International Analysis of Underwriting Cycles

(Paper for the WRIEC 2015)

by

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Abstract:

This study examines the presence of underwriting cycles. First of all we described previous studies about underwriting cycles. As commonly used method of identifying underwriting cycles – a second-order autoregressive model – AR(2) is sometimes criticized, we present a new approach, i.e. the idea of deviation cycles (this method involves fitting a trend to the indicators and analyzing the deviations from this trend) using quarterly data for Australia, Hong Kong and Poland. With that method we also found cycles, however they were shorter than classical ones (about 2-4 years vs. 6-11 years). We tested some relations between profitability (profit ratio) and other variables (loss ratios, claims, premiums and also GDP), however the results of our analysis support only partly our hypothesis.

Key Words: underwriting cycles, deviation cycles, insurance industry

1. Introduction

The cyclicality of underwriting profits for the property-liability insurance industry has been extensively researched.[1] The underwriting cycle refers to a repeating series of phases that insurance markets go through (Niehaus and Terry 1993; Harrington and Danzon 1994). The sequence of hard and soft markets may be observed in prices, profitability, and supply (capacity) for insurance.

Non-life insurance typically goes through price cycles that extend over several years and are particularly pronounced in reinsurance and in the industrial lines. Insurance buyers, cedents, reinsurers and industrial-lines insurers have to live with fluctuating market prices. There are – at least theoretically – supply-side strategies with which better results can be achieved over the cycle, with roughly the same volatility, than by passively standing by and allowing the cycle to take its course.

The difficulties involved in cycle management lie in diagnosing the market situation and in implementing the strategy. Diagnosis requires a future-oriented market analysis to recognize changes in prices in good time to be able to steer capacity accordingly. Implementation depends on underwriting expertise in order to be able to assess the risks with the necessary perspicacity and discernment: only refined underwriting skills make it possible to distinguish good from less good business. But strict business control and incentives structures that are consistently geared towards profitability rather than premium volume targets are also essential. It is also important to maintain client relations in low-price phases, when reinsurer or industrial-lines business is not profitable.

[1] For examples, see: Smith and Gahin (1983); Venezian (1985); Cummins and Outreville (1987); Doherty and Kang (1988); Grace and Hotchkiss (1995); Lamm-Tennant and Weiss (1997); Chen et al. (1999); Harrington et al. (2008); Meier and Outreville (2010); Berry-Stolzle and Born (2012) and Boyer and Owadally (2014).

There is no universal method of underwriting cycles determination, but the most commonly used is a second-order autoregressive model (AR(2)) proposed by Venezian (1985). However that method is sometimes criticized (e.g. Boyer et al. 2012).

We should mention that certain indicators may illustrate the course of the cycle, but usually observations are made on the bases of loss ratio or combined ratio. Nevertheless there are numerous other indices that could be taken into consideration.

Thus, the determination of the overall underwriting cycle for the entire insurance market could be difficult as in practice there is rather bunch of cycles, which show variations of only one selected indicator (e.g. loss ratio). Moreover, we should expect some phase shifts between cycles for different variables. Determining the relation between indices could be important because it will allow for a distinction of three types of indicators: coincident (at approximately the same time as the conditions they signify), leading (signaling future events) and lagging (following an event).

Knowledge about these relations could be helpful in understanding the cycle nature what is necessary for cycle management (i.e. adjusting market shares and adapting the regional, lines-of-business and product mix; Enz 2002). The result of this study could help insurance companies in cycle management. Thus, detailed purposes of this research include:

- investigation the presence of the underwriting cycle by introducing alternative method of underwriting cycles identification (deviation cycles – based on quarterly data);
- determining relations between different variables.

The remainder of this paper is organized as follows. In the next section a brief overview of the previous studies on the presence and causes of underwriting cycles is provided. The results from this section form the basis for the following sections, which describe the data and methods

employed for testing the hypotheses mentioned in the section 3. Finally results and conclusions are presented.

2. Literature Review

As we mentioned before the underwriting cycle is defined as alternating periods of hard markets in which insurance prices and insurer profitability are high and soft markets with low insurance prices and low insurer profitability. Most of the research documenting the existence of cycles relies on the time series behavior of published underwriting information on loss ratios and underwriting profits (Manikowski and Weiss 2013). In addition, sometimes description of the cycle includes four phases. The first phase is characterized by a period of low profitability (recession). In that phase premiums begin to increase and capacity starts to shrink. This is followed by a sudden change to rapidly increasing profitability (crisis) – rates are very high and capacity is restricted because many insurers have left the market. In the third stage (revival), profitability remains high but is no longer increasing. Premiums begin to decrease and capacity increases. Profitability gradually declines during the last stage (boom). The industry returns to a period of low profitability as there is too much capacity and rates are quite low (Gron 1994). However, nowadays this approach is not very popular – usually only two phases are distinguished: hard and soft markets.

Many studies have shown that an underwriting cycle exists in the United States insurance market (e.g. Venezian 1985; Cummins and Outreville 1987; Doherty and Kang 1988; Grace and Hotchkiss 1995; Lamm-Tennant and Weiss 1997), in other developed countries (Cummins and Outreville 1987; Lamm-Tennant and Weiss 1997), in emerging markets (Chen et al. 1999; Zhang and Tang 2012, Manikowski 2013), as well as in different lines of insurance (Venezian 1985; Cummins and Outreville 1987; Lamm-Tennant and Weiss 1997; Chen et al. 1999;

Manikowski and Weiss 2012; 2013). The average cycle length is about six years (Venezian 1985; Cummins and Outreville 1987), but some researchers suggest longer periods (Lamm-Tennant and Weiss 1997; Chen et al. 1999; Meier 2006).

