



Insurance for good days or bad days?

Fuat Erdal

Insurance Training Center, Istanbul



Outline

- Introduction
- Data and methodology
- Graphical representations
- Unit root tests
- Granger causality tests
- Financial crises
- Effect of insurance income on growth
- Effect of growth on insurance income
- Concluding remarks



Insurance: Conceptual issues

- A promise of compensation for specific potential future losses in exchange for a periodic payment.
- Insurance is designed to protect the financial well-being of an individual, company or other entity in the case of unexpected loss.
- Some forms of insurance are required by law, while others are optional.
- Agreeing to the terms of an insurance policy creates a contract between the insured and the insurer.
- In exchange for payments from the insured (called premiums), the insurer agrees to pay the policy holder a sum of money upon the occurrence of a specific event.
- In most cases, the policy holder pays part of the loss (called the deductible), and the insurer pays the rest.



Economic growth and insurance

- A controversial issue:
 - 1. No casual relationship
 - 2. Supply leading hypothesis: A well-functioning insurance market and growth in insurance smoothes short-term volatility and thus induces econ growth in long run
 - 3. Demand following hypothesis: Economic growth leads to a rise in demand for insurance
 - 4. Negative casual link: Growing insurance causes more reckless behaviour (moral hazard), resulting in a less efficient and more volatile economy
 - 5. Interdependence
 - 6. Direction of the relationship may change according to business cycles of an economy

Aim of the study

- The studies analysing the relationship between financial sector and growth focus on banking and stock market, ignoring the insurance sector
- Empirical analyses on the role of insurance market are insufficient
- The relationship between insurance and growth is controversial and needs more empirical testing
- Even there exists, direction of the causality is open discussion:
 - In good days: economic growth leads to higher demand for insurance
 - In bad days (economic and financial crises): there might still be an increased demand for especially life insurance, plus some insurances required by law such as car insurance are still to continue
- Aim: To test all these arguments by time series data

Data

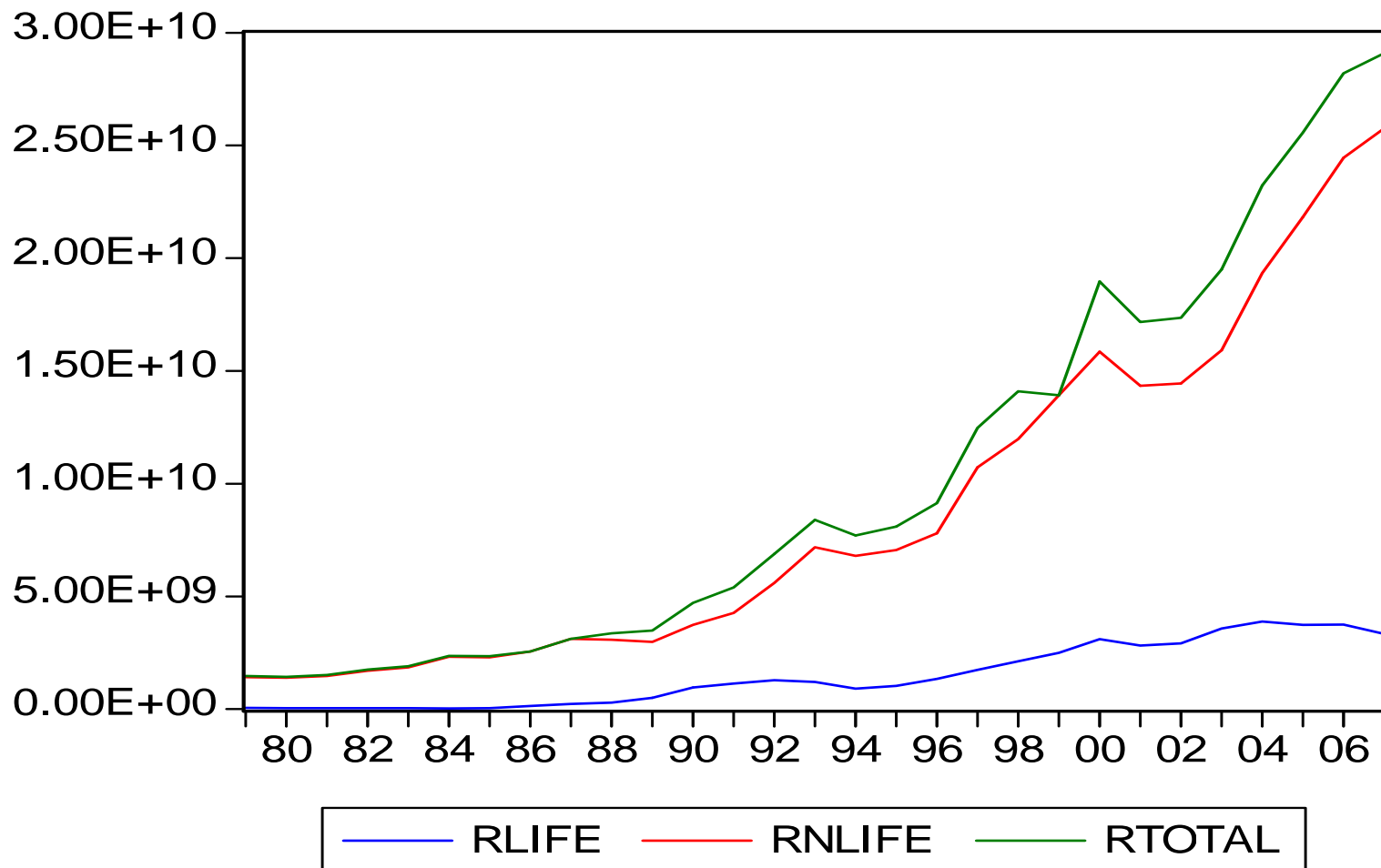
- Annual data from 1979 to 2007 on
 - GDP growth
 - GDP per capita, GDP per capita in US dollars, GDP per capita in PPP
 - Insurance premium income
 - Life insurance
 - Non-life insurance
 - Accident / causality (inc car) insurance
 - Agricultural insurance
 - Fire insurance
 - Transport insurance
 - Engineering (inc machinery breakdown) insurance



