

Web Appendix for

Looking into the Black Box of the Korean Economy:
The Sparse Factor Model Approach

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Abstract

This documents contains the web appendix referenced in the paper “Looking into the Black Box of the Korean Economy: The Sparse Factor Model Approach”.

Appendix I. Sparse Principal Component Analysis

Jolliffe et al. (2003), at first, suggested SCoTLASS for constructing modified principal components with possible zero loadings but the constraint of the method does not ensure convexity so that the estimation is computationally expensive. Then Zou et al. (2006) developed a regression optimization framework to derive sparse loading coefficients, and named it SPCA, which has less computational burden and we follow their approach in the spirit of Kim and Swanson (2016a).

Suppose we derive factors, F via ordinary PCA. In particular, a standardized data matrix, X can be decomposed to UDV' by singular value decomposition. In ordinary PCA, F , is defined as UD , and V becomes the loading. We then consider a simple regression problem like (2) to obtain sparse loadings by letting F_i , the i -th principal component be a dependent variable and be explanatory variables. That is, the SPCA problem can be switched to a penalized regression problem. Zou et al. (2006) suggested the following regression type criterion to obtain sparse loadings. Let X_i be the i -th row vector of X , then for any positive value of η ,

$$(\hat{\delta}_j, \hat{\lambda}_j) = \arg \min_{\delta_j, \lambda_j} \sum_{t=1}^T \|X_t - \delta_j \lambda_j' X_t\|^2 + \eta \|\lambda_j\|^2. \quad (4)$$

$$\text{subject to } \|\delta_j\|^2 = 1$$

Then $\hat{\lambda}_j$ becomes the estimator of the j -th loading, λ_j . We can then simply extend (4) to derive a whole sequence of PCs. However, the penalty parameter is applied to all variables, and this means that we do not have sparsity yet. By giving a lasso penalty term¹, which is the L_1 penalty, we can consider the following penalized regression problem in obtaining the sparse

¹ See Tibshirani (1996) for details about the lasso (least absolute shrinkage and selection operator) penalty

loadings:

$$(\hat{\Delta}, \hat{\Lambda}) = \arg \min_{\delta_j, \lambda_j} \sum_{t=1}^T \|X_t - \Delta \Lambda' X_t\|^2 + \sum_{j=1}^r \eta \|\lambda_j\|^2 + \sum_{j=1}^r \eta_{1,j} \|\lambda_j\|_1 \quad (5)$$

subject to $\Delta' \Delta = I_r$.

when Δ is an $N \times r$ matrix column λ_j and δ is also an $N \times r$ orthogonal constraint, so that $\hat{\lambda}_j$ is the estimator of the j -th factor loadings, λ_j . See Zou et al. (2006) for more computational details. The SPCA algorithm, which solves (5) as follows.

Algorithm 1. Sparse Principal Component Analysis

1. Let Δ be the factor loadings of the first r principal components.
2. Given Δ , solve the following regression problem for, $j = 1, 2, \dots, r$

$$\lambda_j = \arg \min_{\lambda} (\delta_j - \lambda)' X' X (\delta_j - \lambda) + \eta \|\lambda\|^2 + \eta_{1,j} \|\lambda\|_1$$
3. For each fixed $\Lambda = [\lambda_1, \dots, \lambda_r]$, do the singular value decomposition on $X' X \Lambda = U D V'$, then update $\Delta^* = U V'$.
4. Repeat steps 2-3 until convergence. In the final loop, Δ^* becomes sparse factor loading.

There are two parameters for obtaining sparse loadings and in practice, the choice of η is known not to affect the result much. However, the sparsity of loadings depends greatly upon another parameter, η_j . Shen and Huang (2008) introduce two ways of selecting the tuning parameters. The first method is K-fold Cross Validation (CV) which chooses the degree of sparsity where a given CV is minimized. The other is using the cumulative percentage of the explained variance (CPEV) of the first r PCs. The degree of sparsity as the largest parameter can be selected where the CPEV does not drop too much (for example, by less than 5% or 10%) from its peak value. For computational brevity we follow this second approach, which Shen and Huang (2008) state also works reasonably well.

