

The Changing Landscapes in IR Research: Analysis of Research Trends Using Text Mining Methods

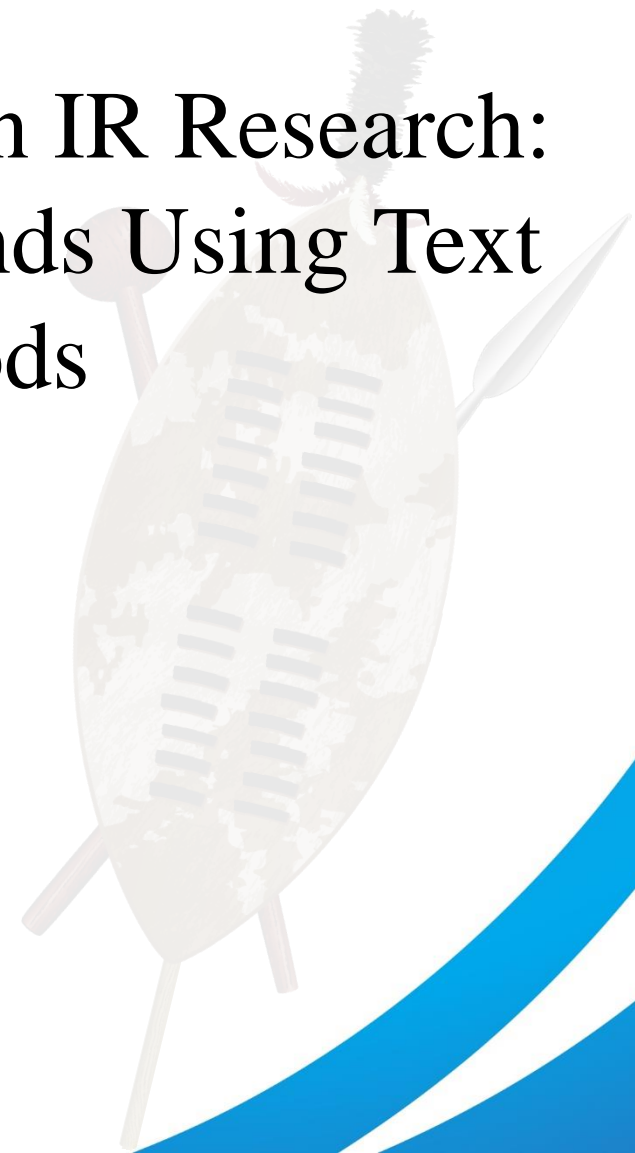
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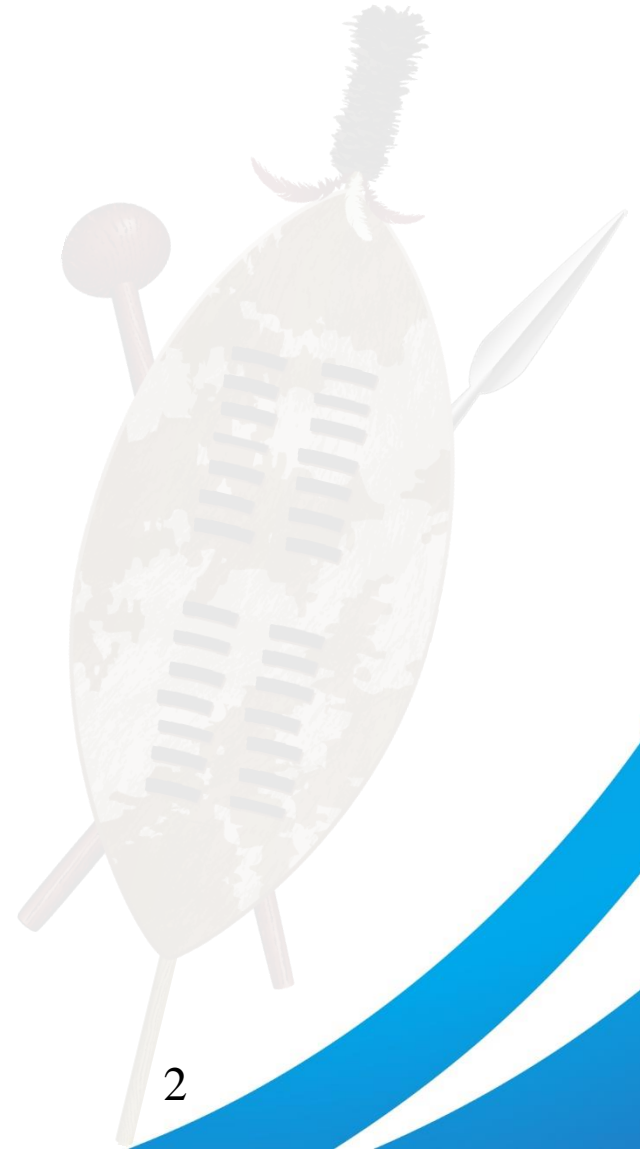
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IR in Crisis?

- There is a growing sense that industrial relations (IR), as a field of study, has been on decline over the past twenty to thirty years.
- This is primarily because IR has not well coped with the changes in the world of work.
- Several features have been driving IR into crisis since the late 1980s: decreasing union density and collective bargaining coverage, effects of globalization, development of human resources management (HRM), and new forms of employment
- IR has been criticized for its excessively narrow scope (e.g., union and collective bargaining).

IR in Crisis?

- In this situation, IR scholars hold divergent opinions about what strategy IR should take; In general, IR scholars suggest three streams of strategy.
- First, it is argued that the current study on IR should return to broad and original version of IR (e.g., Kaufman, 2008).
- Second, some scholars (e.g., Kelly, 1998; Hyman, 2007) predict that study on union will be revitalized in repeated history cycles (long wave theory). They argue that the field and focus of IR do not need to change.
- Last, other scholars (e.g., Jackson et al, 2013) insist that studies of IR turn its attention to newly-emerging labor problems such as contract workers and immigrant workers.

Purpose

- It is important to examine how the topics and focus of the academic field of IR have changed throughout the ages, and to predict future research trend.
- Accordingly, the purposes of this paper are, first, to investigate what topics IR has focused on, and, second, to predict what topics future research in IR would concentrate on.
- To achieve these goals, this study uses text mining methods. By analyzing the frequency of keyword appearance in abstracts of IR journals, this paper examines how traditional topics (e.g. union and collective bargaining) have changed, and what topics are newly-emerging.



ILERA
WORLD CONGRESS

Methods (data)

- Data from three top-tier journals in IR field:
 - 1) *Industrial & Labor Relations Review*
(published since 1947)
 - 2) *Industrial Relations: A Journal of Economy and Society*
(published since 1961)
 - 3) *British Journal of Industrial Relations*
(published since 1963)
- The data include all the abstracts available.



Methods

- Text mining generally refers to the process of extracting interesting and non-trivial patterns or knowledge from unstructured text documents (Tan, 1999; Feldman & Danger, 2007).
- Text mining is also defined as 'the use of large online text collections to discover new facts and trends about the world itself' (Hearst, 1999). It can be regarded as an extension of data mining or knowledge discovery from (structured) databases.
- Text mining can also be one of the nonstructural data analysis tools in big data analysis with a focus on frequencies of terms appearing in texts.

Methods

- Tool: R (version 3.1.1)
- Process

Extract
Text

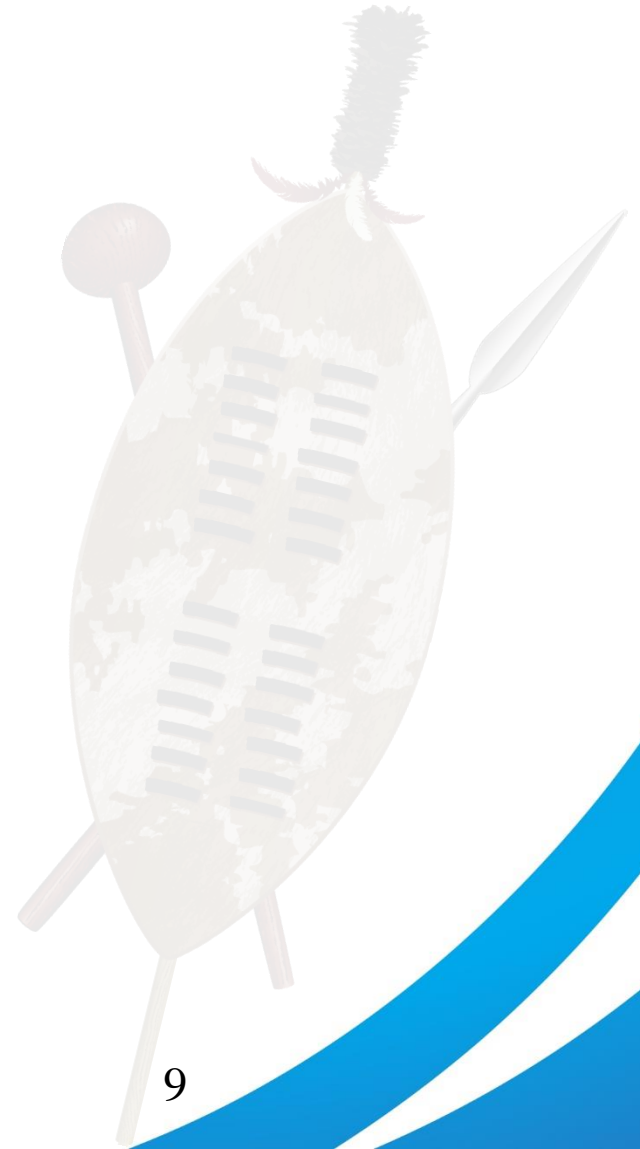
Refine
Text

Remove
stop words

Stemming

Extract
frequency

Results



Basic statistics

The number of articles and abstracts

Journal	Category	1940s (1947~ 1949)	1950s (1950~ 1959)	1960s (1960~ 1969)	1970s (1970~ 1979)	1980s (1980~ 1989)	1990s (1990~ 1991)	2000s (2000~ 2009)	2010s (2010~ 2014)	Total
ILRR	articles	72	331	314	316	347	396	301	186	2,263
	abstracts	66	307	282	275	333	351	297	177	2,088
IR	articles	-	-	211	370	317	336	434	183	1,851
	abstracts	-	-	-	-	66	269	298	148	781
BJIR	articles	-	-	189	270	231	296	219	203	1,408
	abstracts	-	-	-	-	-	230	281	171	682
Total	articles	72	331	714	956	895	1,028	954	572	5,522
	abstracts	66	307	282	275	399	850	876	496	3,551

- ILRR = Industrial & Labor Relations Review
- IR = Industrial Relations
- BJIR = British Journal of Industrial Relations

- ILRR has published its articles since 1947, and provided abstracts at the same time.
- IR has published its articles since 1961, and provided abstracts since 1987.
- BJIR has published its articles since 1963, and provided abstracts since 1990.

Keyword Appearance Analysis

- We divided IR topics into two groups: traditional IR topics and new IR topics

	Traditional IR topics	New IR topics
Keyword	Union Collective bargaining Strike Dispute Mediation Arbitration Negotiation Safety Health Injury Wage	Non union Contract Temporary Contingent Global Immigrant Family Gender Women Ethnicity

Calculation Formula

- Appearance Ratio (AR)

$$AR = \frac{\text{the number of keyword appearances per year}}{\text{the number of total articles per year}}$$

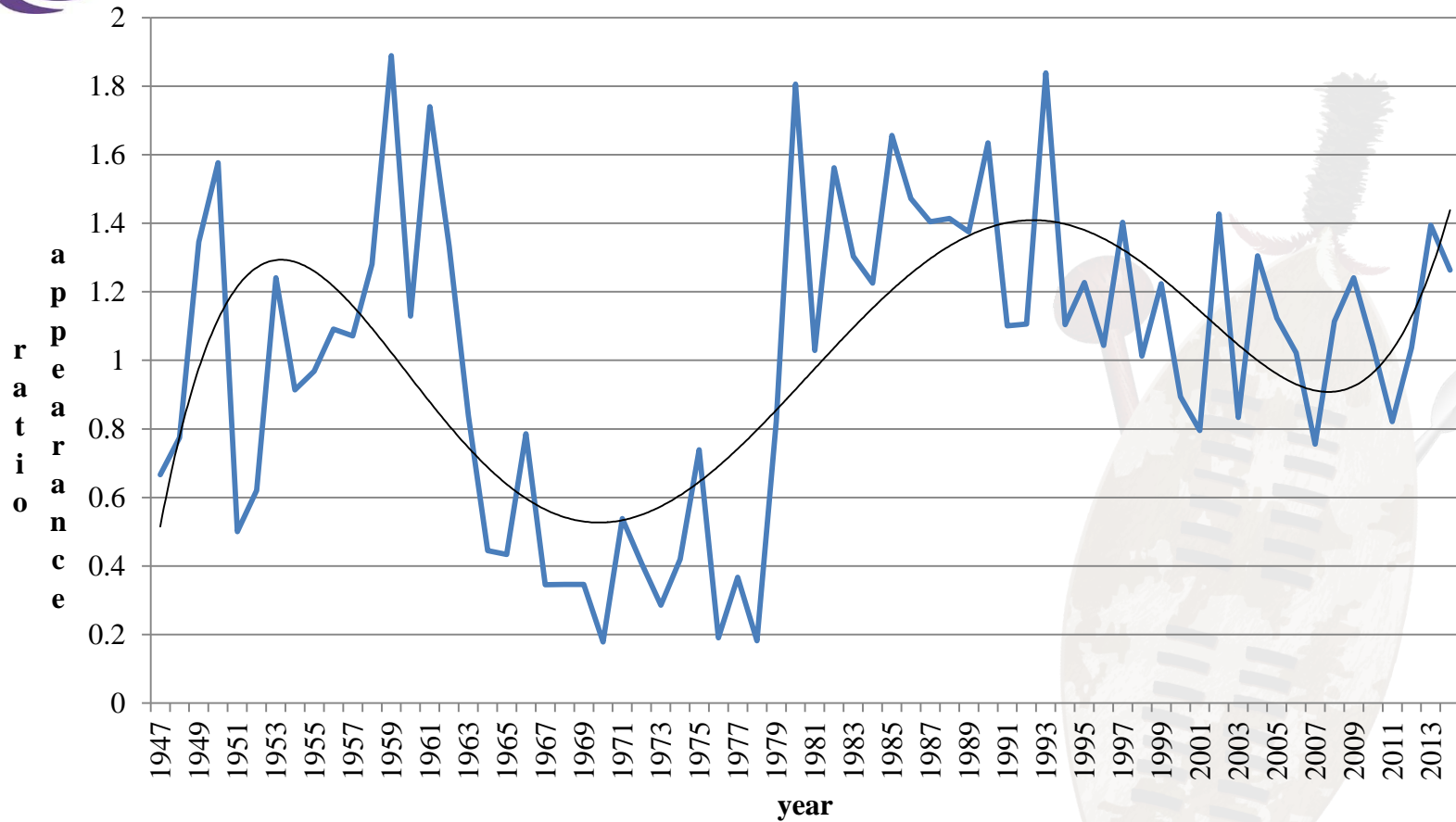
Therefore, Appearance Ratio denotes the average number of keyword appearance per abstract.

e.g.,) If AR of a keyword is 1, the keyword appears once in every abstract in the year.

