

Supplementary Materials

In this section, we will introduce the detailed parameters of all eight VAR models. Specifically, based on Equation 4 described in section 2.4, the VAR model for the RES index and the housing price index comprises two polynomial equations. Below, we provide the details of each VAR model for Beijing, Shanghai, Guangzhou, and Shenzhen, including the fitting coefficients, residuals, and their statistical features.

S1. $nV^{Beijing}$

$nV^{Beijing}$ is the VAR model for the RES index, $RES^{Beijing}$, and the new housing price index in Beijing, $nP^{Beijing}$. The lag period is 2, the details are shown in Table S1–S3.

Table S1. The fitting coefficients of $RES^{Beijing}$ in $nV^{Beijing}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	0.002703	0.01944	0.139	0.889
L1. $RES^{Beijing}$	-0.50486	0.079588	-6.343	0
L1. $nP^{Beijing}$	0.05367	0.032265	1.663	0.096
L2. $RES^{Beijing}$	-0.28603	0.077957	-3.669	0
L2. $nP^{Beijing}$	-0.03709	0.032111	-1.155	0.248

Table S2. The fitting coefficients of $nP^{Beijing}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	0.002703	0.01944	0.139	0.889
L1. $RES^{Beijing}$	-0.50486	0.079588	-6.343	0
L1. $nP^{Beijing}$	0.05367	0.032265	1.663	0.096
L2. $RES^{Beijing}$	-0.28603	0.077957	-3.669	0
L2. $nP^{Beijing}$	-0.03709	0.032111	-1.155	0.248

Table S3. Correlation matrix of residuals in $nV^{Beijing}$.

	$RES^{Beijing}$	$nP^{Beijing}$
$RES^{Beijing}$	1	0.087977
$nP^{Beijing}$	0.087977	1

S2. $sV^{Beijing}$

$sV^{Beijing}$ is the VAR model for the RES index, $RES^{Beijing}$, and the second-hand housing price index in Beijing, $sP^{Beijing}$. The lag period is 4, the details are shown in Table S4–6.

Table S4. The fitting coefficients of $RES^{Beijing}$ in $sV^{Beijing}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	0.007059	0.018934	0.373	0.709
L1. $RES^{Beijing}$	-0.66455	0.088592	-7.501	0
L1. $sP^{Beijing}$	0.06633	0.025481	2.603	0.009
L2. $RES^{Beijing}$	-0.53483	0.105623	-5.064	0
L2. $sP^{Beijing}$	0.035367	0.025345	1.395	0.163
L3. $RES^{Beijing}$	-0.28711	0.102405	-2.804	0.005
L3. $sP^{Beijing}$	-0.01512	0.025431	-0.595	0.552
L4. $RES^{Beijing}$	-0.10197	0.083558	-1.22	0.222
L4. $sP^{Beijing}$	0.027238	0.025018	1.089	0.276

Table S5. The fitting coefficients of $sP^{Beijing}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	-0.002	0.064861	-0.031	0.975
L1. $RES^{Beijing}$	0.726291	0.303491	2.393	0.017
L1. $sP^{Beijing}$	-0.12035	0.087292	-1.379	0.168
L2. $RES^{Beijing}$	0.686163	0.361835	1.896	0.058
L2. $sP^{Beijing}$	-0.36533	0.086826	-4.208	0
L3. $RES^{Beijing}$	0.529412	0.350811	1.509	0.131
L3. $sP^{Beijing}$	-0.28427	0.08712	-3.263	0.001
L4. $RES^{Beijing}$	0.533423	0.286247	1.864	0.062
L4. $sP^{Beijing}$	-0.21367	0.085705	-2.493	0.013

Table S6. Correlation matrix of residuals in $sV^{Beijing}$.

	$RES^{Beijing}$	$sP^{Beijing}$
$RES^{Beijing}$	1	0.250229
$sP^{Beijing}$	0.250229	1

S3. $nV^{Shanghai}$

$nV^{Shanghai}$ is the VAR model for the RES index, $RES^{Shanghai}$, and the new housing price index in Shanghai, $nP^{Shanghai}$. Its lag period is 1, the details are shown in Table S7-9.