Several causes for the underwriting cycle have been posited in the literature[2]. Theories have arisen to explain the existence of underwriting cycles, and these frequently rely on how the insurance product is priced. Some theories emphasize the institutional, accounting and regulatory impact on loss ratios and underwriting profits, while others focus on shocks such as loss, interests, and/or demand and supply shocks. One school of thought suggests that the causes are irrational behavior such as competitor-driven pricing and naive rate-making processes. Another school of thought, that is related to the rational expectations/institutional intervention hypothesis, does not agree that insurance markets and insurers are irrational. Instead, it suggests that the underwriting cycle is created by external factors and market characteristics that are outside the control of insurers (Chen et al. 1999). Numerous studies and debates relating to the two schools of thought exist. Extant studies discuss specific reasons/explanations for the underwriting cycle such as: forecasting errors (Venezian 1985), insurer moral hazard (Harrington and Danzon 1994), arbitrage theory (Cummins and Outreville 1987), risky debt (Cummins and Danzon 1997), interest rate variation (Fields and Venezian 1989; Doherty and Garven 1995), capacity constraints (Niehaus and Terry 1993; Gron 1994; Winter 1994), winner's curse (Fitzpatrick 2004; Chen and Yan 2012) and underwriters' sentiment (Boyer 2006). Nevertheless, there is no generally accepted view of what the causes are. Cummins and Outreville (1987) suggest that the underwriting cycle, as observed in the United States and other developed countries, will also be present in other parts of the world through the proliferation of international reinsurance services.

[2] For detailed descriptions see for examples: Cummins et al (1991); Lamm-Tennant and Weiss (1997); Parsons (2003); Fitzpatrick (2004); Meier and Outreville (2006) and Weiss (2007).

However, there are also thoughts that underwriting cycles are not real (Powers 2011; Boyer et al. 2012; Boyer and Owadally 2014).

3. Hypothesis

Based on the literature review we are expecting the following (table 1) tendencies of indices during hard and soft markets and their relations (we assumed profitability (profit ratio) is the reference (basic) indicator).

Table 1. Expected behavior of insurance metrics during the cycle and hypothetic relations between them

Indicator	Hard market	Soft market	Relation
Profitability (profit ratio)	increase	decrease	Reference Index
Dynamics of claims	decrease	increase	leading
Rates	increase	decrease	leading
Loss ratio	decrease	increase	coincident
Combined ratio	decrease	increase	coincident
Capacity	decrease	increase	lagging
Dynamics of premium	increase	decrease	lagging

There is no doubt that both the loss ratio and combined ratio should coincide with the reference index (profitability) as they reflect the underwriting result. The rates and dynamics of claims are considered as leading indicators. This follows essentially directly from theoretical assumptions regarding the causes of underwriting cycles. Profitability is increasing thanks to the fact that previously prices (tariffs) were raised, which began to grow due to increased dynamics of claims. Insurance capacity should be lagged relative to the reference index. The capacity shrinks due to the withdraws from the market as a result of suffering huge underwriting losses by insurers. The relation between the dynamics of premium and profitability is a little bit controversial. At the

beginning of the crisis the dynamics of premium should decline due to limited availability of insurance coverage, but later, because of the higher rates it should increase as well. The maximum premium growth is expected to be recorded at the beginning of the soft market and then start to decline because of falling prices. Thus, the dynamics of premium should be lagged in relation to the reference index (profitability) (Manikowski 2013). However, taking into consideration difference in causes of underwriting cycles in the emerging markets and in the developed countries, it is possible that these relations could be different in that region.

4. Data

We use insurance statistics (only quarterly data and direct business) of three countries: Australia, Hong Kong and Poland. There is a problem with the accessibility of quarterly data – in many countries there is no such insurance statistics publicly available – that is way we consider only these three markets. We collect data starting form the first quarter 2001 (in case of Australia from fourth quarter of 2002) – thus we have 56 and 49 (Australia) quarterly observations, respectively. We analyze loss ratios, dynamics of claims, dynamics of premiums, profitability (profit ratio). In addition, for purposes of comparison, GDP is analyzed as a control variable, with the expectation that these data should be relatively stable.

We feel that a small data set might yield inconclusive results. In the case of testing the presence of the underwriting cycle, data are mainly obtained from the insurance yearbooks of the insurance authorities and institutions. The macroeconomic data used to test hypothesis are obtained from official publications.

5. Methodology

As a second-order autoregressive model – AR(2) proposed by Venezian (1985) is sometimes criticized (e.g. Boyer et al. 2012) we want to introduce another method for testing the existence of the underwriting cycle.

First of all we consider the idea of growth cycles, which is currently used to determine general business cycles and to measure fluctuations in aggregate economic activity. A growth cycle consists of a period of relatively high growth rates occurring at about the same time in many economic activities, followed by a period of similarly widespread low growth rates which merges into the high-growth phase of the next cycle. It has been argued that what really matters are not fluctuations in aggregate activity but fluctuations in subdivisions of the economy, especially in "socially important" ones. However, it will hardly be denied that analysis of a part of the economy, say the construction industry, will not get far without relating that part to the whole (Mintz 1972). Thus, on this basis we can take into consideration the insurance industry. Previous studies on underwriting cycles were usually based on classical approach (classical cycles), i.e. values of variables were analyzed instead of growth rates as in growth cycles.

Two independent methods serve to distinguish between "high" and "low" growth rates, which in that approach could be similar to hard and soft markets in the insurance industry. The long-run trend of economic activities is used as a criterion in the first method. Growth which is more rapid than the trend is classified as "relatively high". This method involves fitting a trend to the indicators and analyzing the deviations from this trend – it is known as the "deviation cycles". The second method requires no trend fitting. It focuses directly on rates of change and distinguishes between high and low rates by comparing average rates of change in economic

activities during successive time periods - thus we can observe the alternations between high- and low-rate periods, which are termed "step cycles" (Mintz 1972).

