

Appendix

Appendix A Data

A1 Original sources of data

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Beijing1998	2169.836	5116.3	7.682407	8.540187
Beijing1999	2414.418	5613.32	7.789214	8.632898
Beijing2000	2827.37	4752.657	7.947102	8.466459
Beijing2001	3321.862	4909.796	8.108281	8.498988
Beijing2002	3883.767	4851.233	8.264561	8.486988
Beijing2003	4525.919	4726.153	8.417576	8.460867
Beijing2004	5311.376	5005.276	8.577606	8.518248
Beijing2005	6159.49	6691.033	8.725749	8.808524
Beijing2006	6977.199	8206.757	8.850403	9.012713
Beijing2007	8255.357	11281.88	9.018618	9.330954
Beijing2008	10187.9	11819.71	9.228956	9.377524
Beijing2009	11028.97	14015.07	9.308281	9.547888
Tianjin1998	1257.64	2337.845	7.136992	7.756985
Tianjin1999	1364.5	2276.036	7.218543	7.730191
Tianjin2000	1535.993	2337.349	7.336932	7.756773
Tianjin2001	1713.473	2346.838	7.446278	7.760824
Tianjin2002	1908.394	2497.251	7.554017	7.822946
Tianjin2003	2245.671	2492.405	7.71676	7.821004

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Tianjin2004	2686.503	3045.929	7.895995	8.021561
Tianjin2005	3223.731	3992.872	8.078295	8.292266
Tianjin2006	3807.118	4702.437	8.244628	8.455836
Tianjin2007	4384.028	5576.069	8.385723	8.626239
Tianjin2008	5767.391	5706.637	8.659975	8.649385
Tianjin2009	6453.961	6953.786	8.772449	8.847041
Hebei1998	3844.634	1423.753	8.254434	7.261052
Hebei1999	4137.663	1378.186	8.327886	7.228523
Hebei2000	4606.356	1452.357	8.435192	7.280943
Hebei2001	5075.216	1455.721	8.532124	7.283257
Hebei2002	5491.131	1518.676	8.61089	7.325594
Hebei2003	6201.873	1431.863	8.732607	7.266731
Hebei2004	7508.973	1539.968	8.923854	7.339517
Hebei2005	8903.095	1829.129	9.094154	7.511595
Hebei2006	10282.57	2076.271	9.238205	7.638329
Hebei2007	12153.81	2470.178	9.405398	7.812045
Hebei2008	14543.12	2616.763	9.584873	7.869693
Hebei2009	15663.68	3285.291	9.6591	8.09721
Shanxi1998	1465.951	1002.808	7.290259	6.910559
Shanxi1999	1553.681	1031.124	7.348382	6.938405
Shanxi2000	1687.13	1076.035	7.430784	6.981038
Shanxi2001	1843.351	1351.703	7.519341	7.209121
Shanxi2002	2059.167	1458.168	7.630057	7.284936
Shanxi2003	2484.97	1582.145	7.818016	7.366537
Shanxi2004	3100.148	1731.545	8.039205	7.456769
Shanxi2005	3711.829	2160.214	8.21928	7.677962

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Shanxi2006	4250.93	1948.579	8.354893	7.574856
Shanxi2007	5011.67	2150.137	8.519524	7.673287
Shanxi2008	6742.304	2196.954	8.816157	7.694827
Shanxi2009	6981.32	2718.401	8.850993	7.907799
Inner Mongolia1998	1140.506	1009.444	7.039227	6.917155
Inner Mongolia1999	1267.748	1149.299	7.144998	7.046907
Inner Mongolia2000	1389.097	1121.422	7.23641	7.022352
Inner Mongolia2001	1548.157	1227.634	7.344821	7.112844
Inner Mongolia2002	1714.611	1253.197	7.446942	7.133453
Inner Mongolia2003	2025.768	1243.261	7.613704	7.125493
Inner Mongolia2004	2523.71	1360.666	7.833485	7.215729
Inner Mongolia2005	3146.648	1613.873	8.054093	7.386392
Inner Mongolia2006	4036.63	1785.036	8.303166	7.487194
Inner Mongolia2007	5114.291	2147.609	8.539794	7.67211
Inner Mongolia2008	7212.39	2348.166	8.883556	7.76139
Inner Mongolia2009	8332.121	2979.9	9.027873	7.999645
Liaoning1998	3584.211	1816.191	8.184294	7.504497
Liaoning1999	3855.545	1946.247	8.257268	7.573658
Liaoning2000	4287.511	2078.078	8.363462	7.639199
Liaoning2001	4617.505	2126	8.43761	7.661998
Liaoning2002	4953.013	2163.191	8.507751	7.67934
Liaoning2003	5383.444	2253.019	8.591084	7.720026
Liaoning2004	5914.902	2331.27	8.68523	7.754168
Liaoning2005	7131.799	2760.133	8.872319	7.923034
Liaoning2006	8129.306	3036.338	9.003231	8.018407
Liaoning2007	9627.502	3320.097	9.172379	8.107749