Table S7. The fitting coefficients of $RES^{Shanghai}$ in $nV^{Shanghai}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	-7.14267	2.169987	-3.292	0.001
L1. $RES^{Shanghai}$	0.576646	0.069835	8.257	0
L1. $nP^{Shanghai}$	0.071356	0.021612	3.302	0.001

Table S8. The fitting coefficients of $nP^{Shanghai}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	25.20038	5.541015	4.548	0
L1. $RES^{Shanghai}$	0.479697	0.178321	2.69	0.007
L1. $nP^{Shanghai}$	0.748949	0.055185	13.572	0

Table S9. Correlation matrix of residuals in $nV^{Shanghai}$.

	$RES^{Shanghai}$	$nP^{Shanghai}$
$RES^{Shanghai}$	1	0.118054
$nP^{Shanghai}$	0.118054	1

S4. $sV^{Shanghai}$

$sV^{Shanghai}$ is the VAR model for the RES index, $RES^{Shanghai}$, and the second-hand housing price index in Shanghai, $sP^{Shanghai}$. Its lag period is 3, the details are shown in Table S10-12.

Table S10. The fitting coefficients of $RES^{Shanghai}$ in $sV^{Shanghai}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	-3.21102	2.856298	-1.124	0.261
L1. $RES^{Shanghai}$	0.598352	0.086956	6.881	0

L1. $sP^{Shanghai}$	0.066637	0.032714	2.037	0.042
L2. $RES^{Shanghai}$	-0.03785	0.100776	-0.376	0.707
L2. $sP^{Shanghai}$	-0.05732	0.042523	-1.348	0.178
L3. $RES^{Shanghai}$	0.148062	0.088045	1.682	0.093
L3. $sP^{Shanghai}$	0.022897	0.032315	0.709	0.479

Table S11. The fitting coefficients of $sP^{Shanghai}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	31.34588	7.613211	4.117	0
L1. $RES^{Shanghai}$	0.427152	0.231775	1.843	0.065
L1. $sP^{Shanghai}$	0.933872	0.087196	10.71	0
L2. $RES^{Shanghai}$	0.417809	0.268611	1.555	0.12
L2. $sP^{Shanghai}$	-0.38044	0.11334	-3.357	0.001
L3. $RES^{Shanghai}$	-0.39154	0.234675	-1.668	0.095
L3. $sP^{Shanghai}$	0.134214	0.086131	1.558	0.119

Table S12. Correlation matrix of residuals in $sV^{Shanghai}$.

	$RES^{Shanghai}$	$sP^{Shanghai}$
$RES^{Shanghai}$	1	0.232721
$sP^{Shanghai}$	0.23272	1

S5. $nV^{Guangzhou}$

$nV^{Guangzhou}$ is the VAR model for the RES index, $RES^{Guangzhou}$, and the new housing price index in Shanghai, $nP^{Guangzhou}$. Its lag period is 2, the details are shown in Table S13–15.

Table S13. The fitting coefficients of $RES^{Guangzhou}$ in $nV^{Guangzhou}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	-10.2451	3.610886	-2.837	0.005
L1. $RES^{Guangzhou}$	0.166562	0.084932	1.961	0.05
L1. $nP^{Guangzhou}$	0.140166	0.044733	3.133	0.002
L2. $RES^{Guangzhou}$	0.182661	0.084589	2.159	0.031
L2. $nP^{Guangzhou}$	-0.03753	0.044664	-0.84	0.401

Table S14. The fitting coefficients of $nP^{Guangzhou}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	33.03357	6.885445	4.798	0
L1. $RES^{Guangzhou}$	0.220506	0.161954	1.362	0.173
L1. $nP^{Guangzhou}$	0.734553	0.085299	8.612	0
L2. $RES^{Guangzhou}$	0.369687	0.161299	2.292	0.022
L2. $nP^{Guangzhou}$	-0.06386	0.085168	-0.75	0.453

Table S15. Correlation matrix of residuals in $nV^{Guangzhou}$.

	$RES^{Guangzhou}$	$nP^{Guangzhou}$
$RES^{Guangzhou}$	1	0.180492
$nP^{Guangzhou}$	0.180492	1

S6. $sV^{Guangzhou}$

$sV^{Guangzhou}$ is the VAR model for the RES index, $RES^{Guangzhou}$, and the second-hand housing price index in Shanghai, $sP^{Guangzhou}$. Its lag period is 7, the details are shown in Table S16–18.

