ITQM0214 Moscow

Multi-Dimension Monitoring System for Regional Economy: Exploration and Practice in Xinjiang Autonomous Region

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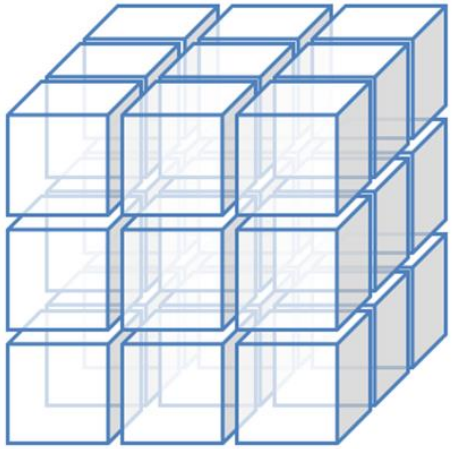


1. Motivation

- Leading index and Economic Early Warning :

Economic monitoring and early warning system has been successfully applied (such as UN, IMF, OECD, the European Central Bank and CEPR), which mainly focus on countries instead of regional economies.

- Characteristics of Regional Economy:

i) independence, specialization, stability

ii) the requirement for economic warning: central government focus on economic growth and price index; local government focus more on regional important industries

iii) lead-lag relationship is more unstable, more challenging

- The Characteristics of Xinjiang Economy:

northwest of China, resource industry oriented economy,

1. Motivation

- General Monitoring and Special Monitoring:

Traditionally, leading index systems focus on economic growth and inflation. For general situation, we take care of these two important aspects, let market work on other aspects. But Xinjiang is in a “great leap” period, the central government makes the whole national effort to promote the development of the region. .

- Multi – dimension Monitoring:

Decision making need take care more aspects: economic growth, inflation, investment, consumption, exports and imports, industry enterprises, energy industry, service industry, connection with other regions

- Connection between Subjects:

Could information from different subjects present a comprehensive view?

1. Motivation

- Monitoring Tools:

Composite index (CI) is the most frequent use tool for economic movement. A tool is a procedure under some assumptions to reveal some information. Single tool only reflects the economic movement from one cone. But the economic is very complexity, why not look at the economy from more cones?

- Multi-methods:

Composite index

Diffusion index

Signal lamps

Comprehensive monitoring index

Business cycle tracer

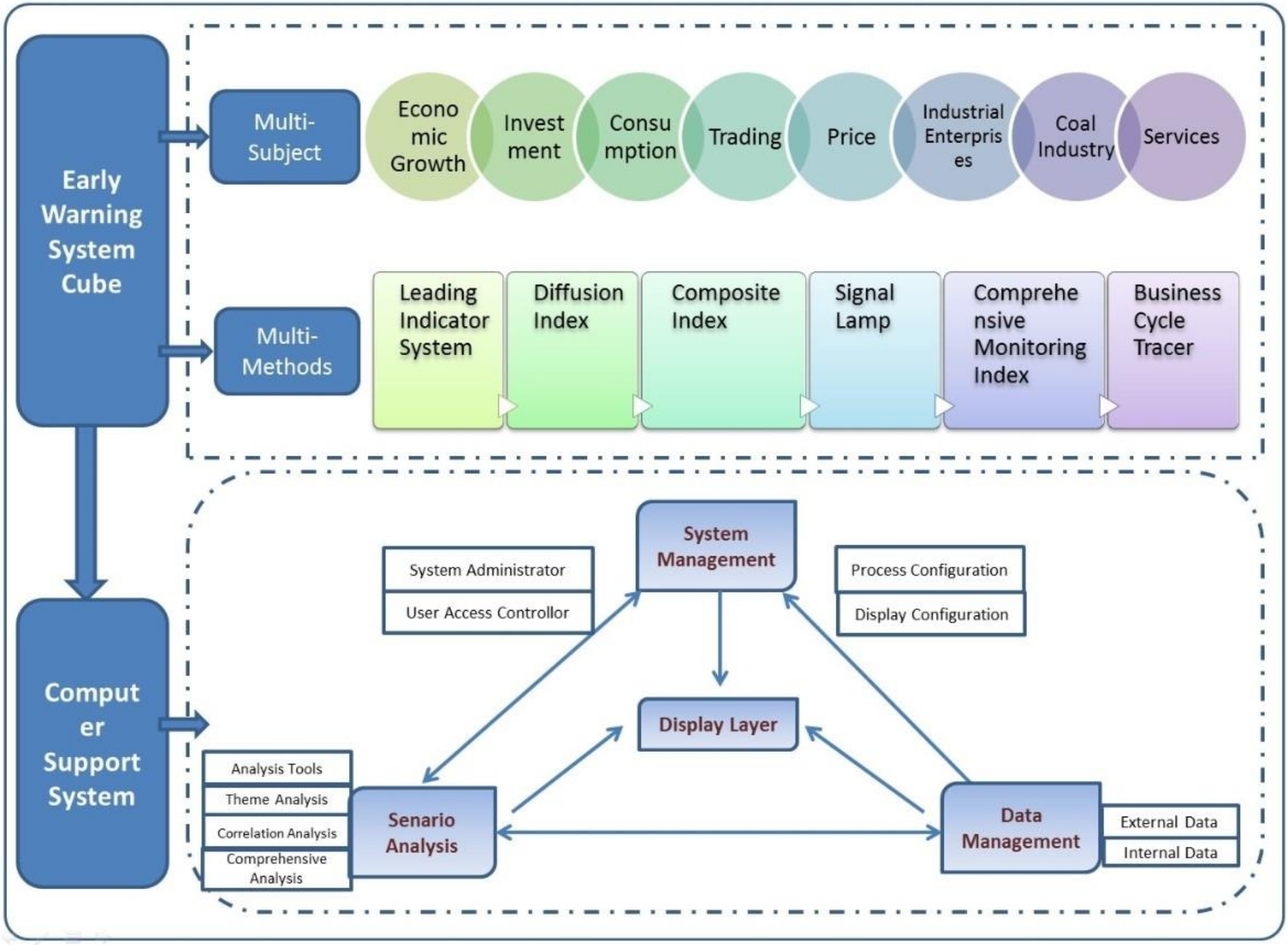
……..