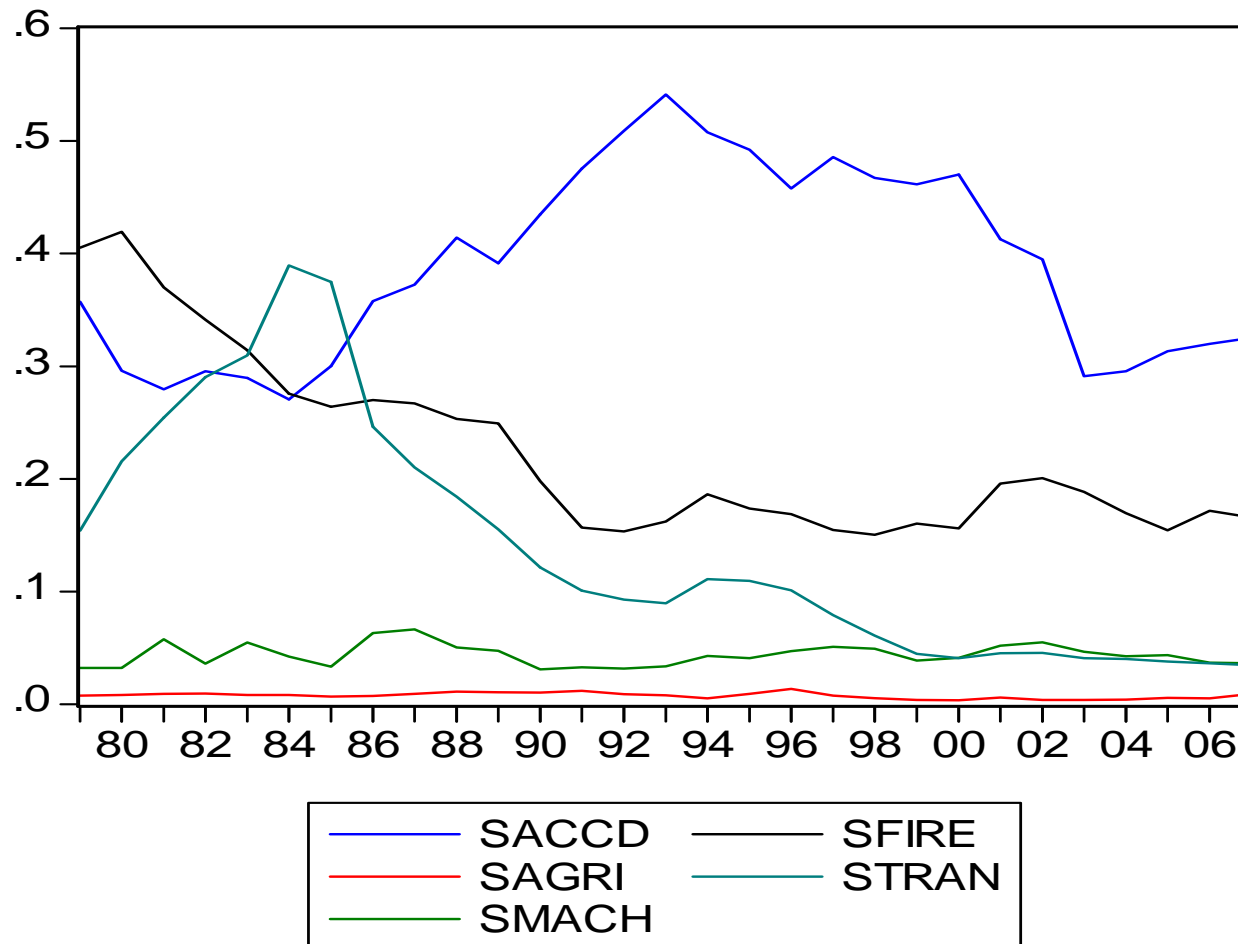
Methodology

- Graphical analyses
- Econometric time series analysis
 - Stationarity tests to avoid from spurious regressions
 - Granger causality test to find out if there exists a relationship
 - OLS regression to examine the direction and magnitude of the relationship

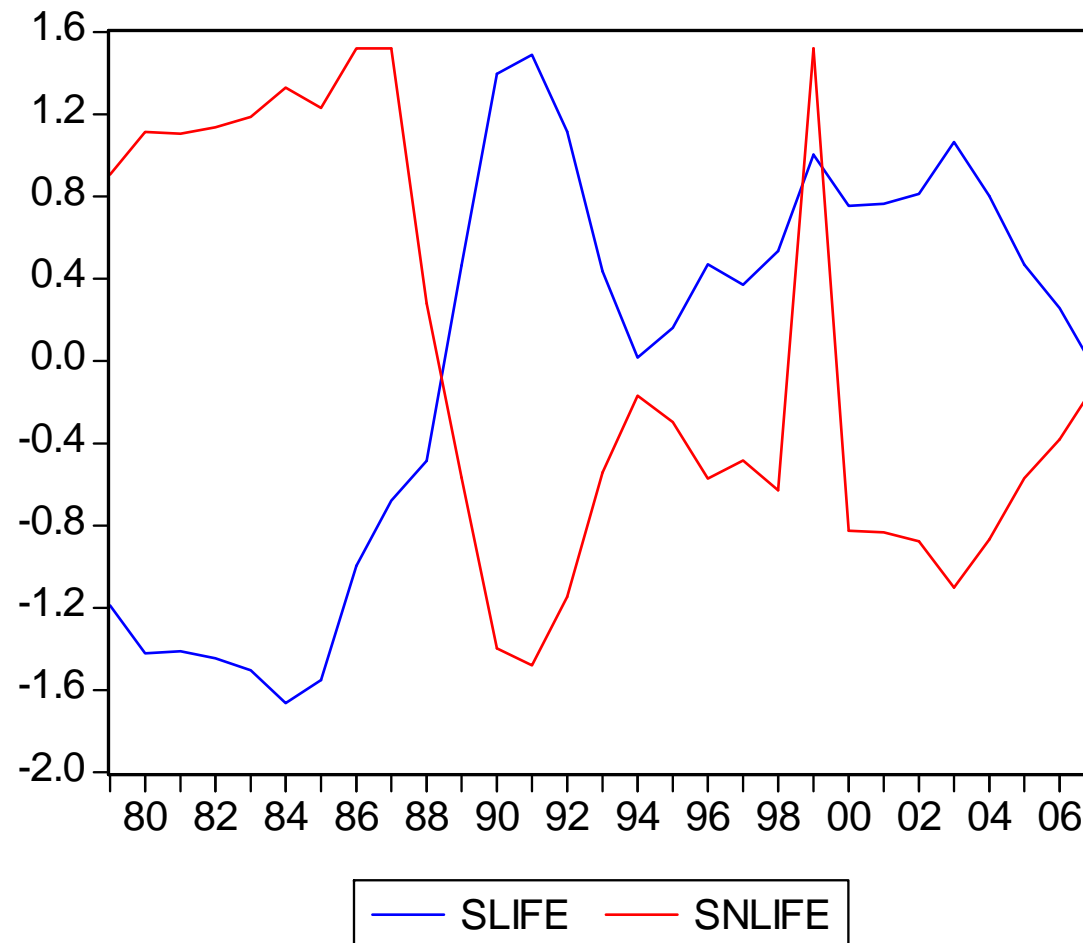
Graph I: Reel total, life and non-life insurance premiums



