Corruption, Political Stability and Efficiency of Government Expenditure on Health Care -- Evidence from Asian Countries

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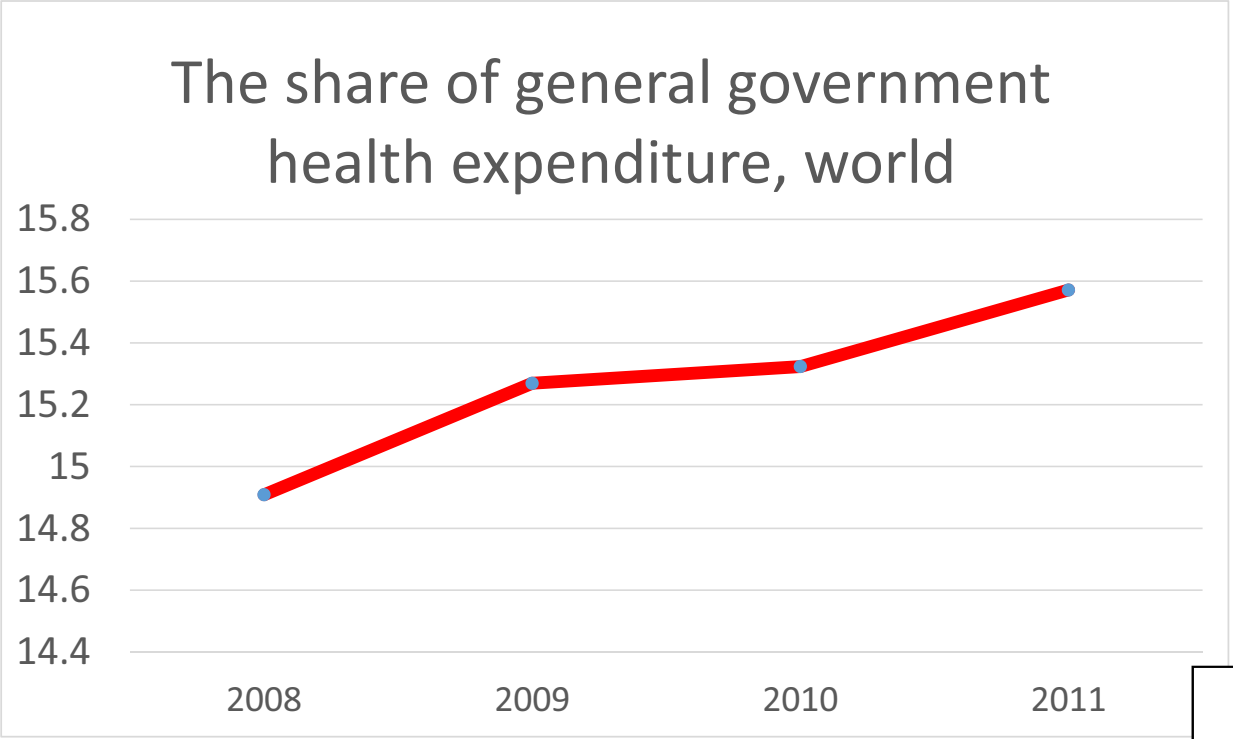
1 Introduction

Health care expenditure in the world



- Health care expenditure is an important field for the government in many countries.
- Expenditure is increasing every year.
- Up to 15% of government expenditure on average in the world in 2011.

Domestic general government health expenditure (% of general government expenditure)

Importance to capture the efficiency of Health care expenditure in Asia

- These years, Asian countries have achieved rapid economic growth. Governments of these countries have to find some effective ways to convert the economic growth to the improvement of citizens' living standards through efficient expenditure in fields such as health care. **Good health condition may help raise the quality of labor force**, which facilitates further economic growth.
- Therefore, it is extremely important to measure the efficiency of the health expenditure of these countries and explore what factors affect it.

Quality of Life in courtiers

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: **a long and healthy life, being knowledgeable and have a decent standard of living**. The HDI is the geometric mean of normalized indices for each of the three dimensions.

The average annual growth rate of Human Development Index and GDP, 2001-2010 （total 188 countries)

Rank	Country	GRHD	GRG	Rank	Country	GRHD	GRG	Rank	Country	GRHD	GRG
5	Singapore	1.05	6.61	69	Iran	1.12	4.65	116	Philippines	0.72	4.63
12	Hong Kong, China	0.85	4.07	70	Georgia	0.99	6.25	120	Kyrgyzstan	0.65	4.11
17	Japan	0.32	0.64	71	Turkey	1.22	4.47	129	Tajikistan	1.28	7.03
18	Korea (Republic of)	0.76	4.42	73	Sri Lanka	0.84	5.17	131	India	1.62	7.51
19	Israel	0.38	3.00	76	Lebanon	..	5.82	132	Bhutan	..	8.70
30	Brunei	0.33	1.36	78	Azerbaijan	1.43	14.94	138	Lao PDR	1.59	7.12
33	Cyprus	0.58	3.03	84	Armenia	1.24	7.95	139	Bangladesh	1.54	5.57
33	Qatar	0.22	12.76	86	Jordan	0.43	6.30	143	Cambodia	2.61	8.00
38	Saudi Arabia	0.80	3.37	87	Thailand	1.03	4.74	144	Nepal	1.73	4.01
42	UAE	0.32	3.87	90	China	1.70	10.55	145	Myanmar	2.12	10.79
47	Bahrain	0.23	5.36	92	Mongolia	1.77	8.04	147	Pakistan	1.55	4.17
51	Kuwait	0.07	4.63	105	Uzbekistan	1.12	6.13	168	Yemen	1.06	3.90
52	Oman	1.25	3.29	111	Turkmenistan	..	9.38				
56	Kazakhstan	1.13	8.28	113	Indonesia	0.92	5.23				
59	Malaysia	0.67	4.79	115	Viet Nam	1.29	6.17		World	0.82	3.64

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Rank: Rank of human development index in 2016
GRHD: growth rate of human development index
GRG: growth rate of GDP