2. Framework of the Multi-Dimension Monitoring System

- Objective:
- it is the requirement of macro-control and decision-making support for the local government.
- the increased uncertainty of international economic environment and the demand for reform in China propose higher requirement for regional monitoring and early-warning.
- multi-subjects:
- economic growth, investment, consumption, trade and prices;
- important industries in Xinjiang province: industrial enterprises, coal industry and services
- multi-methods:
- diffusion index, composite index, signal lamp, comprehensive monitoring index and business cycle tracer.
- computer support system
- monitoring and early warning system for Xinjiang region

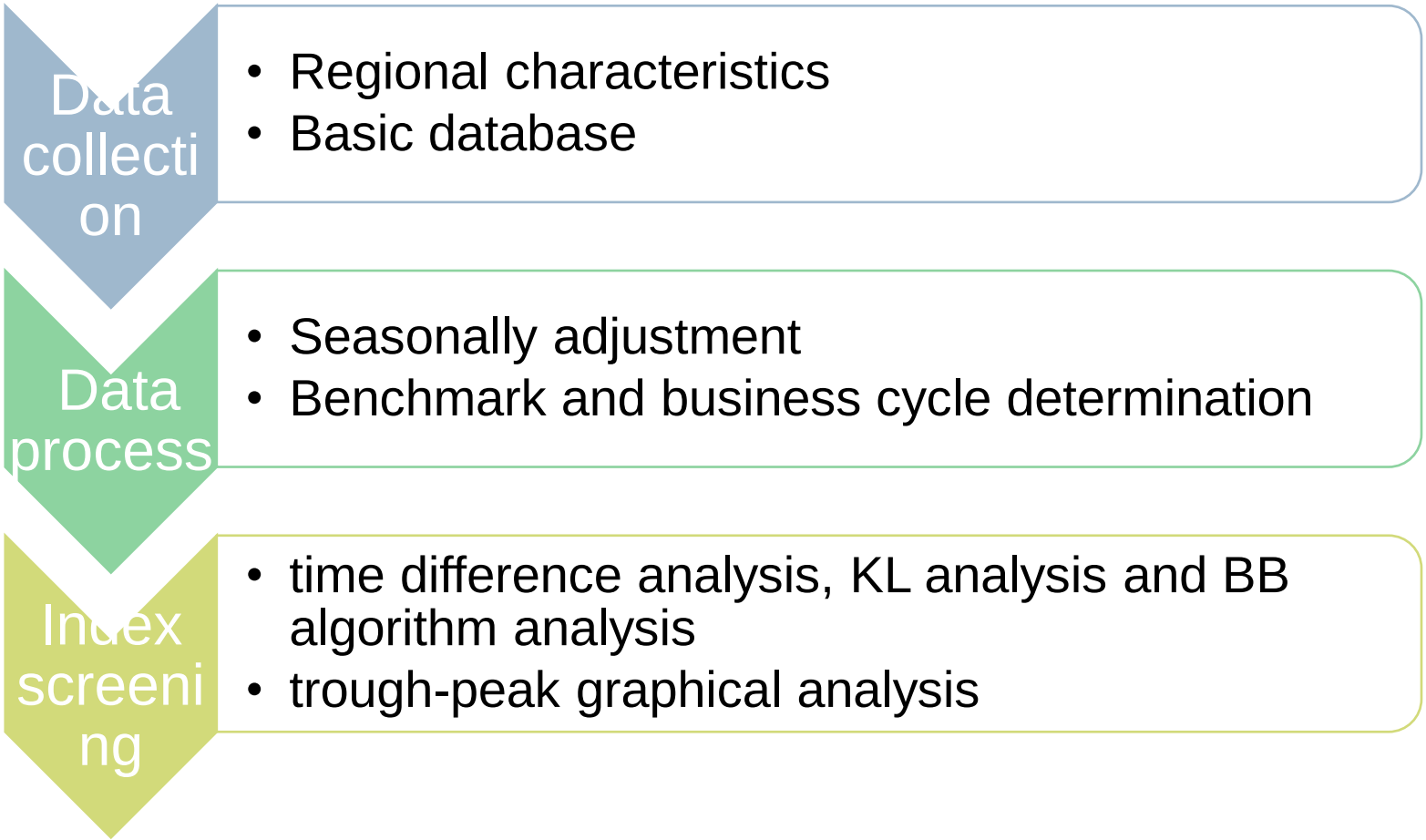
2. Framework of the Multi-Dimension Monitoring System

- **computer support system**
- system management: user access control, process configuration, display configuration
- data management: initialize and manage all types of data in the database, including external data and internal data
- scenario analysis: analyze the data and configure the model for each topic or subject, including analysis tools, theme analysis, correlation analysis and comprehensive analysis
- display layer: directly show the assumptions, outcomes and risks of the forecast


Early Warning System Cube
Multi-Subject
Econo mic Growth
Invest ment
Consu mption
Trading
Price
Industrial Enterpris es
Coal Industry
Services
Multi-Methods
Leading Indicator System
Diffusion Index
Composite Index
Signal Lamp
Comprehe nsive Monitoring Index
Business Cycle Tracer
Comput er Support System
System Management
System Administrator
User Access Controllor
Process Configuration
Display Configuration
Display Layer
Analysis Tools
Theme Analysis
Correlation Analysis
Comprehensive Analysis
Senario Analysis
Data Management
External Data
Internal Data

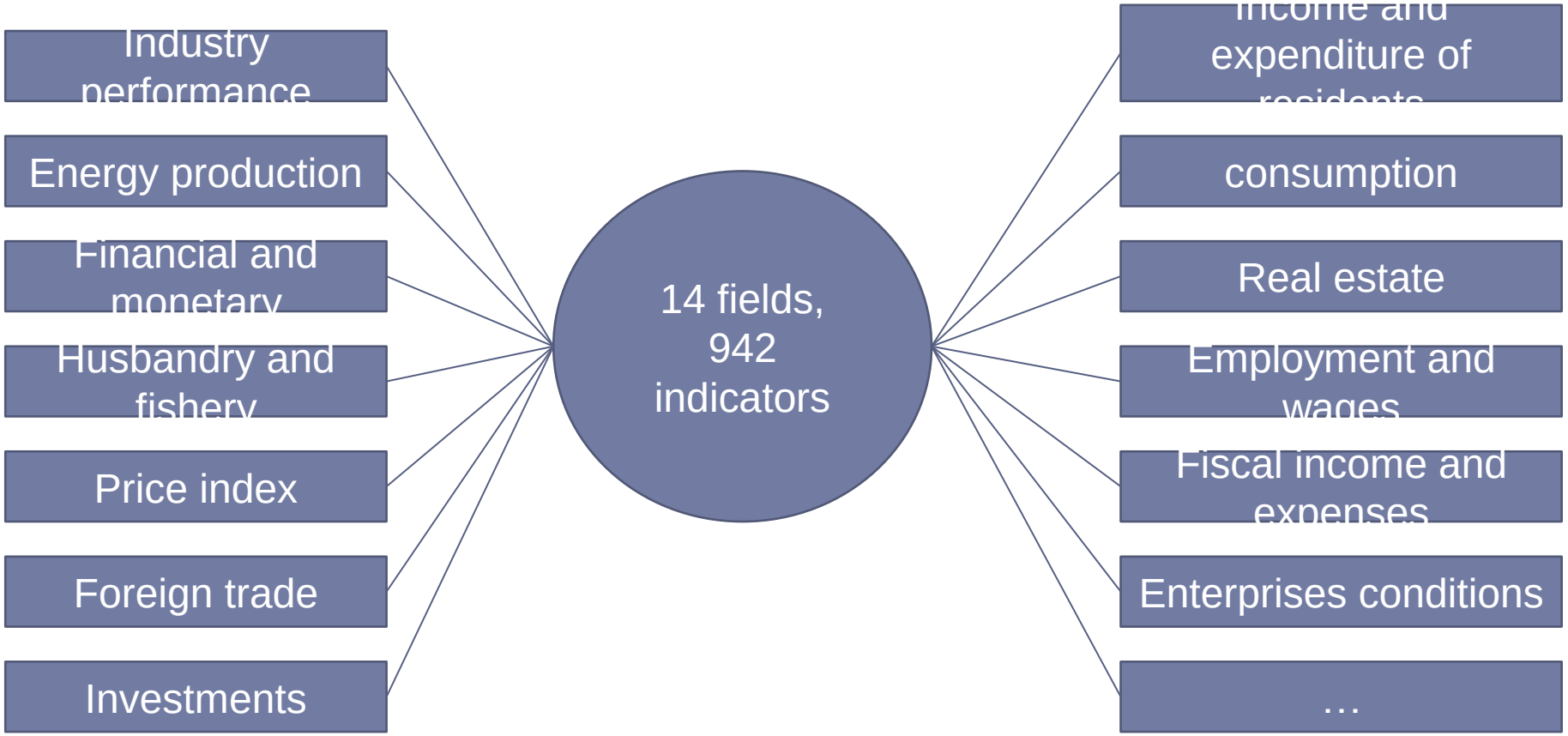
3. Construction of Monitoring Instruments