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Liaoning2008	12053.42	3591.459	9.397104	8.186314
Liaoning2009	13449.09	4032.008	9.506667	8.30202
Jilin1998	1445.509	1303.48	7.276217	7.172793
Jilin1999	1546.174	1465.306	7.343539	7.289819
Jilin2000	1787.097	1427.992	7.488348	7.264024
Jilin2001	1939.936	1532.083	7.57041	7.334383
Jilin2002	2144.785	1673.204	7.670795	7.422495
Jilin2003	2415.681	1555.809	7.789736	7.349751
Jilin2004	2782.54	1806.113	7.931119	7.498933
Jilin2005	3229.5	1860.241	8.080083	7.528461
Jilin2006	3717.496	1982.614	8.220806	7.592171
Jilin2007	4551.843	2196.967	8.423288	7.694833
Jilin2008	5539.741	2385.043	8.619703	7.776973
Jilin2009	6405.648	2914.936	8.764935	7.977603
Heilongjiang1998	2561.773	1471.161	7.848455	7.293807
Heilongjiang1999	2666.326	1662.19	7.888457	7.415891
Heilongjiang2000	2912.569	1769.074	7.976791	7.478212
Heilongjiang2001	3101.674	1769.841	8.039697	7.478645
Heilongjiang2002	3300.544	1816.029	8.101843	7.504408
Heilongjiang2003	3681.851	1782.572	8.211171	7.485812
Heilongjiang2004	4252.999	1867.265	8.35538	7.53223
Heilongjiang2005	4938.62	2074.574	8.504841	7.637511
Heilongjiang2006	5520.874	2153.931	8.616291	7.67505
Heilongjiang2007	6308.036	2344.943	8.74958	7.760016
Heilongjiang2008	7436.826	2682.96	8.914199	7.894676
Heilongjiang2009	7707.943	3234.954	8.950007	8.08177

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Shanghai1998	3446.138	3492.549	8.145009	8.158387
Shanghai1999	3794.139	3371.429	8.241213	8.123092
Shanghai2000	4298.351	3478.049	8.365987	8.154227
Shanghai2001	4715.041	3866	8.458513	8.259976
Shanghai2002	5158.158	4113.568	8.548335	8.322046
Shanghai2003	5961.024	5114.604	8.692998	8.539855
Shanghai2004	7069.028	5731.672	8.863478	8.653762
Shanghai2005	8239.586	6777.223	9.016705	8.821323
Shanghai2006	9255.688	7109.653	9.132994	8.869209
Shanghai2007	10663.91	8105.663	9.27462	9.000318
Shanghai2008	12825.77	7747.023	9.459212	8.955064
Shanghai2009	13900.36	12892.59	9.53967	9.464408
Jiangsu1998	6486.441	1598.982	8.777469	7.377122
Jiangsu1999	6991.662	1604.863	8.852474	7.380794
Jiangsu2000	7733.897	1641.359	8.953368	7.40328
Jiangsu2001	8581.525	1786.706	9.057367	7.488129
Jiangsu2002	9495.837	1940.7	9.158609	7.570804
Jiangsu2003	10953.23	2174.892	9.30139	7.684734
Jiangsu2004	13069.34	2548.073	9.478024	7.843093
Jiangsu2005	15987.48	3289.253	9.679561	8.098416
Jiangsu2006	18838.19	3534.985	9.843641	8.170464
Jiangsu2007	22403.09	3858.094	10.01695	8.257929
Jiangsu2008	27490.67	3842.88	10.2216	8.253977
Jiangsu2009	30642.34	5004.524	10.33014	8.518098
Zhejiang1998	4584.955	1810.06	8.430535	7.501115
Zhejiang1999	4949.018	1931.174	8.506944	7.565883