Traditional Topics



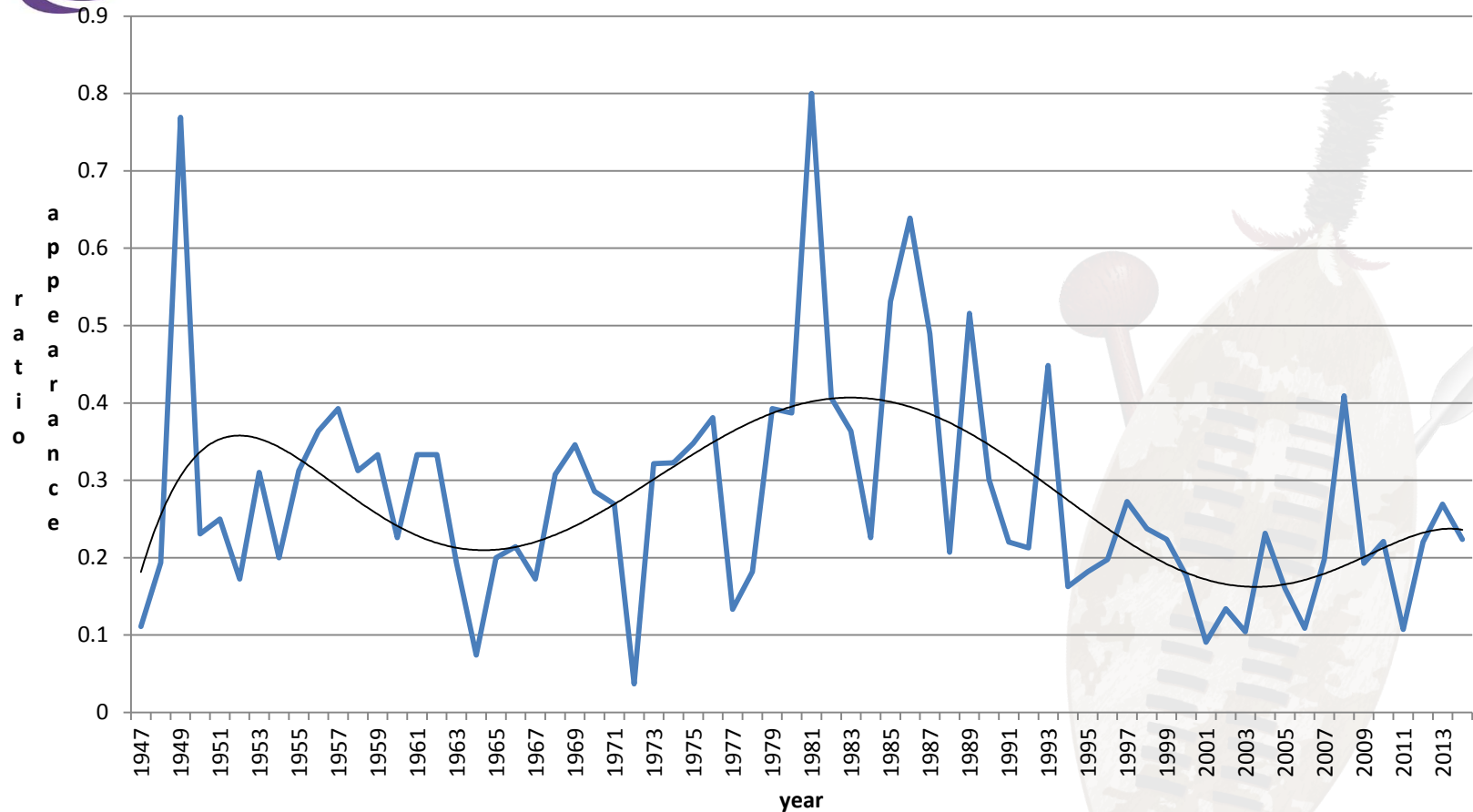
The appearance ratio of 'union' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

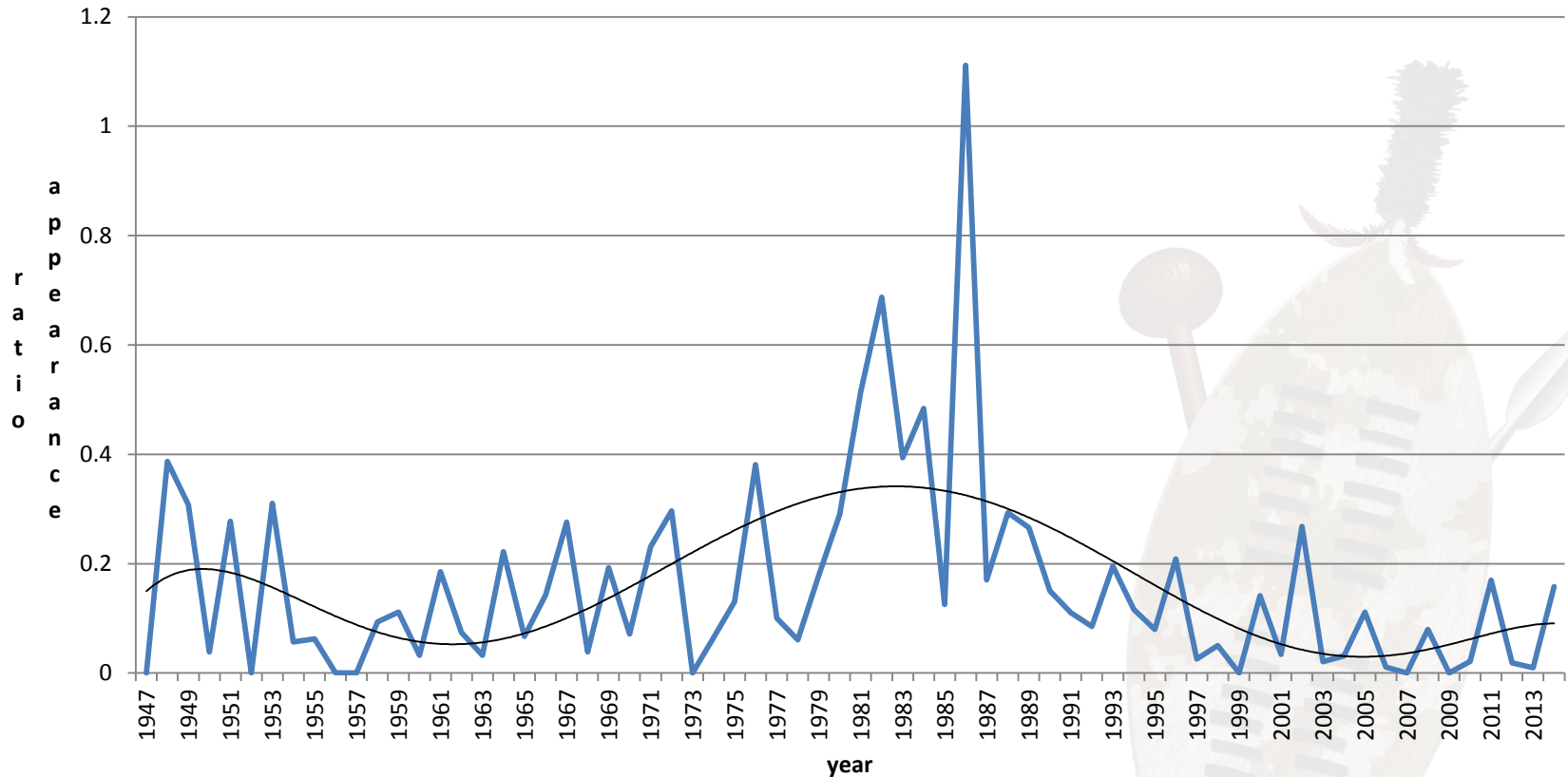
The appearance ratio of 'bargain' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

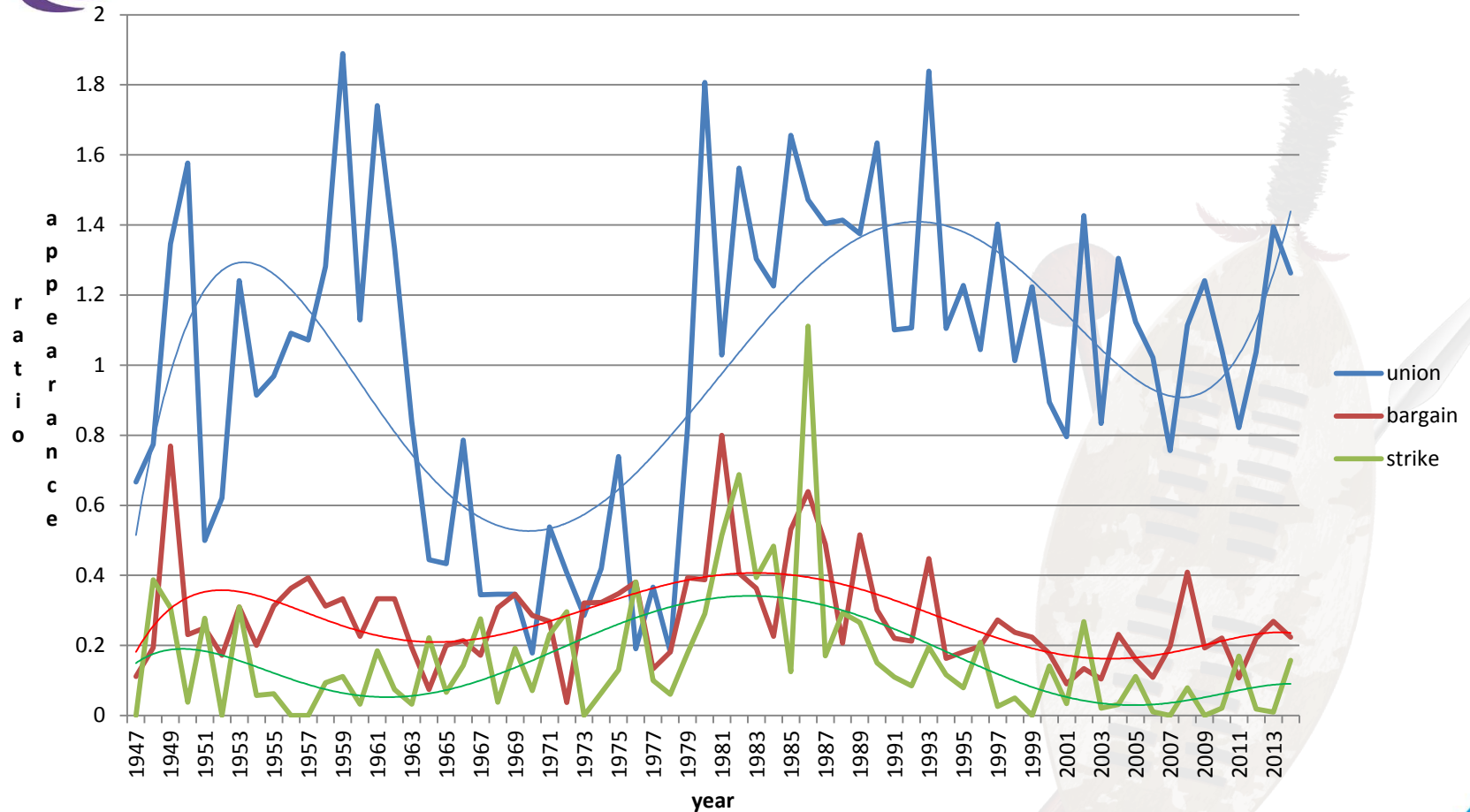
The appearance ratio of 'strike' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