In this study we will try to adopt the idea of deviation cycles for the insurance industry of some Asia-Pacific countries. We will test several variables, including profit ratio, loss ratios, claims, premiums, capacity and also GDP. Table 2 provides a list and definitions of the metrics mentioned above.

Elimination (decomposition) method, i.e. removing from the time series other types of fluctuations, i.e. seasonal, random and long-term (trend) fluctuations, is used:

$$y_t = g_t + c_t + s_t + \mu_t,$$

where: g_t represents a trend, c_t is a cyclical component, s_t – seasonal fluctuations and μ_t – random fluctuations.

Table 2. Variable definitions

Variable name	Definition
Profitability	Profit ratio – underwriting result divided by premiums (only direct business)
Premiums	Premium's growth rate – premiums in the current quarter divided by premiums from the same quarter of the preceding year (only direct business)
Claims	Claims' growth rate – claims in the current quarter divided by claims from the same quarter of the preceding year (only direct business)
Loss ratio	Claims divided by premiums (only direct business)
GDP	Gross Domestic Product in the current quarter divided by Gross Domestic Product from the same quarter of the preceding year

To eliminate other than cyclical fluctuations we use the following procedure:

- the elimination of seasonal and random fluctuations by the use of the X-12 ARIMA method;

- the elimination of a trend by the use of Hodrick-Prescott (HP) filter (Hodrick and Prescott 1997);
- in result we obtain a new time series, indicating the deviations from the trend line, i.e. cyclical fluctuations (a value of 0 means full compatibility with the trend, while values above zero are showing the variation *in plus* and below – deviations *in minus*).

In order to identify the phases of the cycle, its length and its turning points, the following assumptions are taken into consideration:

- the upper (lower) turning point appears in the period when the value of the analyzed indicator reaches its maximum (minimum);
- the phase is a period lasting at least 3 quarters and occurring between the two subsequent, opposite turning points;
- each cycle consists of a growth phase (between the lower and upper turning point) and a decline phase (between the upper and lower turning point), i.e. soft and hard markets.

To test hypothesis mentioned in the Section 3 we use correlation analysis – between profitability (profit ratio) and other indices. The test are conducted for coincident correlation as well as lagging correlations (up to 4 quarters lags).

6. Results

Using quarterly data in deviation cycle approach we confirmed cyclical behavior for all variables and all countries. Cycles length is varying from 2.2 to 3.6 years (see table 3 and Appendices 1-6 for details). There are not very big differences among countries, however cycles periods in Poland looks to be a little bit longer. We can observe more volatility in variables, even in GDP

for Australia and Honk Kong – this is a little bit surprising as the Polish insurance market is younger and less developed than this other we analyze. In spite of clear assumption about identification of turning points in several instances there were some doubts in recognizing a turning point in the proper way. Cycle's phases were quite short and many times we observed its length lasting only 3 quarters, i.e. the minimal required phase's length.

Table 3. Summarized results of tests for cycle existence for quarterly data (in years)

variable	Australia	Hong Kong	Poland
GDP	2.7	2.6	3.6
Premiums	3	3	3.3
Profit ratio	3.3	3.4	3
Loss ratio	2.4	3.1	3.6
Claims	2.9	2.2	2.6

Cycles based on quarterly data are much shorter than those estimated with annual data. The above statement leads to the following: classic cycles (based on yearly data and determined with AR(2) method) could be classified as major cycles (Juglar's cycles), growth cycles should be classified as minor cycles (Kitchin's cycles) (Kitchin 1923).

In addition we found that turning points for different indicators are shifted from each other. That supports our hypothesis about existence of three types of indicators: coincident, leading and lagging. This knowledge could be very helpful for the insurance industry and can help in predicting crises and booms (soft and hard markets), as well as adopting proper strategies.

Table 4 reports the results of the correlation analysis between profitability (profit ratio) and other variables (loss ratios, claims, premiums and also GDP) for Australia, Hong Kong and Poland. The tests were conducted for coincident correlation as well as lagging correlations (up to 4 quarters lags).

Table 4. Summarized results of the correlation analysis between profitability (profit ratio) and other variables

Country	Variable	Coincident correlation	Max correlation	Time (phase) shift*
Australia	***GDP***	−0.60	−0.64	−1
	Premiums	0.23	−0.57	−3
	Claims	−0.87	−0.87	0
	Loss ratio	−0.98	−0.98	0
Hong Kong	***GDP***	0.17	0.51	−3
	Premiums	−0.09	−0.30	−2
	Claims	−0.64	−0.64	0
	Loss ratio	−0.93	−0.93	0
Poland	***GDP***	0.19	0.41	3
	Premiums	0.44	0.44	0
	Claims	−0.40	−0.50	2
	Loss ratio	−0.92	−0.92	0

* Time (phase) shift between coincident and maximal correlations: '+' means leading index (and the number of quarters), '–' means lagging index (and the number of quarters), and '0' means coincidence of variable and reference index (profit ratio)

We can confirm our hypothesis about relations between variables only partly. In case of Australia and Hong Kong, we confirmed the loss ratio and claims are a coincident indices. But premiums and GDP are lagging indicators. Moreover, except of loss ratio and claims the correlation coefficients are quite moderate. This result is a little bit surprising, especially in the context of not identifying leading indices. However, in case of Poland we can observe something almost opposite. GDP and claims are leading indices, but premiums and loss ratio coincident the profitability.

Thus, on the basis of our results it could be quite difficult to predict soft and hard markets, as only in Poland we can observed leading indices. Probably, it is because of observed volatility in analyzed indices. In addition, we should take into consideration Chen's findings that although the underwriting cycle does exist in Asia, the causes of it are different from those found in the other countries. That result is explained based on the difference in economic developments and

the level of regulatory control prevailing in developed countries (Chen et al. 1999). It is possible that the nature and characteristics of underwriting cycles are dissimilar for different regions and countries.