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Zhejiang2000	5532.459	1927.723	8.618388	7.564095
Zhejiang2001	6237.197	2054.108	8.738286	7.627597
Zhejiang2002	7108.055	2408.847	8.868984	7.786904
Zhejiang2003	8461.221	2686.932	9.043249	7.896155
Zhejiang2004	10173.54	2992.582	9.227545	8.003892
Zhejiang2005	11912.99	4224.136	9.385384	8.34857
Zhejiang2006	13821.34	4724.435	9.533969	8.460503
Zhejiang2007	16373.53	5554.192	9.703421	8.622308
Zhejiang2008	19502.67	5962.18	9.878307	8.693191
Zhejiang2009	21102.77	7947.396	9.957159	8.9806
Anhui1998	2348.07	1120.452	7.761349	7.021488
Anhui1999	2486.104	1259.714	7.818472	7.13864
Anhui2000	2679.677	1164.846	7.893451	7.060344
Anhui2001	2981.368	1157.214	8.000138	7.053771
Anhui2002	3211.423	1302.686	8.07447	7.172184
Anhui2003	3586.015	1487.104	8.184797	7.304586
Anhui2004	4200.635	1705.428	8.342991	7.441571
Anhui2005	4816.416	2190.581	8.479785	7.691922
Anhui2006	5451.002	2293.832	8.603555	7.737979
Anhui2007	6465.478	2530.976	8.774232	7.83636
Anhui2008	7854.179	2777.679	8.968801	7.929371
Anhui2009	8909.475	3451.272	9.094871	8.146498
Fujian1998	2851.904	2046.049	7.955742	7.623666
Fujian1999	3106.633	2082.745	8.041295	7.641442
Fujian2000	3444.227	2041.136	8.144455	7.621262
Fujian2001	3746.872	2041.54	8.228677	7.62146

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Fujian2002	4054.038	2162.408	8.307469	7.678978
Fujian2003	4469.659	2277.651	8.405067	7.7309
Fujian2004	5155.054	2460.102	8.547733	7.807958
Fujian2005	5886.138	3093.104	8.680355	8.03693
Fujian2006	6632.883	3962.154	8.799795	8.284543
Fujian2007	8028.759	4451.608	8.990785	8.401021
Fujian2008	9248.532	4193.182	9.13222	8.341215
Fujian2009	10894.99	5527.113	9.296059	8.617421
Jiangxi1998	1605.854	736.7575	7.381411	6.602259
Jiangxi1999	1719.527	831.643	7.449804	6.723403
Jiangxi2000	1854.694	946.1615	7.525475	6.852413
Jiangxi2001	1999.706	976.8844	7.600755	6.884368
Jiangxi2002	2217.629	1060.49	7.704194	6.966486
Jiangxi2003	2484.434	1200.699	7.8178	7.090659
Jiangxi2004	3053.622	1279.916	8.024084	7.15455
Jiangxi2005	3596.418	1502.818	8.187694	7.315097
Jiangxi2006	4158.976	1688.176	8.333024	7.431404
Jiangxi2007	4867.478	1976.244	8.490331	7.588954
Jiangxi2008	6156.083	2014.214	8.725196	7.607984
Jiangxi2009	6767.249	2660.522	8.81985	7.886278
Shandong1998	6336.958	1327.713	8.754154	7.191213
Shandong1999	6812.582	1353.474	8.826526	7.21043
Shandong2000	7558.903	1424.152	8.930481	7.261332
Shandong2001	8359.127	1431.238	9.031109	7.266295
Shandong2002	9199.194	1616.069	9.126871	7.387752
Shandong2003	10650.93	1679.258	9.273402	7.426107

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Shandong2004	13017.19	1973.423	9.474026	7.587525
Shandong2005	16073.67	2385.232	9.684938	7.777052
Shandong2006	19231.15	2515.098	9.864287	7.830067
Shandong2007	22717.33	2780.679	10.03088	7.93045
Shandong2008	27613.71	2820.734	10.22607	7.944752
Shandong2009	30216.97	3505.084	10.31616	8.16197
Henan1998	3959.779	1002.099	8.283944	6.909852
Henan1999	4179.408	1054.696	8.337925	6.961007
Henan2000	4614.603	1270.161	8.436981	7.146899
Henan2001	5076.156	1227.408	8.53231	7.11266
Henan2002	5511.854	1378.285	8.614656	7.228596
Henan2003	6203.884	1366.578	8.732931	7.220065
Henan2004	7523.122	1492.33	8.925737	7.308094
Henan2005	9270.946	1828.981	9.134641	7.511514
Henan2006	10923.05	1986.135	9.298631	7.593946
Henan2007	13099.88	2137.475	9.480358	7.66738
Henan2008	16072.69	2185.35	9.684877	7.689531
Henan2009	17562.84	2681.634	9.773541	7.894182
Hubei1998	2867.422	1638.504	7.961169	7.401539
Hubei1999	2995.631	1325.153	8.00491	7.189283
Hubei2000	3264.632	1381.818	8.090902	7.231155
Hubei2001	3563.388	1358.923	8.178467	7.214448
Hubei2002	3857.894	1461.868	8.257877	7.28747
Hubei2003	4336.782	1473.071	8.374888	7.295105
Hubei2004	5065.746	1593.231	8.530257	7.373519
Hubei2005	5816.36	2199.451	8.66843	7.695963