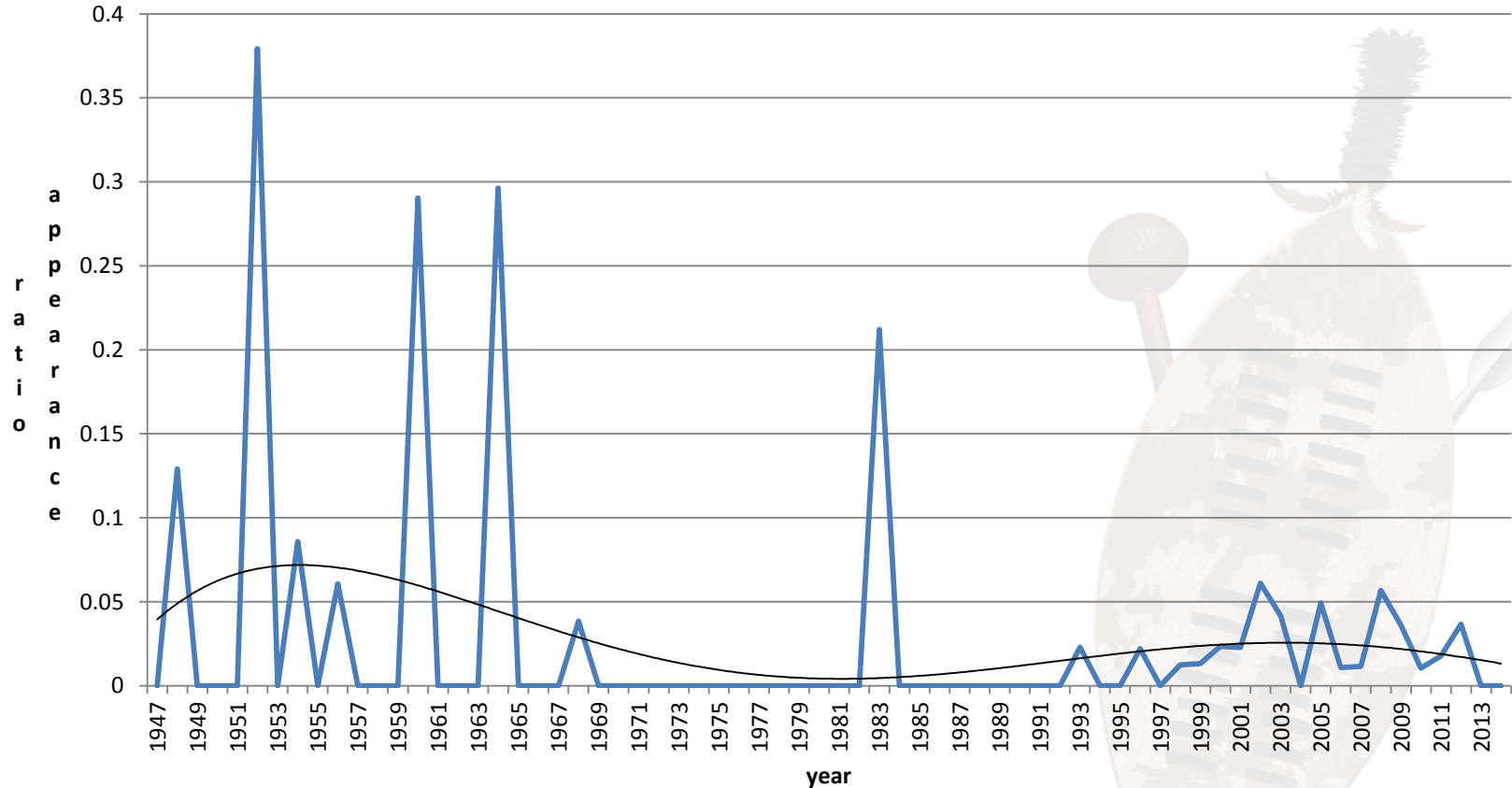
The appearance ratio of 'union', 'bargain', and 'strike' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Waves are trend lines.

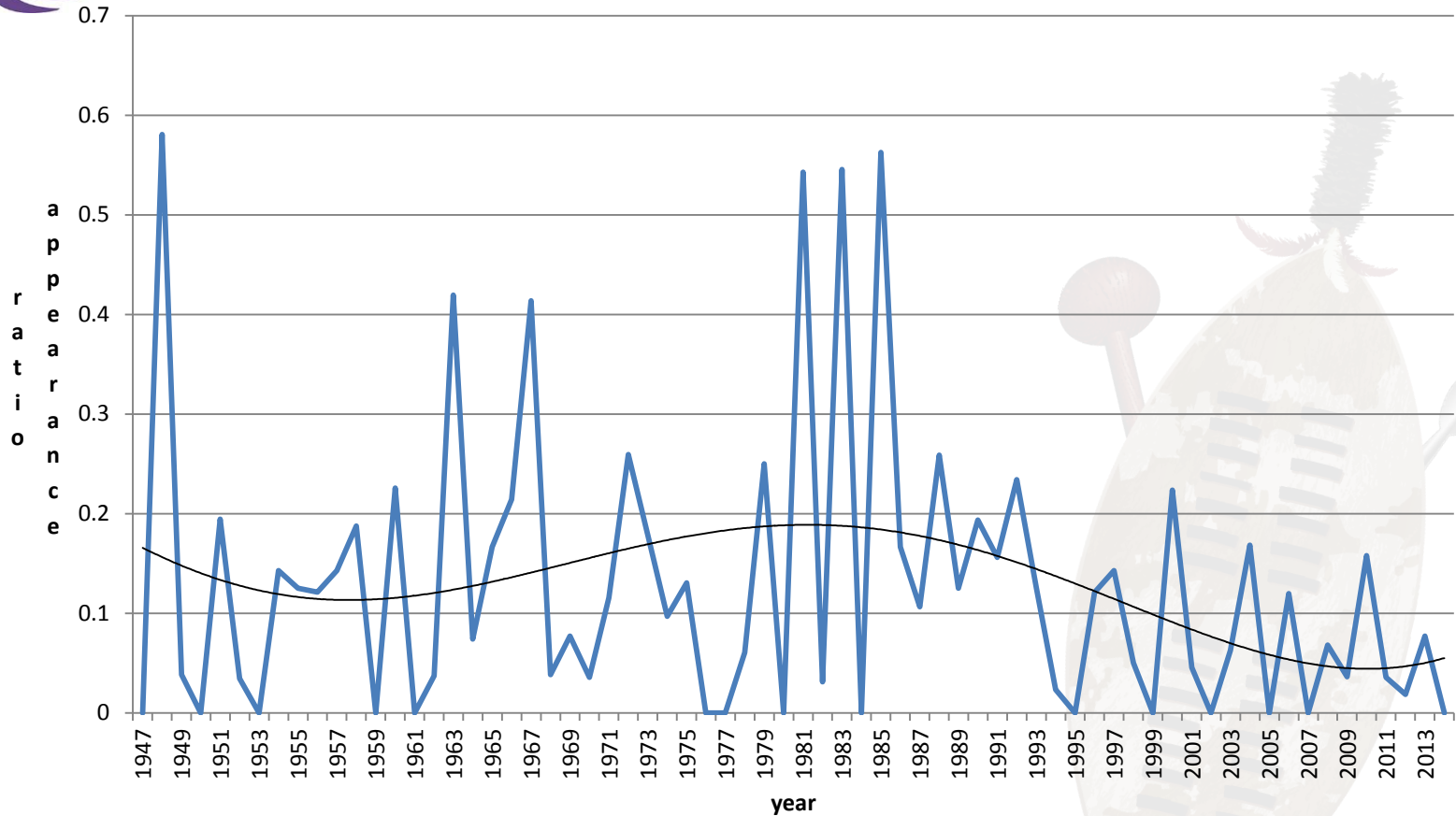
The appearance ratio of 'mediation' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

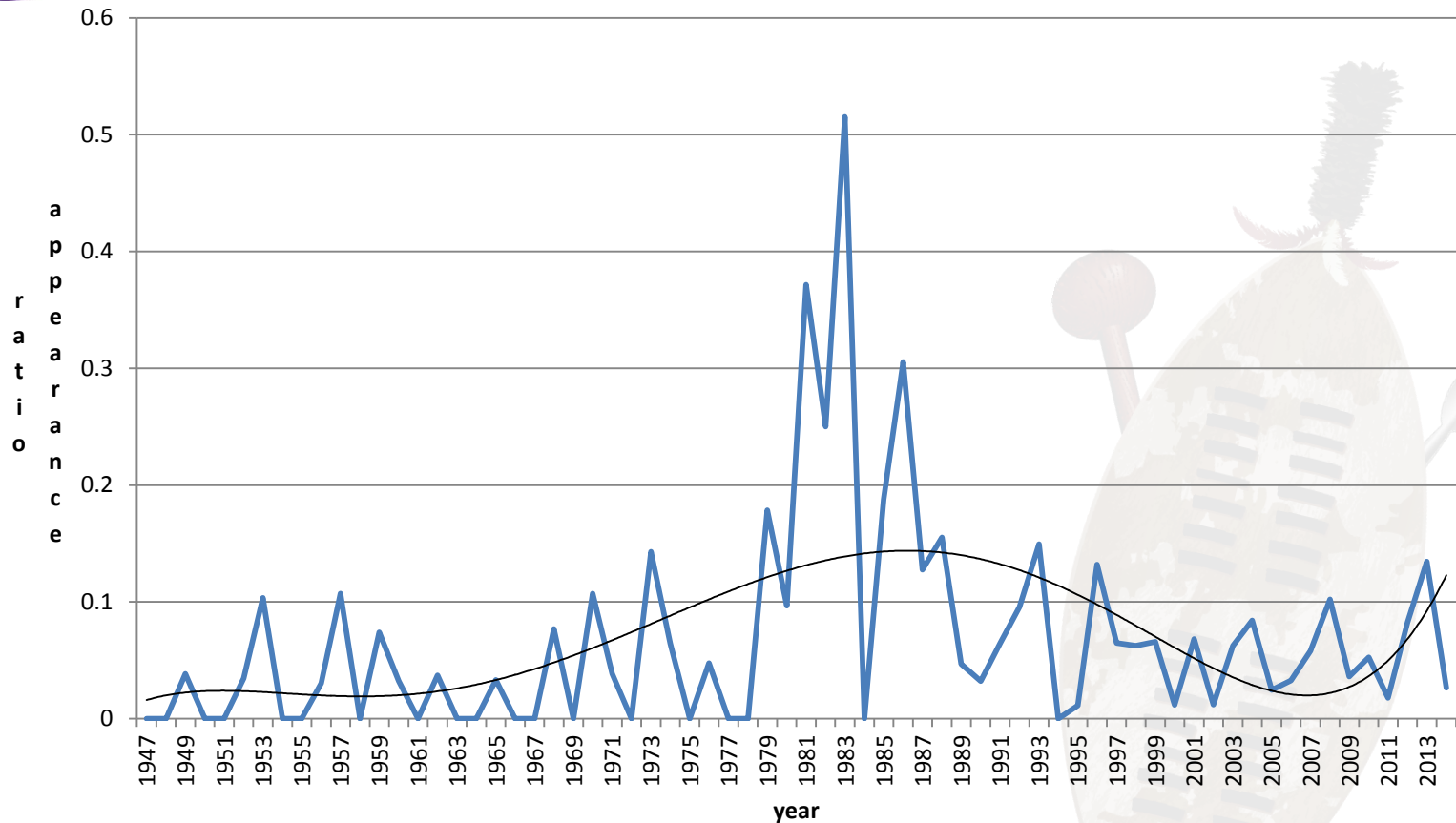
The appearance ratio of 'arbitration' by years



$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Black line is trend line.

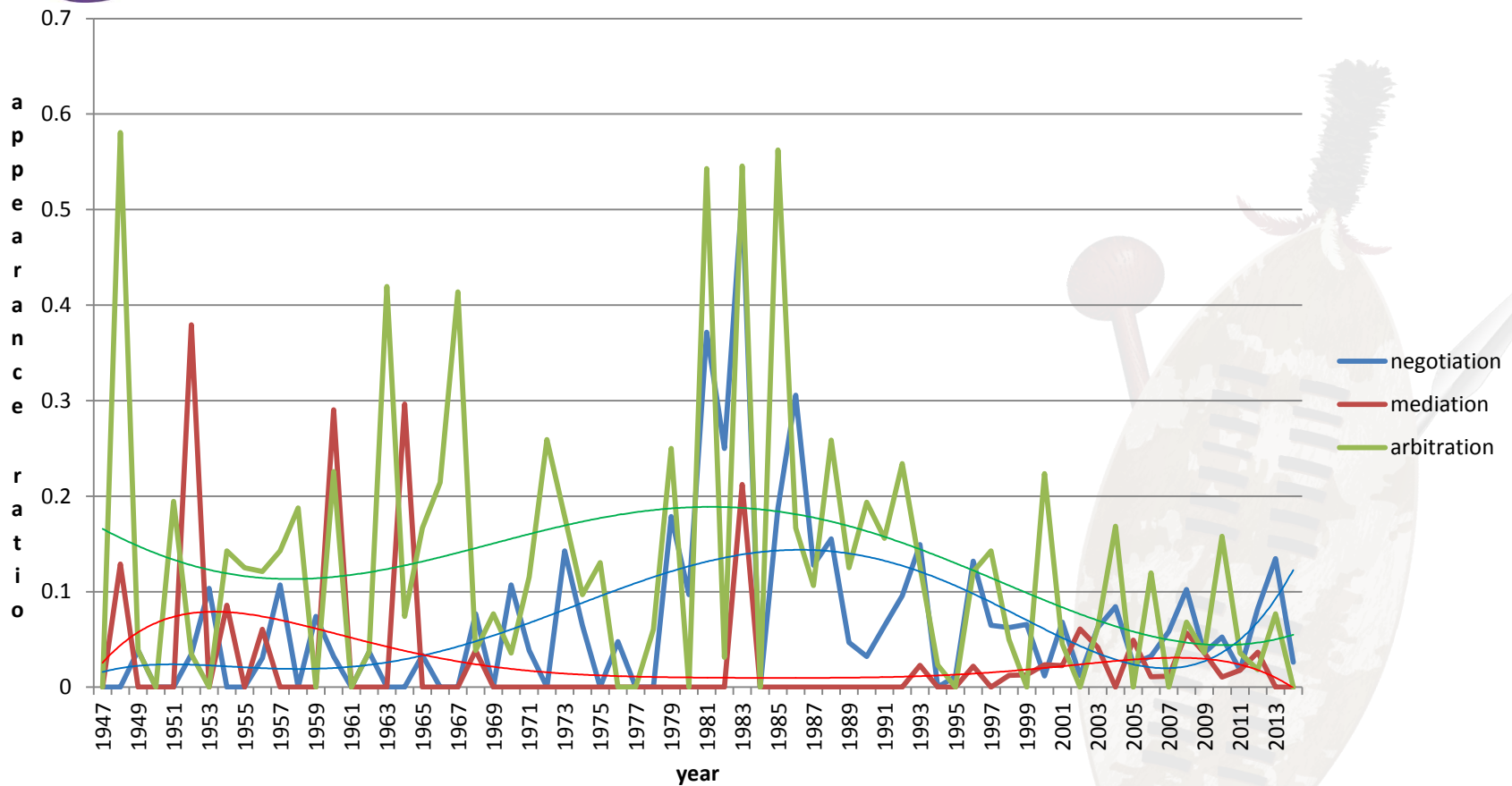
The appearance ratio of 'negotiation' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