Appendix II. Tables for Relative MSFE of other variables

Table A2-1. Relative MSFEs for Month-on-Month Consumption Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.017	0.014	0.015	0.012	0.017	0.014	0.015	0.012
ARX	1.298*	1.058	0.999**	1.314	1.298*	1.058	0.999**	1.314
CADL	0.966	1.087	1.093	1.090	0.966	1.087	1.093	1.090
FAAR	0.823	1.083	1.024	1.289	0.762	1.183	0.992	1.235**
PCR	1.040	1.044	0.977**	1.283*	0.999	1.152	0.988**	1.229**
Bagg	1.058	0.943	0.882**	0.963	0.996	0.957	0.890**	1.005
Boost	1.020	1.076**	1.020	1.093	1.002	1.033	1.007	1.084
BMA1	1.021	1.022	1.005*	1.110	1.001	1.020	1.007**	1.105
BMA2	1.019	1.026	1.009*	1.111	1.001	1.023	1.008**	1.098
Ridge	1.006	1.027	1.027	1.074	1.001	1.080	1.032*	1.184
LAR	1.010	0.993	0.910**	1.036	0.996	0.981	0.902**	0.925*
EN	1.010	0.992	0.910**	1.031	0.996	0.981	0.902**	0.925*
NNG	1.000	1.042	0.949**	1.052*	0.988	1.021	0.928**	0.938**
Mean	0.938	0.970	0.948**	1.046	0.925	0.981	0.944**	1.002

* Notes: See notes to Table 2.

Table A2-2. Relative MSFEs for Year-on-Year Consumption Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.034	0.063	0.106	0.091	0.034	0.063	0.106	0.091
ARX	1.560**	0.956**	0.656	1.006	1.560**	0.956**	0.656	1.006
CADL	0.939	0.915*	1.055*	0.859*	0.939	0.915*	1.055*	0.859*
FAAR	1.264*	0.530	0.408	0.826*	1.719	1.141	0.746*	0.842
PCR	0.904	0.438**	0.450	0.941*	1.076	0.833**	0.688	0.977*
Bagg	0.987	0.857**	0.683	1.502	1.000	0.725**	0.663	1.062
Boost	0.925	0.721	0.689	0.825	1.054	1.081*	1.006	0.937
BMA1	0.897	0.683	0.685	0.811	1.064	1.111**	1.011	0.927
BMA2	0.898	0.683	0.683	0.812	1.064	1.112*	1.014	0.927
Ridge	0.914	0.695*	0.663	0.843	1.044	1.096*	1.038	0.967
LAR	0.934	0.614**	0.605	0.999	1.020	0.735**	0.618	0.928
EN	0.934	0.614**	0.605	0.998	1.019	0.734**	0.616	0.932
NNG	0.951	0.690**	0.648	0.991	1.027	0.724**	0.661	0.958
Mean	0.887	0.584**	0.562	0.765	0.994	0.794**	0.731	0.840

* Notes: See notes to Table 2.

Table A2-3. Relative MSFEs for Month-on-Month GDP Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.027	0.030	0.031	0.033	0.027	0.030	0.031	0.033
ARX	1.059	1.149	1.211	1.105	1.059	1.149	1.211	1.105
CADL	1.086	1.025	1.037	1.021	1.086	1.025	1.037	1.021
FAAR	1.086	1.050	1.052	1.093	1.046	1.052	1.021	1.061
PCR	1.242	1.061	1.034	1.043	1.267	1.032	0.968	0.935
Bagg	1.043	1.017	1.005	1.019	1.016	1.019	1.018	1.016
Boost	1.026	1.012	1.013	1.007	1.056	0.996	0.994	0.994
BMA1	1.022	1.005	1.007	1.012	1.060	0.997	0.993	0.993
BMA2	1.028	1.011	1.014	1.016	1.059	0.996	0.990	0.993
Ridge	1.036	1.013	1.014	1.039	1.019	1.001	0.988	0.988
LAR	1.012	1.018	1.020	1.009	1.026	1.000	0.994	1.001
EN	1.012	1.018	1.020	1.009	1.026	1.000	0.994	1.001
NNG	1.014	1.020	1.033	1.009	1.020	1.005	0.989	1.008
Mean	0.988	1.011	1.017	1.002	0.987	0.998	0.993	0.979

* Notes: See notes to Table 2.