Table S16. The fitting coefficients of $RES^{Guangzhou}$ in $sV^{Guangzhou}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	2.284016	4.684548	0.488	0.626
L1. $RES^{Guangzhou}$	0.133616	0.088421	1.511	0.131
L1. $sP^{Guangzhou}$	0.168455	0.050661	3.325	0.001
L2. $RES^{Guangzhou}$	0.17112	0.088764	1.928	0.054
L2. $sP^{Guangzhou}$	-0.06768	0.066751	-1.014	0.311
L3. $RES^{Guangzhou}$	0.111977	0.089644	1.249	0.212
L3. $sP^{Guangzhou}$	-0.03359	0.06397	-0.525	0.599
L4. $RES^{Guangzhou}$	-0.03157	0.089639	-0.352	0.725
L4. $sP^{Guangzhou}$	0.061186	0.061071	1.002	0.316
L5. $RES^{Guangzhou}$	0.020405	0.089369	0.228	0.819
L5. $sP^{Guangzhou}$	-0.03711	0.059412	-0.625	0.532
L6. $RES^{Guangzhou}$	-0.02612	0.087385	-0.299	0.765
L6. $sP^{Guangzhou}$	-0.04108	0.060626	-0.678	0.498
L7. $RES^{Guangzhou}$	0.28497	0.086314	3.302	0.001
L7. $sP^{Guangzhou}$	-0.07251	0.048295	-1.501	0.133

Table S17. The fitting coefficients of $sP^{Guangzhou}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	25.84334	8.444784	3.06	0.002
L1. $RES^{Guangzhou}$	-0.01186	0.159396	-0.074	0.941
L1. $sP^{Guangzhou}$	0.886725	0.091325	9.71	0
L2. $RES^{Guangzhou}$	0.240651	0.160015	1.504	0.133
L2. $sP^{Guangzhou}$	-0.24838	0.120332	-2.064	0.039
L3. $RES^{Guangzhou}$	0.035921	0.161601	0.222	0.824
L3. $sP^{Guangzhou}$	0.116058	0.115319	1.006	0.314
L4. $RES^{Guangzhou}$	0.137167	0.161591	0.849	0.396
L4. $sP^{Guangzhou}$	-0.16506	0.110091	-1.499	0.134
L5. $RES^{Guangzhou}$	0.112827	0.161104	0.7	0.484
L5. $sP^{Guangzhou}$	0.261083	0.107101	2.438	0.015
L6. $RES^{Guangzhou}$	-0.1772	0.157529	-1.125	0.261
L6. $sP^{Guangzhou}$	0.079982	0.10929	0.732	0.464
L7. $RES^{Guangzhou}$	0.085707	0.155597	0.551	0.582
L7. $sP^{Guangzhou}$	-0.1881	0.08706	-2.161	0.031

Table S18. Correlation matrix of residuals in $sV^{Guangzhou}$.

	$RES^{Guangzhou}$	$sP^{Guangzhou}$
$RES^{Guangzhou}$	1	0.217395
$sP^{Guangzhou}$	0.217395	1

S7. $nV^{Shenzhen}$

$nV^{Shenzhen}$ is the VAR model for the RES index, $RES^{Shenzhen}$, and the new housing price index in Shanghai, $nP^{Shenzhen}$. Its lag period is 4, the details are shown in Table S19–21.

Table S19. The fitting coefficients of $RES^{Shenzhen}$ in $nV^{Shenzhen}$.

	Coefficient	Standard Error	T-statistic	P-value
intercept	-0.0011	0.03265	-0.034	0.973
L1. $RES^{Shenzhen}$	-0.54671	0.089375	-6.117	0
L1. $nP^{Shenzhen}$	-0.00149	0.04542	-0.033	0.974
L2. $RES^{Shenzhen}$	-0.41613	0.097893	-4.251	0
L2. $nP^{Shenzhen}$	0.014944	0.044689	0.334	0.738
L3. $RES^{Shenzhen}$	-0.24602	0.097572	-2.521	0.012
L3. $nP^{Shenzhen}$	0.067625	0.044358	1.525	0.127
L4. $RES^{Shenzhen}$	-0.09477	0.087914	-1.078	0.281
L4. $nP^{Shenzhen}$	0.032728	0.044819	0.73	0.465

Table S20. The fitting coefficients of $nP^{Shenzhen}$.