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Hubei2006	6697.279	2515.81	8.809457	7.83035
Hubei2007	8061.729	2912.048	8.994883	7.976612
Hubei2008	9990.509	2824	9.209391	7.94591
Hubei2009	11419.29	3546.683	9.343059	8.173768
Hunan1998	2788.507	1007.533	7.933262	6.91526
Hunan1999	2965.443	1057.711	7.994782	6.963863
Hunan2000	3258.248	1064.103	8.088945	6.969887
Hunan2001	3515.505	1259.334	8.164938	7.138338
Hunan2002	3808.752	1332.437	8.245057	7.194765
Hunan2003	4251.816	1379.219	8.355101	7.229273
Hunan2004	5032.935	1437.68	8.523759	7.270786
Hunan2005	5834.534	1587.915	8.67155	7.370177
Hunan2006	6745.891	1901.04	8.816689	7.550156
Hunan2007	8034.934	2115.237	8.991554	7.656922
Hunan2008	10144.86	2171.196	9.224723	7.683034
Hunan2009	11482.06	2689.642	9.348541	7.897164
Guangdong1998	7699.35	3508.536	8.948891	8.162954
Guangdong1999	8402.071	3218.941	9.036233	8.076808
Guangdong2000	9633.408	3183.432	9.172992	8.065715
Guangdong2001	10895.25	3328.298	9.296082	8.110216
Guangdong2002	12012.83	3287.365	9.39373	8.097842
Guangdong2003	13801.95	3175.026	9.532565	8.063071
Guangdong2004	16432.6	3381.567	9.707022	8.126095
Guangdong2005	19654.25	4344.989	9.886049	8.376778
Guangdong2006	22866.03	4767.586	10.03741	8.469595
Guangdong2007	27100.61	5704.589	10.20731	8.649026

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Guangdong2008	33330.35	5637.457	10.41422	8.637188
Guangdong2009	36007.39	6669.479	10.49148	8.805297
Guangxi1998	1737.545	1508.193	7.460229	7.318668
Guangxi1999	1825.38	1552.712	7.509543	7.347759
Guangxi2000	1927.748	1454.363	7.564108	7.282323
Guangxi2001	2104.654	1825.05	7.651906	7.509362
Guangxi2002	2281.854	1943.247	7.732743	7.572115
Guangxi2003	2559.991	1863.211	7.847759	7.530057
Guangxi2004	3071.109	1994.912	8.029794	7.598355
Guangxi2005	3600.486	1965.591	8.188824	7.583548
Guangxi2006	4250.449	2166.39	8.35478	7.680817
Guangxi2007	5174.327	2392.94	8.551464	7.780278
Guangxi2008	6223.958	2621.946	8.736161	7.871672
Guangxi2009	6809.789	3331.453	8.826116	8.111164
Hainan1998	407.4931	1683.099	6.010024	7.428392
Hainan1999	439.3272	1830.112	6.085244	7.512132
Hainan2000	483.3211	1958.457	6.180681	7.579912
Hainan2001	511.8332	1939.086	6.237999	7.569972
Hainan2002	567.4909	1798.476	6.341225	7.494695
Hainan2003	626.7631	2102.372	6.440569	7.650822
Hainan2004	721.6802	2303.416	6.581582	7.742149
Hainan2005	811.7695	2882.479	6.699216	7.966406
Hainan2006	935.8667	3730.316	6.841473	8.224248
Hainan2007	1065.575	3961.859	6.97127	8.284469
Hainan2008	1362.702	5090.477	7.217225	8.535127
Hainan2009	1481.17	6303.79	7.300587	8.748906

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Chongqing1998	1328.93	1380.702	7.192129	7.230347
Chongqing1999	1386.608	1386.707	7.234616	7.234687
Chongqing2000	1477.567	1397.104	7.298152	7.242157
Chongqing2001	1619.89	1418.879	7.390113	7.257622
Chongqing2002	1804.18	1561.959	7.497861	7.353696
Chongqing2003	2038.404	1586.793	7.619922	7.369471
Chongqing2004	2400.009	1703.64	7.783228	7.440522
Chongqing2005	2753.803	2118.84	7.920738	7.658624
Chongqing2006	3111.916	2216.595	8.042994	7.703727
Chongqing2007	3566.185	2599.524	8.179252	7.863084
Chongqing2008	5059.965	2638.025	8.529115	7.877786
Chongqing2009	5680.985	3499.255	8.64488	8.160305
Sichuan1998	3166.901	1217.831	8.060509	7.104827
Sichuan1999	3423.189	1370.558	8.138328	7.222974
Sichuan2000	3620.461	1338.661	8.194357	7.199425
Sichuan2001	3938.982	1339.863	8.278678	7.200323
Sichuan2002	4283.781	1384.894	8.362591	7.233379
Sichuan2003	4791.635	1397.748	8.474627	7.242618
Sichuan2004	5660.719	1498.957	8.641306	7.312525
Sichuan2005	6558.712	1913.708	8.78855	7.556798
Sichuan2006	7623.839	2219.555	8.939035	7.705062
Sichuan2007	9199.037	2681.501	9.126854	7.894132
Sichuan2008	11352.46	3004.592	9.33719	8.007897
Sichuan2009	12364.46	3481.32	9.422582	8.155167
Guizhou1998	791.1429	1260.785	6.673479	7.13949
Guizhou1999	861.6728	1293.347	6.758876	7.164989