- **screening process**



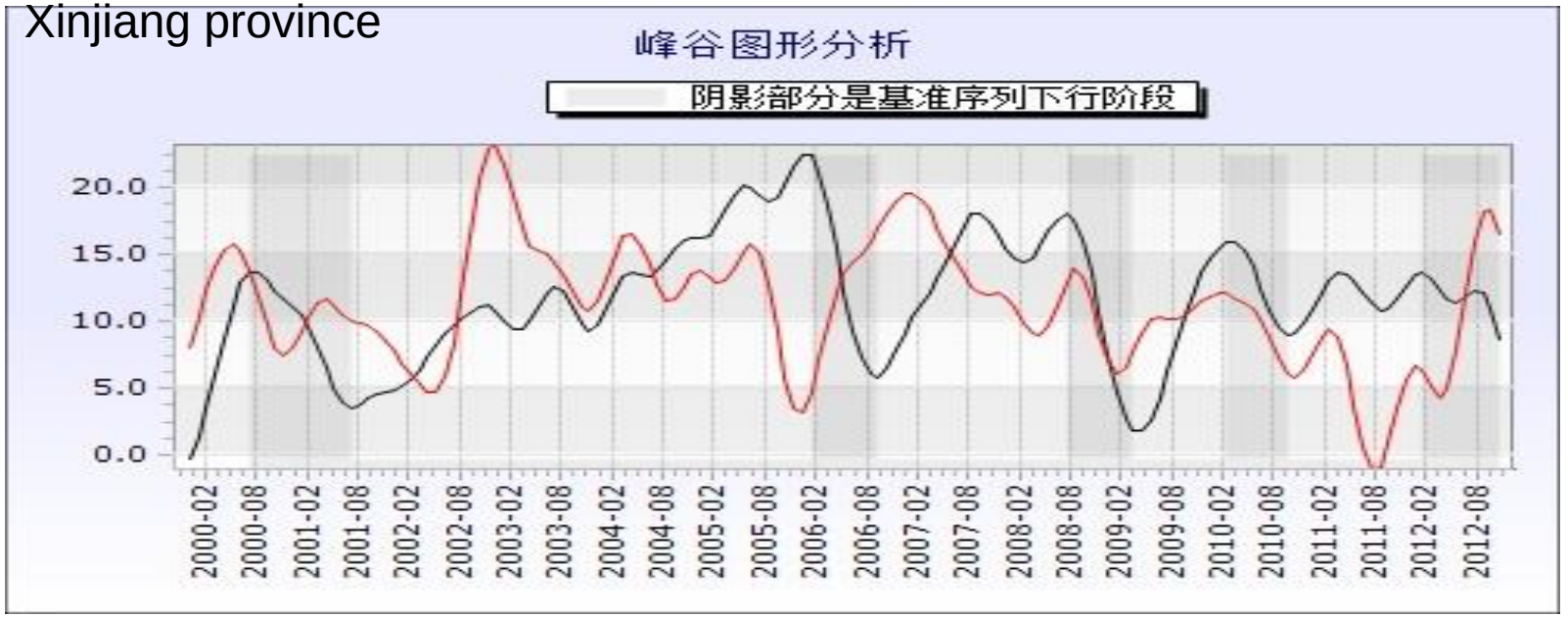
3. Construction of Monitoring Instruments

- **Database: capture the characteristics of China's economy as a whole and Xinjiang's regional economy**



3. Construction of Monitoring Instruments

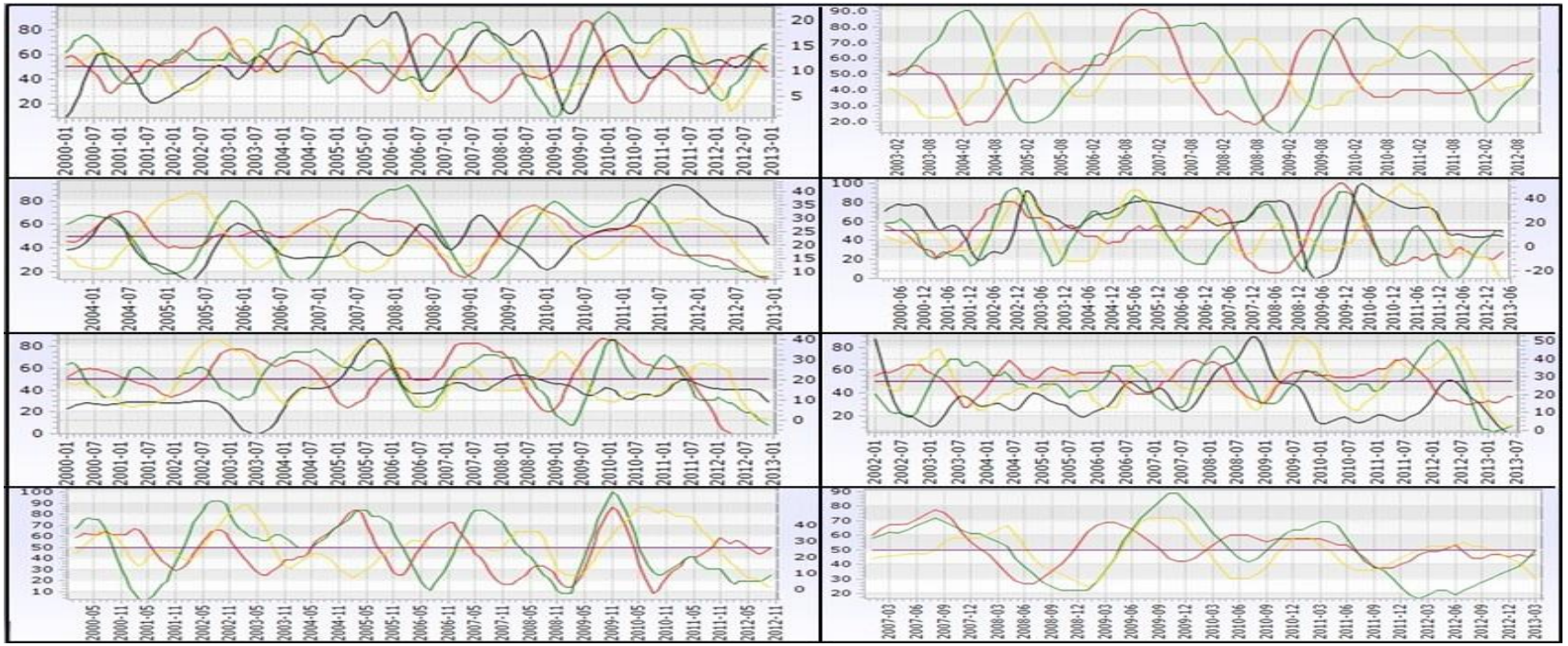
- Regional characteristic: trough and peaks of Y-to-Y growth of gasoline production stably precede the Y-to-Y growth of industrial added value for Xinjiang province