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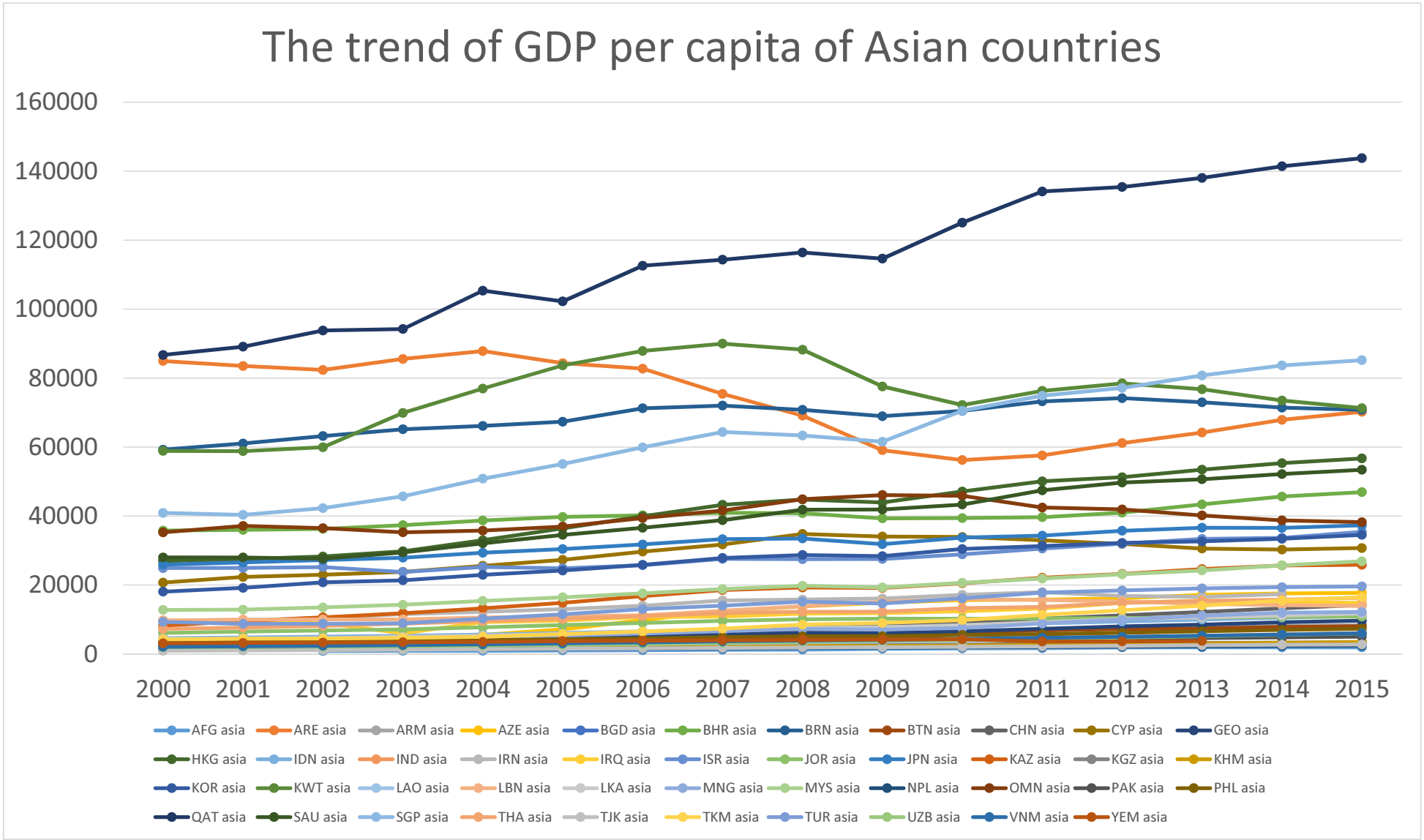
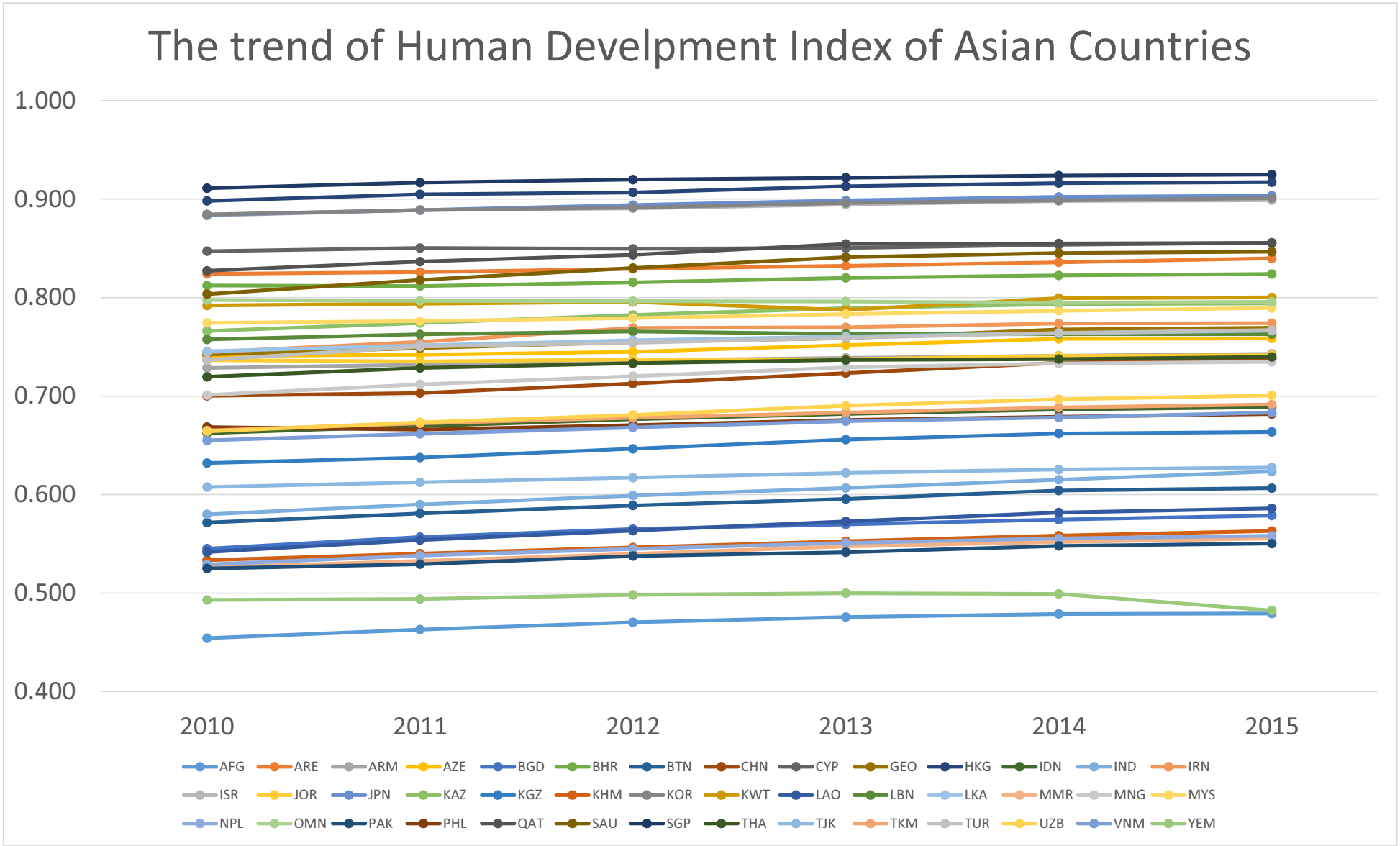

The trend of GDP per capita of Asian countries
160000
140000
120000
100000
80000
60000
40000
20000
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
AFG asia
ARE asia
ARM asia
AZE asia
BGD asia
BHR asia
BRN asia
BTN asia
CHN asia
CYP asia
GEO asia
HKG asia
IDN asia
IND asia
IRN asia
IRQ asia
ISR asia
JOR asia
JPN asia
KAZ asia
KGZ asia
KHM asia
KOR asia
KWT asia
LAO asia
LBN asia
LKA asia
MNG asia
MYS asia
NPL asia
OMN asia
PAK asia
PHL asia
QAT asia
SAU asia
SGP asia
THA asia
TJK asia
TKM asia
TUR asia
UZB asia
VNM asia
YEM asia


The trend of Human Develpment Index of Asian Countries
1.000
0.900
0.800
0.700
0.600
0.500
0.400
2010
2011
2012
2013
2014
2015
AFG ARE ARM AZE BGD BHR BTN CHN CYP GEO HKG IDN IND IRN
ISR JOR JPN KAZ KGZ KHM KOR KWT LAO LBN LKA MMR MNG MYS
NPL OMN PAK PHL QAT SAU SGP THA TJK TKM TUR UZB VNM YEM

Political factors (corruption, etc.) for efficiency

- Political factors such as corruption, democracy and political stability are often recognized as **one of the main factors to influence the efficiency.**

- The effect of political factors on economy or expenditure itself are researched. However, **the political effect on efficiency is rarely examined.** Therefore, it is important to focus on the political effect on efficiency.

Corruption as one of the factors of efficiency

- Corruption may be one of the factors that have led to the difference of efficiency, because in Asian countries, corruption is still one of the major problems that the health care system faces.