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Guizhou2000	950.1107	1275.377	6.856579	7.150997
Guizhou2001	1041.608	1143.418	6.948521	7.041778
Guizhou2002	1139.716	1250.918	7.038534	7.131633
Guizhou2003	1295.495	1296.936	7.166648	7.16776
Guizhou2004	1506.104	1331.983	7.317282	7.194424
Guizhou2005	1773.351	1590.52	7.480626	7.371817
Guizhou2006	2044.803	1749.855	7.623057	7.467288
Guizhou2007	2411.522	2008.102	7.788013	7.604945
Guizhou2008	3199.964	2174.022	8.070895	7.684334
Guizhou2009	3510.96	2911.326	8.163645	7.976364
Yunnan1998	1694.107	1647.957	7.434911	7.407291
Yunnan1999	1770.568	1655.968	7.479056	7.412141
Yunnan2000	1870.874	1776.302	7.534161	7.482289
Yunnan2001	2002.163	1957.619	7.601983	7.579484
Yunnan2002	2121.853	1917.089	7.660045	7.558563
Yunnan2003	2349.283	1859.116	7.761865	7.527856
Yunnan2004	2769.012	1865.246	7.926246	7.531148
Yunnan2005	3186.138	2134.561	8.066565	7.666017
Yunnan2006	3580.626	2336.498	8.183293	7.756408
Yunnan2007	4214.498	2319.058	8.346286	7.748916
Yunnan2008	5146.582	2535.493	8.546088	7.838143
Yunnan2009	5505.14	2919.416	8.613438	7.979139
Shaanxi1998	1306.81	1314.165	7.175344	7.180957
Shaanxi1999	1443.917	1065.44	7.275115	6.971143
Shaanxi2000	1634.058	1259.296	7.398822	7.138308
Shaanxi2001	1831.166	1554.455	7.512708	7.348881

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Shaanxi2002	2028.254	1570.778	7.614931	7.359326
Shaanxi2003	2314.597	1509.091	7.746991	7.319263
Shaanxi2004	2812.737	1679.744	7.941913	7.426397
Shaanxi2005	3264.352	2035.805	8.090816	7.618647
Shaanxi2006	4010.408	2425.448	8.296648	7.793771
Shaanxi2007	4769.45	2493.642	8.469986	7.8215
Shaanxi2008	6284.003	2775.504	8.745763	7.928588
Shaanxi2009	7190.547	3206.219	8.880523	8.072848
Gansu1998	809.1796	1297.62	6.696021	7.168287
Gansu1999	877.3578	1305.328	6.776915	7.17421
Gansu2000	959.7812	1308.543	6.866705	7.176669
Gansu2001	1024.927	1210.577	6.932377	7.098852
Gansu2002	1121.046	1325.635	7.022018	7.189647
Gansu2003	1264.526	1261.551	7.142452	7.140097
Gansu2004	1514.341	1713.792	7.322736	7.446463
Gansu2005	1729.857	1902.925	7.455794	7.551147
Gansu2006	2041.883	1757.338	7.621628	7.471556
Gansu2007	2406.411	2075.793	7.785892	7.638099
Gansu2008	2875.375	1809.45	7.963939	7.500778
Gansu2009	3071.64	2452.242	8.029967	7.804758
Qinghai1998	202.865	1260.737	5.312541	7.139451
Qinghai1999	221.4431	1469.347	5.400166	7.292573
Qinghai2000	242.1304	1244.221	5.489476	7.126265
Qinghai2001	268.6929	1177.388	5.593569	7.071054
Qinghai2002	303.8805	1262.813	5.716634	7.141097
Qinghai2003	348.7042	1436.244	5.854224	7.269786