Underwriting cycles require further detailed analysis. The next step could be taking into consideration more countries. Also two prominent underwriting cycle theories, the rational expectations/institutional intervention hypothesis (Cummins and Outreville 1987) and the capacity constraint theory (Gron 1994; Winter 1994) should be tested, to better understand the causes of cycles. However, first of all we should find the proper method of cycles examination. As mentioned Powers (2011), it is particularly ironic that over a dozens of years, researchers pursued causal explanations of the cyclical nature of insurance company profitability without first having carried out a formal test of this pattern.

7. Conclusion

This paper was intended to present an international analysis of underwriting cycles. The main goal of the paper was to propose an alternative method of cycle investigation. Because of using quarterly data we were able to collect data and present results of only three countries as an sample. The results of this study confirmed the existence of deviation cycles in analyzed countries. However, we were not able to confirm all excepted relations between different variables, probably as a result of volatility observed in analyzed indices and the characteristics of economies and insurance markets in different regions.

Understanding of the nature of cyclicality could be very helpful in the cycle management for the insurance industry. Insurers can take advantage of price cycles to boost profits by increasing their market share in phases with above-average prices and reducing it in low-price phases. Market share can be adjusted not only across the board, but also in specific lines of

business, products and regional markets. The basic idea of adapting market shares is very simple. However, it depends on being able to assess the price situation in time and with sufficient accuracy. This calls for market monitoring and forecasting, but also and above all for underwriting expertise. But decisive and convincing management is also important, because the advantages of adjusting market share are not easy to communicate in all phases of the cycle (Enz 2002). However, the detailed knowledge about the cycle nature is crucial. Cycle management is essentially proper timing. Monitoring the market, predicting market trends and accurately assessing prices play an important role. This study is helpful for these ideas, however, as we mentioned before further detailed analysis is required.

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Appendix 1. Deviation Cycles for Australia (in quarters)

		Phase								Average length
		↗	↘	↗	↘	↗	↘	↗	↘	
GDP	**Period**		IV.2003–III.2005	IV.2005–II.2006	III.2006–II.2007	III.2007–III.2008	IV.2008-III.2009	III.2009-I.2012	II.2012–III.2013	
	Phase's length		7	3	4	5	4	10	6	5.6
	Cycle's length			7		9		16		10.7
Premium	**Period**	I.2005–II.2007	III.2007–I.2008	II.2008–III.2009	IV.2009–III.2011	IV.2011–II.2013	III.2013–I.2014			
	Phase's length	10	3	6	7	7	3			6
	Cycle's length	13		13		10				12
Profit ratio	**Period**	I.2004–IV.2005	I.2006–IV.2006	I.2007–III.2008	IV.2008–III.2009	IV.2009–III.2011	IV.2011–IV.2013	IV.2013–		
	Phase's length	8	4	7	4	9	8			6.7
	Cycle's length	12		11		17				13.3
Loss ratio	**Period**	III.2004–I.2005	II.2005–IV.2005	I.2006–III.2006	IV.2006–III.2008	VI.2008–III.2009	IV.2008–III.2010	IV.2010–I.2013	I.2013-	
	Phase's length	3	3	3	8	4	8	6		5.0
	Cycle's length	6		11		12				9.7
Claims	**Period**	III.2004–I.2007	II.2007–III.2008	IV.2008–III.2009	IV.2009–III.2011	IV.2011–IV.2012	I.2013-			
	Phase's length	11	6	4	8	5				6.8
	Cycle's length	17		6						11.5

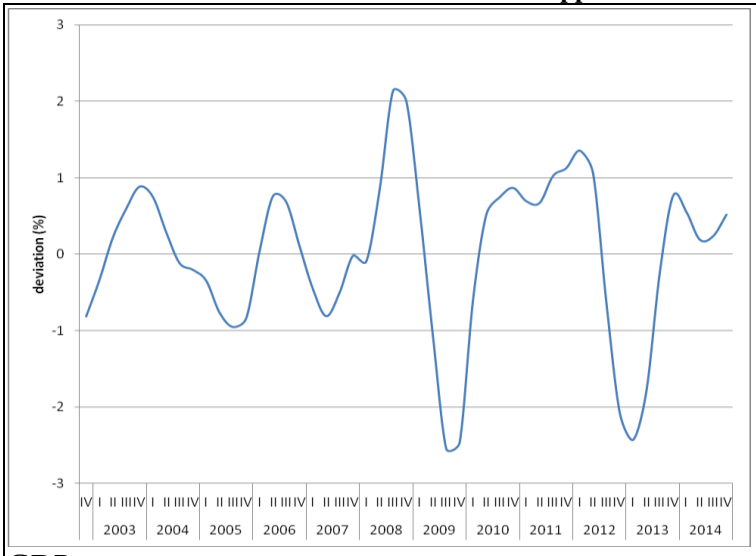
Appendix 2. Deviation Cycles for Hong Kong (in quarters)