Case of corruption

- Asian countries are facing the corruption problem.
- For example, in China, in recent years, several cases of corruption in the health care system were revealed.
- In 2006, Heping Hao, head of the department of medical equipment in the National Food and Drug Administration, got 50,000 yuan (about 7,200 dollars), one car and three membership cards that value approximately 500,000 yuan (about 72,000 dollars) as bribe.
- Hong Bai, a governor in the Health Bureau of Beijing, illegally took 4 million yuan (about 580,000 dollars) of public fund for personal purpose in 2011.
- Lanmao Xie, deputy head of the Health Bureau of Xingguo County, Jiangxi Province, illegally took 2.1 million yuan (about 300,000 dollars) of public fund for personal purpose in 2014.
- “Tip” for doctor is often required.

Research Question

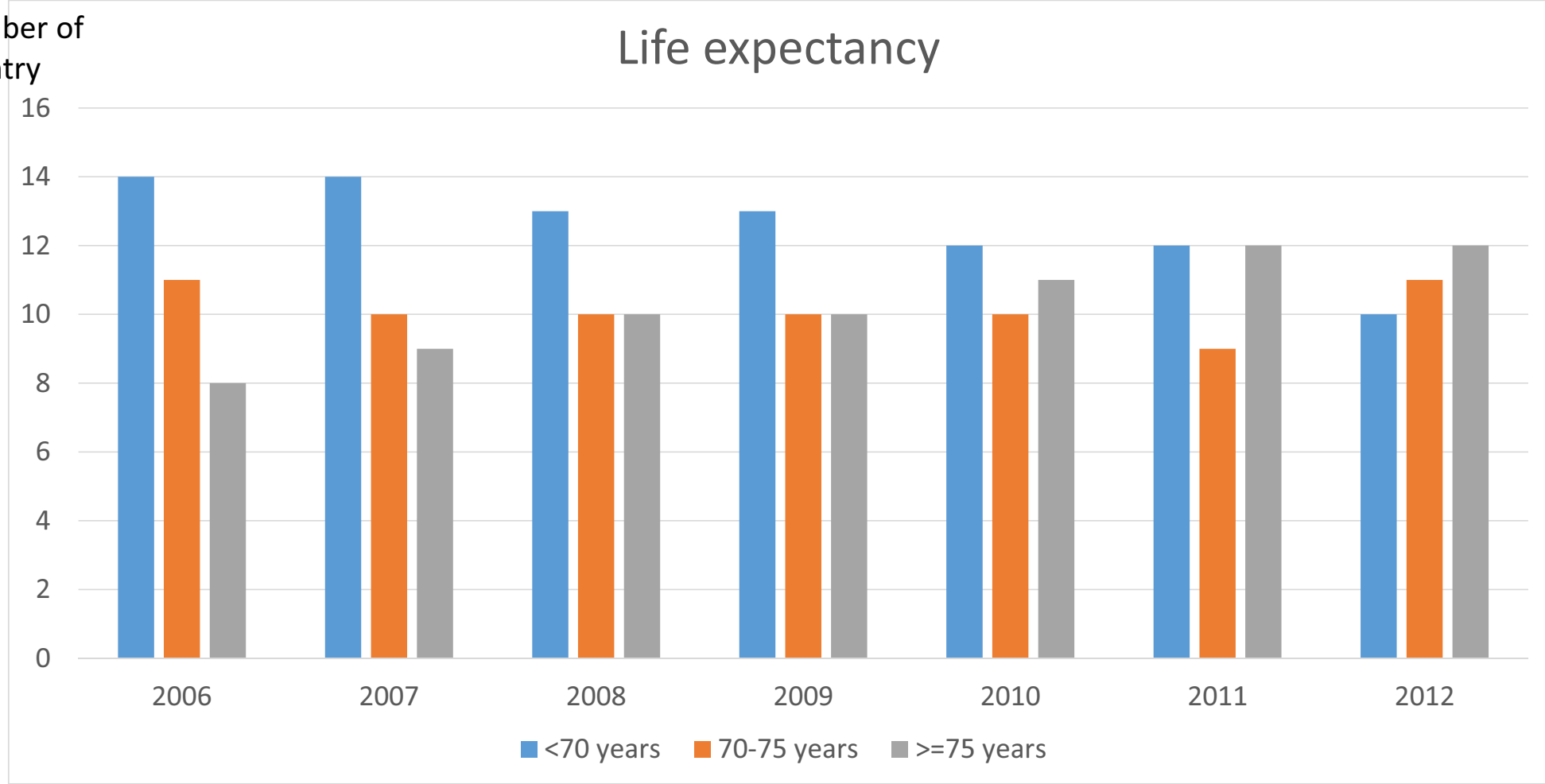
- How do corruption, political stability and democracy influence the efficiency of government expenditure on health care in Asian countries?

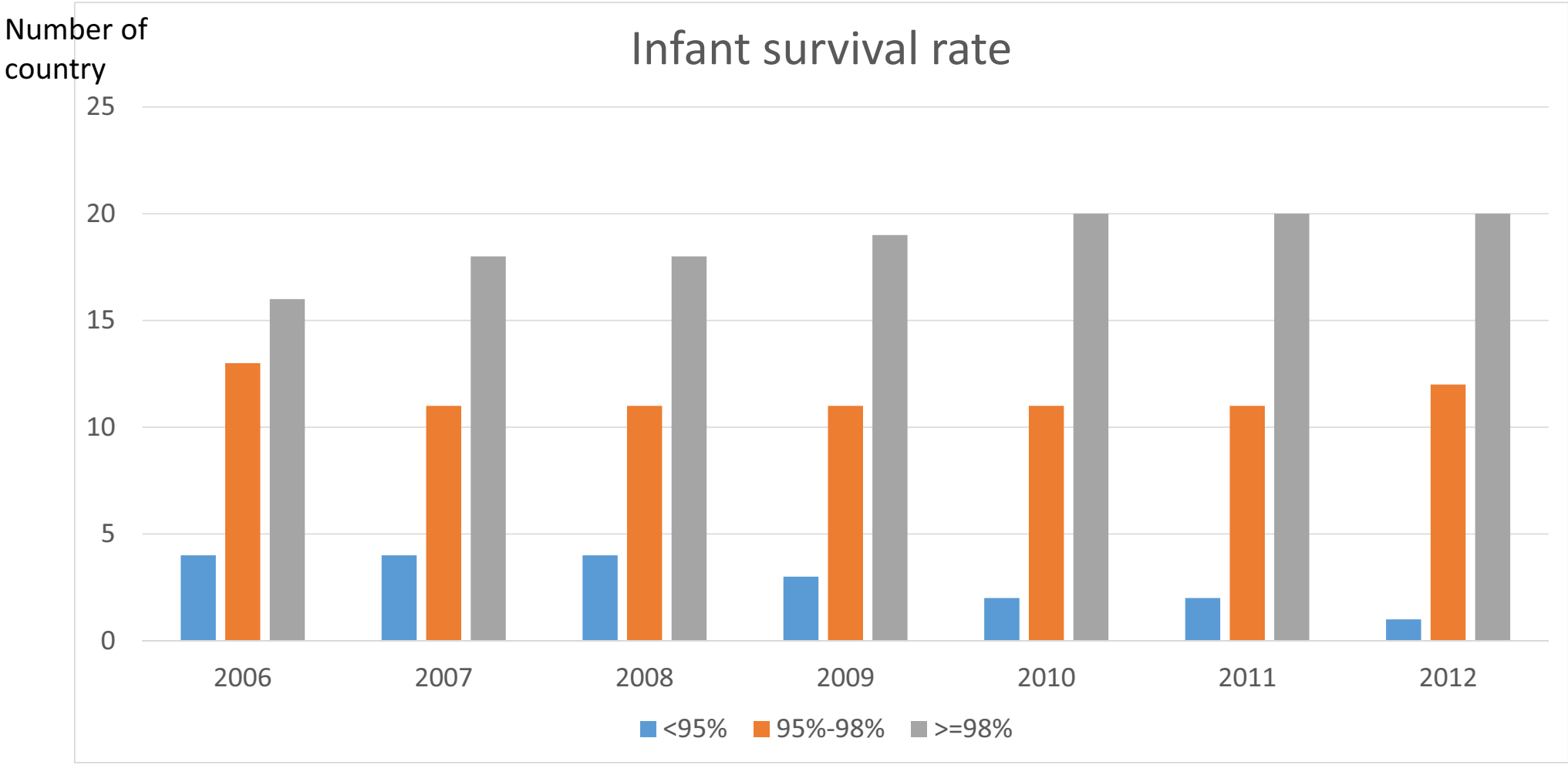
2 Health care output/outcome in Asian countries