Indicator	time difference analysis		KL analysis		BB algorithm	
	order	coefficient	order	coefficient	Peak order	Trough order
Y-to-Y growth of gasoline production	-10	0.2678	-12	1838.07	-14	-0.33

3. Construction of Monitoring Instruments

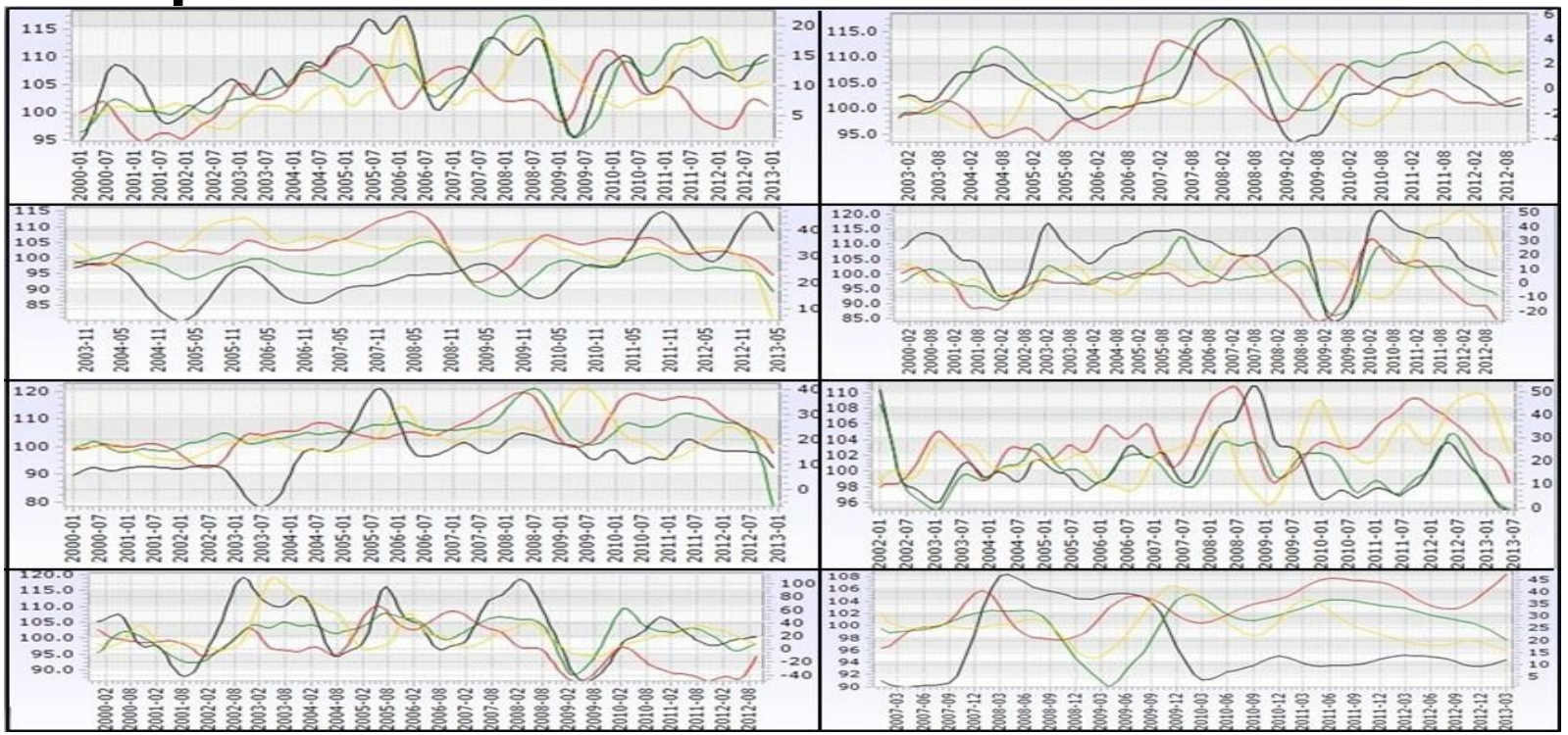
- **Diffusion Index**



- **Note:** The red line indicates the leading diffusion index. The green line indicates the consistent diffusion index. The yellow line indicates the lagging diffusion index. The sequence of the first column is economic growth, investment, consumption and trade. The sequence of the second column is prices, industrial enterprise, coal industry and services.

3. Construction of Monitoring Instruments

- **Composite Index**



- **Note:** The red line indicates the leading diffusion index. The green line indicates the consistent diffusion index. The yellow line indicates the lagging diffusion index. The sequence of the first column is economic growth, investment, consumption and trade. The sequence of the second column is prices, industrial enterprise, coal industry and services.