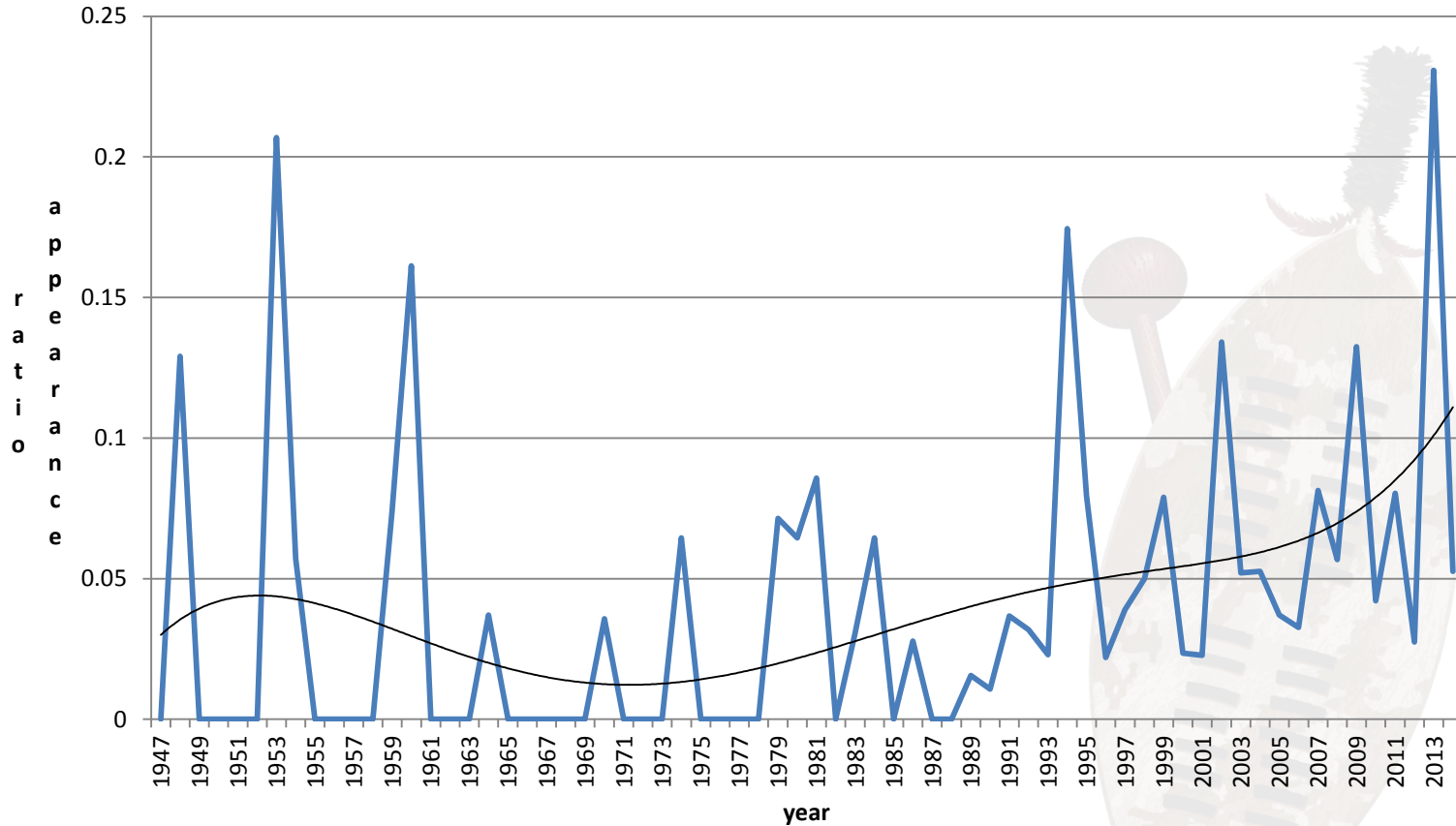
The appearance ratio of ‘negotiation’, ‘mediation’, and ‘arbitration’ by years



$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Waves are trend lines.

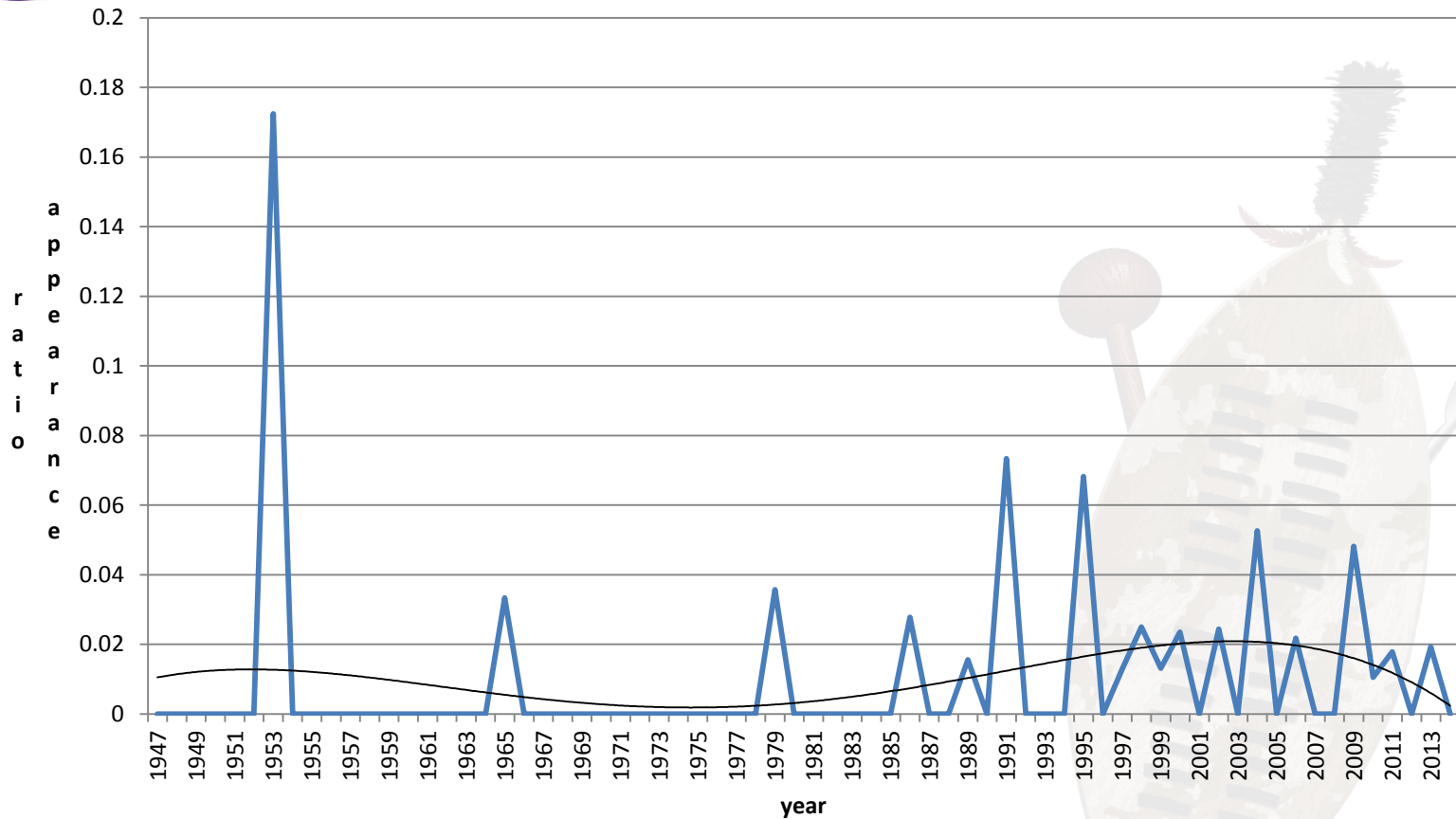
The appearance ratio of 'health' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

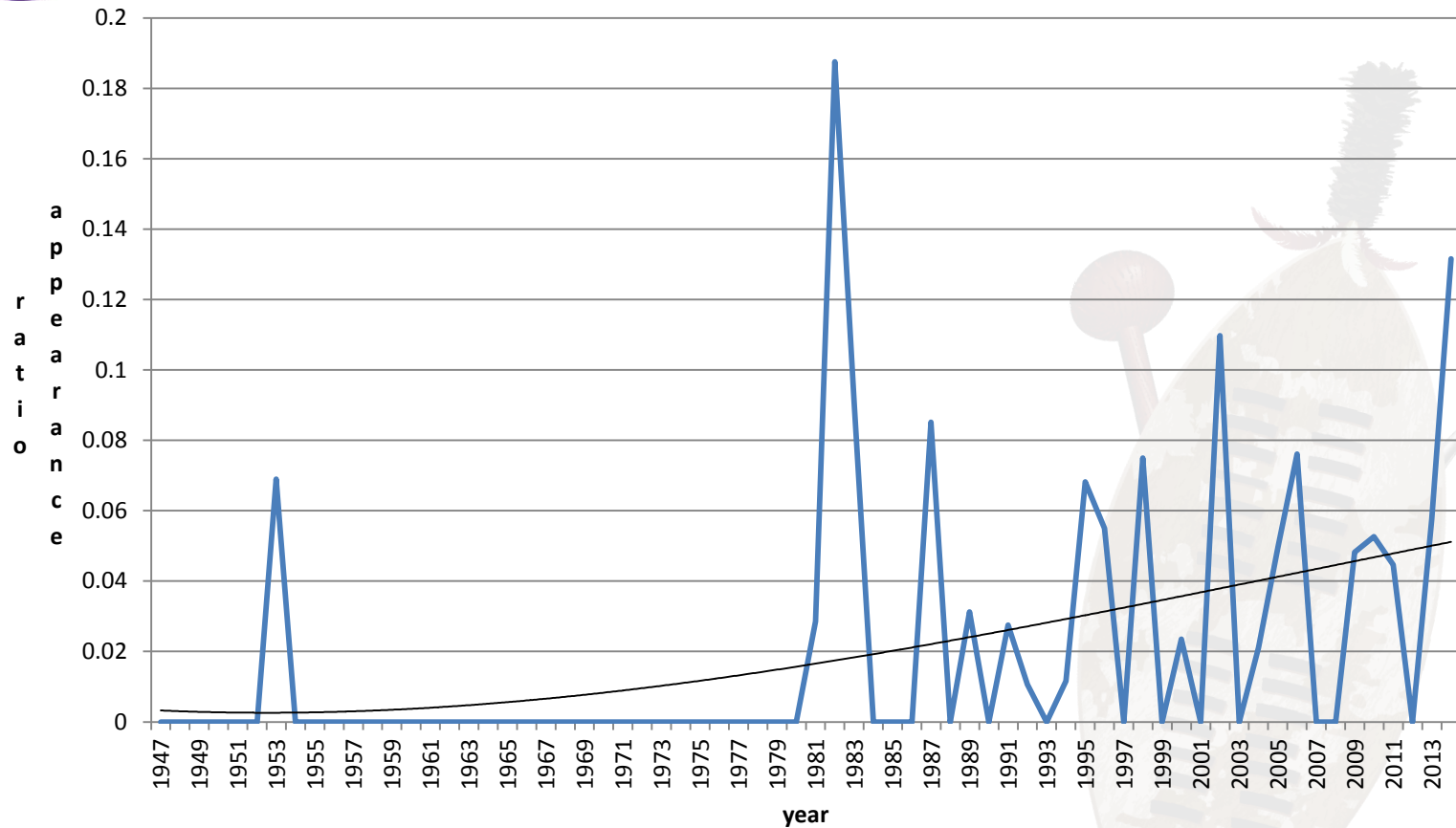
The appearance ratio of 'safety' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

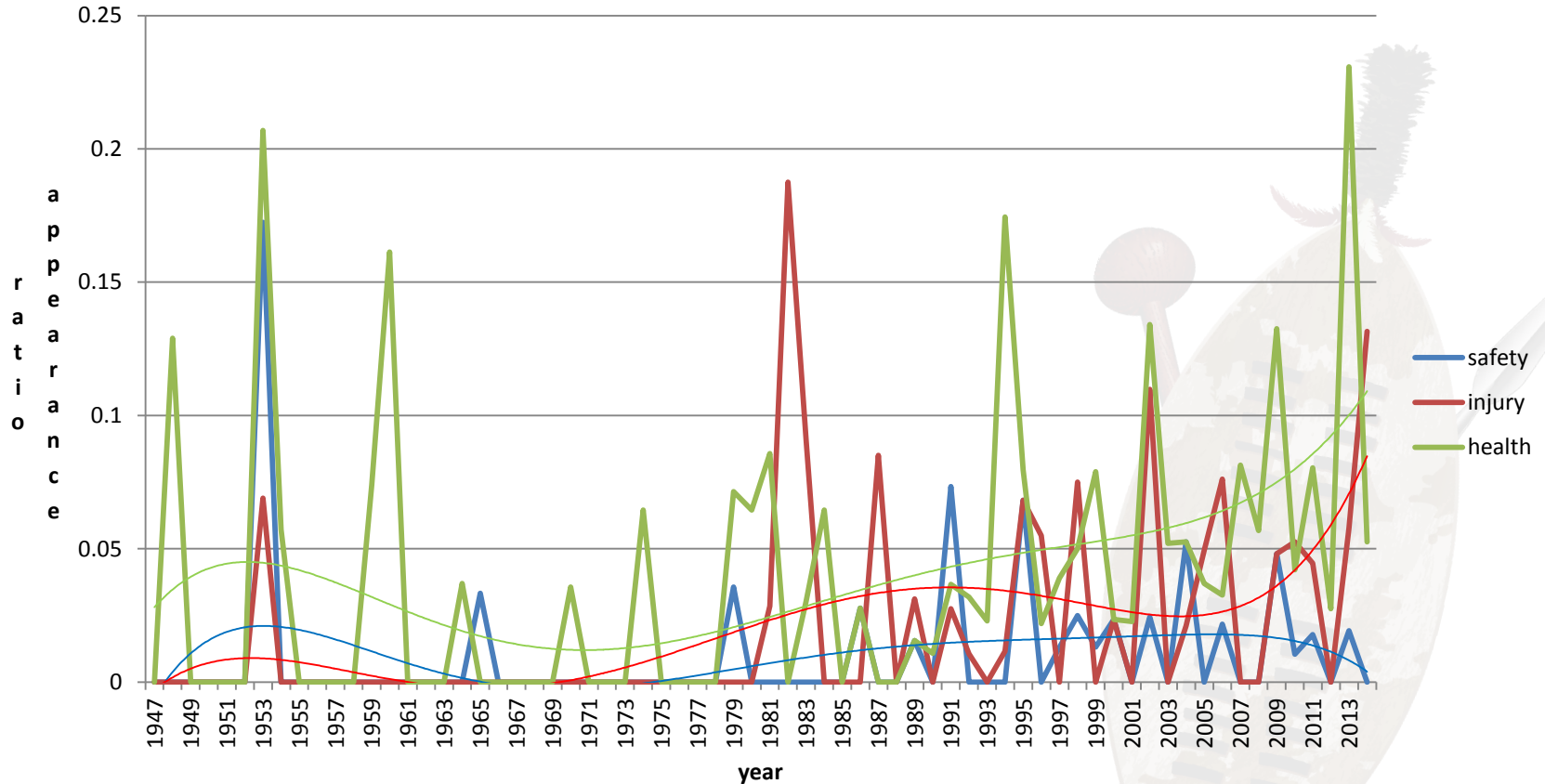
The appearance ratio of 'injury' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