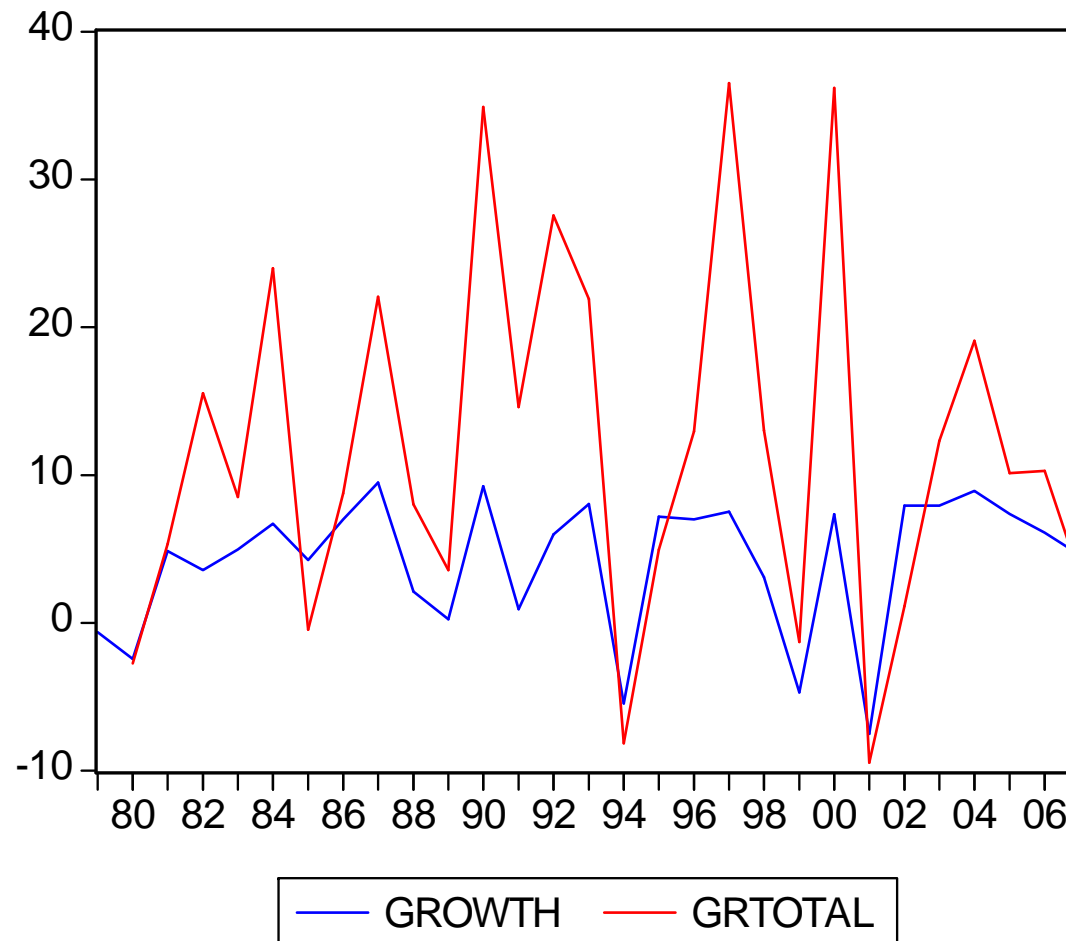
Graph 2: Shares of each branch in total premium