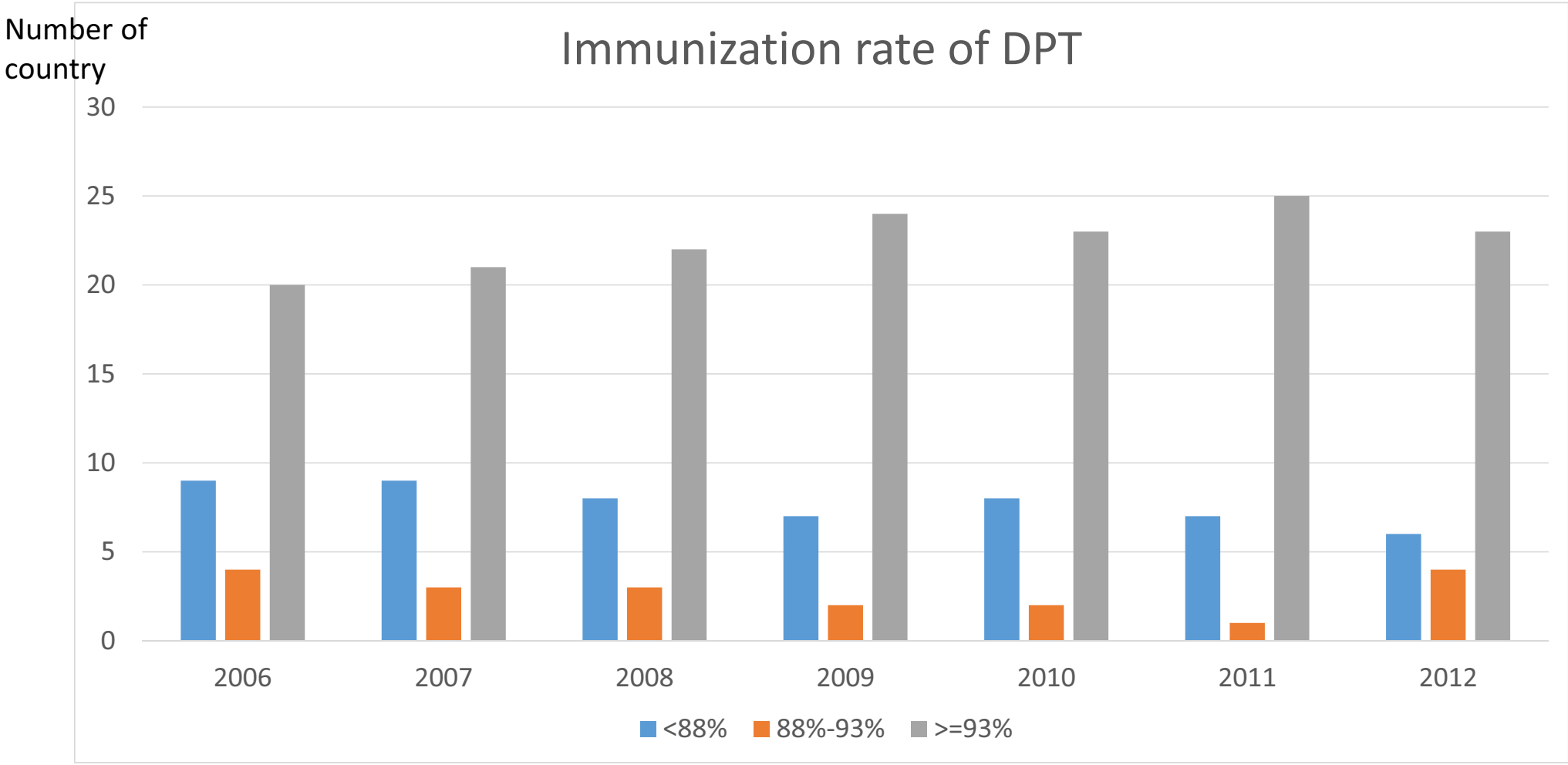
Descriptive statistics of health outputs of 33 Asian countries

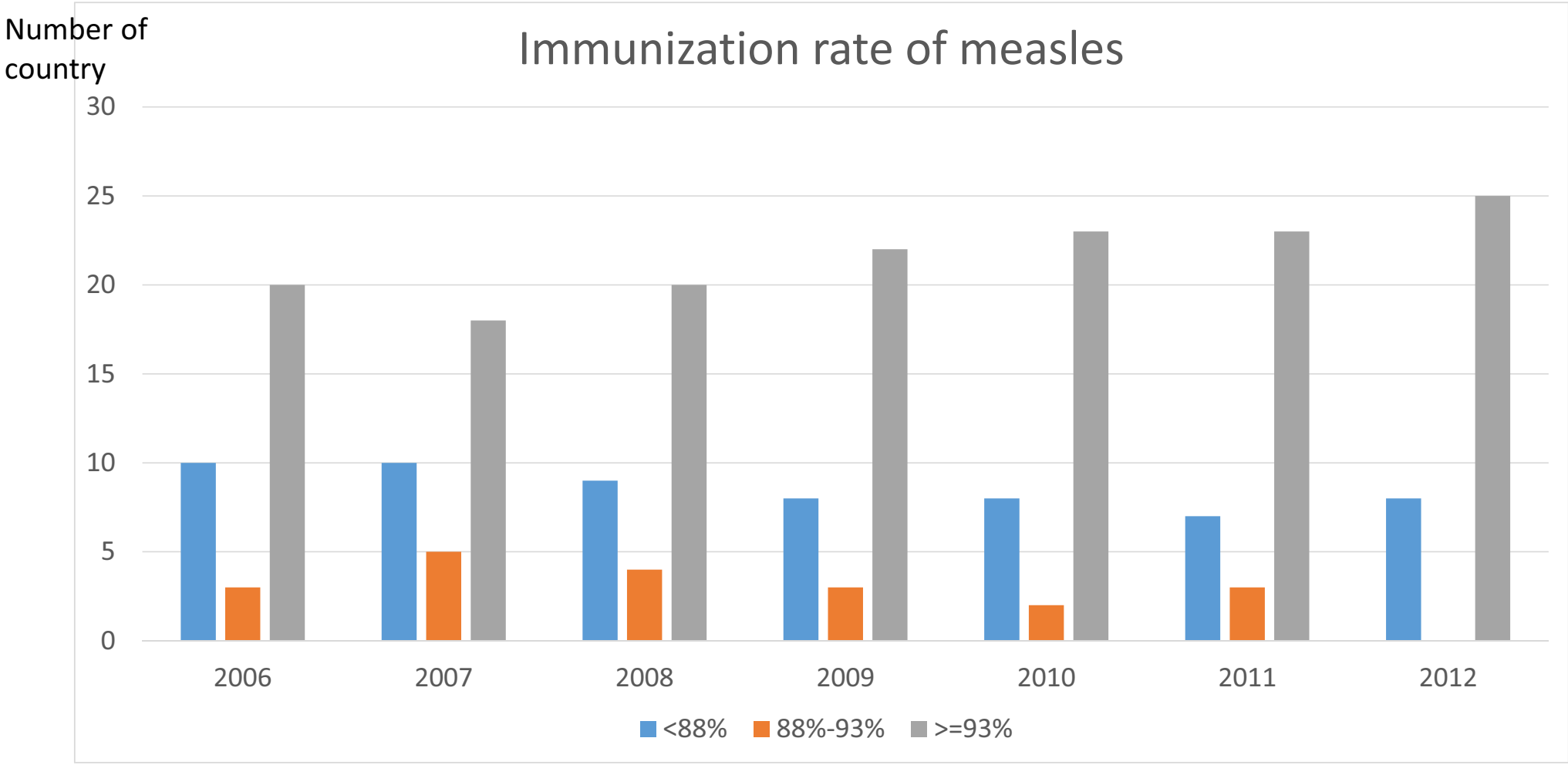
	Mean	Standard deviation	Min	Max	Coefficient of Variation
Life expectancy	72.53	5.21	62.2	83.1	0.0718
Infant survival rate	97.76	1.64	93.17	99.78	0.0168
DPT immunization	91.19	9.52	50	99	0.1044
Measles immunization	90.1	11.3	40	99	0.12543