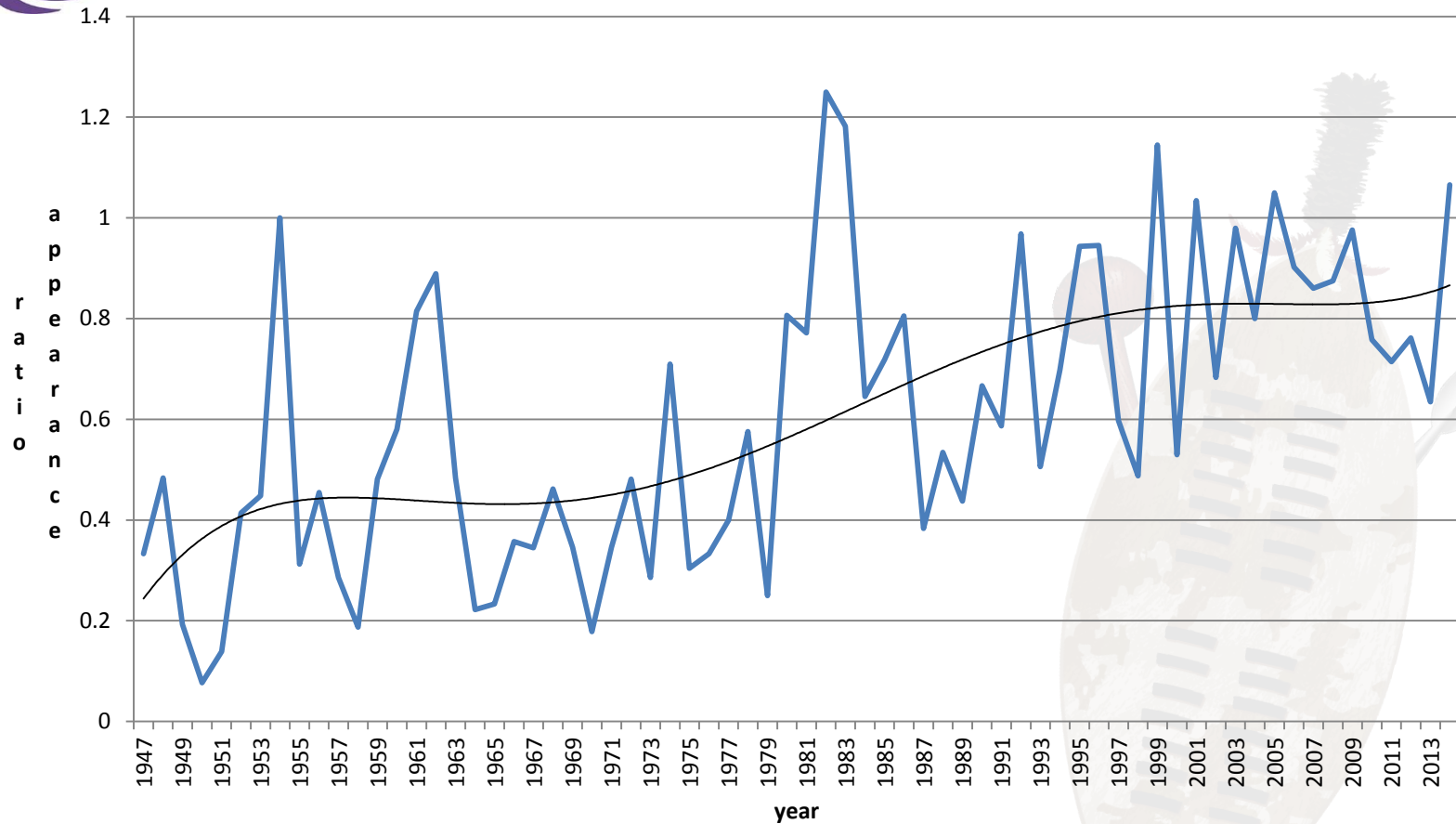
The appearance ratio of ‘safety’, ‘injury’, and ‘health’ by years



$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Waves are trend lines.

The appearance ratio of 'wage' by years



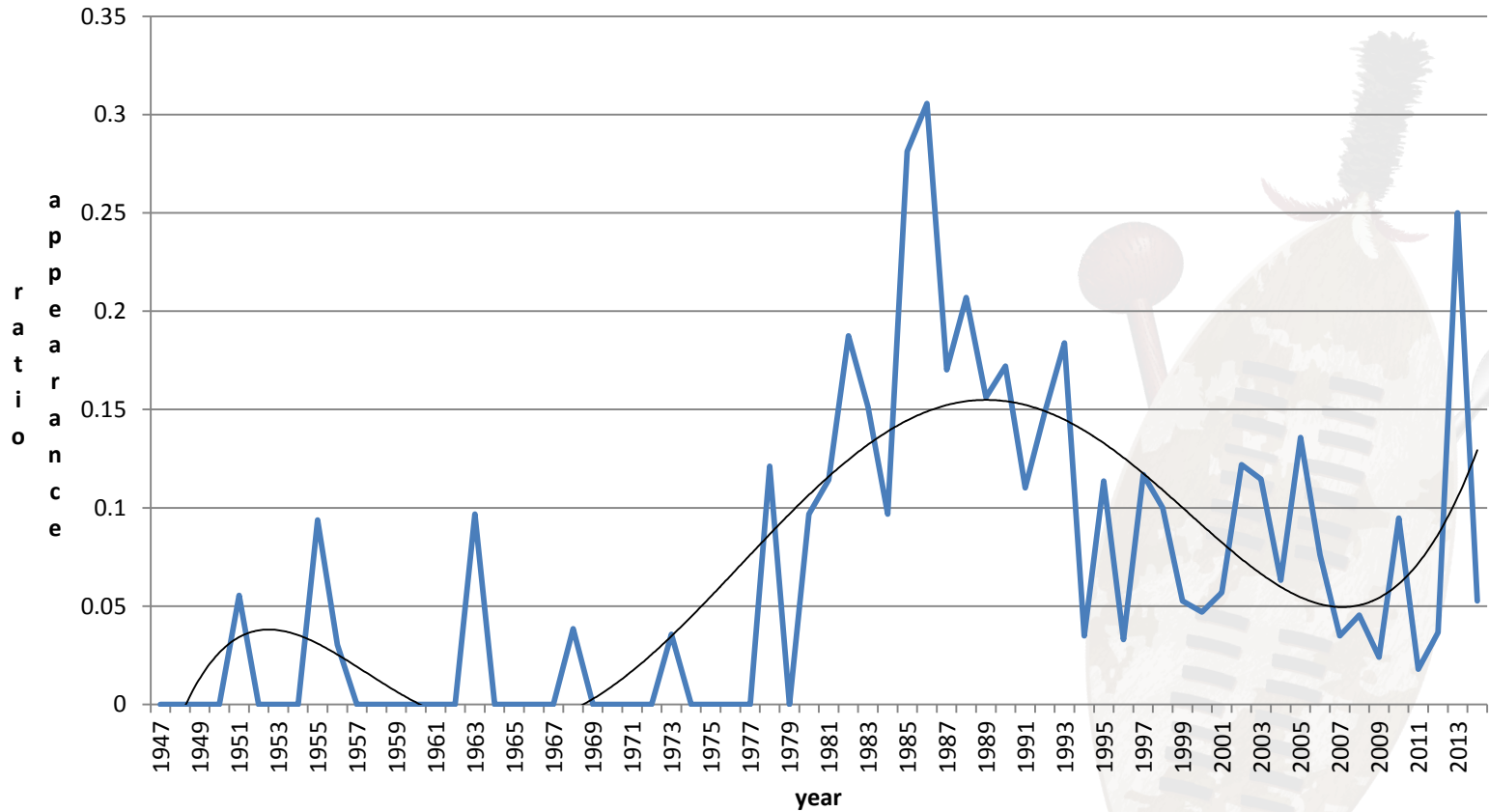
$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Black line is trend line.

New Topics



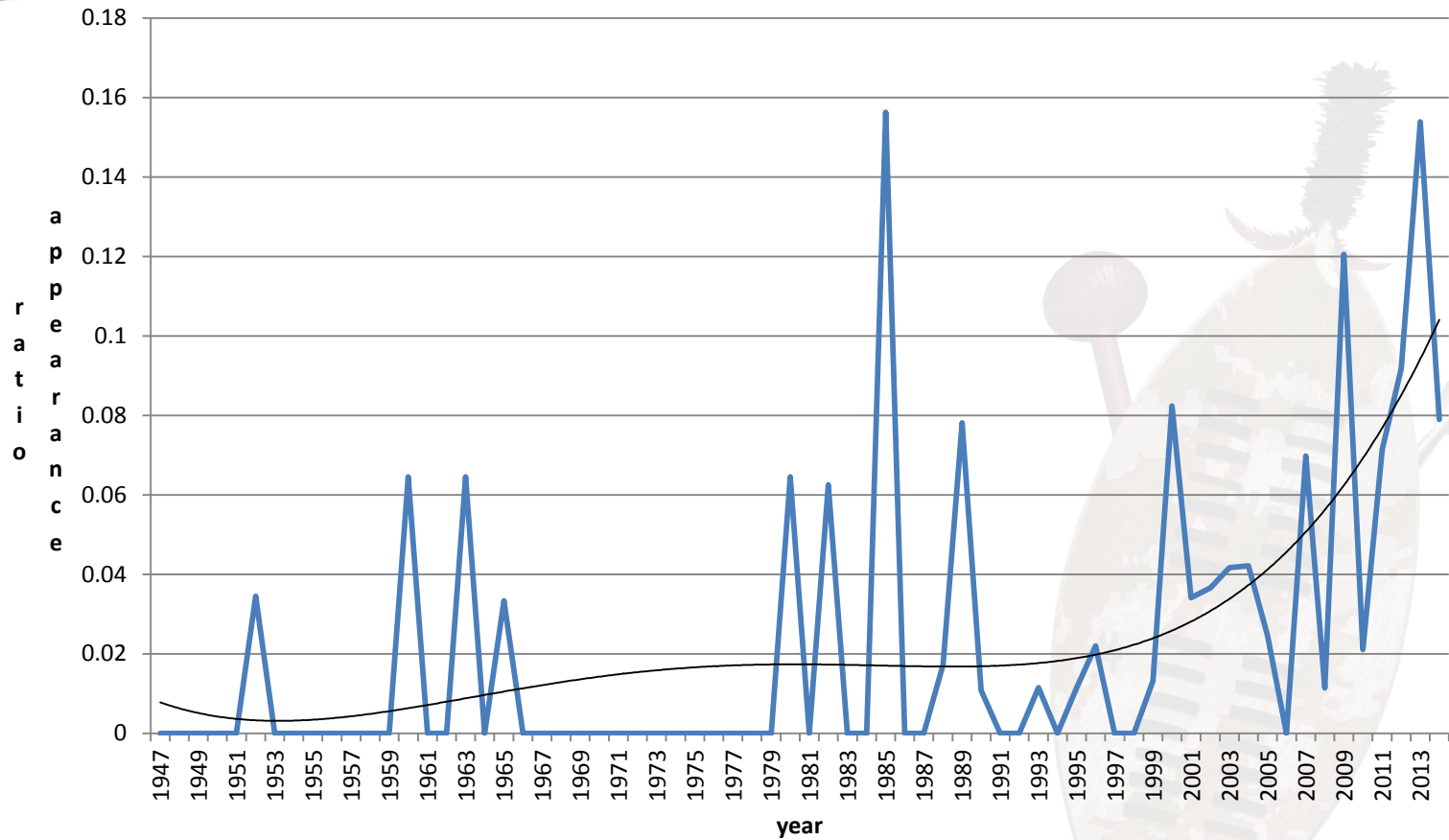
The appearance ratio of 'non union' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