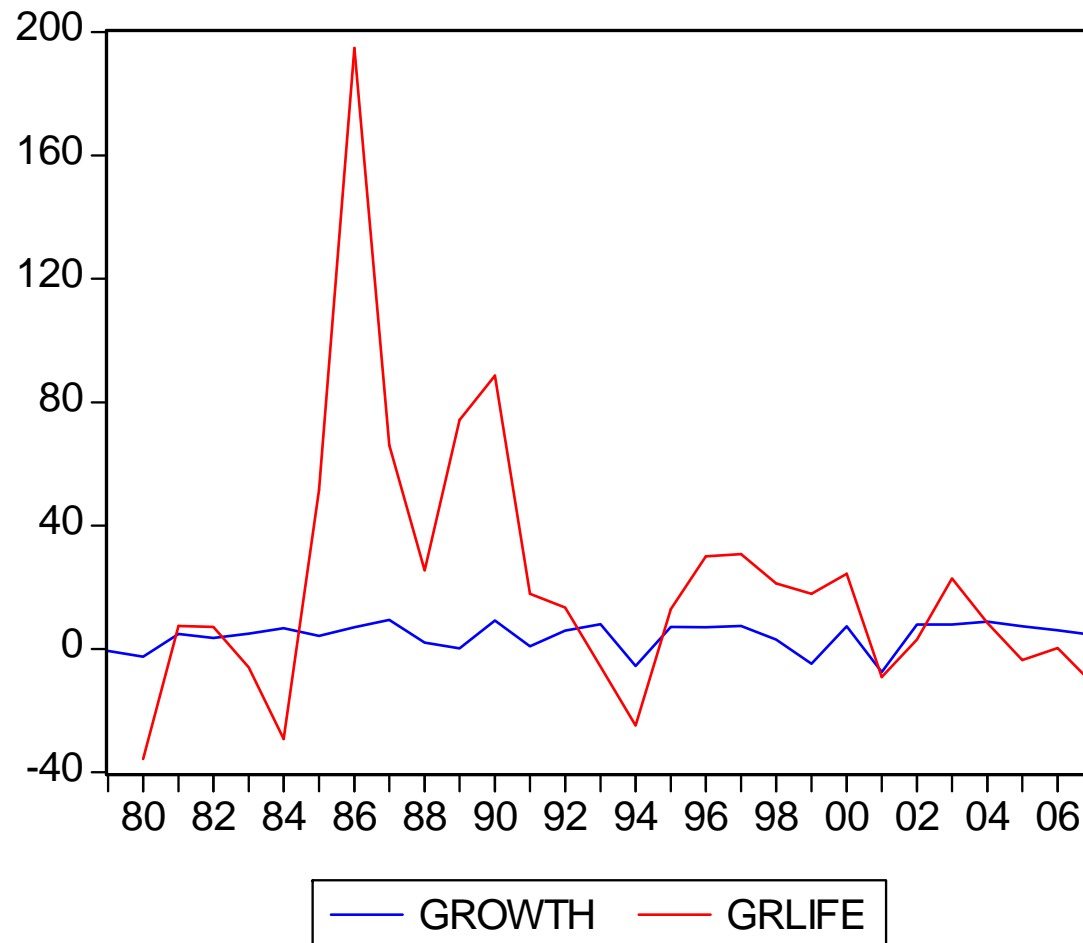
Graph 3: Shares of life and non-life insurance in total premium (normalised graph)



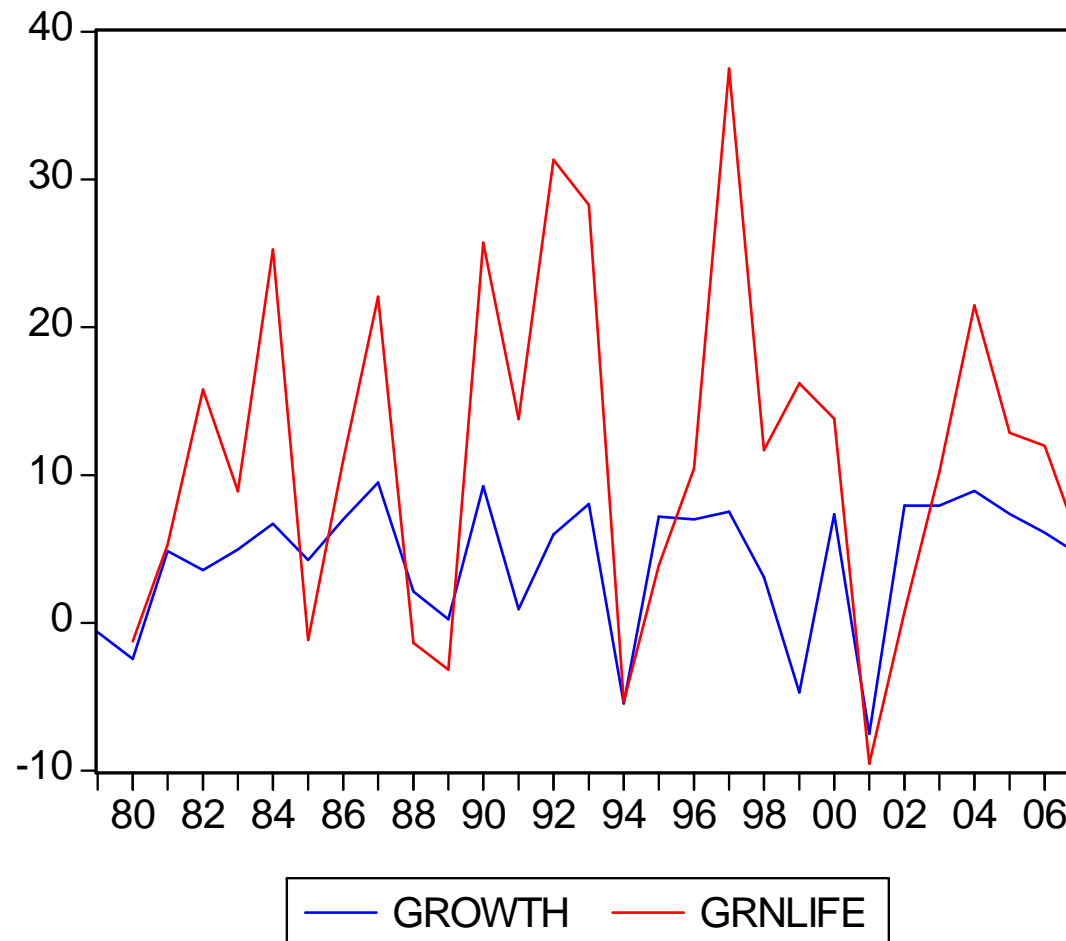
Graph 4:
Growth rate of GDP and total insurance premium income