Number of country



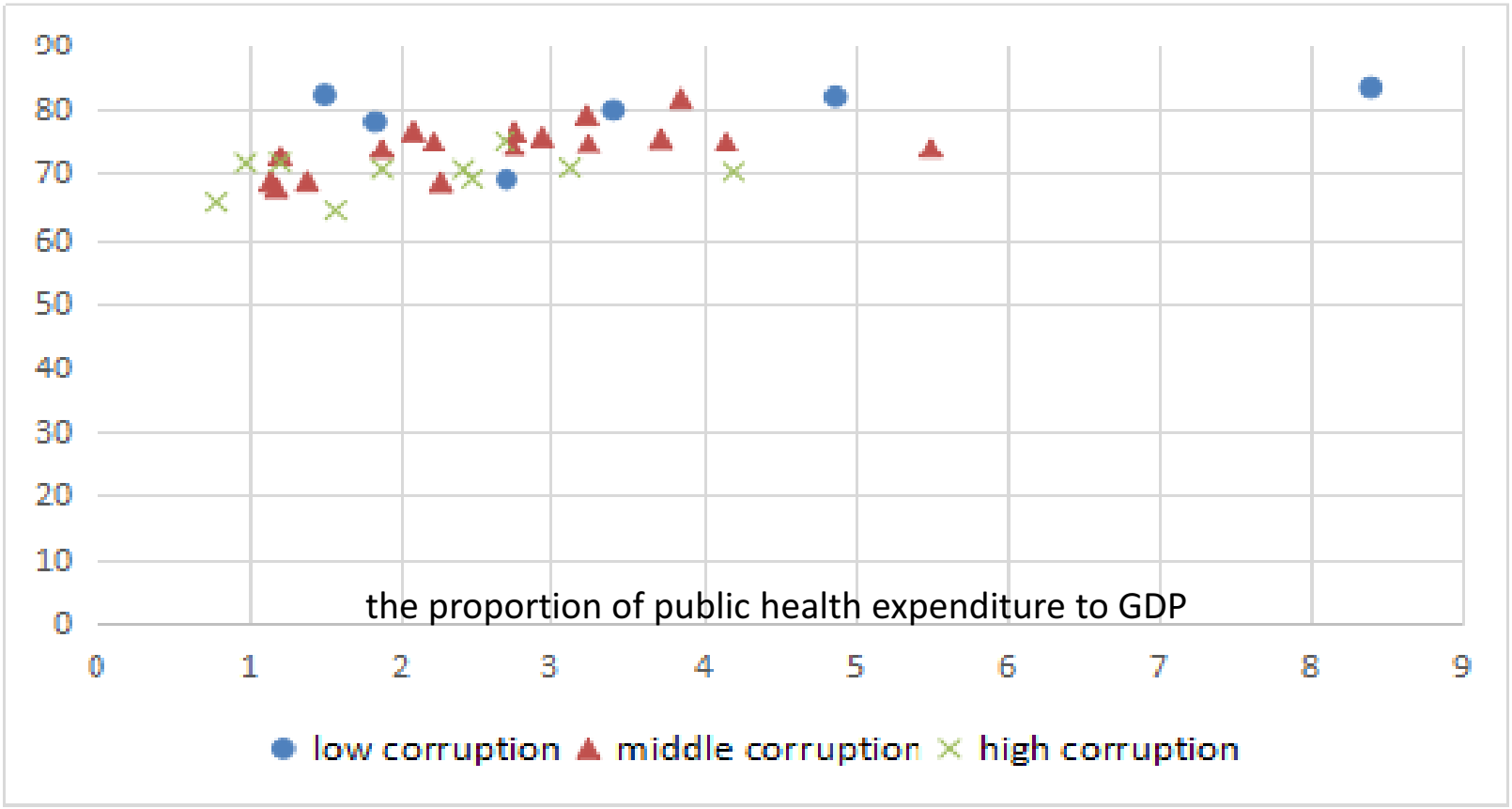

Number of country
Infant survival rate
25
20
15
10
5
0
2006
2007
2008
2009
2010
2011
2012
<95%
95%-98%
>=98%


Number of country
Immunization rate of DPT
30
25
20
15
10
5
0
2006
2007
2008
2009
2010
2011
2012
<88%
88%-93%
>=93%