		Phase											Average length
		↗	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗	
GDP	**Period**	II.2002–IV.2002	I.2003–III.2003	IV.2003–II.2004	III.2004–I.2005	II.2005–IV.2007	I.2008-I.2009	II.2009-III.2010	IV.2010–II.2012	III.2012-II.2013	III.2013-		
	Phase's length	3	3	3	3	11	5	6	7	4			5
	Cycle's length	6		6		16		13					10.3
Premium	**Period**	IV.2002–II.2003	III.2003–I.2005	II.2005–IV.2005	I.2006–III.2007	IV.2007–III.2008	IV.2008–III.2009	IV.2009–II.2013	III.2013–III.2014				
	Phase's length	3	7	3	7	4	4	15	5				6
	Cycle's length	10		10		8		20					12
Profit ratio	**Period**	III.2002–II.2004	III.2004–I.2005	II.2005–II.2006	III.2006–II.2008	III.2008–III.2010	IV.2010–III.2012	IV.2012–IV.2013					
	Phase's length	8	3	5	8	9	8	5					6.6
	Cycle's length	11		13		17							13.7
Loss ratio	**Period**	III.2001–II.2002	III.2002–II.2004	III.2004–I.2005	II.2005–II.2006	III.2006–III.2008	IV.2008–III.2010	IV.2010–I.2013	II.2013–IV.2013	I.2014–			
	Phase's length	4	8	3	5	9	8	10	3				6.3
	Cycle's length	12		8		17		13					12.5
Claims	**Period**	I.2003–II.2005	III.2005–I.2006	II.2006–IV.2006	I.2007–III.2007	IV.2007–III.2008	IV.2008–III.2009	IV.2009–III.2011	IV.2011–II.2012	III.2012–I.2013	II.2013–IV.2013	I.2014–	
	Phase's length	10	3	3	3	4	4	8	3	3	3		4.4
	Cycle's length	13		6		8		11		6			8.8

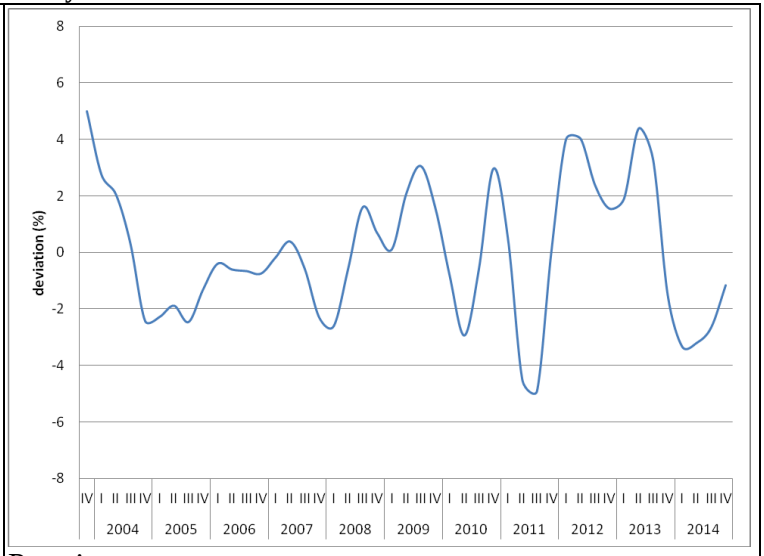
Appendix 3. Deviation Cycles for Poland (in quarters)

		Phase									Average length
		↗	↘	↗	↘	↗	↘	↗	↘	↗	
GDP	**Period**	II.2002–I.2004	II.2004–I.2005	II.2005–II.2007	III.2007–I.2009	II.2009–IV.2011	I.2012-IV.2012	I.2013-II.2014			
	Phase's length	8	4	9	7	11	4	6			7
	Cycle's length	12		16		15					14.3
Premium	**Period**		II.2003–IV.2003	I.2004–I.2005	III.2005–IV.2006	I.2007–III.2008	IV.2008–II.2010	III.2010-IV.2011	I.2012-III.2013	IV.2013-	
	Phase's length		3	5	7	7	7	6	7		6
	Cycle's length			12		14		13			13
Profit ratio	**Period**		I.2002–I.2004	II.2004–III.2006	IV.2006–II.2007	III.2007–I.2008	II.2008–I.2010	II.2010–I.2013	II.2013–		
	Phase's length		8	10	3	3	8	12			7.3
	Cycle's length			13		11					12
Loss ratio	**Period**		II.2002–I.2003	II.2003–IV.2003	I.2004–III.2006	IV.2006–III.2007	IV.2007-II.2008	III.2008-I.2010	II.2010–IV.2013	I.2014–	
	Phase's length		4	3	11	4	3	7	15		6.7
	Cycle's length			14		7		22			14.3
Claims	**Period**	II.2003–IV.2003	I.2004–II.2006	III.2006–III.2007	IV.2007–II.2008	III.2008–IV.2009	I.2010-I.2011	II.2011-II.2012	III.2012–III.2013	IV.2013–	
	Phase's length	3	10	5	3	6	5	4	5		5.1
	Cycle's length	13		8		11		9			10.3

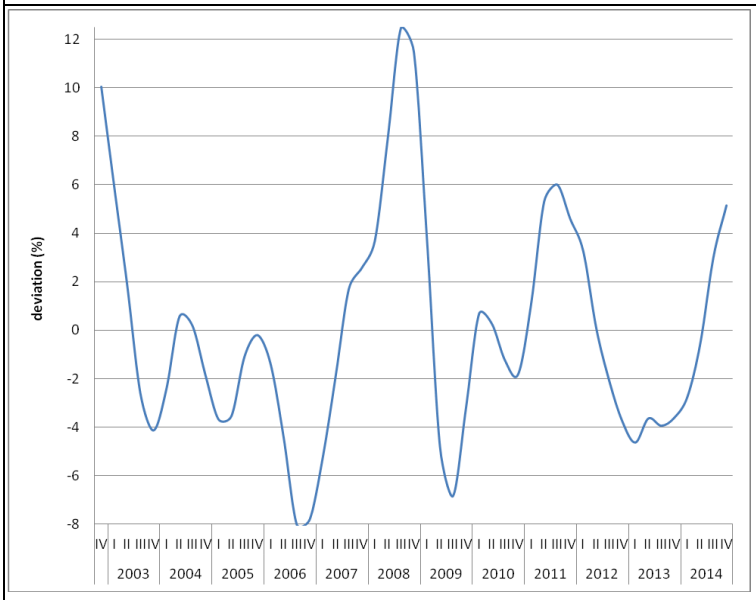
Appendix 4. Deviation Cycles for Australia