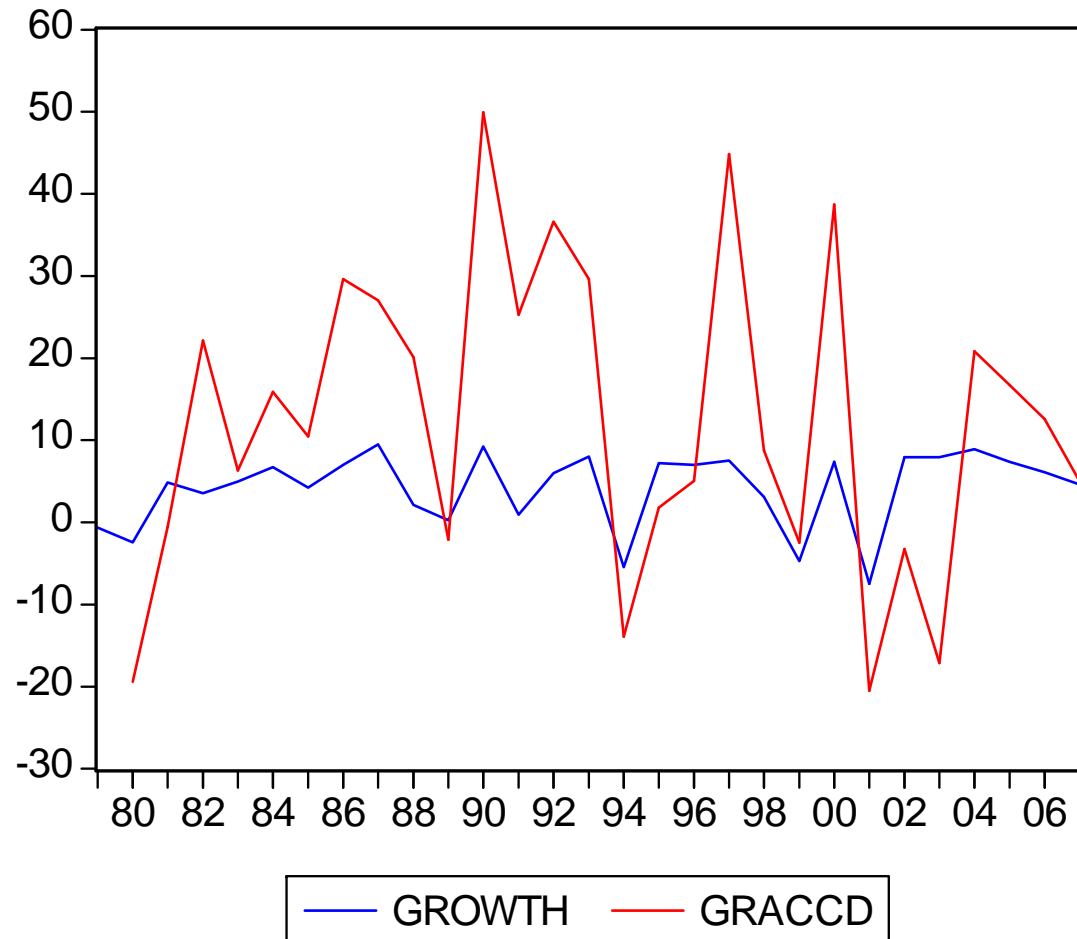
Graph 5:
Growth rate of GDP and life insurance premium income



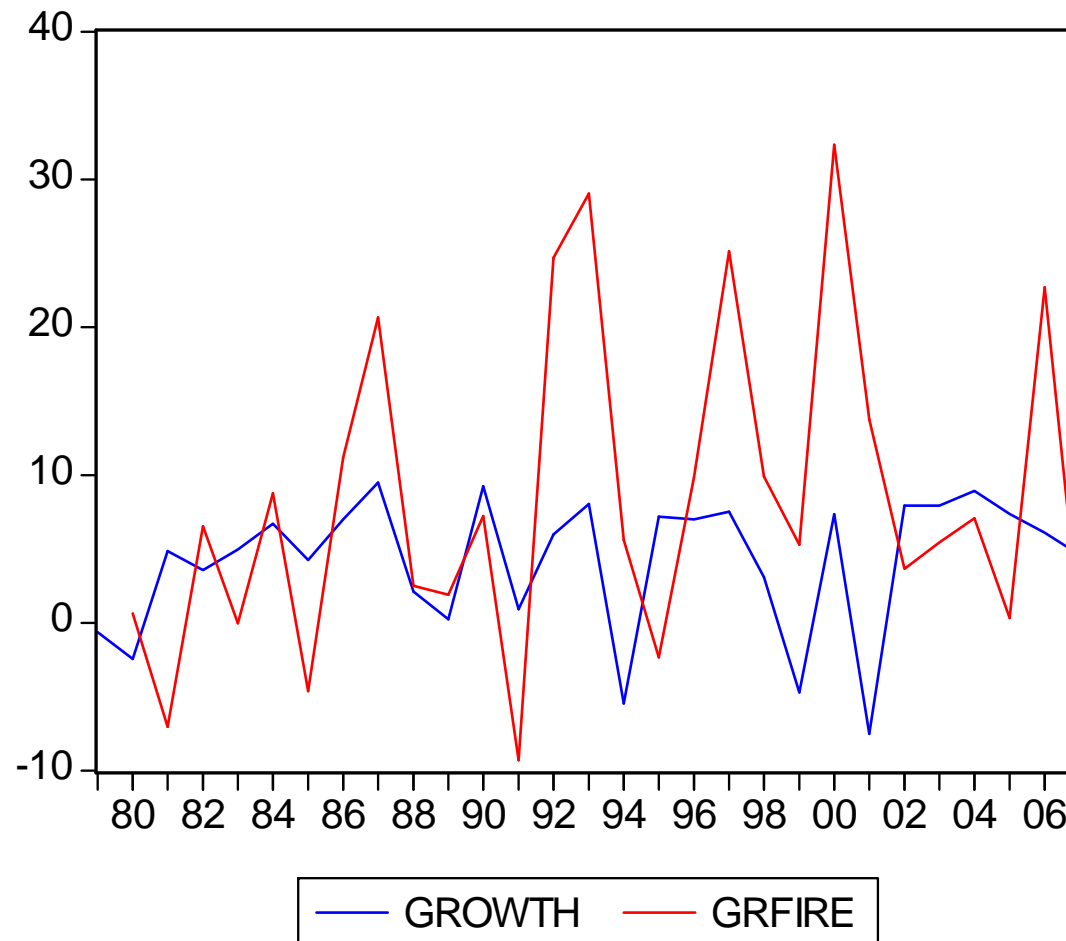
Graph 6:
Growth rate of GDP and non-life insurance premium income