Table A2-4. Relative MSFEs for Year-on-Year GDP Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.048	0.062	0.061	0.064	0.048	0.062	0.061	0.064
ARX	0.955	0.822	0.943	0.906	0.955	0.822	0.943	0.906
CADL	1.135	1.243	1.230	1.640*	1.135	1.243	1.230	1.640*
FAAR	1.160*	0.857	0.825	0.735	0.991	0.894	0.979	0.957
PCR	1.167*	0.925	0.837	0.883	1.250	1.031	1.215	0.912
Bagg	1.368	0.885	1.006	0.941	1.014	1.025	1.079	0.788*
Boost	1.009	1.013	0.825	0.790	1.002	1.068	1.218**	0.980
BMA1	1.014	1.055	0.835	0.812	1.009	1.107	1.312**	1.054
BMA2	1.017	1.030	0.836	0.859	1.010	1.106*	1.311**	1.052
Ridge	1.012	1.042	0.844	0.743	1.006	1.099	1.259*	0.935
LAR	1.002	0.971	0.952	0.923**	0.999	1.005	1.011	0.918*
EN	1.002	0.971	0.952	0.922**	0.999	1.005	1.011	0.918*
NNG	1.004	0.969	0.970	0.988*	1.001	0.995	1.007	0.990*
Mean	0.951	0.855	0.801*	0.723*	0.941*	0.941*	1.008	0.851**

* Notes: See notes to Table 2.

Table A2-5. Relative MSFEs for Month-on-Month Consumption Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.010	0.013	0.013	0.012	0.010	0.013	0.013	0.012
ARX	1.881*	1.312*	1.290	1.309	1.881*	1.312*	1.290	1.309
CADL	1.083	1.000	0.995	1.020	1.083	1.000	0.995	1.020
FAAR	1.035	1.066	1.142	1.090	1.045	1.142	1.006	0.954
PCR	1.406	1.059	1.148	1.123	1.395	1.045	1.096	1.147
Bagg	0.994	0.997	1.010	0.997	0.952	0.990	1.037	1.032
Boost	1.007	1.027	1.019	1.037	0.978	0.993	1.019	1.023
BMA1	0.997	1.018	1.019	1.016	1.006	1.015	1.004	1.038
BMA2	1.002	1.025	1.034	1.024	1.015	1.021	1.009	1.040
Ridge	1.000	1.023	1.041	1.027	1.021	1.018	1.016	1.039
LAR	1.000	1.037	1.022	1.045	0.991	1.024	1.014	1.011
EN	1.000	1.036	1.021	1.043	0.991	1.024	1.014	1.010
NNG	1.007	1.052	1.047	1.072	0.988	1.015	1.049	0.996
Mean	1.022	1.028	1.030	1.024	1.019	1.009	1.014	0.971

* Notes: See notes to Table 2.