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Qinghai2004	415.049	1534.508	6.028397	7.335965
Qinghai2005	484.2424	1818.39	6.182586	7.505707
Qinghai2006	571.8182	1890.499	6.348821	7.544596
Qinghai2007	696.5422	2167.022	6.546128	7.681109
Qinghai2008	897.4626	2234.606	6.799571	7.71182
Qinghai2009	981.6832	2452.076	6.889269	7.80469
Ningxia1998	225.5882	1211.73	5.418711	7.099804
Ningxia1999	242.5115	1422.492	5.491049	7.260166
Ningxia2000	267.7132	1357.43	5.589916	7.213348
Ningxia2001	306.485	1570.866	5.725169	7.359382
Ningxia2002	342.2505	1876.212	5.835543	7.53701
Ningxia2003	395.173	1837.593	5.979324	7.516212
Ningxia2004	483.0126	1813.455	6.180043	7.502989
Ningxia2005	546.5284	2202.417	6.303586	7.697311
Ningxia2006	630.6655	2023.893	6.446776	7.612778
Ningxia2007	788.9973	2026.565	6.670763	7.614098
Ningxia2008	1069.373	2244.634	6.974827	7.716298
Ningxia2009	1209.215	3067.055	7.097727	8.028473
Xinjiang1998	1029.721	1418.534	6.937043	7.257379
Xinjiang1999	1083.026	1431.211	6.987514	7.266277
Xinjiang2000	1254.425	1432.596	7.134433	7.267243
Xinjiang2001	1373.481	1474.038	7.225103	7.295761
Xinjiang2002	1490.434	1745.933	7.306823	7.465045
Xinjiang2003	1696.358	1809.557	7.436239	7.500838
Xinjiang2004	1983.025	1543.335	7.592379	7.341701
Xinjiang2005	2348.233	1784.727	7.761418	7.487021

Region	GDP	HP	LNGDP	LNHP
Time	(100 million Yuan)	(Yuan / sq.m²)		
Xinjiang2006	2743.477	1834.027	7.916982	7.514269
Xinjiang2007	3140.071	1972.914	8.052001	7.587267
Xinjiang2008	3769.747	2073.003	8.234763	7.636754
Xinjiang2009	3957.703	2584.916	8.283419	7.857448

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A2 Basic statistics of LnGDP and LnHP

	LnGDP	LnHP
Mean	8.261517	7.697726
Median	8.344167	7.606432
Maximum	10.59764	9.599532
Minimum	5.398718	6.622061
Std. Dev.	1.010522	0.498122
Skewness	-0.417236	1.013451
Kurtosis	3.182705	4.150658
Jarque-Bera	10.94588	81.48526
Probability	0.004199	0.000000
Sum	2974.146	2771.181
Sum Sq. Dev.	366.5945	89.07699
Observations	360	360

Appendix B Panel unit root test results**B1** The results of LLC test for LnHP and LnGDP at levels

Null Hypothesis: Unit root (common unit root process)

Series: LNHP

Sample: 1998 2009

Total number of observations: 325

Cross-sections included: 30

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-2.22683	0.0130

** Probabilities are computed assuming asymptotic normality

Null Hypothesis: Unit root (common unit root process)

Series: LNGDP

Sample: 1998 2009

Total number of observations: 324

Cross-sections included: 30

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-5.19938	0.0000

** Probabilities are computed assuming asymptotic normality

B2 The results of IPS test for LnHP and LnGDP at levels

Null Hypothesis: Unit root (individual unit root process)

Series: LNHP

Sample: 1998 2009

Total number of observations: 325

Cross-sections included: 30

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	3.40788	0.9997

** Probabilities are computed assuming asymptotic normality

Null Hypothesis: Unit root (individual unit root process)

Series: LNGDP

Sample: 1998 2009

Total number of observations: 324

Cross-sections included: 30

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	2.47042	0.9933

B3 The results of LLC test for LnHP and LnGDP at first differences

Null Hypothesis: Unit root (common unit root process)

Series: D(LNHP)

Sample: 1998 2009

Total number of observations: 293

Cross-sections included: 30

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-13.1677	0.0000

** Probabilities are computed assuming asymptotic normality

Null Hypothesis: Unit root (common unit root process)

Series: D(LNGDP)

Sample: 1998 2009

Total number of observations: 290

Cross-sections included: 30

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-7.49601	0.0000

** Probabilities are computed assuming asymptotic normality

B4 The results of IPS test for LnHP and LnGDP at first differences

Null Hypothesis: Unit root (individual unit root process)

Series: D(LNHP)

Sample: 1998 2009

Total number of observations: 293

Cross-sections included: 30

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-6.26039	0.0000

** Probabilities are computed assuming asymptotic normality

Null Hypothesis: Unit root (individual unit root process)

Series: D(LNGDP)

Sample: 1998 2009

Total number of observations: 290

Cross-sections included: 30

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-2.82905	0.0023

** Probabilities are computed assuming asymptotic normality

Appendix C Panel cointegration results

C1 The results of Pedroni cointegration Test

Pedroni Residual Cointegration Test

Series: LNGDP LNHP

Sample: 1998 2009

Included observations: 360

Cross-sections included: 30

Null Hypothesis: No cointegration

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	41.17611	0.0000	30.07050	0.0000
Panel rho-Statistic	1.641046	0.9496	1.482419	0.9309
Panel PP-Statistic	-4.216795	0.0000	-4.999358	0.0000
Panel ADF-Statistic	-5.897235	0.0000	-6.063676	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	3.243719	0.9994
Group PP-Statistic	-6.257061	0.0000
Group ADF-Statistic	-6.272861	0.0000