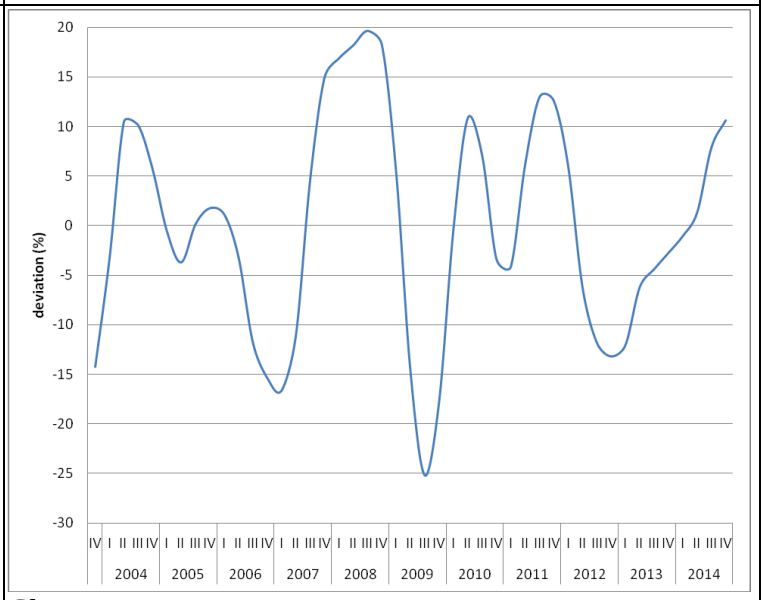
GDP



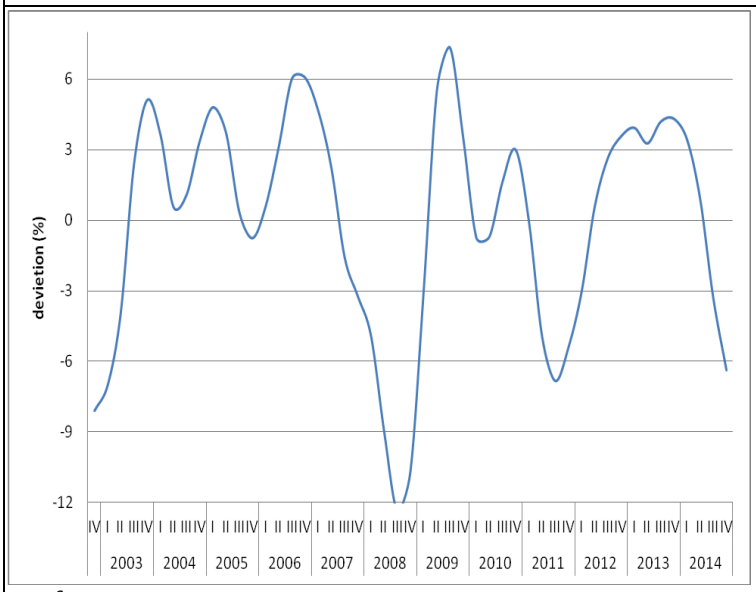
Premiums



Loss ratio

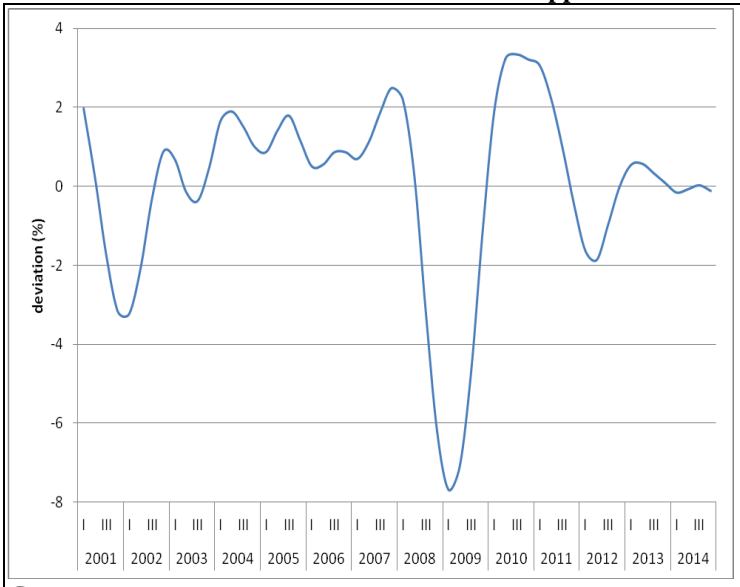


Claims

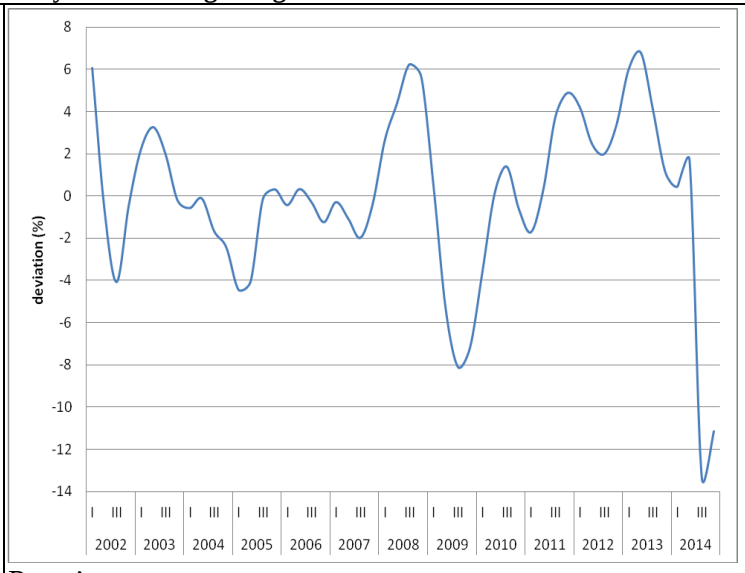


Profit ratio

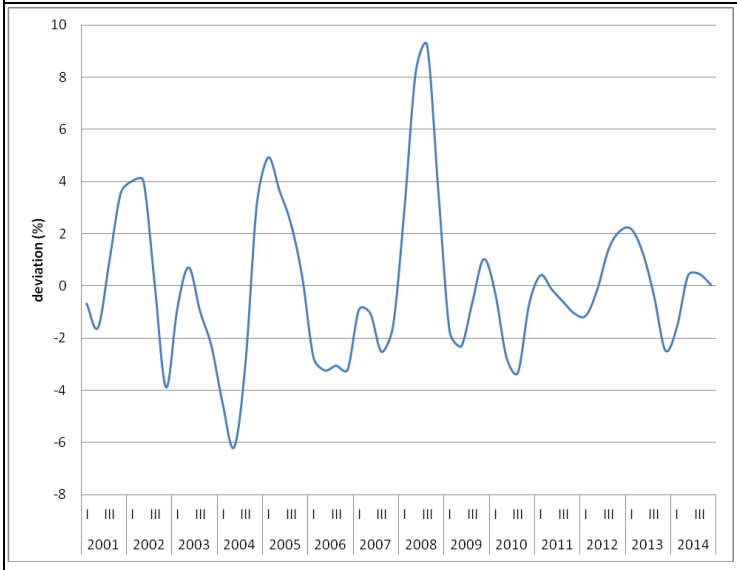
Appendix 5. Deviation Cycles for Hong Kong