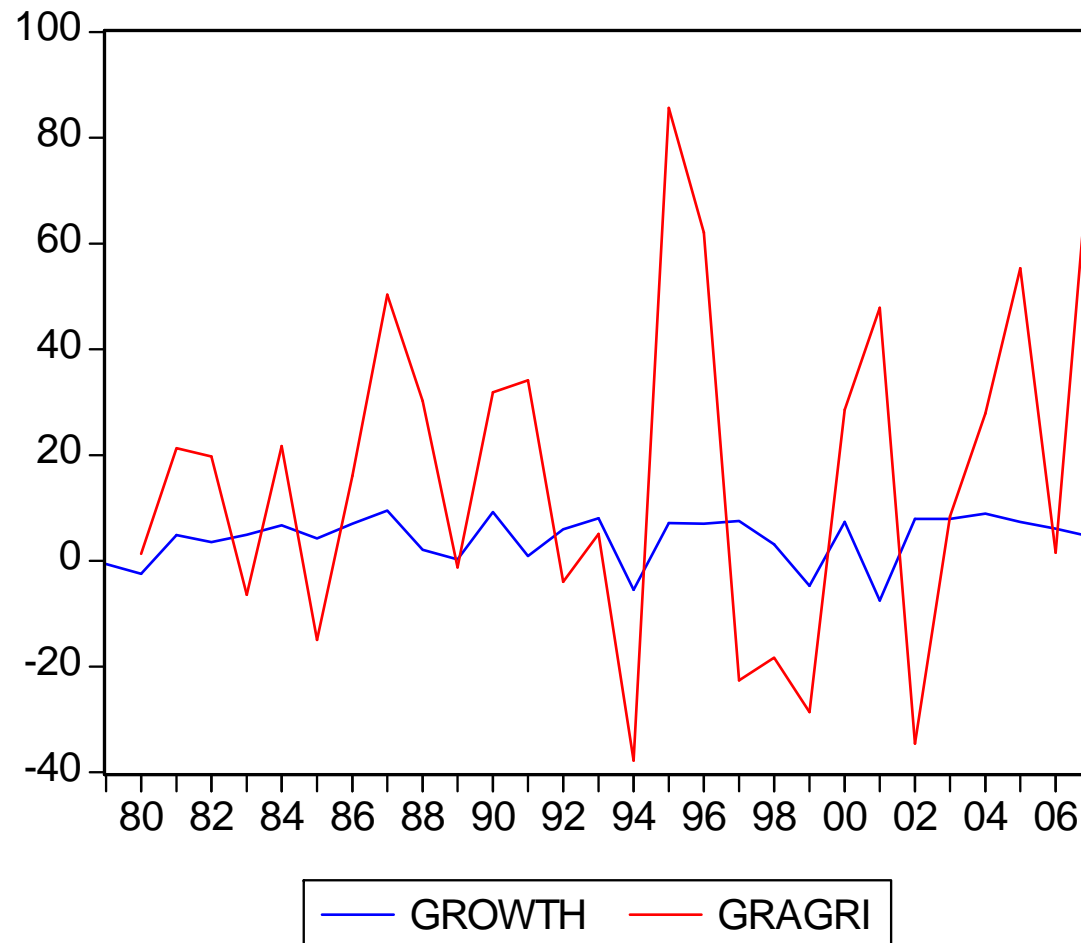
Graph 7:
Growth rate of GDP and accident insurance premium income



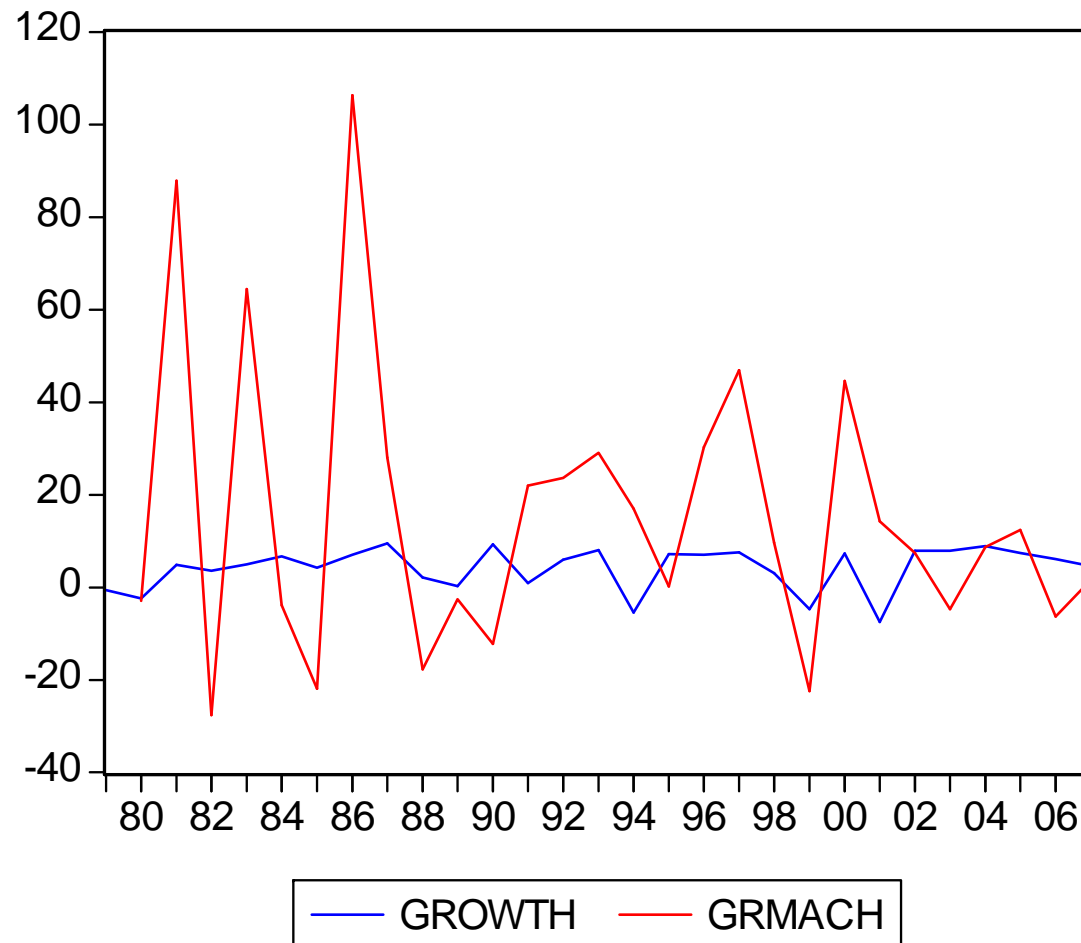
Graph 8:
Growth rate of GDP and fire insurance premium income