C2 The results of panel general least squares for LnGDP and LnHP

Dependent Variable: LNGDP

Method: Panel General Least Squares

Sample: 1998 2009

Cross-sections included: 30

Total panel (balanced) observations: 360

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.708790	0.183265	-14.78069	0.0000
LNHP	1.425136	0.023787	59.91234	0.0000

Weighted Statistics

R-squared	0.973904	Mean dependent var	10.04687
Adjusted R-squared	0.971524	S.D. dependent var	4.388559
S.E. of regression	0.185246	Sum squared resid	11.29002
F-statistic	409.2769	Durbin-Watson stat	0.872487
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.969196	Mean dependent var	8.261517
Sum squared resid	11.29241	Durbin-Watson stat	0.682861

C3 The results of LLC test for the residuals from the regression function between
LnGDP and LnHP

Null Hypothesis: Unit root (common unit root process)

Series: RESID01

Sample: 1998 2009

Total number of observations: 322

Cross-sections included: 30

Method	Statistic	Prob.**
Levin, Lin & Chu t*	-9.15770	0.0000

** Probabilities are computed assuming asymptotic normality

C4 The results of panel pooled least squares for LnGDP and LnHP by provinces

Dependent Variable: LNGDP

Method: Pooled Least Squares

Sample: 1998 2009

Included observations: 12

Cross-sections included: 30

Total pool (balanced) observations: 360

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Beijing--C	-1.649734	1.014344	-1.626404	0.1049
Tianjin--C	-2.536292	0.902720	-2.809610	0.0053
Hebei--C	-2.842085	1.191822	-2.384655	0.0177
Shanxi--C	-3.976727	1.039669	-3.824992	0.0002
Innermongolia--C	-6.688177	1.008955	-6.628813	0.0000
Liaoning--C	-4.441915	1.401857	-3.168593	0.0017
Jilin--C	-7.416210	1.478680	-5.015428	0.0000
Heilongjiang--C	-4.497006	1.608455	-2.795854	0.0055
Shanghai--C	-0.451504	0.946941	-0.476803	0.6338
Jiangsu--C	-0.720705	0.897394	-0.803109	0.4225
Zhejiang--C	0.887418	0.735457	1.206621	0.2285
Anhui--C	-0.042077	0.885258	-0.047531	0.9621
Fujian--C	-0.509922	1.008445	-0.505652	0.6135
Jiangxi--C	-0.907050	0.844930	-1.073521	0.2839
Shandong--C	-2.833439	1.050507	-2.697212	0.0074
Henan--C	-3.255160	1.098039	-2.964520	0.0033
Hubei--C	-0.924043	1.001774	-0.922407	0.3571
Hunan--C	-2.379039	1.075707	-2.211605	0.0277

Guangdong--C	-4.992281	1.421655	-3.511599	0.0005
Guangxi--C	-6.467013	1.473013	-4.390330	0.0000
Hainan--C	-0.817028	0.817955	-0.998867	0.3187
Chongqing--C	-3.798266	1.123433	-3.380946	0.0008
Sichuan--C	-0.761483	0.957064	-0.795645	0.4269
Guizhou--C	-4.664866	1.196499	-3.898763	0.0001
Yunnan--C	-9.271476	2.014743	-4.601817	0.0000
Shaanxi--C	-4.154715	1.015876	-4.089788	0.0001
Gansu--C	-6.016521	1.466912	-4.101487	0.0001
Qinghai--C	-8.785340	1.348295	-6.515889	0.0000
Ningxia--C	-9.311909	1.379571	-6.749856	0.0000
Xinjiang--C	-9.863856	1.902764	-5.183963	0.0000
Beijing--LnHP Beijing	1.155860	0.114395	10.10408	0.0000
Tianjin-- LnHP Tianjin	1.289512	0.110508	11.66897	0.0000
Hebei-- LnHP Hebei-	1.575572	0.158224	9.957866	0.0000
Shanxi-- LnHP Shanxi	1.626666	0.139985	11.62026	0.0000
Innermongolia-- LnHP Innermongolia	1.990263	0.136816	14.54703	0.0000
Liaoning—LnHP Liaoning	1.686891	0.178043	9.474605	0.0000
Jilin—LnHP Jilin	2.050158	0.196330	10.44238	0.0000
Heilongjiang—LnHP Heilongjiang	1.692169	0.210279	8.047252	0.0000
Shanghai—LnHP Shanghai	1.086337	0.109507	9.920212	0.0000
Jiangsu—LnHP Jiangsu	1.312256	0.114118	11.49911	0.0000
Zhejiang—LnHP Zhejiang	1.032081	0.090462	11.40902	0.0000
Anhui—LnHP Anhui	1.135354	0.118294	9.597771	0.0000
Fujian—LnHP Fujian	1.152830	0.126448	9.117018	0.0000
Jiangxi—LnHP Jiangxi	1.254742	0.117269	10.69973	0.0000
Shandong—LnHP Shandong	1.629715	0.137940	11.81466	0.0000
Henan—LnHP Henan	1.663563	0.148502	11.20228	0.0000

