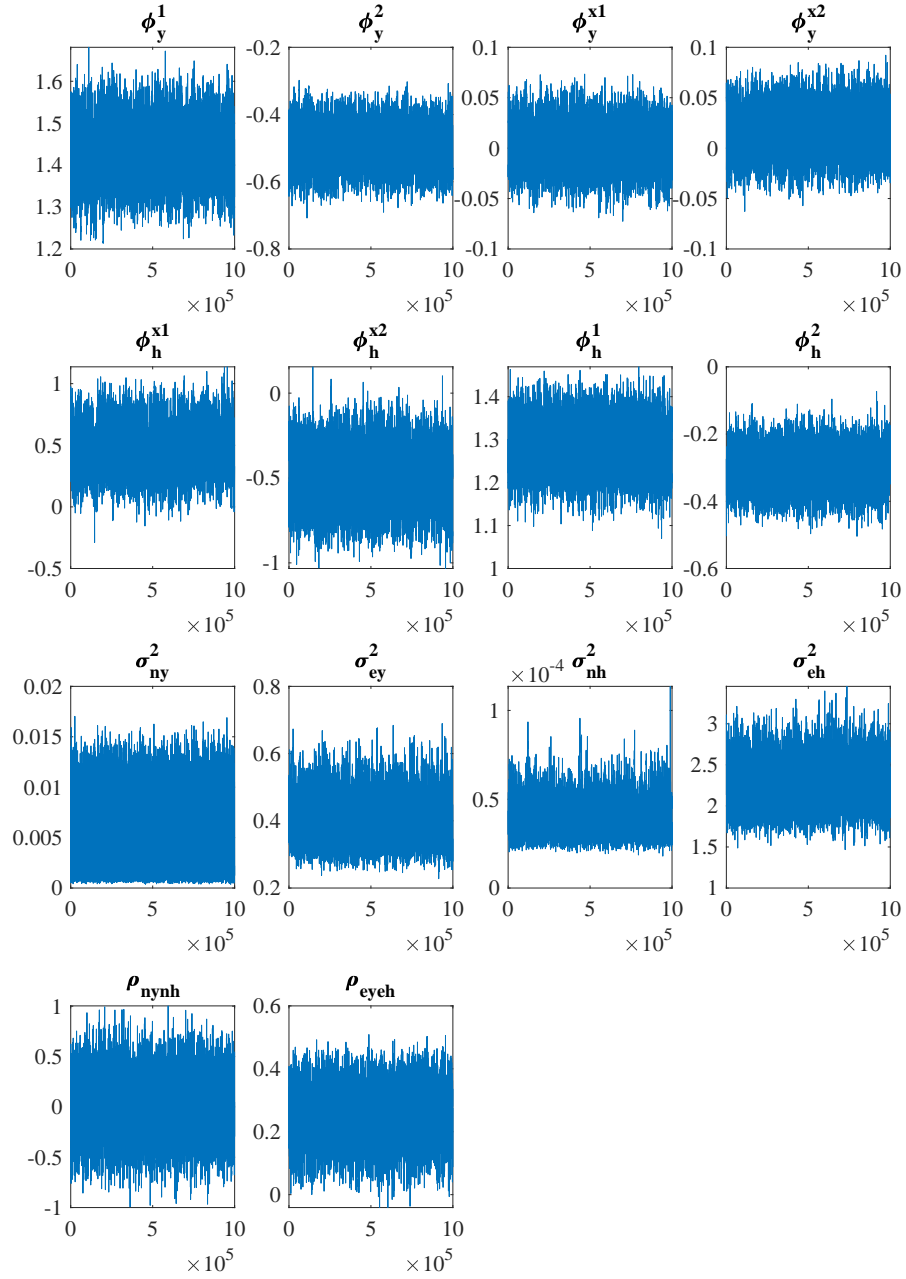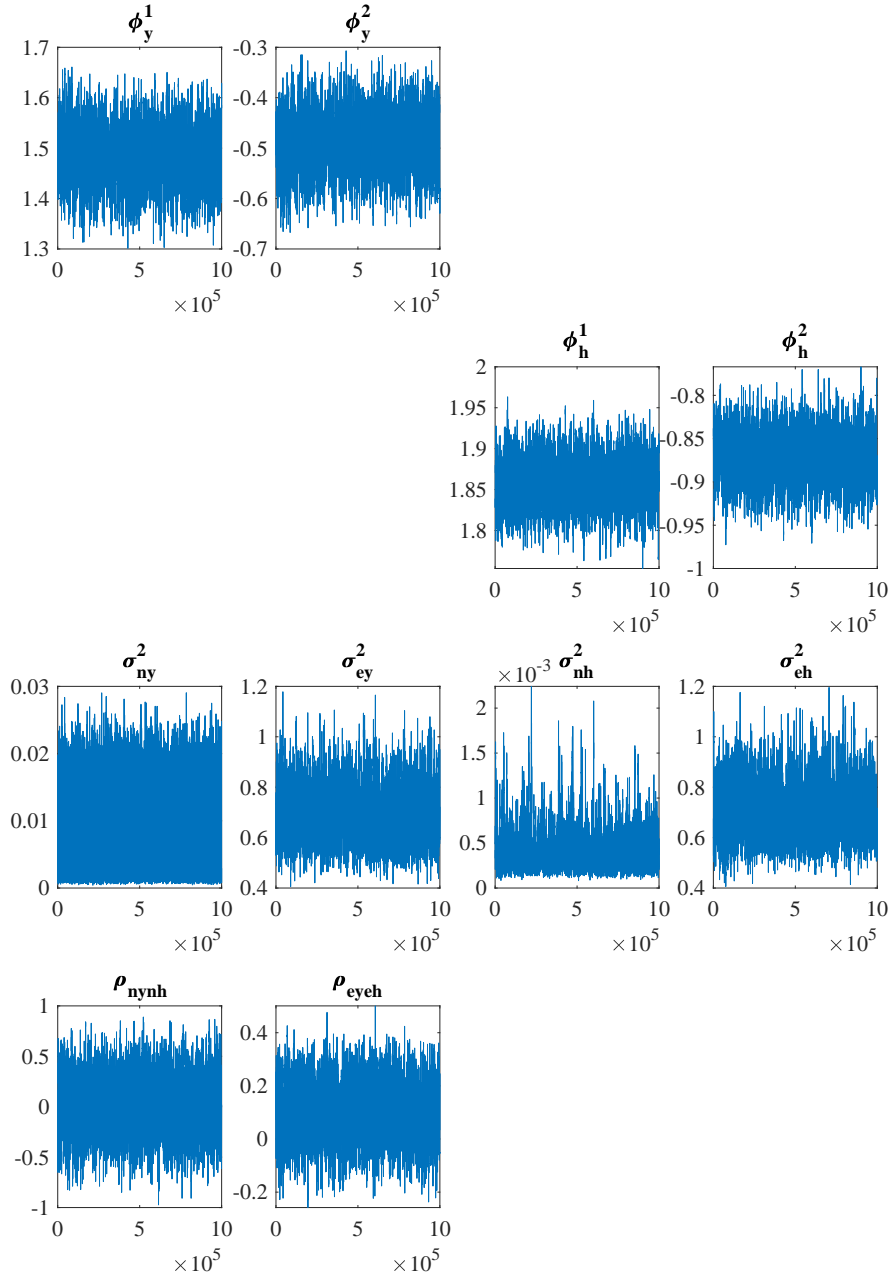