Table A2-6. Relative MSFEs for Year-on-Year Consumption Growth*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.022	0.024	0.024	0.028	0.022	0.024	0.024	0.028
ARX	1.424	1.119	1.370	0.909	1.424	1.119	1.370	0.909
CADL	1.049	1.084	0.982	1.074	1.049	1.084	0.982	1.074
FAAR	1.349	1.200	0.894	0.832	1.140	1.464	1.313	1.068
PCR	1.317	1.111	0.856	1.080	1.731	1.885*	1.497	1.199
Bagg	1.466	1.628*	1.983	1.123	1.027	1.014	0.943	0.975
Boost	1.043	1.262	1.249	0.822	1.029	1.325	1.006	1.001
BMA1	1.049	1.399	1.403	0.936	1.024	1.455	1.133	1.164
BMA2	1.033	1.350	1.466	0.978	1.033	1.464	1.153	1.154
Ridge	1.117	1.241	0.989	0.875	1.042	1.428	1.104	1.040
LAR	1.002	0.994	0.988	0.878	1.017	1.161	0.920*	0.960
EN	1.002	0.994	0.988	0.878	1.017	1.160	0.921*	0.960
NNG	1.029	0.999	1.006	0.967	1.051*	1.087	0.960	0.977
Mean	0.977	0.976	0.928	0.696	1.008	1.140*	0.925	0.799

* Notes: See notes to Table 2.

Table A2-7. Relative MSFEs for Month-on-Month Growth in Exports*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.108	0.108	0.113	0.101	0.108	0.108	0.113	0.101
ARX	1.210	1.647**	1.561**	1.554*	1.210	1.647**	1.561**	1.554*
CADL	1.069	1.120	0.995	1.022	1.069	1.120	0.995	1.022
FAAR	1.320	1.050	1.149*	1.198	1.346	0.989	1.019	1.195
PCR	1.024	1.005	0.976	1.028	1.188	1.342**	1.106	1.308
Bagg	1.237	0.991	1.034	1.020	1.188	1.232*	1.029	1.113
Boost	1.038	1.003	1.026	1.010	1.077	1.201**	1.016	1.003
BMA1	1.077	1.016	1.034	1.029	1.104	1.401**	0.999	1.055
BMA2	1.084	1.002	1.048	1.049	1.112	1.426**	1.008	1.078
Ridge	1.078	0.973	1.056	1.062	1.137	1.270*	1.028	1.069
LAR	0.967	1.015	1.007	0.989	1.018	1.096**	1.007	1.017
EN	0.967	1.015	1.007	0.989	1.018	1.096**	1.007	1.016
NNG	0.993	0.989	1.025	0.983	1.003	1.054*	1.020	1.023
Mean	0.939	0.958	1.001	0.970	0.988	1.048	0.979	0.964

* Notes: See notes to Table 2.

Table A2-8. Relative MSFEs for Month-on-Month Growth in Exports*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.194	0.372	0.523	0.380	0.194	0.372	0.523	0.380
ARX	1.180	1.708*	1.991	1.232	1.180	1.708*	1.991	1.232
CADL	1.039	1.186	1.154*	2.278**	1.039	1.186	1.154*	2.278**
FAAR	1.222	2.287**	2.115**	1.007	1.153	1.826**	1.267**	1.268
PCR	3.376**	1.290	1.599*	1.006	3.105**	1.908**	1.153	1.491*
Bagg	1.472*	3.267**	2.569**	1.119	1.001	1.087	1.326*	1.119*
Boost	0.935	1.129	0.784	0.839	1.026	1.390*	1.251**	1.268
BMA1	1.009	1.364	0.930	0.943	1.036	1.607**	1.425**	1.513*
BMA2	1.009	1.448*	0.862	1.090	1.041	1.622**	1.464**	1.523*
Ridge	0.891	0.948	1.094	0.647**	1.070	1.518*	1.447**	1.404**
LAR	1.006	0.977	0.941	0.989	1.005	1.153	1.053*	1.015
EN	1.006	0.977	0.941	0.989	1.005	1.152	1.053*	1.014
NNG	0.988	0.996	0.986	1.012	1.008	1.031	1.026*	0.977
Mean	0.845*	0.959	0.667*	0.545**	0.960	1.128	0.886	0.948

* Notes: See notes to Table 2.