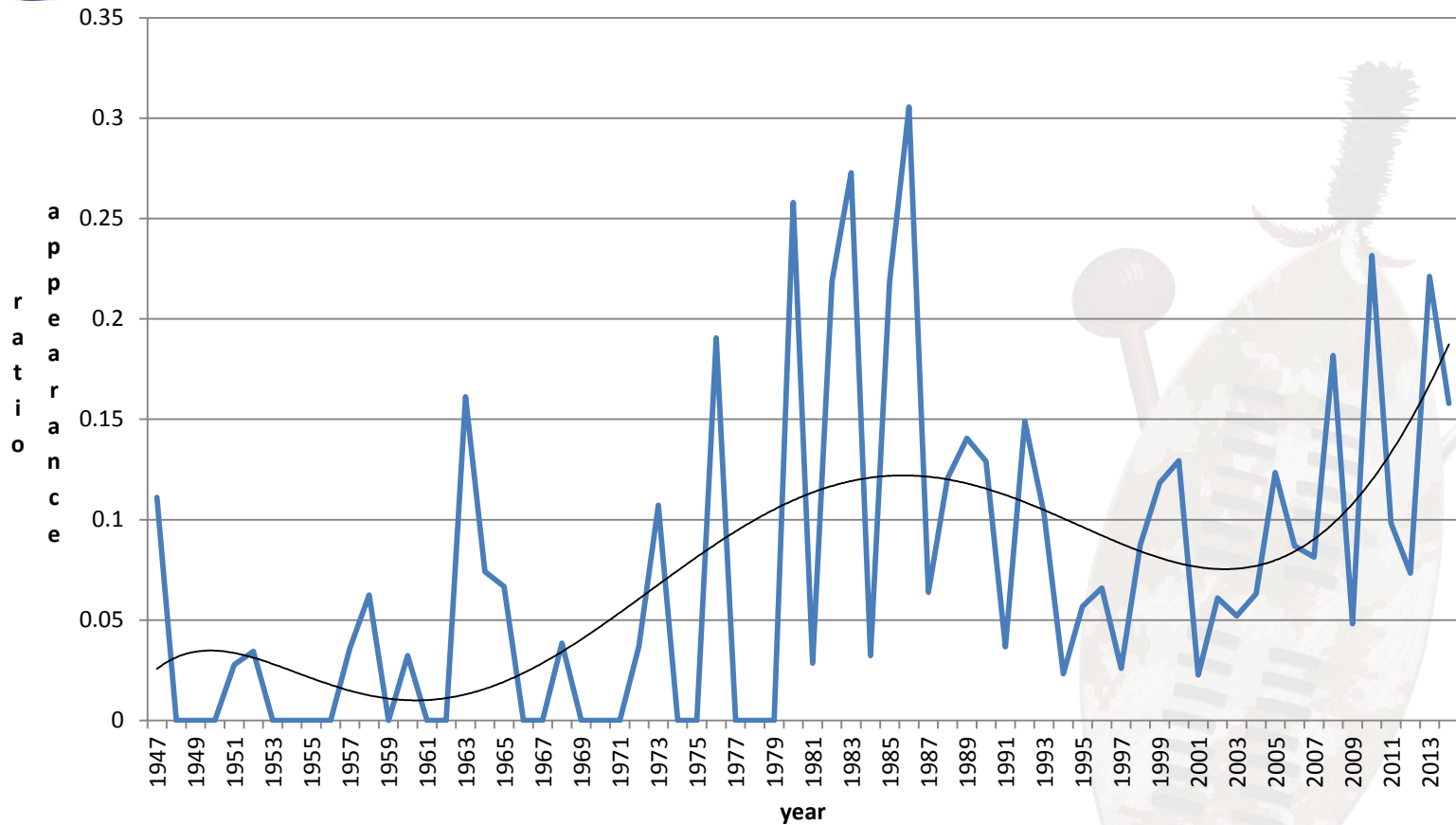
The appearance ratio of 'temporary' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

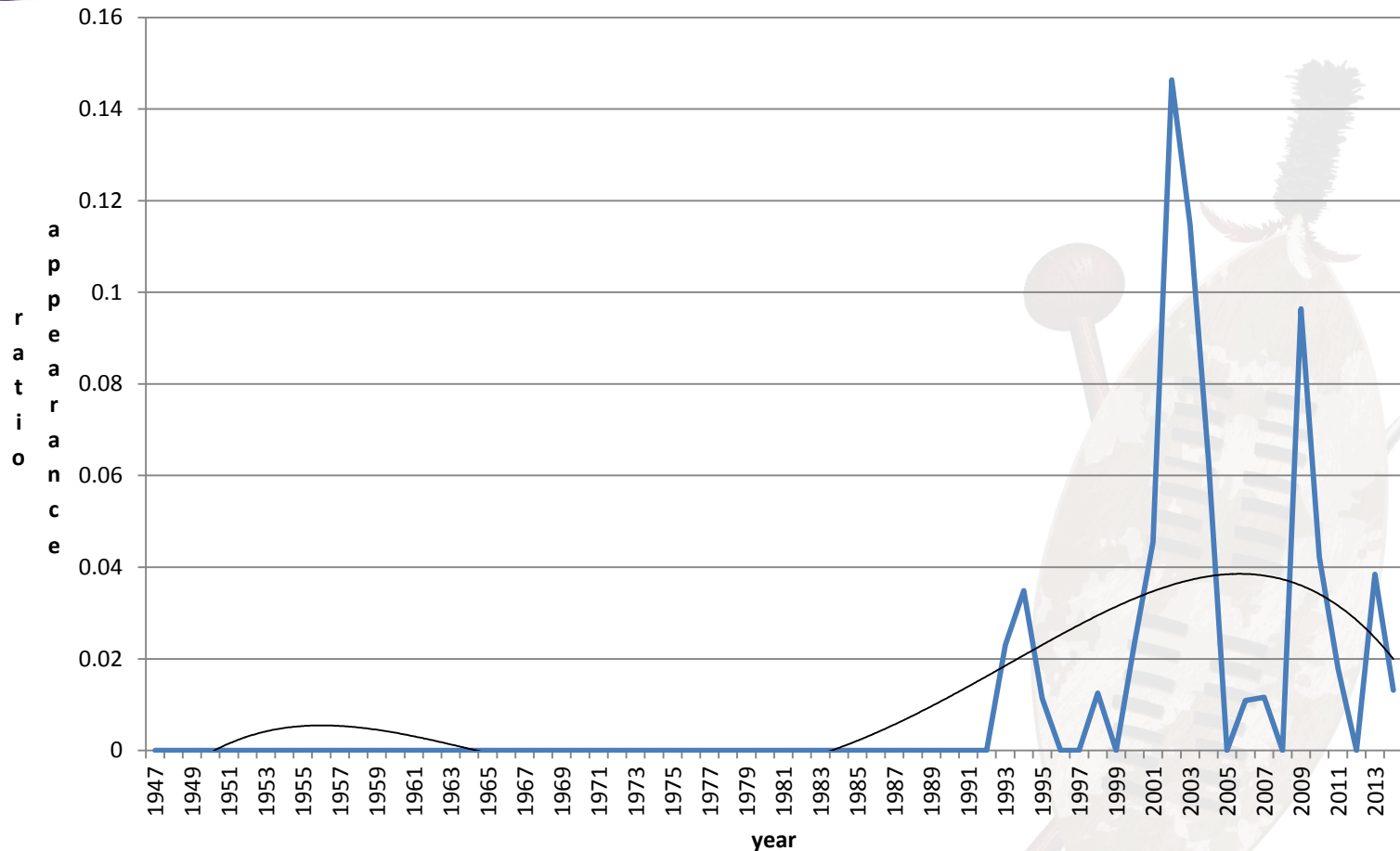
The appearance ratio of 'contract' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

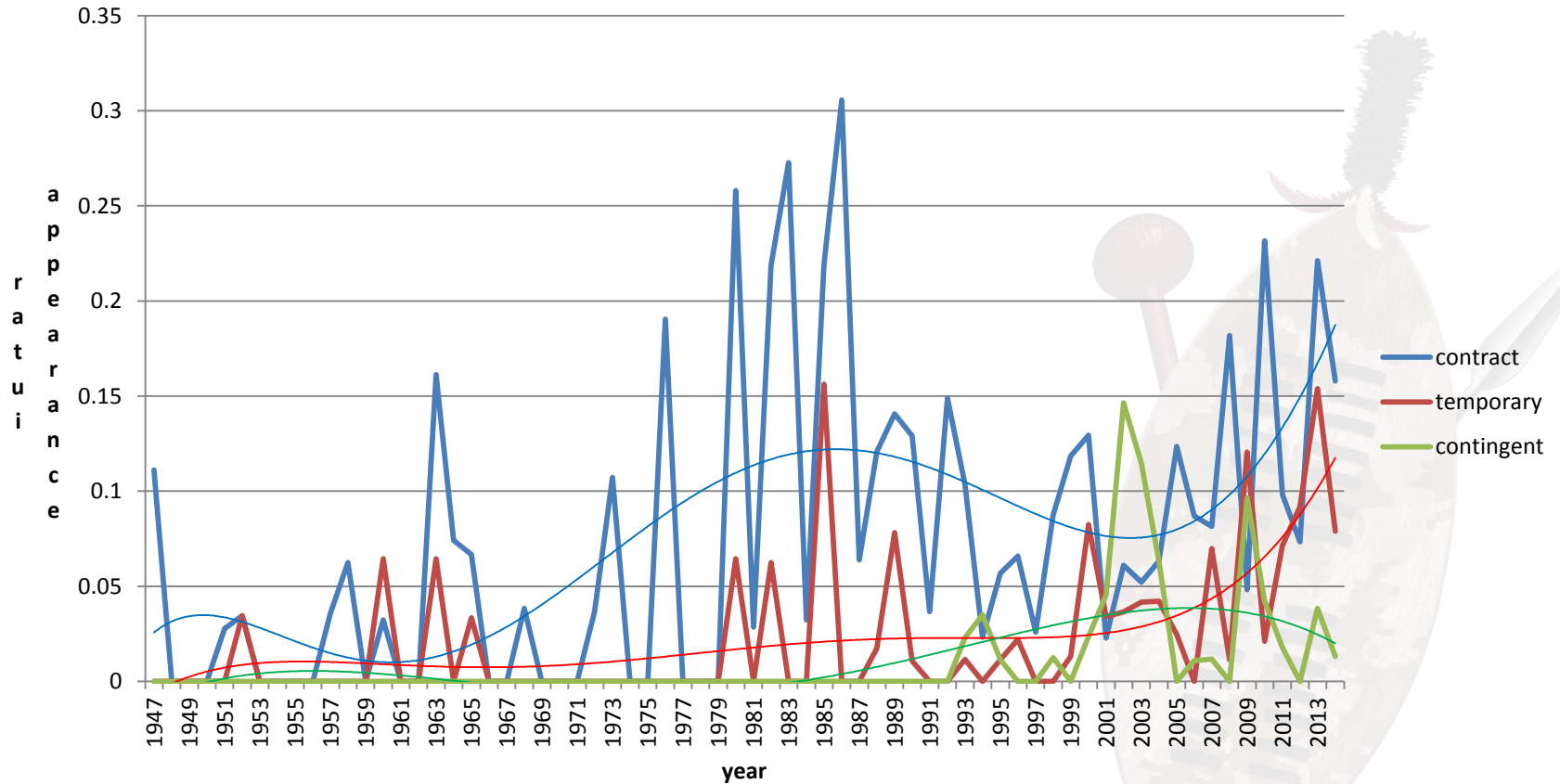
The appearance ratio of 'contingent' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

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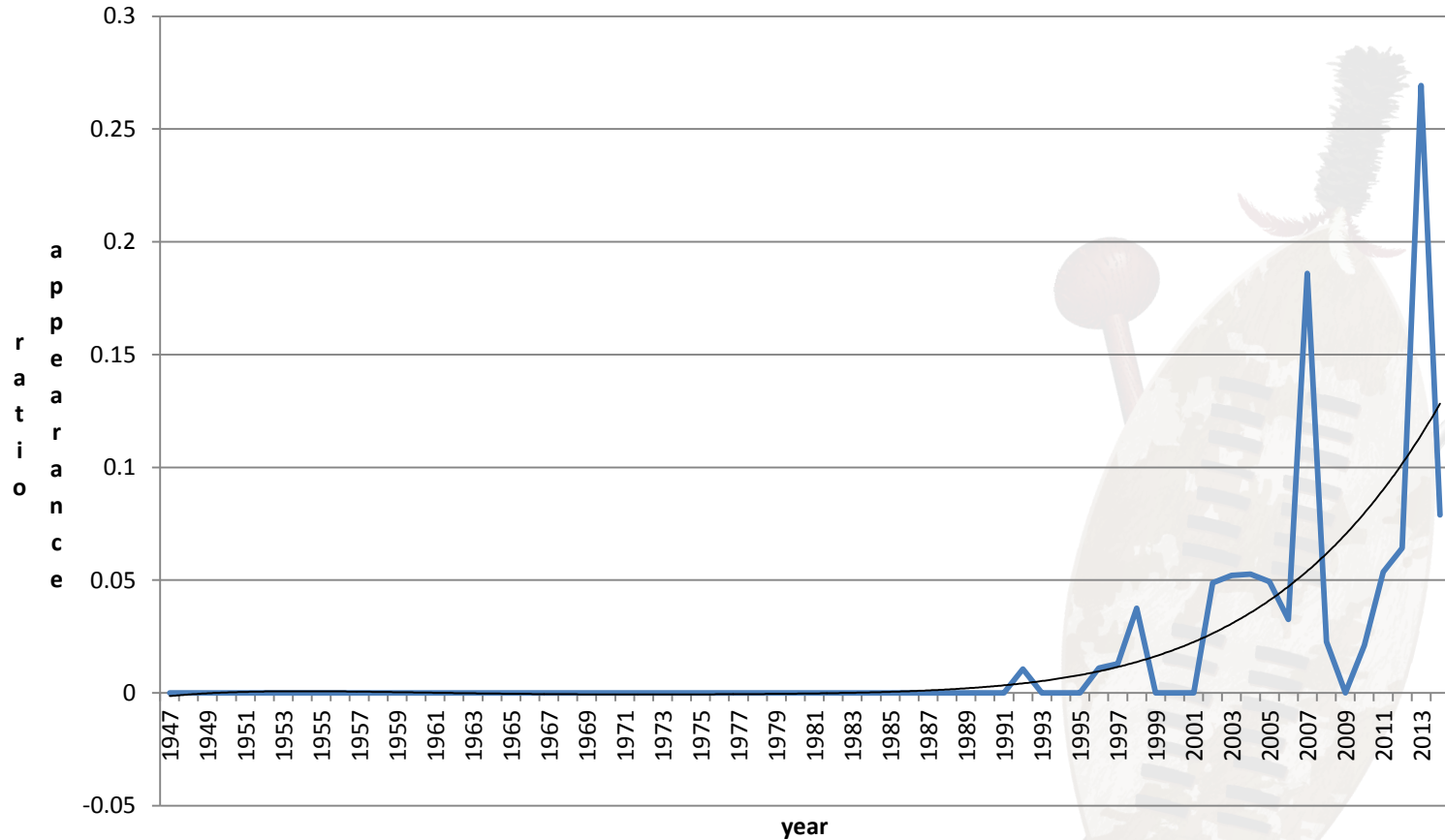
The appearance ratio of ‘contract’, ‘temporary’, and ‘contingent’ by years



$$* \text{ Appearance Ratio (AR) } = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Waves are trend lines.