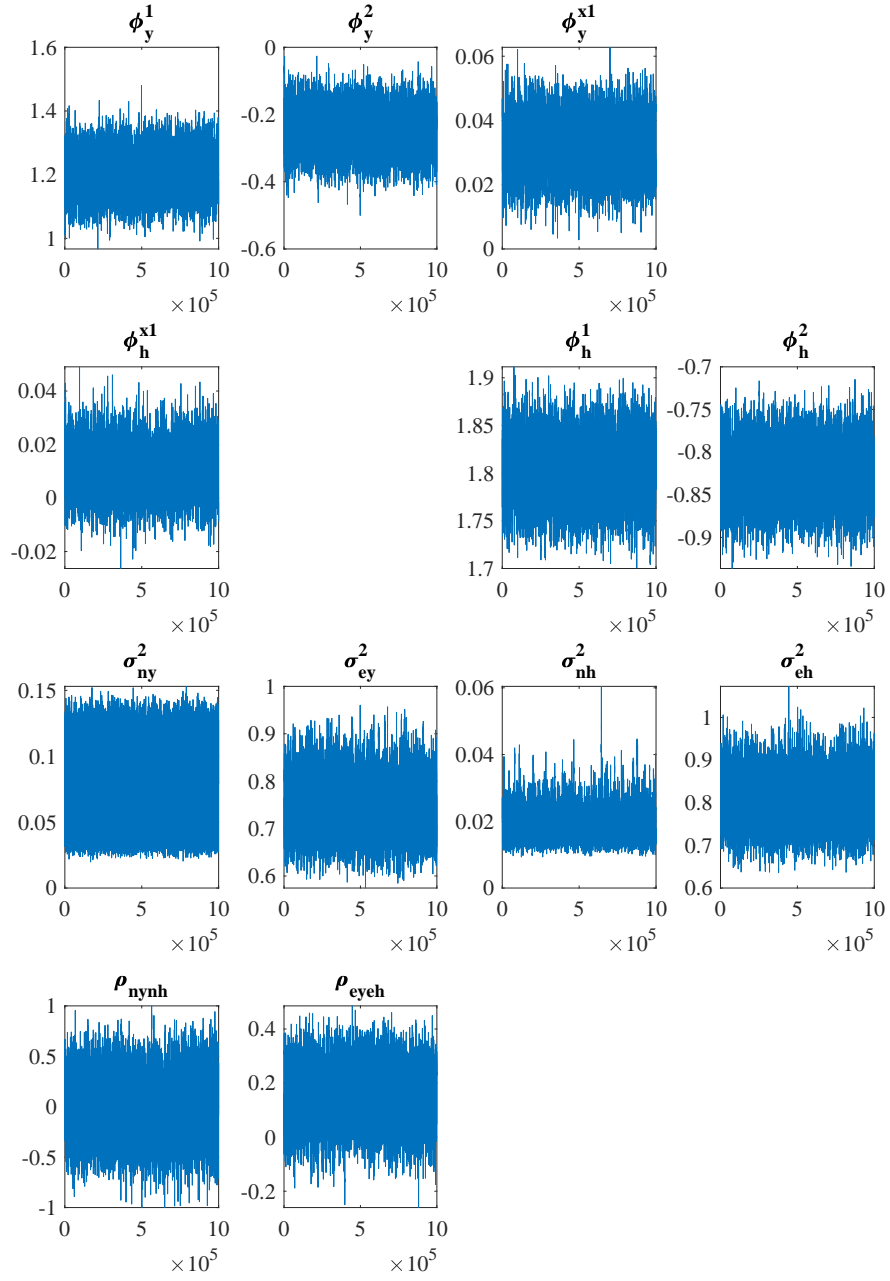
Figure 13: UK VAR(2)