3. Construction of Monitoring Instruments

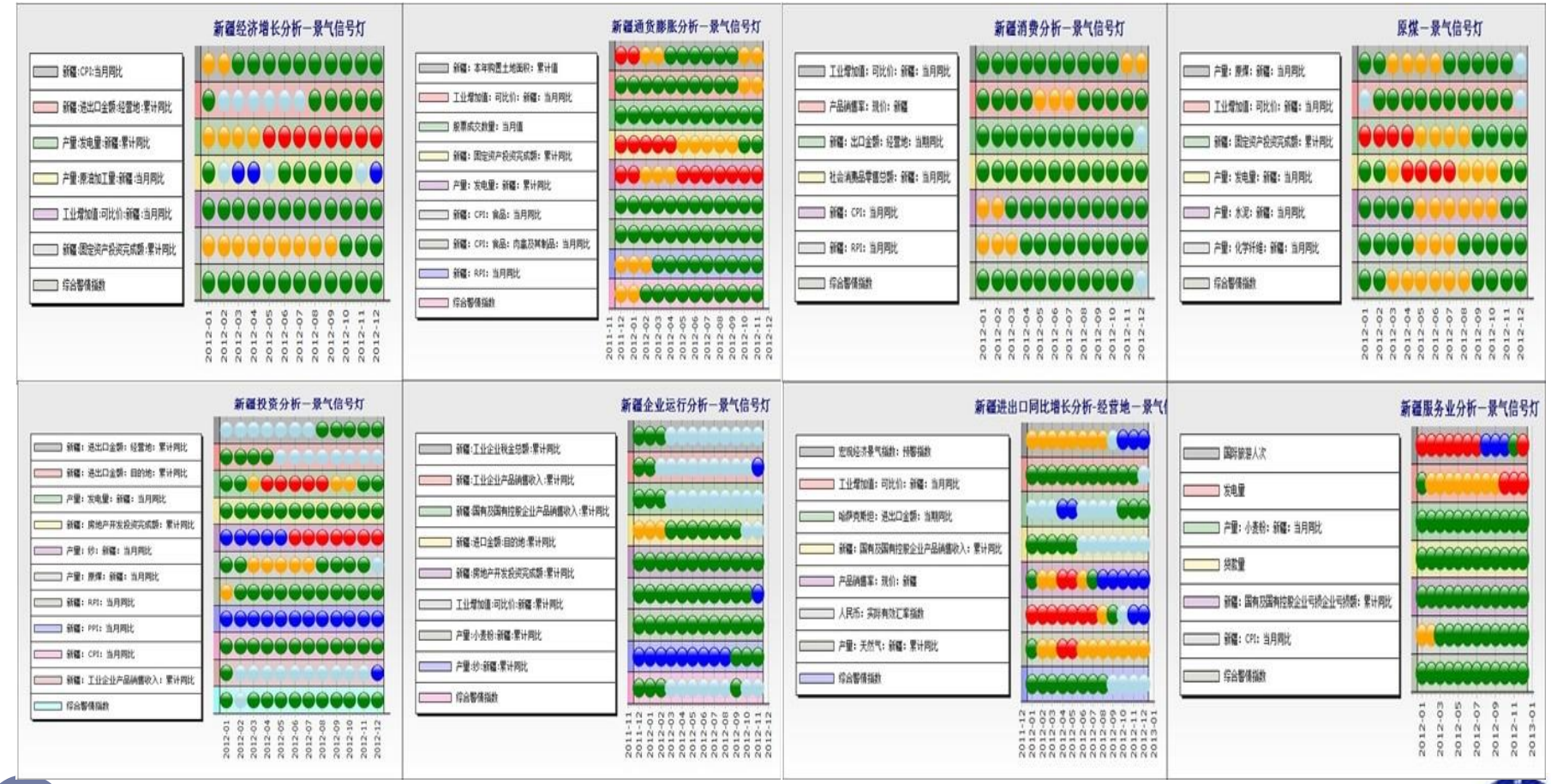
- **Composite Index:** the result of peak-trough graphical analysis

	Leading composite index				Consistent composite index				Lagging composite index			
	Peak orders	Peak SD	Trough orders	Trough SD	Peak orders	Peak SD	Trough orders	Trough SD	Peak orders	Peak SD	Trough orders	Trough SD
Economic Growth	-7.25	4.27	-5.66	3.06	0.8	1.64	0.4	2.88	10.5	8.1	9	4.58
Investment	-3	1.732	-4	2.65	1.5	1.414	4	2.645	13.3	3.46	15	4.24
Consumption	-12	7.12	-9.67	5.51	2.75	2.22	-1.33	8.02	7.25	4.92	11.67	10.12
Trade	-5.6	7.96	-4	5.94	-0.6	6.77	0	1.83	5.4	2.97	6.25	2.22
Prices	-11.6	3.49	-5	1	1	0.82	0.67	2.87	8.33	0.94	8.33	2.87
Industrial enterprise	-5.33	3.32	-7.25	4.55	0.4	0.49	-1	0.83	7.75	8.58	2.5	8.35
Coal industry	-6	1.15	-7.33	3.79	0.67	1.15	0.67	1.15	12.5	5.32	12.75	4.11
Services	-8	5.1	-7	1.41	2.75	16.87	5.25	5.17	14	2.45	13	14.97

the reference series. Consumption has the longest leading periods and it can predict the fluctuations 9 to 12 months in advance. However, investment has the shortest leading periods for 3 to 4 months.

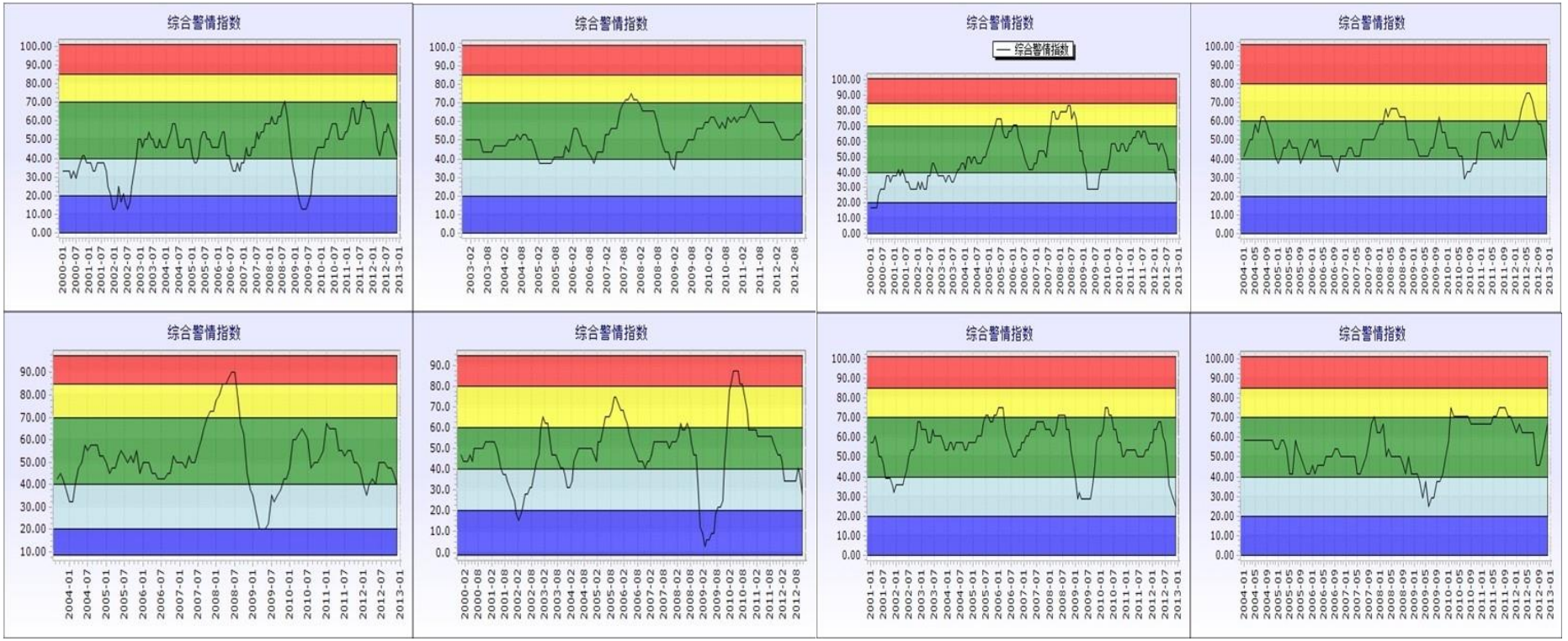
3. Construction of Monitoring Instruments