Table A2-9. MSFEs for Month-on-Month Growth in GCF*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.523	0.602	0.645	0.471	0.523	0.602	0.645	0.471
ARX	0.878	0.823	0.891	1.294	0.878	0.823	0.891	1.294
CADL	0.953	0.987	0.984	0.985	0.953	0.987	0.984	0.985
FAAR	0.857	0.949	0.882	0.959	0.410	0.276	0.138	0.223
PCR	1.117	0.950	0.876*	1.013	0.521	0.460	0.286*	0.396
Bagg	0.978	0.877	1.063	1.003	0.373	0.344	0.222	0.167
Boost	0.945	1.019	0.936*	0.934	0.989	1.127	1.108	1.087
BMA1	0.943	1.035	0.923*	0.939	1.002	1.139	1.130	1.093
BMA2	0.927	0.999	0.912*	0.943	1.007	1.139	1.134	1.099
Ridge	0.902	0.916	0.915*	0.943	0.371	0.323	0.190	0.235
LAR	1.013	1.050	0.960*	0.969	0.996	1.155	1.093	1.080
EN	1.013	1.049	0.960*	0.969	0.996	1.135	1.094	1.079
NNG	1.005	1.016	0.953*	0.977	0.993	1.016	1.013	1.022
Mean	0.895	0.927	0.899*	0.928	0.350	0.308	0.151	0.210

* Notes: See notes to Table 2.

Table A2-10. MSFEs for Year-on-Year Growth in GCF*

Method	PCA				SPCA			
	$h = 1$	$h = 3$	$h = 6$	$h = 12$	$h = 1$	$h = 3$	$h = 6$	$h = 12$
AR	0.495	0.955	1.584	1.805	0.495	0.955	1.584	1.805
ARX	1.105	0.699*	1.032	1.000	1.105	0.699*	1.032	1.000
CADL	0.913	0.823*	0.805*	0.869	0.913	0.823*	0.805*	0.869
FAAR	0.715	0.484*	0.314*	0.377**	0.919	0.801	0.727*	0.769
PCR	0.714	0.448*	0.307*	0.357**	1.549*	1.208	1.125	0.917
Bagg	3.572**	1.958*	0.978	0.668**	1.003	0.844	1.065	0.724**
Boost	0.878*	0.577*	0.412**	0.387**	0.955	0.878	1.100	1.000
BMA1	0.829*	0.546*	0.409*	0.389**	0.981	0.869	1.160	1.301*
BMA2	0.828*	0.555*	0.414**	0.392**	0.981	0.876	1.161	1.285*
Ridge	0.820**	0.555*	0.370*	0.395**	0.940	0.910	1.150	0.998
LAR	0.970	0.871*	0.798*	0.848**	0.984	0.929*	0.941	1.002
EN	0.970	0.871*	0.798*	0.848**	0.983	0.931*	0.942	1.003
NNG	0.948*	0.956**	0.962**	0.978**	0.958	0.940	0.997	0.981
Mean	0.818**	0.583**	0.510**	0.473**	0.884*	0.815*	0.962	0.853**

* Notes: See notes to Table 2.