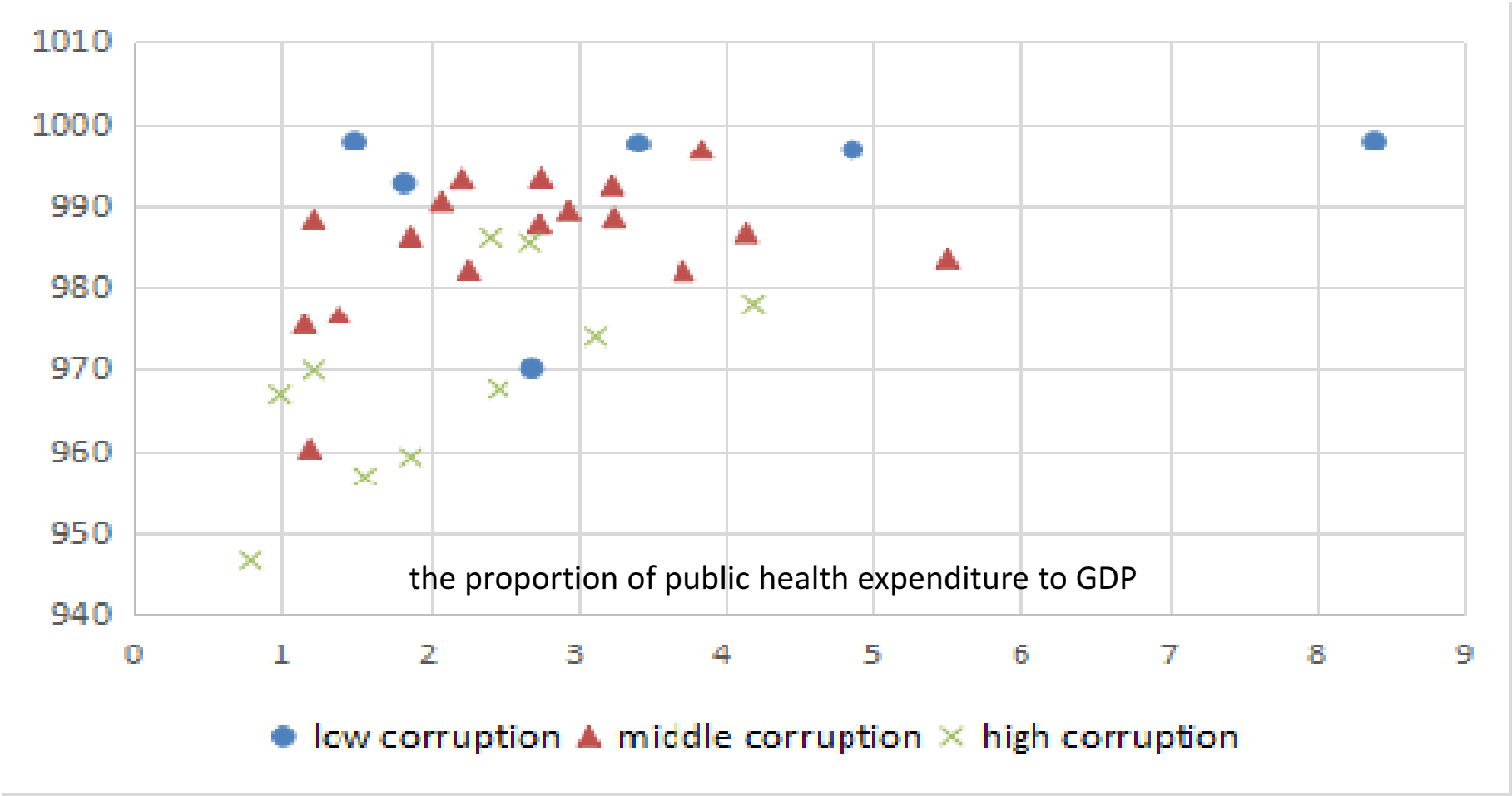

Number of country
Immunization rate of measles
30
25
20
15
10
5
0
2006
2007
2008
2009
2010
2011
2012
<88%
88%-93%
>=93%

Efficiency (Health outputs / the proportion of public health expenditure to GDP, 2012) by the level of corruption