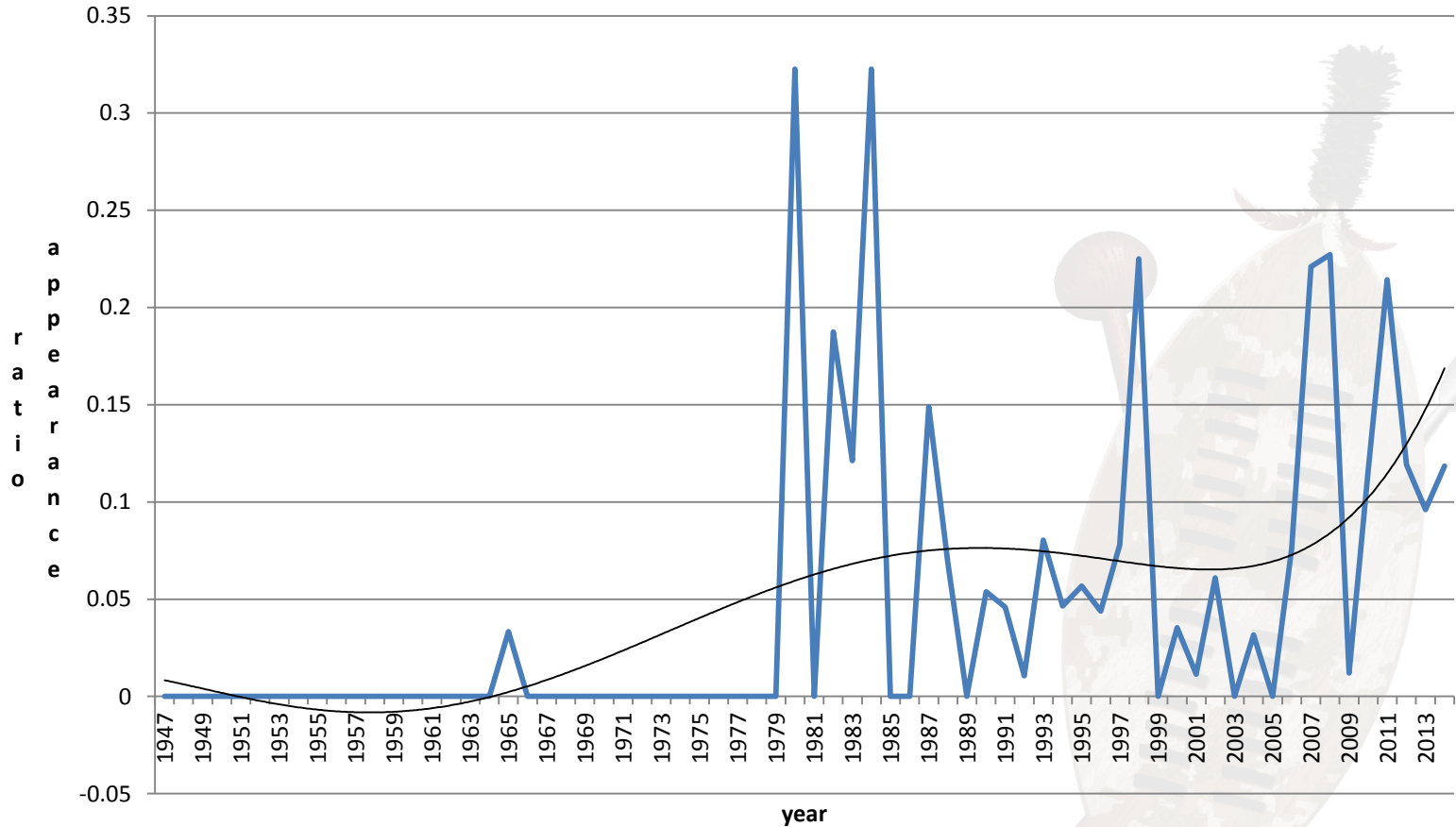
The appearance ratio of 'global' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

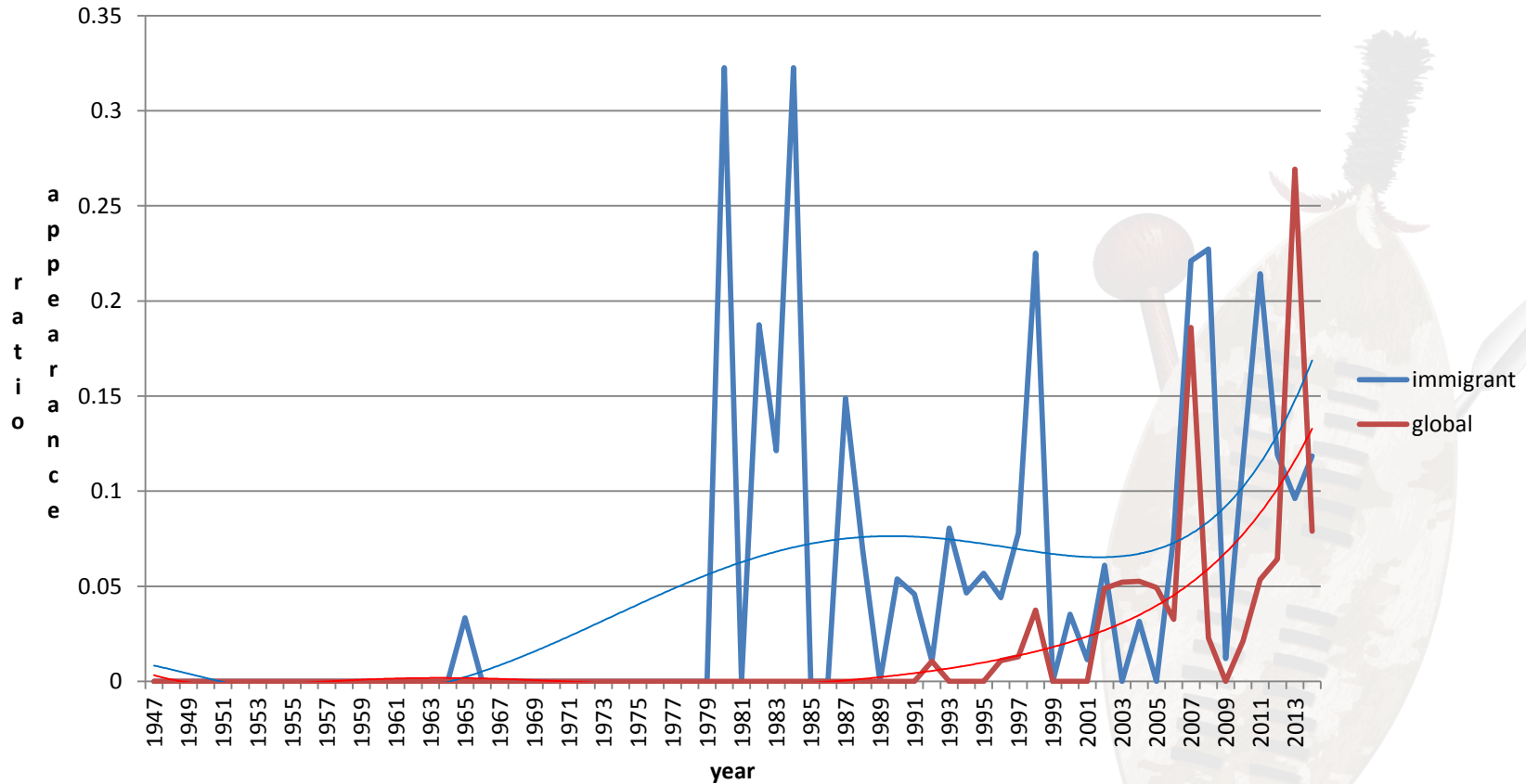
The appearance ratio of 'immigrant' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

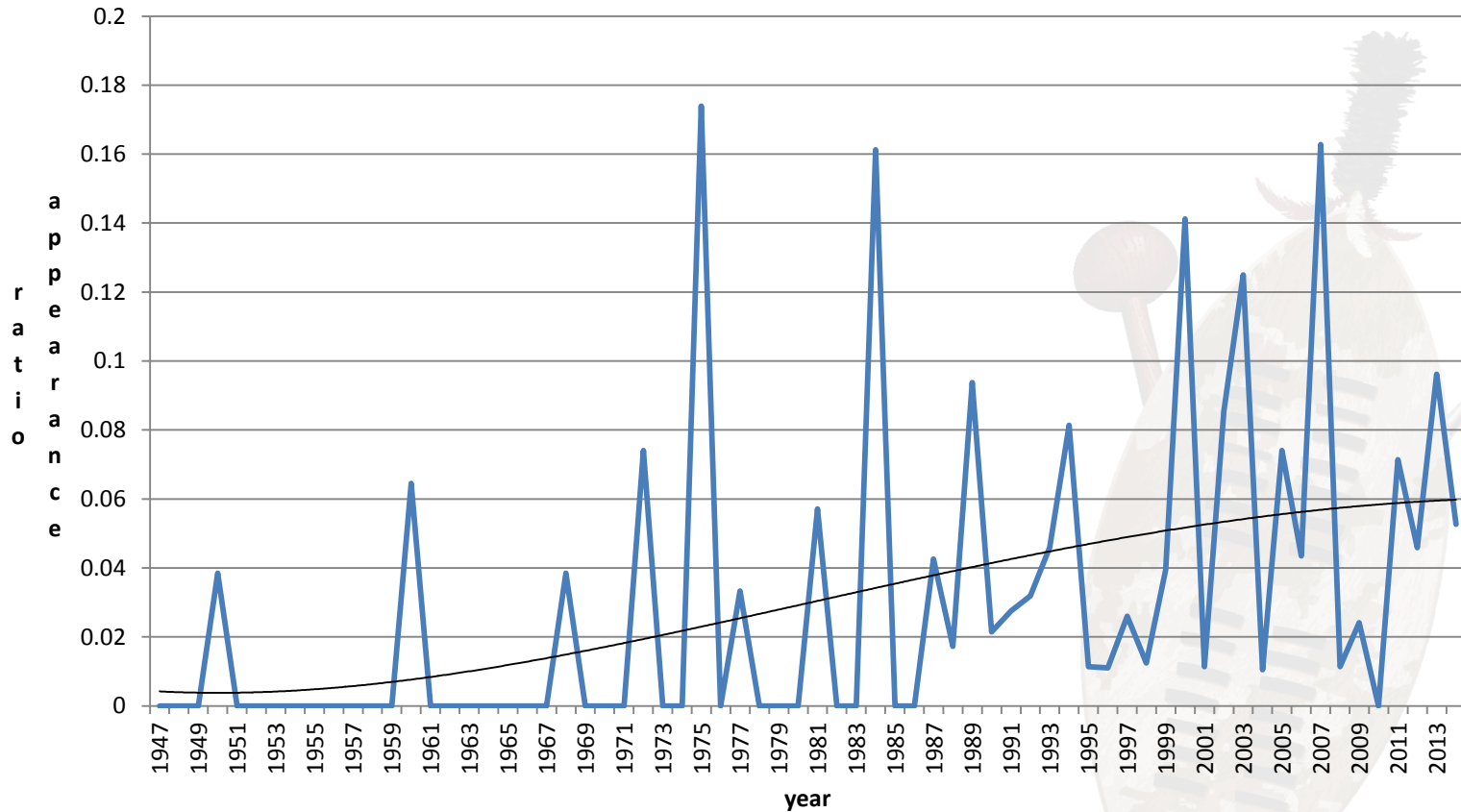
The appearance ratio of 'global' and 'immigrant' by years



$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Waves are trend lines.

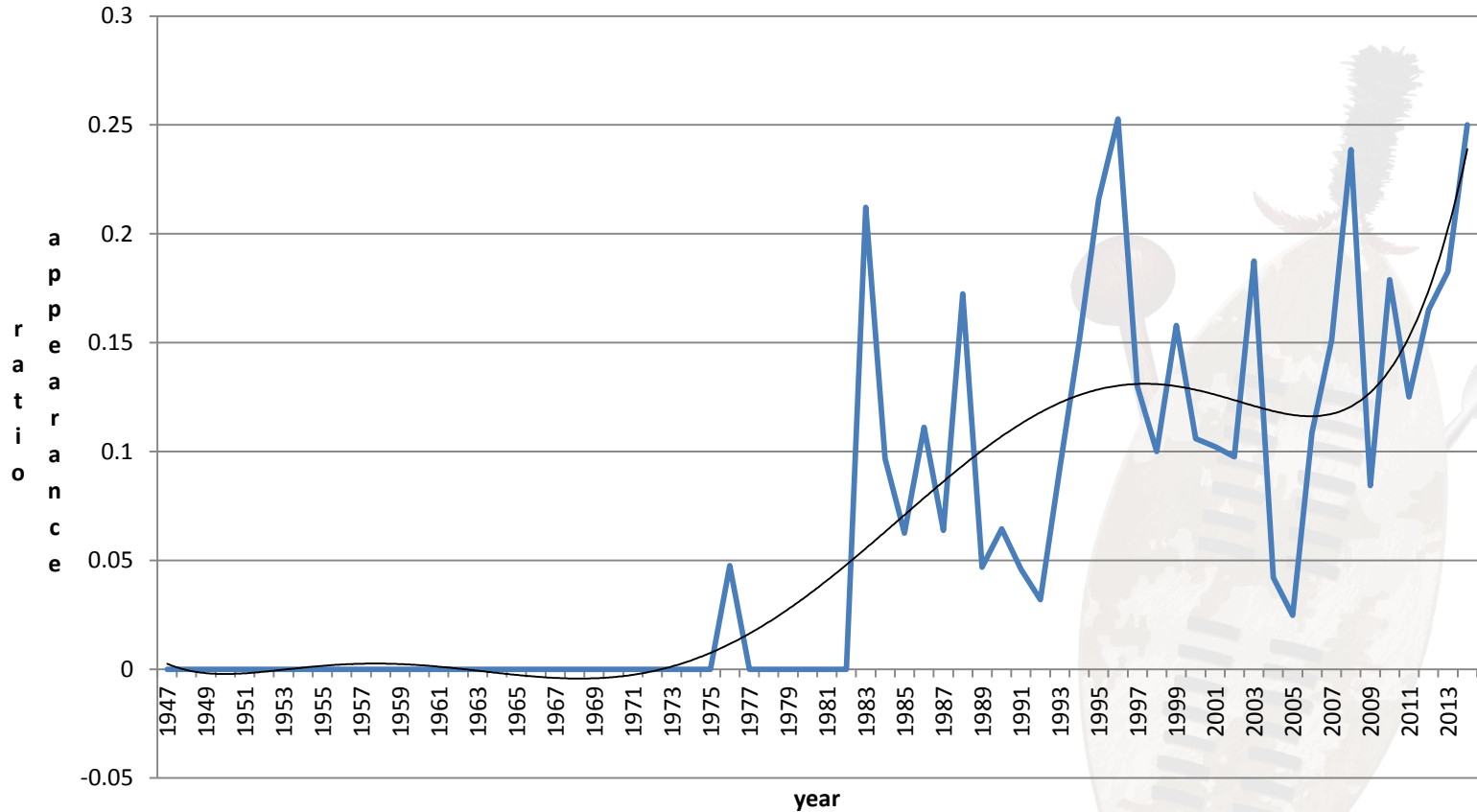
The appearance ratio of 'family' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