	Coefficient	Standard Error	T-statistic	P-value
intercept	-0.01112	0.061583	-0.18	0.857
L1. $RES^{Shenzhen}$	-0.03003	0.168578	-0.178	0.859
L1. $nP^{Shenzhen}$	0.000907	0.085671	0.011	0.992
L2. $RES^{Shenzhen}$	0.086817	0.184646	0.47	0.638
L2. $nP^{Shenzhen}$	-0.02283	0.084292	-0.271	0.787
L3. $RES^{Shenzhen}$	0.212076	0.184041	1.152	0.249
L3. $nP^{Shenzhen}$	-0.09785	0.083668	-1.169	0.242
L4. $RES^{Shenzhen}$	0.23222	0.165822	1.4	0.161
L4. $nP^{Shenzhen}$	-0.297	0.084537	-3.513	0

Table S21. Correlation matrix of residuals in $nV^{Shenzhen}$.

	$RES^{Shenzhen}$	$nP^{Shenzhen}$
$RES^{Shenzhen}$	1	0.217395
$nP^{Shenzhen}$	0.217395	1

S8. $sV^{Shenzhen}$

$sV^{Shenzhen}$ is the VAR model for the RES index, $RES^{Shenzhen}$, and the new housing price index in Shanghai, $sP^{Shenzhen}$. Its lag period is 8, the details are shown in Table S22-24.

Table S22. The fitting coefficients of $RES^{Shenzhen}$ in $sV^{Shenzhen}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	0.003168	0.032978	0.096	0.923
L1. $RES^{Shenzhen}$	-0.60898	0.093195	-6.534	0
L1. $sP^{Shenzhen}$	0.070961	0.044083	1.61	0.107
L2. $RES^{Shenzhen}$	-0.48594	0.109147	-4.452	0
L2. $sP^{Shenzhen}$	0.05353	0.045472	1.177	0.239
L3. $RES^{Shenzhen}$	-0.35981	0.118684	-3.032	0.002
L3. $sP^{Shenzhen}$	0.126379	0.044978	2.81	0.005
L4. $RES^{Shenzhen}$	-0.20603	0.122908	-1.676	0.094
L4. $sP^{Shenzhen}$	0.100954	0.045924	2.198	0.028
L5. $RES^{Shenzhen}$	-0.08691	0.120358	-0.722	0.47
L5. $sP^{Shenzhen}$	0.033588	0.046481	0.723	0.47
L6. $RES^{Shenzhen}$	-0.07301	0.112593	-0.648	0.517
L6. $sP^{Shenzhen}$	0.098473	0.045537	2.162	0.031

$L7.RES^{Shenzhen}$	-0.13032	0.104944	-1.242	0.214
$L7.sP^{Shenzhen}$	0.098689	0.044791	2.203	0.028
$L8.RES^{Shenzhen}$	-0.07574	0.090048	-0.841	0.4
$L8.sP^{Shenzhen}$	0.054713	0.043685	1.252	0.21

Table S23. The fitting coefficients of $sP^{Shenzhen}$.

	Coefficient	Standard Error	T-statistic	P-value
Intercept	-0.00068	0.068414	-0.01	0.992
$L1.RES^{Shenzhen}$	0.217613	0.193337	1.126	0.26
$L1.sP^{Shenzhen}$	-0.19917	0.091452	-2.178	0.029
$L2.RES^{Shenzhen}$	0.395174	0.226429	1.745	0.081
$L2.sP^{Shenzhen}$	-0.04536	0.094334	-0.481	0.631
$L3.RES^{Shenzhen}$	0.159624	0.246213	0.648	0.517
$L3.sP^{Shenzhen}$	-0.24031	0.093308	-2.575	0.01
$L4.RES^{Shenzhen}$	0.054783	0.254977	0.215	0.83
$L4.sP^{Shenzhen}$	-0.21314	0.095271	-2.237	0.025
$L5.RES^{Shenzhen}$	-0.06135	0.249686	-0.246	0.806
$L5.sP^{Shenzhen}$	-0.23369	0.096427	-2.424	0.015
$L6.RES^{Shenzhen}$	0.100958	0.233579	0.432	0.666
$L6.sP^{Shenzhen}$	0.159632	0.094468	1.69	0.091
$L7.RES^{Shenzhen}$	-0.25369	0.217709	-1.165	0.244
$L7.sP^{Shenzhen}$	0.177692	0.092922	1.912	0.056
$L8.RES^{Shenzhen}$	-0.49089	0.186808	-2.628	0.009
$L8.sP^{Shenzhen}$	0.085002	0.090627	0.938	0.348

Table S24. Correlation matrix of residuals in $sV^{Shenzhen}$.

	$RES^{Shenzhen}$	$sP^{Shenzhen}$
$RES^{Shenzhen}$	1	0.173561
$sP^{Shenzhen}$	0.173561	1