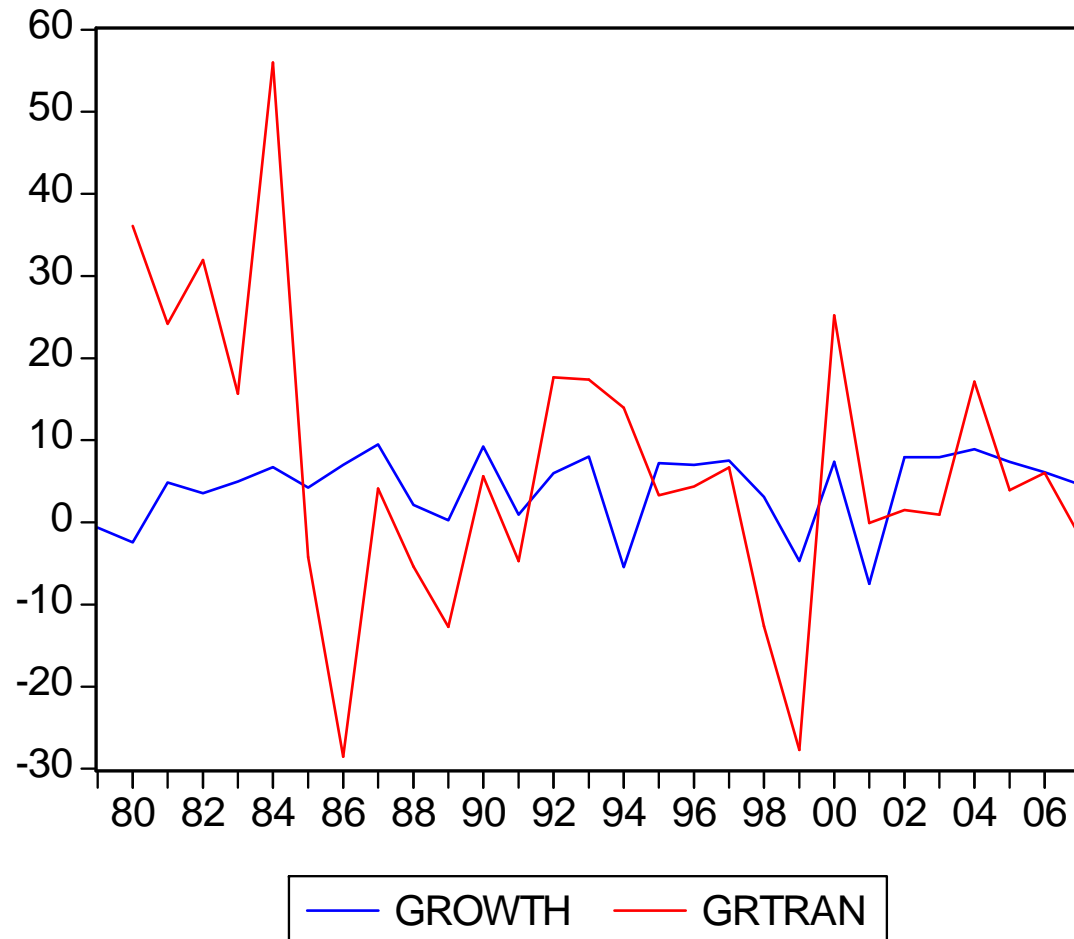
Graph 9:
Growth rate of GDP and agricultural insurance premium income



Graph 10:
Growth rate of GDP and machinery insurance premium income



Graph II:
Growth rate of GDP and transport insurance premium income



Unit root tests (ADF)

Variable	Test Stats	Variable	Test Stats
pcrtotal	1.441	grtotal	-6.048***
pcrlife	-0.368	grlife	-3.318**
pcrnlife	2.167	grnlife	-4.929***
pcraccd	-0.338	graccd	-5.178***
pcragri	0.740	gragri	-4.959***
pcrfire	1.667	grfire	-4.994***
pcrmach	-0.154	grmach	-6.937***
pcrtrans	-2.999**	grtrans	-4.262***
pcy87	-0.640	growth	-6.078***
Critical values	-3.689 (%1)	-2.979 (%5)	-2.625 (%10)

Per capita variables are non-stationary, while growth variables are stationary: OLS regressions with levels might be spurious

Granger Causality tests (with per capita values)

Hypotheses	F-stats	Prob values
PCRTOTAL does not Granger Cause PCY87 PCY87 does not Granger Cause PCRTOTAL	5.088*** 2.511*	0.009 0.089
PCRLIFE does not Granger Cause PCY87 PCY87 does not Granger Cause PCRLIFE	2.512* 2.408*	0.089 0.098
PCRNLIFE does not Granger Cause PCY87 PCY87 does not Granger Cause PCRNLIFE	6.649*** 3.930**	0.002 0.024
PCRACCD does not Granger Cause PCY87 PCY87 does not Granger Cause PCRACCD	7.174*** 7.078***	0.002 0.002
PCRAGRI does not Granger Cause PCY87 PCY87 does not Granger Cause PCRAGRI	1.131 4.178**	0.361 0.019
PCRFIRE does not Granger Cause PCY87 PCY87 does not Granger Cause PCRFIRE	7.046*** 2.703*	0.002 0.074
PCRMACH does not Granger Cause PCY87 PCY87 does not Granger Cause PCRMACH	1.501 1.079	0.246 0.381
PCRTRAN does not Granger Cause PCY87 PCY87 does not Granger Cause PCRTRAN	0.499 0.007	0.687 0.999
Note: Tests with variables, per capita income in US dollars and per capita income in PPP are almost similar, though not reported here		