- **Signal Lamp**



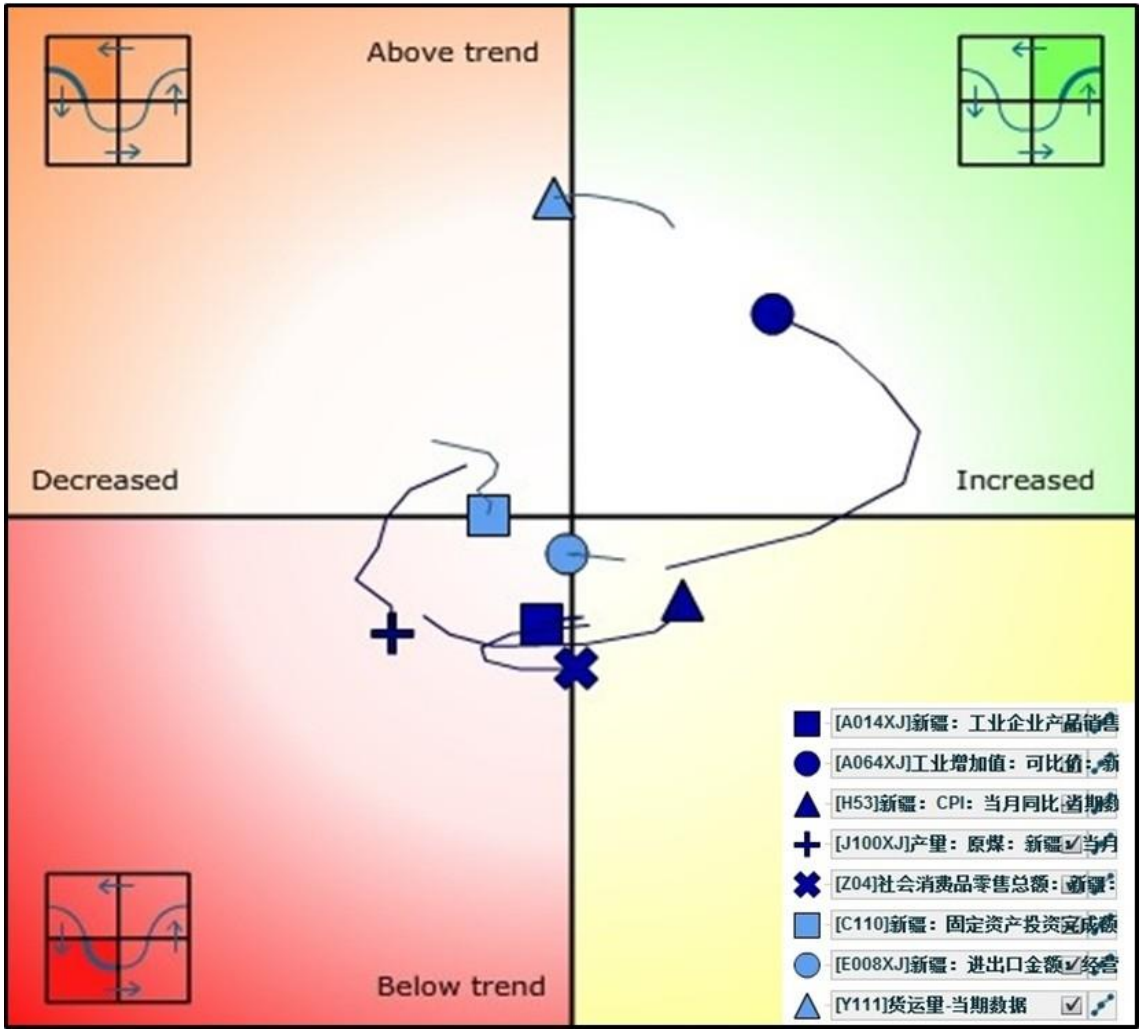
3. Construction of Monitoring Instruments

- **Comprehensive Monitoring Index**

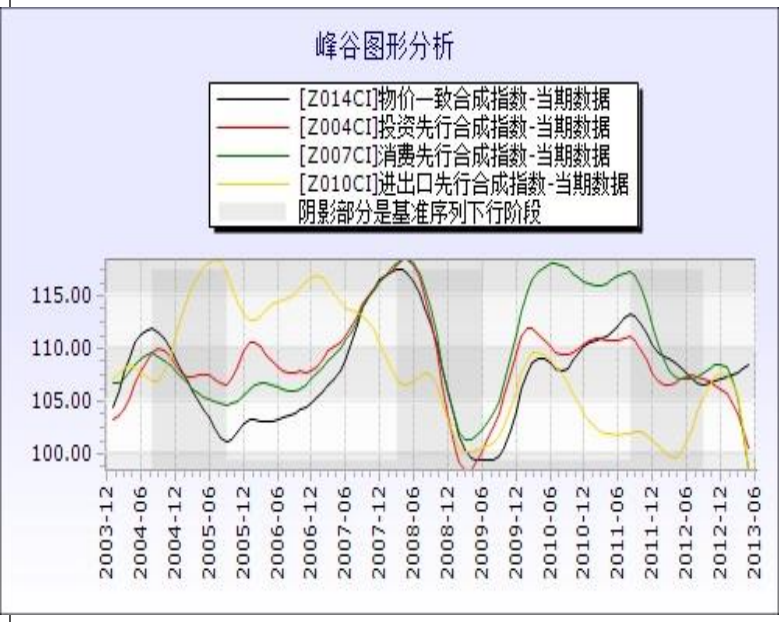


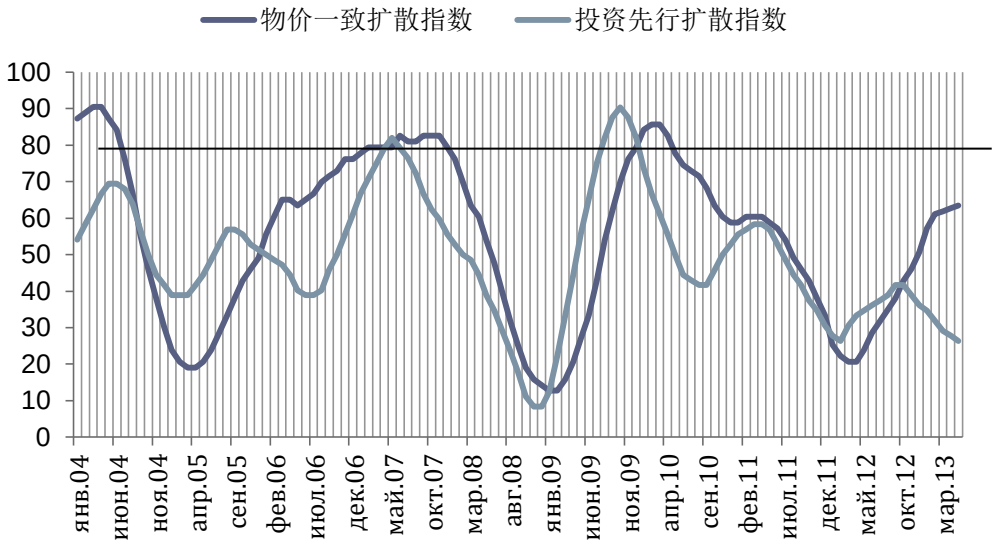
3. Construction of Monitoring Instruments