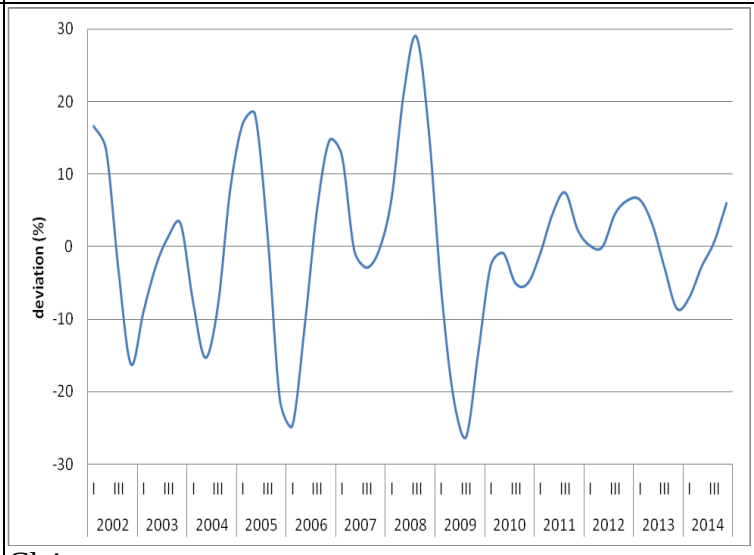
GDP



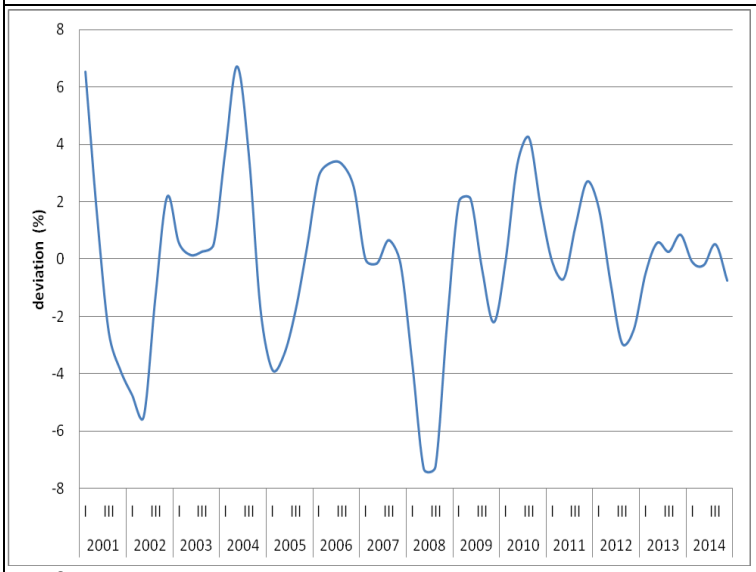
Premiums



Loss ratio

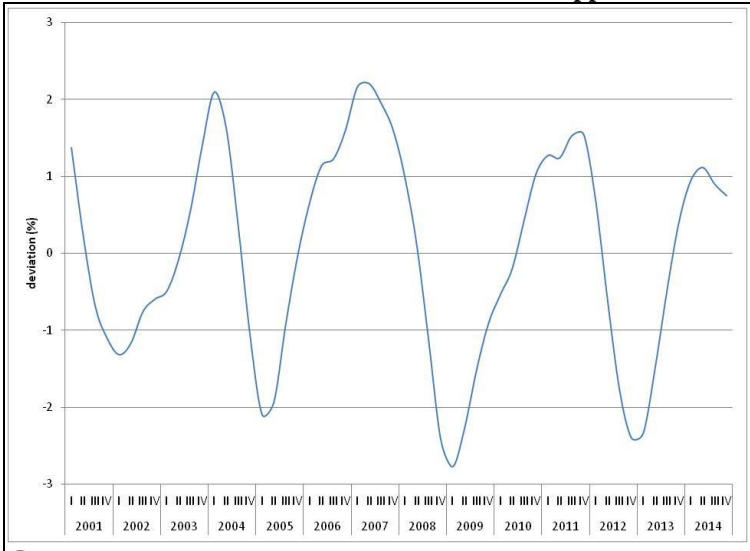


Claims

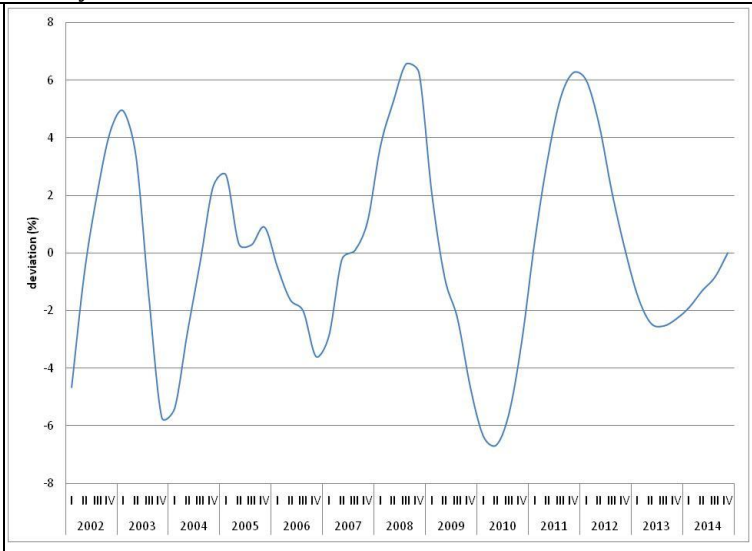


Profit ratio