Figure 14: UK VAR(2) 1 cross-lag

Figure 15: UK VAR(2) 2 cross-lags
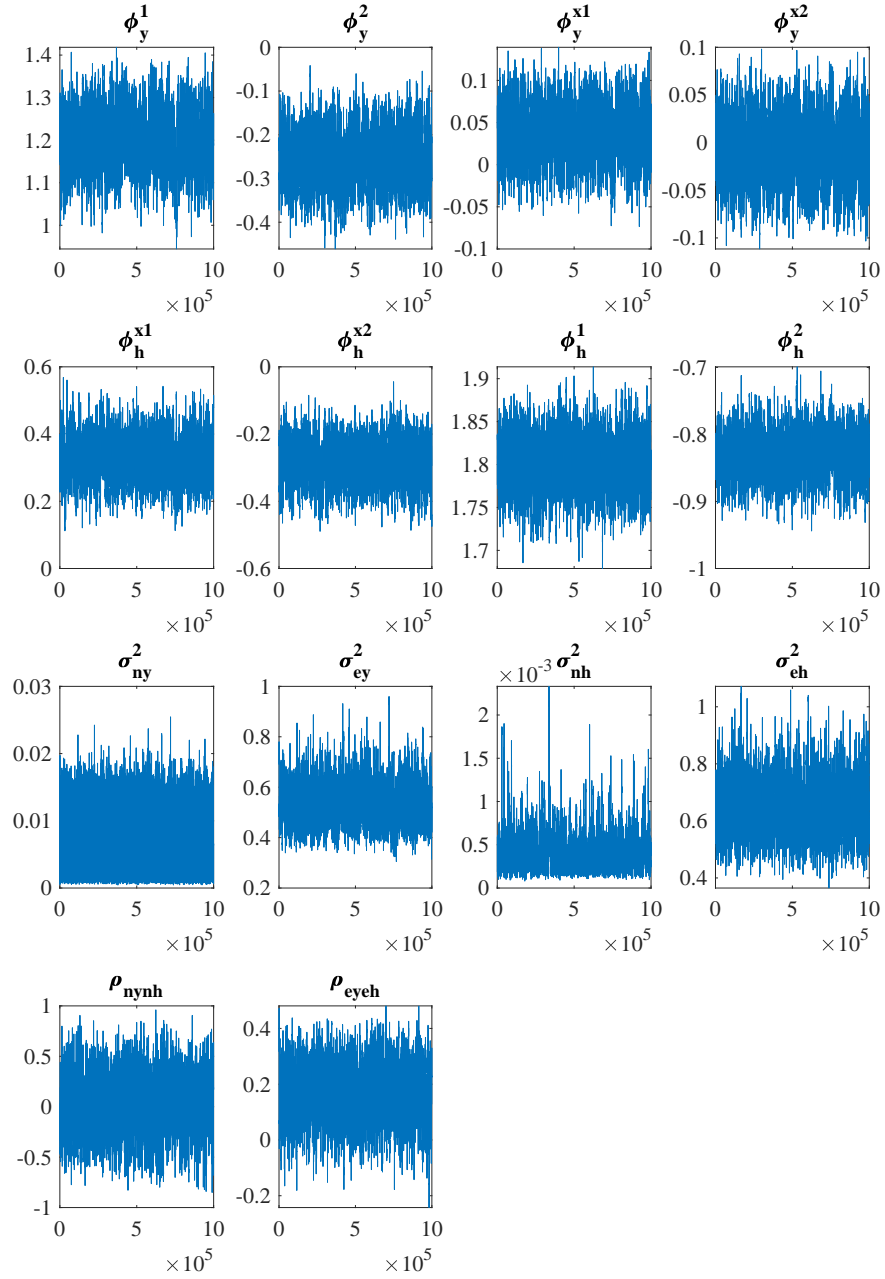
5.2   US Posterior chain

Figure 16: US VAR(2)

Figure 17: US VAR(2) 1 cross-lag

Figure 18: US VAR(2) 2 cross-lags