Appendix III. List of Predictors

#	Class	Type	Variable
1	Interest Rates	Domestic Interest Rates	Uncollateralized Call Rates(Overnight)
2			Uncollateralized Call Rates(Overnight, Direct Interbank Transactions)
3			Uncollateralized Call Rates(Overnight, Intermediated Transactions)
4			Yields on CD(91-day)
5			Yields on CP(91-day)
6			Yields of National Housing Bonds Type1(5-year)
7			Yields of Treasury Bonds(1-year)
8			Yields of Treasury Bonds(3-year)
9			Yields of Treasury Bonds(5-year)
10			Yields of Treasury Bonds(10-year)
11			Yields of Monetary Stab. Bonds(2-year)
12			Yields of Financial Debentures(1-year)
13			Yields of Financial Debentures(3-Year)
14			Yields of Corporate Bonds : O.T.C (3-year, BBB-)
15		Major International Interest rates	C/D(90days)(USA)
16			T/N(2years)(USA)
17			T/N(5years)(USA)
18			Govt.Bond(5years)(Japan)
19	Trade	Unit Value Index of Import –All	Total
20			Cereal
21			Fuel
22			Crude Oil
23			Mineral
24			Textile Yarn & Thread
25			Chemicals
26			Iron & Steel Product
27			Non Ferreous Metal
28			Machinery & Precision equipment
29			Precision Equipment
30			Electric-electronic Machine
31			Information&communication's Equipment
32			Semi-conductor
33		Unit Value Index of Export	to Hong Kong
34			Total
35			Foods and Direct consumer goods
36			Fish & shellfish
37			Crude Material & Fuels
38			Petroleum & Petroleum products
39			Textile Yarn & Thread
40			Woven & Textile Fabrics
41			Clothing
42			Tyres & inner Tube
43			Gold
44			Paper & Paperboard
45			Chemicals
46			Iron & Steel Product
47			Machinery & Precision equipment
48			Precision Equipment
49			Electric-electronic Machine
50			Electric machine for domestic purpose
51			Information & Communication Equi.
52			Semi-conductor
53			Passenger Car
54	Prices	Producer Price Index	All
55			Commodities
56			Agricultural, Forest & Marine Products
57			Services
58			Transportation
59			Financial Services
60		Customer Price Index	Total item
61			Food and non-alcoholic beverages
62			Housing, water, electricity, gas and other fuels
63			Furnishings, household equipment and routine household maintenance
64			Recreation and culture
65			Restaurants and hotels
66			Miscellaneous goods and services
67		Housing Price Index	All Groups
68			All Groups(Seoul)
69			Detached Dwelling

#	Class	Type	Variable
70	Prices	Housing Price Index	Row House
71			Apartment(All)
72			Apartment(Seoul)
73	Money	Monetary Aggregates	Bank Notes and Coins in Circulation(End Of)
74			Monetary Base(End Of)
75			M1-MMF(End of)
76			M2(Broad Money, End Of)
77			Lf(End Of)
78			L(End of)
79			Seasonally Ajusted M1(End of)
80			Seasonally Ajusted M2(End of)
81			Seasonally Adjusted Lf(End Of)
82			Seasonally Adjusted L(End of)
83		Loans & Discounts by fund	Total Deposits of CBs & SBs. (End Of)
84			Time & Savings Deposits of CBs & SBs. (End Of)
85			Loans of CBs & SBs(End Of)
86			Turnover Ratio of Demand Deposits, CBs & SBs
87			Total Loans(CBs & SBs)
88			Equipment
89			Operation
90			Loans With Banking Funds
91			Loans With Govt Funds
92		Loans & Discounts by BOK	TOTAL
93			AGGR.LOANS PROV (Total)
94			AGGR.LOANS PROV (Local)
95	Exchange Rates	Exchange Rates	Won per Japan Yen(100Yen)
96			Won per Euro
97			Won per United Kingdom Pound Sterling
98			Won per Canadian Dollar
99			Won per Swiss Franc
100			Won per Hongkong Dollar
101			Won per Sweden Swdish Krona
102			Won per Australian Dollar
103			Won per Denmark Danish Krone
104			Won per Norwagian Krone
105			Won per Saudi Riyal
106	Value of Orders	Value of Machinery Orders	Total Value Ordered
107			Domestic Demand
108			Government and Public
109			Private Demand
110			Manufacturing
111			Non-Manufacturing
112			Agencies
113			Overseas Demand
114			Engines
115			Special Purpose Machinery
116			General Purpose Machinery
117			Electrical Machinery
118			Motor Vehicles
119			Precise Process Control Equipment
120		Value of Orders	Total Value Ordered(Excluding Vessels)
121			Domestic Demand(Excluding Vessels)
122			Private Demand(Excluding Vessels)
123			Overseas Demand(Excluding Vessels)
124			Total Value Ordered(Excluding Vessels·Internal conversion engine for vessels)
125			Domestic Demand(Excluding Vessels·Internal conversion engine for vessels)
126			Government and Public(Excluding Vessels·Internal conversion engine for vessels)
127			Private Demand(Excluding Vessels·Internal conversion engine for vessels)
128			Overseas Demand(Excluding Vessels·Internal conversion engine for vessels)
129		Value of Domestic Construction Orders	Total Orders Received
130			Public
131			Central Government
132			Local Government
133			Public Corporation
134			Other Public Body
135			Private
136			Manufacturing
137			Non-Manufacturing
138			Building
139			Dwellings
140			Offices and Stores
141			Factory and Storage
142			Public Offices