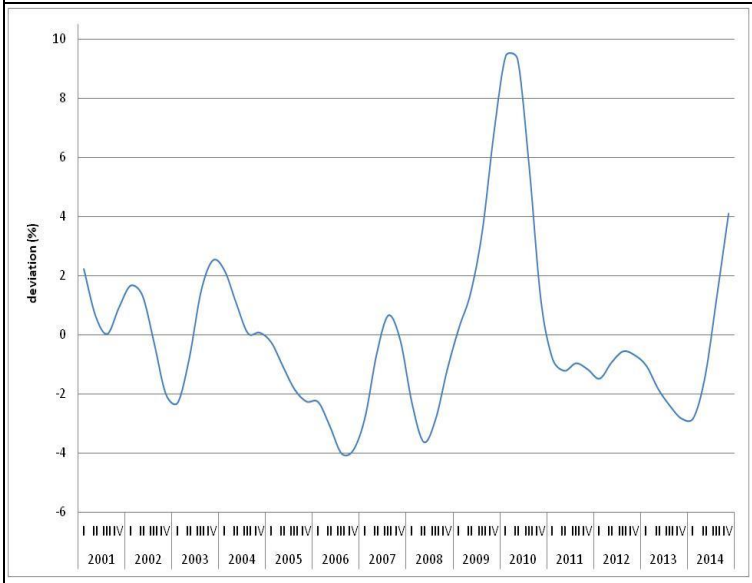
Appendix 6. Deviation Cycles for Poland



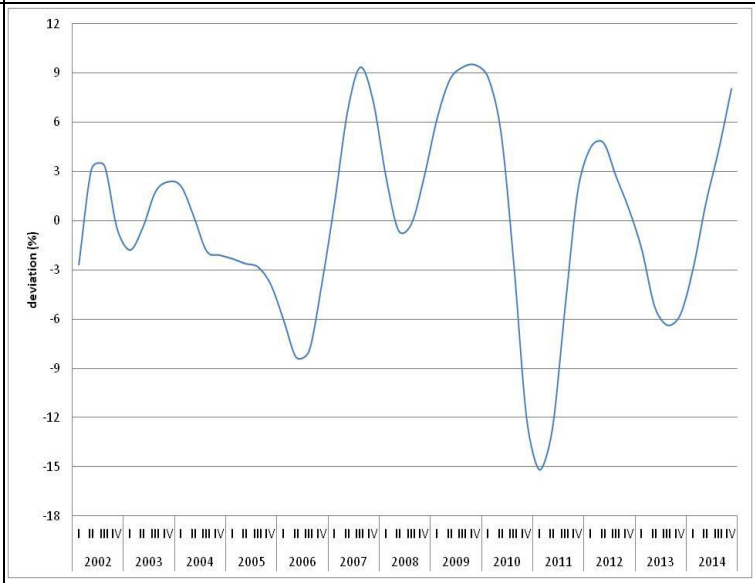
GDP



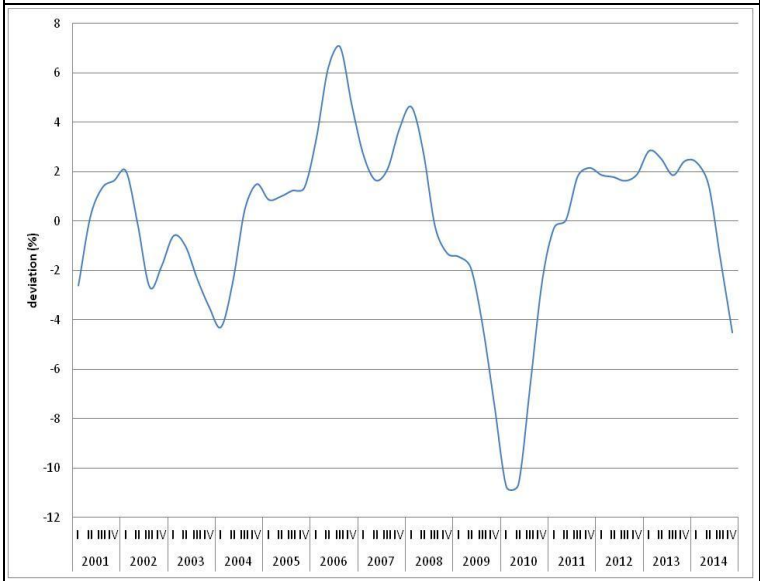
Premiums



Loss ratio



Claims



Profit ratio