Hubei—LnHP Hubei	1.262309	0.131982	9.564240	0.0000
Hunan—LnHP Hunan	1.498411	0.146278	10.24358	0.0000
Guangdong—LnHP Guangdong	1.775424	0.170743	10.39821	0.0000
Guangxi—LnHP Guangxi	1.916935	0.193556	9.903777	0.0000
Hainan—LnHP Hainan	0.943775	0.103350	9.131837	0.0000
Chongqing—LnHP Chongqing	1.544370	0.148423	10.40517	0.0000
Sichuan—LnHP Sichuan	1.261727	0.126862	9.945667	0.0000
Guizhou—LnHP Guizhou	1.637328	0.162131	10.09881	0.0000
Yunnan—LnHP Yunnan	2.255862	0.262750	8.585590	0.0000
Shaanxi—LnHP Shaanxi	1.615003	0.134510	12.00655	0.0000
Gansu—LnHP Gansu	1.813453	0.198356	9.142426	0.0000
Qinghai—LnHP Qinghai	2.002760	0.181313	11.04584	0.0000
Ningxia—LnHP Ningxia	2.056927	0.182619	11.26349	0.0000
Xinjiang—LnHP Xinjiang	2.337841	0.253878	9.208518	0.0000
R-squared	0.980625	Mean dependent var	8.261517	
Adjusted R-squared	0.976815	S.D. dependent var	1.010522	
S.E. of regression	0.153869	Akaike info criterion	-0.754418	
Sum squared resid	7.102704	Schwarz criterion	-0.106734	
Log likelihood	195.7952	Hannan-Quinn criter.	-0.496887	
F-statistic	257.3561	Durbin-Watson stat	1.260155	
Prob(F-statistic)	0.000000			

Appendix D Panel Granger causality test results

D1 The VECM results for Granger causality from LnHP to LnGDP

Dependent Variable: D(LNGDP)

Method: Panel general least squares

Sample (adjusted): 2001 2009

Cross-sections included: 30

Total panel (balanced) observations: 270

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.099260	0.010426	9.520859	0.0000
RESID01(-1)	0.009030	0.022116	0.408318	0.6834
D(LNGDP(-1))	0.106900	0.086513	1.235657	0.2178
D(LNGDP(-2))	0.127859	0.103058	1.240653	0.2160
D(LNHP(-1))	0.102552	0.035838	2.861525	0.0046
D(LNHP(-2))	0.061490	0.035134	1.750173	0.0814

Weighted Statistics

R-squared	0.228306	Mean dependent var	0.155578
Adjusted R-squared	0.116657	S.D. dependent var	0.060105
S.E. of regression	0.048626	Sum squared resid	0.555653
F-statistic	2.044852	Durbin-Watson stat	2.080183
Prob(F-statistic)	0.001093		

Unweighted Statistics

R-squared	0.200262	Mean dependent var	0.143552
Sum squared resid	0.563207	Durbin-Watson stat	2.179516

D2 The VECM results for Granger causality from LnGDP to LnHP

Dependent Variable: D(LNHP)

Method: Panel general least squares

Sample (adjusted): 2001 2009

Cross-sections included: 30

Total panel (balanced) observations: 270

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.028868	0.013664	-2.112768	0.0357
RESID02(-1)	-0.381768	0.059067	-6.463310	0.0000
D(LNHP(-1))	0.015946	0.067428	0.236497	0.8133
D(LNHP(-2))	0.165322	0.063744	2.593516	0.0101
D(LNGDP(-1))	0.739606	0.114124	6.480741	0.0000
D(LNGDP(-2))	0.004907	0.155018	0.031653	0.9748

Weighted Statistics

R-squared	0.487073	Mean dependent var	0.116209
Adjusted R-squared	0.412863	S.D. dependent var	0.111128
S.E. of regression	0.082451	Sum squared resid	1.597552
F-statistic	6.563388	Durbin-Watson stat	1.966922
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.369719	Mean dependent var	0.099731
Sum squared resid	1.605349	Durbin-Watson stat	1.914778

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 - Applied Research of Edge detection Operators in Telescope Control System, *Microcomputer Information*, 2010, 26(9), pp: 57-58;
 - The Long-term Hemispheric Variation of Polar Faculae, *Journal of The Korean Astronomical Society*, 2011, 44(1), pp: 1-6.