#	Class	Type	Variable
143	Value of Orders	Value of Domestic Construction Orders	Others
144			Civil Engineering
145			Roads and Bridges
146			Water Supply and Sewerage
147			Generation of Electricity
148			Land Development
149			Installation of Machinery
150	Inventory	Inventory Index	All Groups
151			Mining and quarrying
152			Manufacturing
153			Manufacture of Food Products
154			Manufacture of Beverages
155			Manufacture of Tobacco Products
156			Manufacture of Textiles, Except Apparel
157			Manufacture of wearing apparel, Clothing Accessories and Fur Articles
158			Tanning and Dressing of Leather , Manufacture of Luggage and Footwear
159			Manufacture of Wood and of Products of Wood and Cork ; Except Furniture
160			Manufacture of Pulp, Paper and Paper Products
161			Manufacture of Coke, hard-coal and lignite fuel briquettes and Refine
162			Manufacture of chemicals and chemical products (except pharmaceuticals
163			Manufacture of Rubber and Plastic Products
164			Manufacture of Other Non-metallic Mineral Products
165			Manufacture of Basic Metal Products
166			Manufacture of Fabricated Metal Products, Except Machinery and Furniture
167			Manufacture of Electronic Components, Computer, Radio, Television and
168			Manufacture of Medical, Precision and Optical Instruments, Watches and
169			Manufacture of electrical equipment
170			Manufacture of Other Machinery and Equipment
171			Manufacture of Motor Vehicles, Trailers and Semitrailers
172			Manufacture of Other Transport Equipment
173			Manufacture of Furniture
174			Other manufacturing
175	Housing	Unsold Houses in Lots	Whole Country
176			Seoul
177			Busan
178			Daegu
179			Incheon
180			Gwangju
181			Daejeon
182			Ulsan
183			Gyeonggi-do
184			Gangwon-do
185			Chungcheongbuk-do
186			Chungcheongnam-do
187			Jeollabuk-do
188			Jeollanam-do
189			Gyeongsangbuk-do
190			Gyeongsangnam-do
191			Jeju-do
192			(National Capital Region)
193	Wholesale and Retail Sales	Wholesale Index	All Groups
194			Sale of Motor Vehicles and Parts
195			Sale of Motor Vehicles
196			Sale of Motor Vehicle Parts and two-wheeled vehicle
197			Wholesale Trade
198			Brokerage of Industrial Agricultural Raw Materials
199			Wholesale of Food, Beverages and Tobaccos
200			Wholesale of Household Goods
201			Wholesale of Machinery Equipment and Supplies
202			Wholesale of Construction Materials and Hardware
203			Other Specialized Wholesale
204		Retail Sales Index	Retail Trade
205			Retail Sale in Non-Specialized Stores
206			Retail Sale of Foods, Beverages and Tobacco in Specialized Stores
207			Retail Sale of Textiles, Clothing and Footwear Goods
208			Retail Sale of Fuel
209			Retail Sale not in Stores
210	Manufacturing	Industrial Index	All Items
211			Capital Goods
212			Manufacturing Equipment
213			Electricity
214			Communication
215			Transportation Equipment