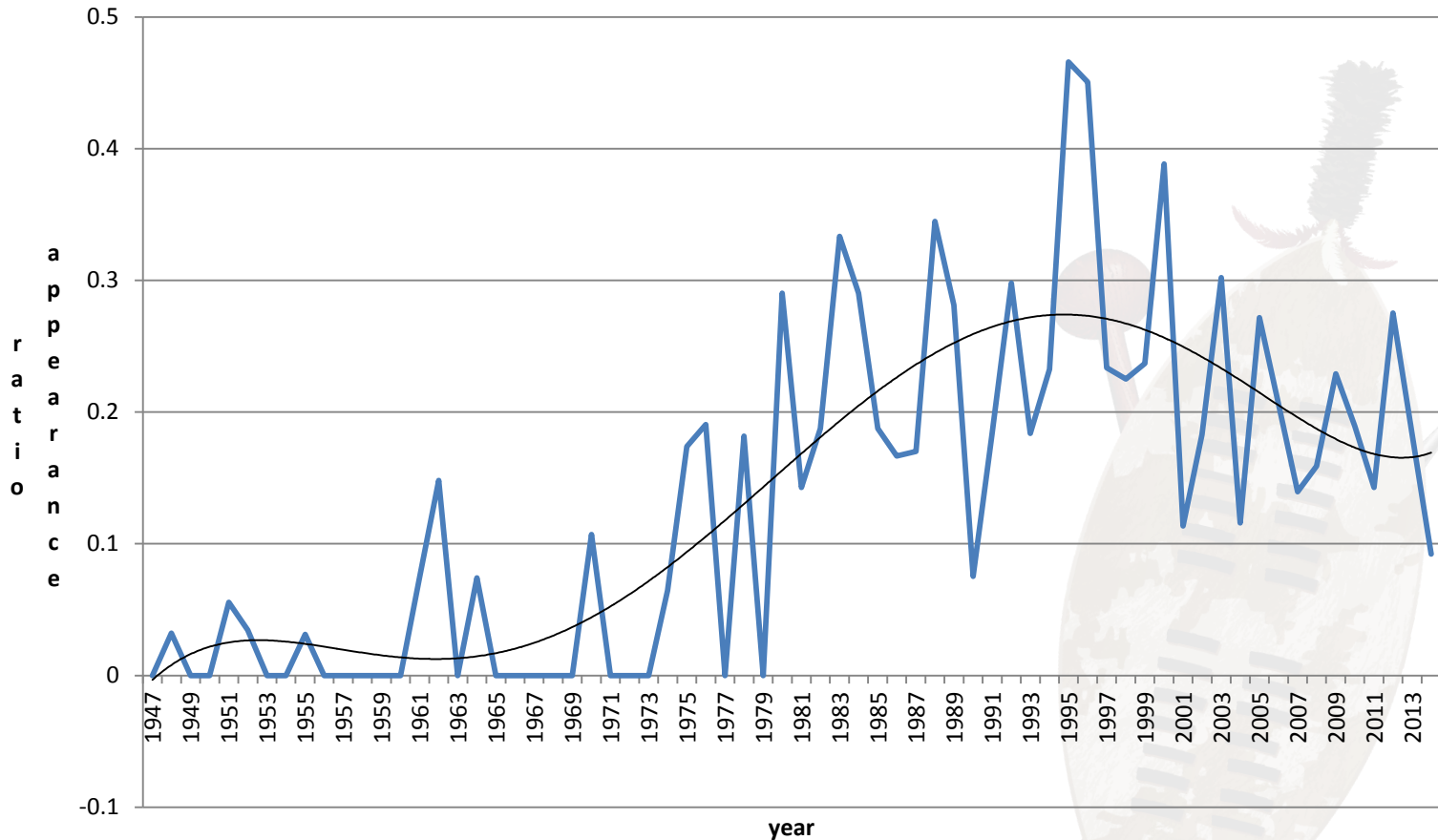
The appearance ratio of 'gender' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

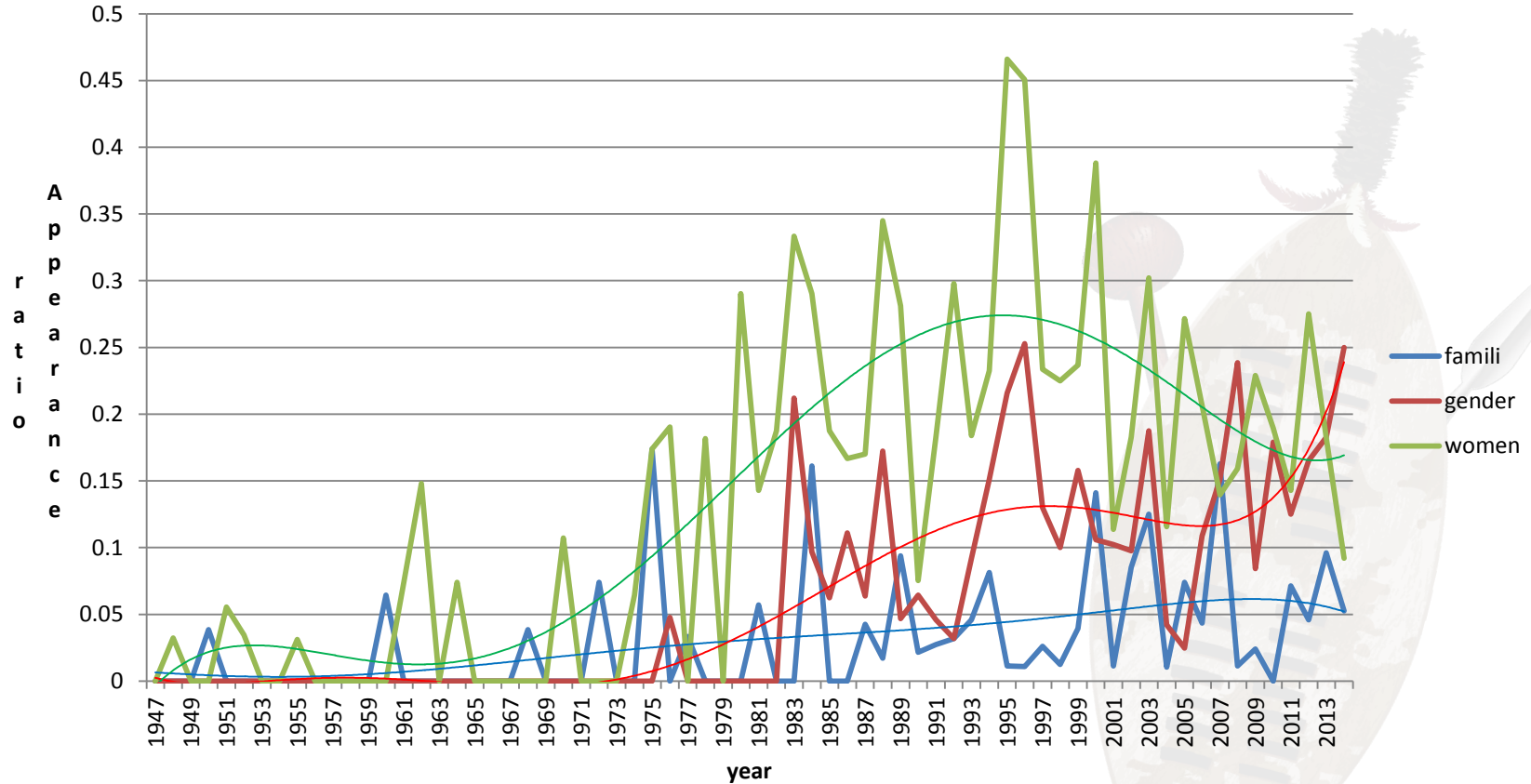
The appearance ratio of 'women' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

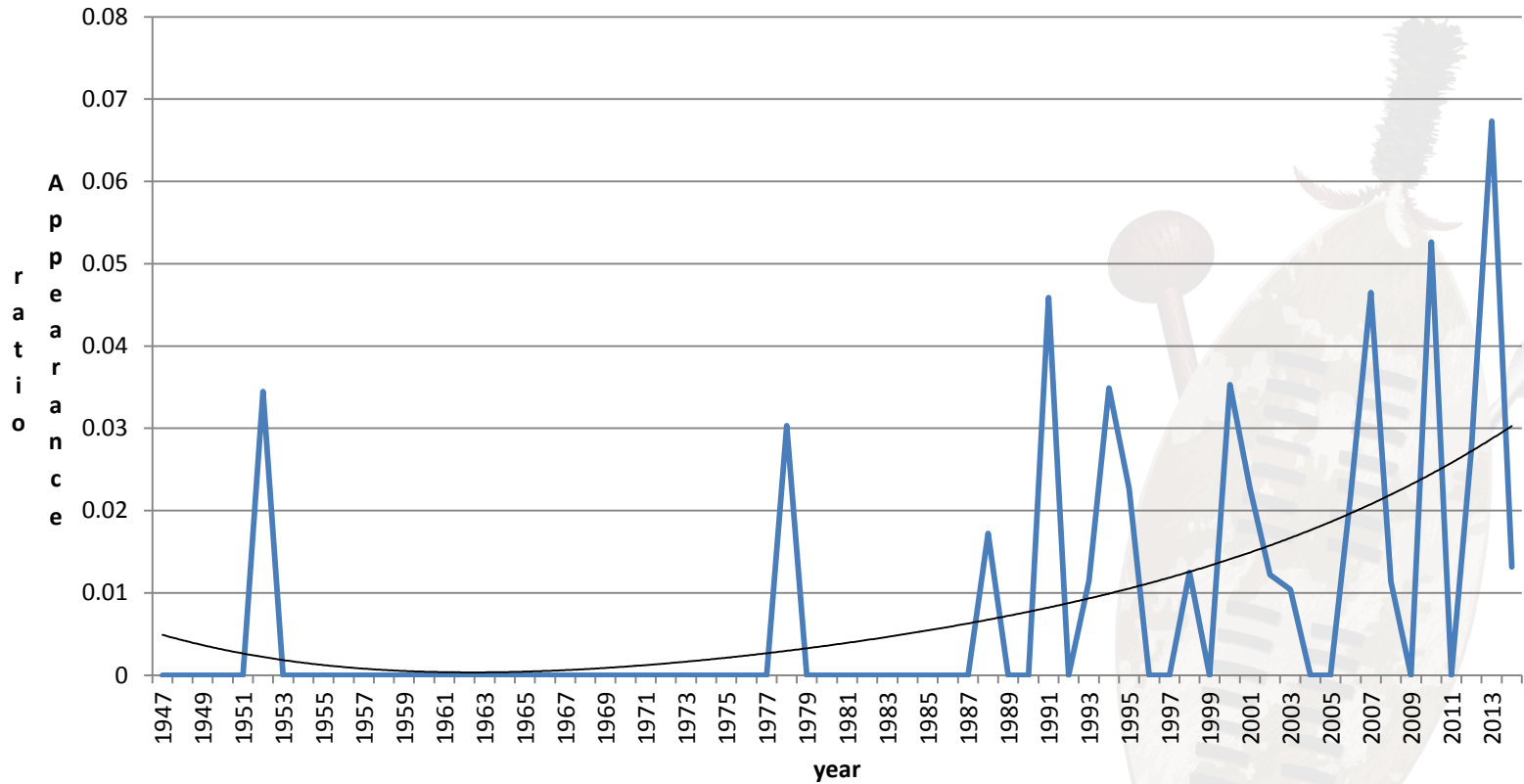
The appearance ratio of ‘family’, ‘gender’, and ‘women’ by years



$$* \text{ Appearance Ratio (AR)} = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$$

* Waves are trend lines.

The appearance ratio of 'ethnicity' by years



* $Appearance\ Ratio\ (AR) = \frac{\text{The number of appearance of a key word within a year}}{\text{The number of articles within a year}}$

* Black line is trend line.

Conclusion

- In summary, most traditional topics in the field of IR are not frequently dealt in recent days EXCEPT for ‘union’ research.
- Research trend related with union seems to follow Kelly and Hyman's argumentation (long wave theory).
- Newly emerging topics are actually 'newly emerging'. They are gaining popularity in academia.
- These changes are quite congruous with Kaufman's statement (2008) that IR should return to broad and original IR.
- Also, the field of IR is expanding its scope beyond employment (Giles, 2000; Wood, 2000).

Limitations

- First of all, we were not able to filter out words with multiple meanings.
- Second, we assume that the particular keywords can indicate particular topics, but not all keywords necessarily indicate the topic.
- Last, we select three most influential journals in the field of IR for the analysis. However, it can be doubted whether the three journals can represent the whole research trend in the world.

Thank you

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