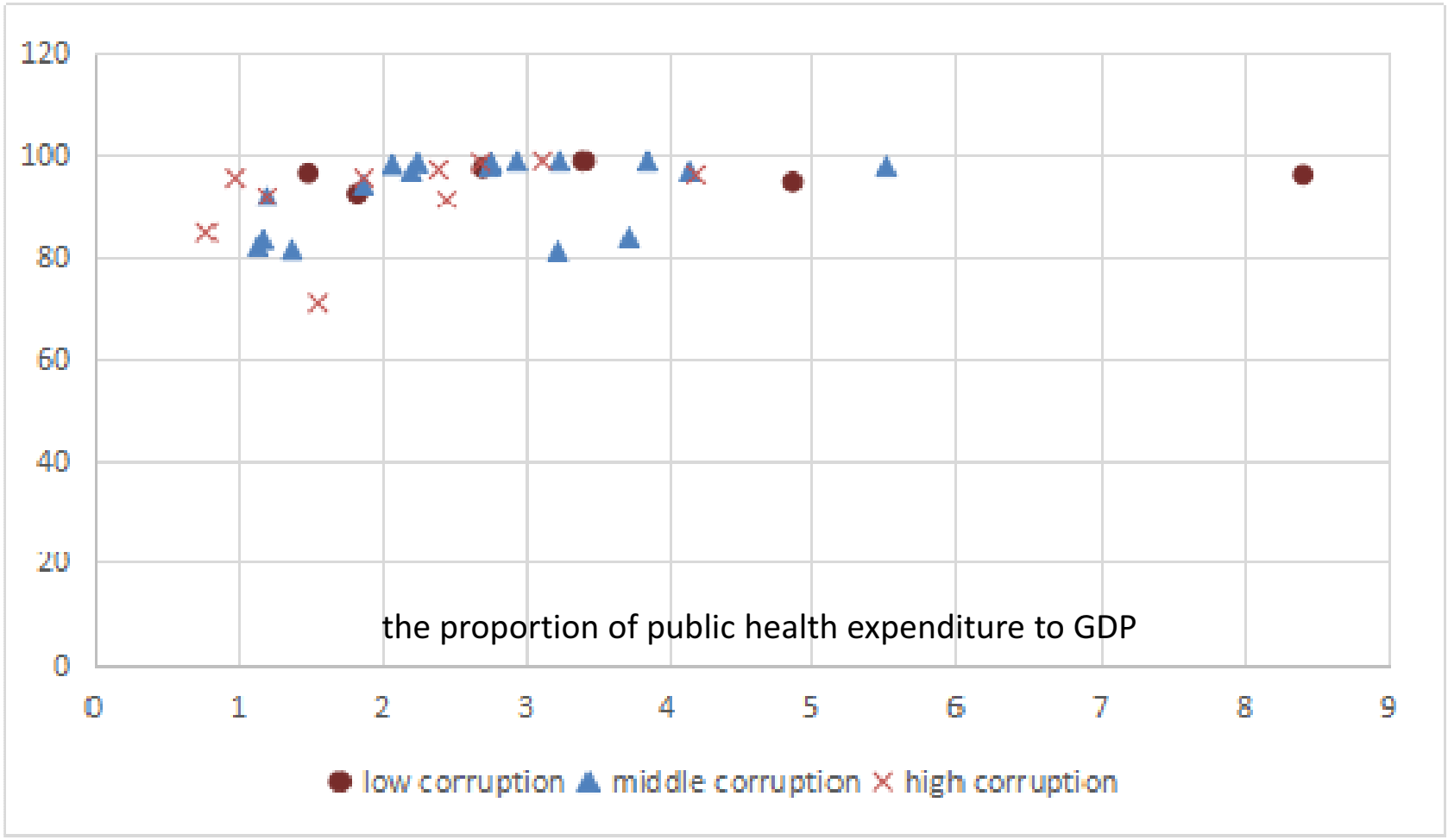
- 1: Life expectancy



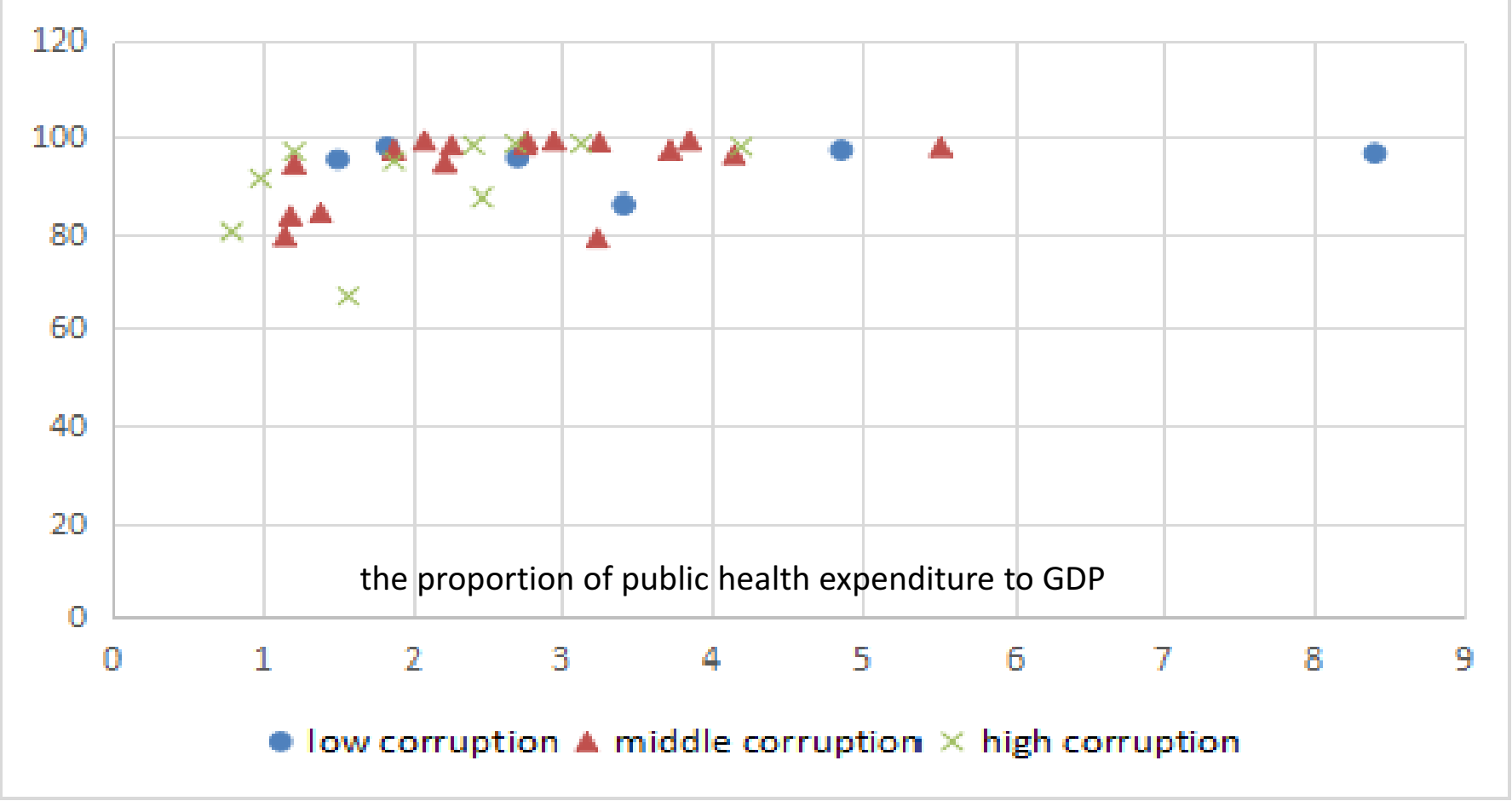
2: Infant survival rate



- 3: DPT immunization rate



4: Measles immunization rate



3 Literature
A:Political effect on expenditure

- One strand of research focus on the relationship between political factors such as corruption, political stability and democracy, and government expenditure itself.
- Shleifer and Vishny (1993): corruption reduces investments in high value projects such as health and education.
- Mauro (1998): corruption is likely to reduce the expenditure on health care.
- Delavallade (2006) : in developing countries, corruption distorts the structure of government expenditure. The proportion of expenditure in total budget in sectors such as education and health is reduced.

- Although previous literature provide evidence that corruption causes distorted government expenditure structure and reduces health expenditure, most of them concentrate on the level of expenditure, rather than the efficiency of health care expenditure.
- Given the limited fiscal budget under the aging society, **the effect of political factors on efficiency** should be examined, in addition to the effect on the level of expenditure. If efficiency can be improved, it is possible to achieve a higher level of health care service with less expenditure.

B: Efficiency of health care expenditure

- As another strand of research, there exist some research on the **efficiency of health care expenditure**.
- Gupta et al. (2001) measure the efficiency of education and health care expenditures of African countries.
- Afonso and St. Aubyn (2006i) use quantity inputs such as hospital beds per 10,000 people to calculate the efficiency of health care expenditure of OECD members.
- However, these research **do not consider the effect of political factors on the efficiency**. In addition, these previous research focus mostly on developed countries. No research focuses on Asian countries.

Contribution

This paper provides the following new insights.

- Firstly, this paper is the first attempt to examine the political effect on the efficiency of health care.

- Secondly, this paper focus on Asian countries where improving efficiency is urgent.

4 Efficiency of government expenditure on health care

4.1 Methodology

- Data Envelopment Analysis (DEA) is used for this research to calculate the efficiency of government expenditure on health care. It is a non-parametric method. For calculation, every country is regarded as a decision making unit (DMU). The efficiency scores range from 0 to 1. Graphically, the efficient units form a convex frontier, and other units locate under the frontier.
- The DEA model here is **the various return to scale (VRS) model**. We adopt the input-oriented approach, by which we know the degree to which input can be reduced with the same amount of outputs.

4.2 Data

This research focuses on Asian countries, and the time period of expenditure is **from 2006 to 2012**. As data is not available for some of these countries, **we select 33 countries** whose data for every variable is complete as the objective of the research.

Input for DEA:the ratio of government expenditure on health

- 1) We use **the ratio of government expenditure on health care to GDP as the indicator for input.** We call this "Ordinary efficiency".
- 2) However it might be better to eliminate the effect of the different stage of aging society in each country.
- =>We additionally consider another type of efficiency, which is "Adjusted efficiency" . Adjusted efficiency is calculated by equation (1) to eliminate the effect of aging which may raise the proportion of expenditure and cause biased result in efficiency score.

$$\Rightarrow \quad \frac{1}{1+\left(AgirgRate_i - \overline{AgingRate}\right)} \times \text{non-adjustment proportion} \qquad (i = 1,2,\ldots,33) \qquad (1)$$

Output for DEA

- **Several indicators** that are comparative among countries and are considered to be useful to measure the output/outcome achieved by health care services provided by governments.
- 1) life expectancy
- 2) infant survival rate
- 3) immunization rate of diseases (measles)
- 4) immunization rate of diseases (DPT)

4.3 Result of efficiency score

- Japan, Singapore and Oman are among the most efficient countries.
- Developed east Asian countries and some resource-rich middle-east countries have higher efficiency.
- For other countries, the health care expenditure reaches low outcome, in spite that the proportion of expenditure on health care to GDP has been still kept at a relatively high level. The governments of these countries need to raise the efficiency of relevant expenditure.

5 Effect of political and other factors on the efficiency

5.1 Hypothesis

- Based on literature and conventional theory, we propose the following hypothesis.

- **Hypothesis 1**
- The system of anti-corruption positively affects the efficiency of the government expenditure on health care. Stable political conditions have positive effect on the efficiency. In addition, democracy contributes to higher efficiency.

- **Hypothesis 2**
- Public governance, such as effective government and good rule of law, is beneficial to higher efficiency.

- **Hypothesis 3**
- Socio-economic situation such as the level of GDP positively affects the efficiency of the government expenditure on health care.