#	Class	Type	Variable
216	Manufacturing	Industrial Index	Agriculture
217			Construction
218			Office
219			Others
220			Intermediate Goods
221			Manufacturing
222			Construction
223			Fuel and Electricity
224			Others
225			Consumers' Goods
226			Durable Consumers' Goods
227			Non-Durable Consumers' Goods
228		Manufacturing Operation Ratio Index	Manufacture
229			Food Products
230			Beverages Products
231			Tobacco Products
232			Petroleum Products
233			Manufacture of wearing apparel, Accessories and Fur Articles
234			Tanning and Dressing of Leather, Luggage and Footwaer
235			Manufacture of Wood and of Products of Wood and Cork
236			Pulp, Paper and Paper Products
237			Coke, hard-coal and lignite fuel briquettes and Refined Petroleum Products
238			Chemicals and chemical products
239			Rubber and Plastic Products
240			Non-metallic Mineral Products
241			Basic Metal Products
242			Fabricated Metal Products
243			Electronic Components, Computer, Radio, Television and Communication Equipment and Apparatuses
244			Medical, Precision and Optical Instruments, Watches
245			Electrical Equipment
246			Other Machinery and Equipment
247			Motor Vehicles, Trailers and Semitrailers
248			Other Transport Equipment
249			Other manufacturing
250	Employment	Unemployed	Total
251			Less than 3mo.
252			More than 3mo. And Less than 6mo.
253			More than 6mo. And Less than 12mo.
254			More than 6mo.
255		Labor Force	Pop. 15 Years Old an Over
256			Economically Active Pop.
257			Employed Persons
258			Unemployment Persons
259			Not Economically Active Pop.
260			Participation Rate
261			Unemployment Rate
262			Employment Rate
263	Output	Production Index	All Groups
264			Mining and Manufacturing
265			Mining
266			Manufacturing
267		Shipment Index	All Groups
268			Mining and Manufacturing
269			Mining
270			Manufacturing
271			Electricity & Gas
272	Misc.	Misc.	Leading Composite Index
273			Coincident Composite Index
274			Lagging Composite Index
275			Cycle of Coincident Composite Index
276			Cycle of Leading Composite Index
277			Total Equipment Index
278	Stocks	Stocks	Korea Kospi 100 Index (Kospi100)
279			Korea Kospi 50 Index (Kospi50)
280			Kosdaq 100 Index (Kosd100)
281			Kosdaq Construction Indx (Koscnst)
282			Kosdaq Distrib Srv Indx (Kosdist)
283			Kosdaq Finance Index (Kosfinc)
284			Kosdaq Index (Kosdaq)
285			Kosdaq It Composite Indx (Kositcp)
286			Kosdaq Manufacturing Idx (Kosmanu)
287			Kosdaq Others Index (Kosothr)

#	Class	Type	Variable
288			Kospi 200 Index (Kospi2)
289			Kospi Banks Index (Kospbank)
290			Kospi Chemicals Index (Kospchem)
291			Kospi Communication Idx (Kospcomm)
292			Kospi Construction Indx (Kospcons)
293			Kospi Distribution Indus (Kospwhol)
294			Kospi Electric & Ele Equ (Kospolec)
295			Kospi Electricity & Gas (Kospelgs)
296			Kospi Finance Index (Kospfin)
297			Kospi Food & Beverage Ix (Kospfbev)
298			Kospi Index (Kospi)
299	Stocks	Stocks	Kospi Insurance Index (Kospinsr)
300			Kospi Iron & Metal Pr Ix (Kospbmet)
301			Kospi Large Cap Index (Kosplmkc)
302			Kospi Machinery Index (Kospmach)
303			Kospi Manufact Indu Indx (Kospman)
304			Kospi Medic Supplies Idx (Kospmed)
305			Kospi Medical & Prec Mac (Kospmdeq)
306			Kospi Mid Cap Index (Kospmmkc)
307			Kospi Nonmetallic Minrl (Kospnmet)
308			Kospi Paper & Wood Index (Kosppprd)
309			Kospi Securities Index (Kospsec)
310			Kospi Services Index (Kospserv)
311			Kospi Small Cap Index (Kospsmkc)
312			Kospi Textile & Wear App (Kosptxap)
313			Kospi Transport & Strge (Kosptran)
314			Kospi Transport Equipmt (Kosptreq)