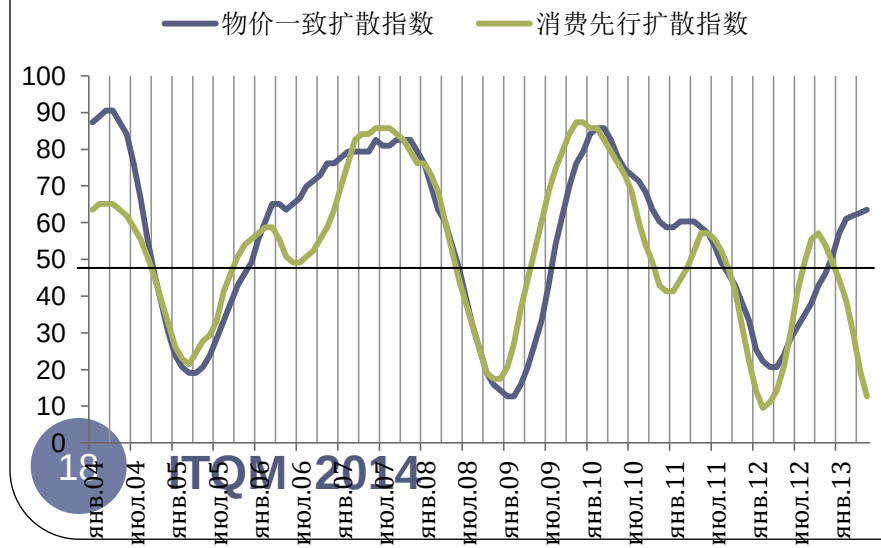
- **Business cycle tracer for 8 subjects**