Granger Causality tests (with growth rates)

Hypotheses	F-stats	Prob values
GRTOTAL does not Granger Cause GROWTH GROWTH does not Granger Cause GRTOTAL	8.403*** 0.035	0.007 0.851
GRNLIFE does not Granger Cause GROWTH GROWTH does not Granger Cause GRNLIFE	11.365*** 0.756	0.000 0.481
GRLIFE does not Granger Cause GROWTH GROWTH does not Granger Cause GRLIFE	1.251 0.044	0.274 0.834
GRACCD does not Granger Cause GROWTH GROWTH does not Granger Cause GRACCD	4.738** 0.090	0.039 0.765
GRAGRI does not Granger Cause GROWTH GROWTH does not Granger Cause GRAGRI	0.040 0.063	0.841 0.803
GRFIRE does not Granger Cause GROWTH GROWTH does not Granger Cause GRFIRE	6.194*** 0.009	0.020 0.921
GRMACH does not Granger Cause GROWTH GROWTH does not Granger Cause GRMACH	0.004 0.293	0.983 0.593
GRTRAN does not Granger Cause GROWTH GROWTH does not Granger Cause GRTRAN	0.953 0.874	0.338 0.359



Financial and economic crises

- 1980: Regime shift from import substitution to export oriented development strategy
- Financial and economic crises:
 - 1991
 - 1994
 - 1999
 - 2001

Effect of insurance premiums on economic growth (OLS)

Dependent variable: GROWTH

Variable	Model 1	Model 2
Constant	1.362 (1.510)	3.824 (4.762)***
GRTOTAL	0.253*** (4.786)	0.141*** (3.149)
Dummy1991	-	-4.950* (-1.971)
Dummy1994	-	-8.134*** (-3.012)
Dummy1999	-	-8.352*** (-3.207)
Dummy2001	-	-9.992*** (-3.671)
Diagnostic statistics	R ² : 0.468; F-stats: 22.910***; DW: 1.266	R ² : 0.767; F-stats: 14.542***; DW: 1.266
Note: Figures in brackets are t-ratios; * significant at %10, ** at %5, *** at %1		

Effect of insurance income on economic growth (OLS)
 Dependent variable: GROWTH

Variable	Coefficient (t-ratios)	R ²	F-stats	DW stats
GRLIFE	0.029 (1.518)	0.081	2.305	2.377
GRNLIFE	0.231*** (3.684)	0.342	13.573***	2.155
GRACCD	0.145*** (3.831)	0.360	14.669***	1.768
GRFIRE	0.114 (1.430)	0.072	2.045	2.125
GRAGRI	0.036 (1.359)	0.066	1.847	2.400
GRMACH	0.032 (1.177)	0.051	1.387	2.320
GRTRAN	0.043 (0.883)	0.029	0.780	2.198

Note: Crises dummies are not reported here, but all dummies are significant in all regressions

Insurance for good days or bad days?

Dependent variable: GROWTH

Estimation period	Coefficient of GRTOTAL
1980 – 2007 (whole period)	0.253 (4.768)***
1980 – 1991	0.236 (3.238)***
1992 - 2007	0.260 (3.421)***
1980 – 1994	0.277 (4.656)***
1995 – 2007	0.232 (2.512)**
1980 – 1999	0.261 (4.627)***
2000 – 2007	0.253 (2.037)*
1980 – 2001	0.276 (5.449)***
2002 – 2007	0.133 (1.346)

Almost a stable significant positive relationship, crises have an impulse effect

Insurance for good days or bad days? Dependent variable: GROWTH

Estimation period	Coefficient of GRLIFE
1980 – 2007 (whole period)	0.029 (1.518)
1980 – 1991	0.024 (1.509)
1992 - 2007	0.139 (1.752)
1980 – 1994	0.029 (1.616)
1995 – 2007	0.100 (0.983)
1980 – 1999	0.030 (1.613)
2000 – 2007	0.209 (1.513)
1980 – 2001	0.037 (1.818)
2002 – 2007	0.093 (1.952)

Almost a stable positive BUT insignificant relationship,
crises have an impulse effect

Insurance for good days or bad days? Dependent variable: GROWTH

Estimation period	Coefficient of GRNLIFE
1980 – 2007 (whole period)	0.230 (3.684) ***
1980 – 1991	0.251 (3.487) ***
1992 - 2007	0.222 (2.316) **
1980 – 1994	0.258 (4.284) ***
1995 – 2007	0.191 (1.495)
1980 – 1999	0.202 (3.014) ***
2000 – 2007	0.458 (3.380) ***
1980 – 2001	0.247 (3.802) ***
2002 – 2007	0.094 (0.956)

Similar results with total premium income: Almost a stable significant positive relationship, crises have an impulse effect

Effect of economic growth on insurance income (OLS)

Dependent	Independent	Coefficient (t-ratio)
GRTOTAL	GROWTH	1.848 (4.784)***
GRLIFE	GROWTH	2.769 (1.518)
GRNLIFE	GROWTH	1.485 (3.684)***
GRACCD	GROWTH	2.475 (3.830)***
GRAGRI	GROWTH	1.827 (1.359)
GRFIRE	GROWTH	0.636 (1.430)
GRMACH	GROWTH	1.557 (1.177)
GRTRAN	GROWTH	0.669 (0.883)
Effect of growth on insurance income is greater than the reverse case		

Concluding remarks

- Relationship between economic growth and insurance is **always positive**
- Causality is usually **bi-directional**
- Relationship is positive and **significant** for total premiums, non-life, accident and fire insurance, but **insignificant** for life, agriculture, transport and engineering insurances
- Influence of insurance premium on growth is greater in terms of magnitude of the coefficients when compared to the influence of growth on insurance:
 - On average, if insurance premiums grow 1%, economy will grow 0.25 %
 - If economy grows 1%, insurance income will grow 1.5% to 2.5%
- Insurance demand is more **reactive** to changes in the economy in “good days”, however has limited reaction to changes in the economy in “bad days”.