- Simple Model estimated

$$\text{Efficiency}_{ij} = \beta_0 + \beta_1\ \text{CorruptionPerception}$$
$$+ \beta_2\ \text{PoliticalStabilityandNoViolence} + \beta_3\text{Democracy}$$
$$+ \beta_4\ \text{GovernmentEffectiveness} + \beta_5\ \text{RuleofLaw} + \beta_6\ \text{PopulationDensity}$$
$$+ \beta_7\ \text{LogGDPpercapita} + \beta_8\ \text{Trade} + \beta_9\ \text{PrivateExpenditure} + \beta_{10}\ \text{AgingRate}$$
$$+ \beta_{11}\ \text{Sanitation} + \beta_{12}\ \text{RuralPopulation} + u_{ij}$$

Variables adopted

Variable	Expected effect
Corruption Perception	+
Political Stability and No Violence	+
Democracy	+
Government effectiveness	+
Rule of law	+
Population Density	+
GDP per capita	+
Trade	+
Private Expenditure	+
Aging Rate	-
Sanitation	+
Rural population	-

Descriptive Statistics

Variable*	Mean	Standard Deviation	Min	Max
Corruption Perception[1]	3.89	1.82	1.6	9.4
Political Stability and No Violence[2]	-0.45	0.92	-2.42	1.34
Democracy[3]	-0.087	0.79	-2	1.99
Government Effectiveness[4]	0.07	0.82	-1.28	2.43
Rule of Law[5]	-0.138	0.8	-1.41	1.77
Population Density[6] (thousand per km^2)	0.42	1.21	0.0016	7.52
GDP per capita[7](thousand dollars)	19.36	23.54	1.58	129.35
Trade[8] (%)	97.27	63.53	24.49	441.6
Private Expenditure[9] (%)	49.24	19.24	12.12	85.99
Aging Rate[10](%)	6.46	4.11	1.02	23.88
Sanitation[11](%)	81.25	20.88	31.5	100
Rural Population[12](%)	41.48	23.81	0	84.5
Efficiency(Ordinary)	74.98	24.51	22.71	100
Efficiency (Adjusted)	75.05	24.67	21.77	100

5.3 Result

	Y: Adjusted Efficiency				Y: Ordinary Efficiency			
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Corruption Perception	6.613*	6.295*			8.032**	7.493**		
	(3.470)	(3.498)			(3.523)	(3.531)		
Political Stability	9.611***		9.284**		8.551**		7.847**	
	(3.694)		(3.735)		(3.808)		(3.856)	
Democracy	10.39**			8.782*	9.371*			6.284
	(4.464)			(4.725)	(5.046)			(5.285)
Government Effectiveness	-14.07	-6.994	-2.684	-8.672	-14.20	-10.55	-5.478	-8.183
	(9.448)	(9.222)	(8.632)	(9.484)	(9.840)	(9.863)	(9.437)	(9.875)
Rule of law	-10.64	-3.002	-1.641	2.489	-12.11	-6.287	-1.830	1.077
	(10.50)	(10.67)	(9.937)	(9.999)	(10.70)	(10.81)	(10.13)	(10.22)
Population Density	36.65***	28.92***	35.67***	29.10***	45.32***	42.42***	45.98***	40.49***
	(10.00)	(10.65)	(10.18)	(10.56)	(12.17)	(13.46)	(12.82)	(13.16)
Log GDP	37.19***	35.40***	33.07***	40.62***	38.26***	38.88***	36.89***	42.18***
	(6.605)	(6.782)	(6.382)	(7.106)	(6.935)	(7.215)	(7.096)	(7.443)
Trade to GDP	-0.204***	-0.200***	-0.236***	-0.175**	-0.148*	-0.101	-0.143	-0.100
	(0.0746)	(0.0772)	(0.0748)	(0.0782)	(0.0843)	(0.0868)	(0.0874)	(0.0874)
Private Expenditure	0.645***	0.627***	0.655***	0.542***	0.736***	0.695***	0.710***	0.633***
	(0.180)	(0.190)	(0.181)	(0.190)	(0.188)	(0.196)	(0.193)	(0.199)
Aging Rate					0.229	1.333	1.137	0.864
					(1.102)	(1.096)	(1.054)	(1.172)
Sanitation	0.507**	0.410*	0.415**	0.459**	0.449**	0.285	0.301	0.341
	(0.202)	(0.222)	(0.203)	(0.222)	(0.227)	(0.237)	(0.225)	(0.247)
Rural Population	1.187***	1.150***	1.016***	1.277***	1.166***	1.152***	1.037***	1.224***
	(0.291)	(0.310)	(0.288)	(0.317)	(0.301)	(0.317)	(0.305)	(0.326)
Constant	-398.4***	-373.5***	-317.9***	-404.0***	-421.2***	-423.6***	-365.5***	-425.5***
	(76.15)	(76.61)	(71.54)	(80.17)	(79.78)	(81.74)	(79.96)	(84.13)
Number of Observations	231							

5.3 Result (political factors)

	Y: Adjusted Efficiency				Y: Ordinary Efficiency			
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
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Log GDP	37.19***	35.40***	33.07***	40.62***	38.26***	38.88***	36.89***	42.18***
	(6.605)	(6.782)	(6.382)	(7.106)	(6.935)	(7.215)	(7.096)	(7.443)

Result and intuition : "Corruption Perception"

- "Corruption Perception" are significantly positive.
- This supports Hypothesis 1, and demonstrates that anti-corruption contributes to higher efficiency. Conversely, the more corrupt a country is, the less efficient its expenditure is.
- Corruption may cause less funds than reported to be put into the health care system. It raises cost for enterprises and transaction, and enterprises may convert the cost from corrupt governors to the high price in the procurement process where public funds are utilized. This lowers the efficiency.

Result and intuition : “Political Stability and No Violence”

- The coefficient of “Political Stability and No Violence” is significantly positive.
- Stable political situation also enhances the efficiency. It prevents the harm of fluctuation, facilitates business and the development of economy, and helps people improve their living standard in a stable environment.

Result and intuition : “Democracy”

- “Democracy” affects the efficiency positively.
- Under a democratic system, people have sufficient right to elect a government that achieves higher efficiency. The scrutiny system on the expenditure activities of government may also be well-constructed. People have sufficient information about the expenditure and they can participate in the decision making process of government expenditure.
- These enable the government to raise their efficiency and reduce the waste of funds.

Details of the result

- The results show that GDP per capita have positive effects on efficiency, so the developed social environment, advanced facilities in countries with high GDP may have raised the efficiency of health care expenditure.
- The coefficient of trade to GDP ratio is negative and significant. The reason may be that health care is not directly related to the degree of openness, or openness did not create a transparent social environment to raise the efficiency.
- The proportion of private health care expenditure affects the efficiency positively. Private expenditure plays an important role in the health care system. It helps people improve their health conditions and raises the efficiency of public expenditure.
- The results show that the coefficient of sanitation is significantly positive, so exploiting sanitation facilities may create a better environment for people's health and raise the efficiency of public health expenditure
- Rural population is shown to affect the efficiency positively. The difference of the efficiency of government expenditure on health care between rural and urban areas may be not very large. Efficient use of funds in rural area may have larger marginal effect and improve the general efficiency of the expenditure.

5.4 Policy implication

- **First, government need to develop legal system for anti-corruption.**
- This would prevent governors from taking funds for public use secretly, which causes waste of resource.
- It also encourages citizens' monitoring on whether the financial resource is efficiently used. If the funds are used for its original purpose, they may generate higher outcome through the health care system. The Corruption Perception Index is still low in many Asian countries, so there is enough potential for them to take anti-corruption actions and raise the efficiency.

5.4 Policy implication

- **Secondly, political stability is important to enhance the efficiency.**
- Countries should keep their political environment stable and avoid conflict. Only under a stable political environment, can a country develop its economy and health care service constantly. People would improve their living standard with respect to health care in such an environment, and enterprises would do their business without trouble, which yields high efficiency of expenditure.

5.4 Policy implication

- **Thirdly, democracy is shown to have positive effect on efficiency, so constructing a democratic system is important.**
- A good democratic condition is beneficial to the monitoring of government activities. People can take part in the policy making process with respect to expenditure. People's voice on policies can be heard by governors and be reflected on the change of policy rapidly. These contribute to the enhancement of expenditure efficiency.

For further research

- 1) It is required to improve the indicator of output/outcome of health care.
- 2) We also noticed that it may be important to evaluate the quality of health care facilities as input.