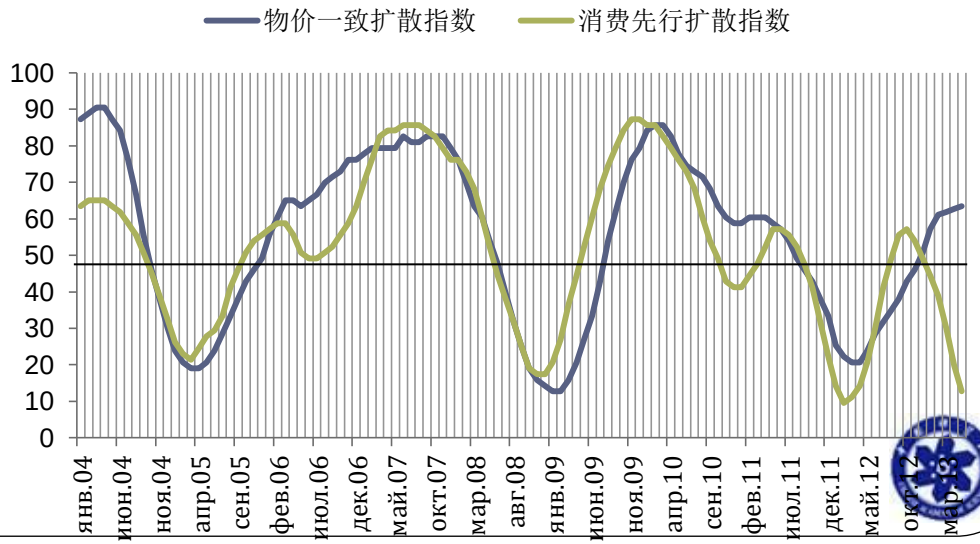


4. Monitoring Cube

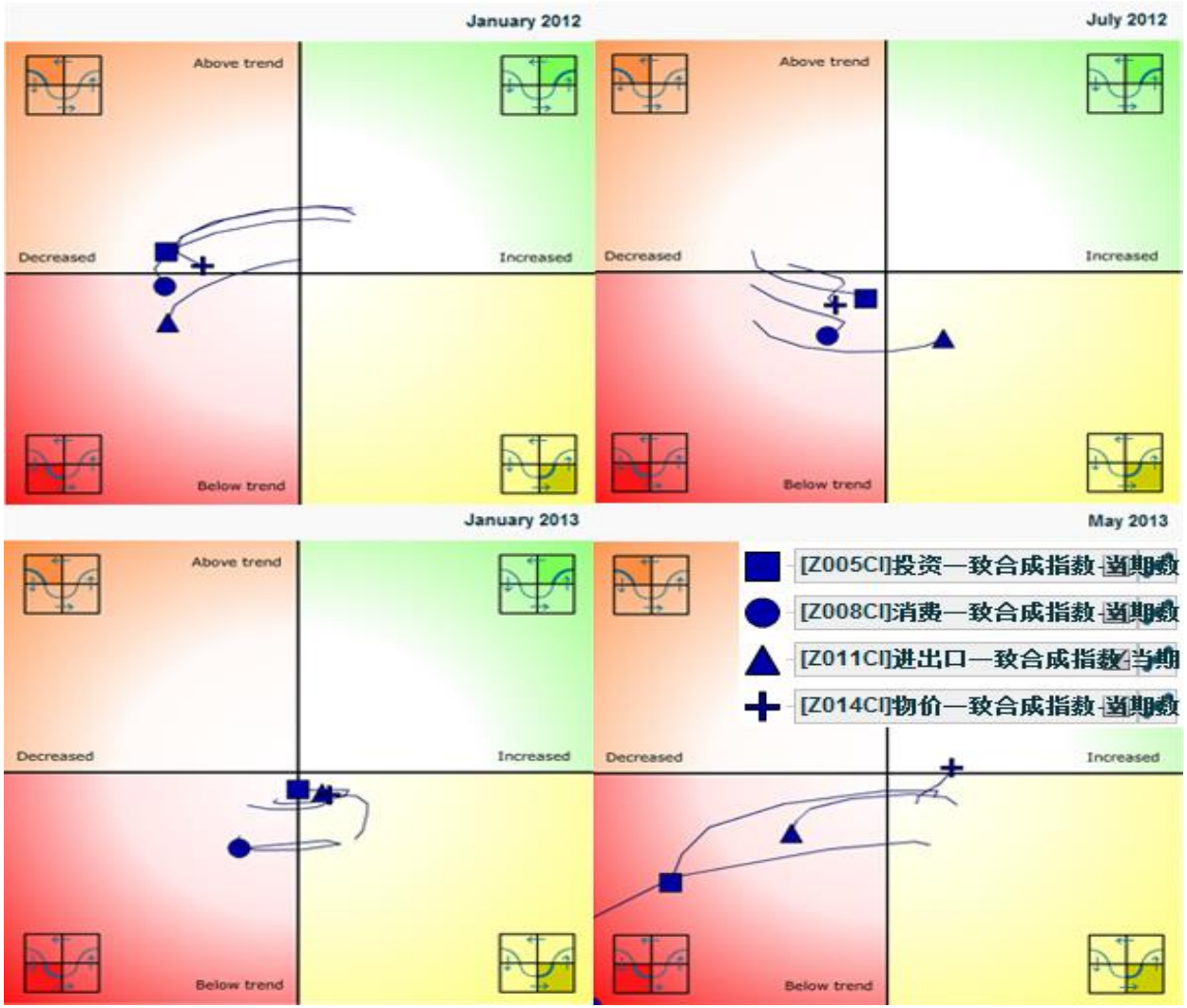






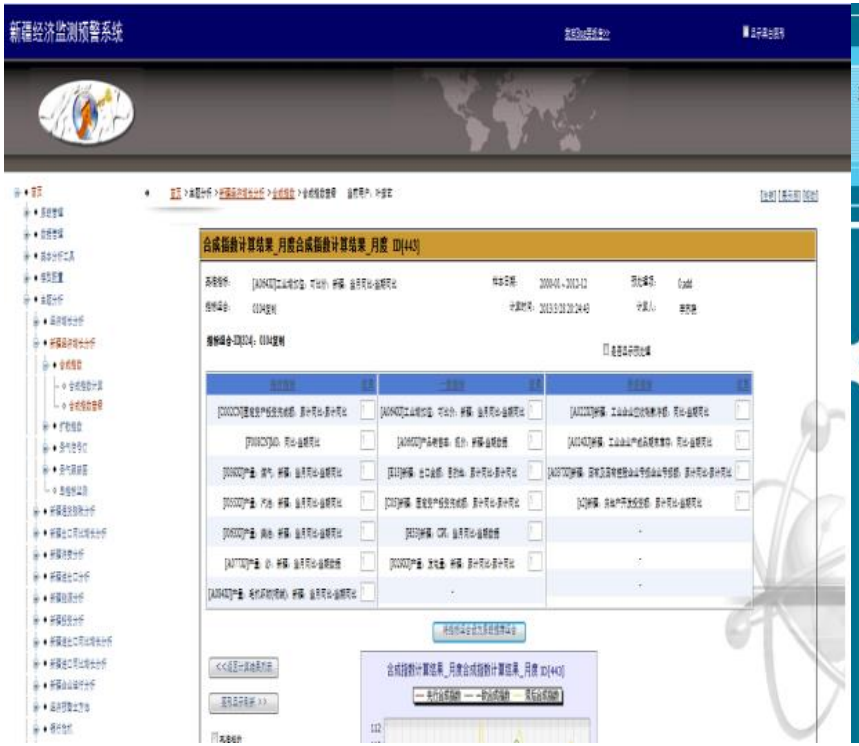


4. Monitoring Cube



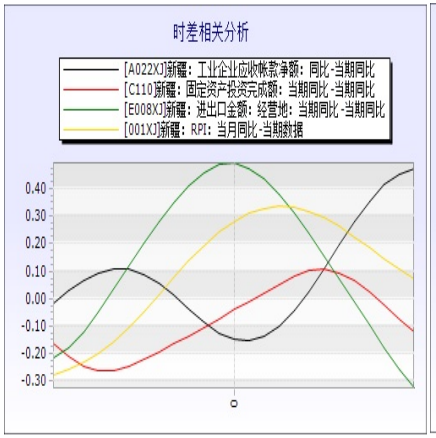
5. Practice in Decision Supporting

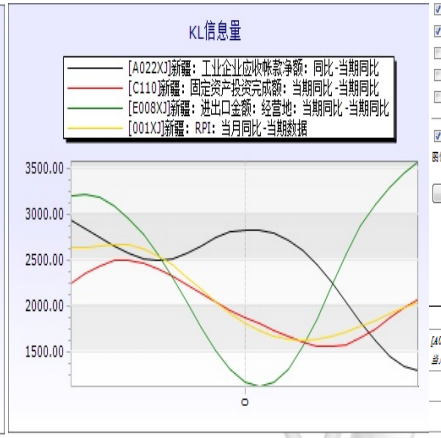
- The calculation process about the leading-lagging index and the presentation layer

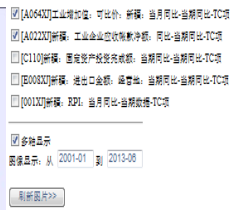


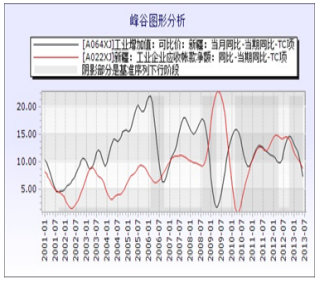
5. Practice in Decision Supporting

- the correlation analysis and trough graphical analysis in the basic analysis tools









指标名称	时差相关分析（阶数：系数）	KL信息量（阶数：系数）
[A022XJ]新疆：工业企业应收帐款净额：同比-当期同比	阶数：12，统计量：0.4763	阶数：12，统计量：1292.6046
[C110]新疆：固定资产投资完成额：当期同比-当期同比	阶数：-9，统计量：-0.2637	阶数：6，统计量：1554.1301
[E008XJ]新疆：进出口金额：经营地：当期同比-当期同比	阶数：0，统计量：0.4950	阶数：1，统计量：1123.8518
[001XJ]新疆：RPI：当月同比-当期数据	阶数：3，统计量：0.3364	阶数：4，统计量：1625.9694

基准指标拐点	分析指标拐点			
[A064XJ]工业增加值：可比价：新疆：当月同比-当期同比	[A022XJ]新疆：工业企业应收帐款净额：同比-当期同比	[C110]新疆：固定资产投资完成额：当期同比-当期同比	[E008XJ]新疆：进出口金额：经营地：当期同比-当期同比	[001XJ]新疆：RPI：当月同比-当期数据
2001-09(谷)	2004-04(谷)	2002-03(谷)	2004-09(谷)	2002-05(谷)
2006-02(峰)	2005-09(峰)	2003-01(峰)	2005-08(峰)	2004-09(峰)
2006-10(谷)	2006-05(谷)	2005-03(谷)	2006-09(谷)	2005-09(谷)
2008-08(峰)	2007-08(峰)	2005-12(峰)	2008-04(峰)	2008-04(峰)
2009-04(谷)	2008-08(谷)	2007-01(谷)	2009-06(谷)	2009-04(谷)
2010-03(峰)	2009-05(峰)	2010-02(谷)	2010-12(峰)	2011-08(峰)
2012-04(谷)	2010-04(谷)	2010-02(谷)	2012-01(谷)	2012-08(谷)
2012-10(峰)	2012-03(峰)	2011-10(峰)	2012-12(峰)	--
分析结果：	峰平均阶数为 -8.5,标准差为3.11,谷平均阶数为 -1.5,标准差为23.22.	峰平均阶数为 -27,标准差为13.23,谷平均阶数为 -16.5,标准差为15.42.	峰平均阶数为 0.25,标准差为6.75,谷平均阶数为 8.5,标准差为18.45.	峰平均阶数为 -1.3333,标准差为17.16,谷平均阶数为 -0.25,标准差为9.11.

5. Practice in Decision Supporting

- **Bi-annual reports**
- “Report of Xinjiang’s economy in 2012”, “Report of Xinjiang’s economy in the first half of 2013”, “Report of Xinjiang’s economy in 2013”
- **Policy reports:**
- "Analysis and Forecast of Xinjiang’s Economic Growth in 2013", " Analysis and Forecast of Xinjiang’s Import and Export Trade in 2013 ", " Analysis and Forecast of Xinjiang’s Consumer Price Index in 2013”, “Analysis and Forecast of Xinjiang’s Consumption Operating Characteristics And Climate", "Boom of Xinjiang’s Investment Operating Characteristics And Analysis and Forecast in the Second half of 2013”, “Boom of Xinjiang’s Coal Industry And Analysis and Forecast in the Second half of 2013”, "The characteristics, analysis and forecasts of Xinjiang’s services", "The characteristics, analysis and forecasts of Xinjiang’s Industrial enterprises above designated scale "

5.Conclusion

- Construct a multi-dimension monitoring system for Xinjiang province
- develop a computer support system for integrated monitoring and comprehensive early warning

Thanks