

**In Tandem or Out of Sync?  
Academic Economics Research and Public Policy Measures**

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Academic Economics Research and Public Policy Measures**

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**Abstract**

This paper investigates whether academic research attention to certain public policy related measures (including unemployment, inflation, bankruptcies, and GDP) is correlated with empirical measurements of the measures themselves. In other words, when unemployment rises, does academic research attention to the matter increase? Or do economists pursue research interests relatively uninfluenced by policy shocks on the ground, at least in the short run? Text-analysis based results imply that economic attention to key public policy terms does correlate with empirical movements of the terms in most instances, however, the stronger and more consistent correlation is between use of public policy terms in the academic literature and discussion of them by the broader public.

JEL Code: A11; H00

Keywords: text analysis, economics research, public policy, GDP, inflation, unemployment, recession.

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## **Introduction**

Is economics research, as represented by publications in the top general interest journals in the field, correlated in the short run with public policy concerns? When the 2007 recession and associated economic crises hit, was there any significant change in research attention to “GDP”, “unemployment”, “inflation”, or “bankruptcy”? Similarly, as societal concerns related to broad policy issues such as acid rain, social security, or health care reform waxed and waned, did the attention of economics researchers to these topics follow similar paths?

This paper employs methodological techniques related to text analysis in order to investigate the relationship between academic research attention and measures of public policy concerns as they change over time. It assumes that at least one goal of economics research is indeed to address public policy. Other goals have of course been offered, including the development of sound theoretical models, the satisfaction of pure intellectual curiosity, and the approval of one’s peers and prestige at one’s job. Not every researcher cares about each of these goals equally, or even all of them at any particular time, but most would agree that at least one broad goal of economics research is to speak to public policy concerns. This paper explores the short run relationship between contemporary policy issues and economics research attention, at least in the top general interest journals in the field.

A demand and supply based theoretical model is assumed, where events on the ground affect the demand for policy-based academic research. The question is whether or not the supply of academic research is elastic enough to respond in any significant way in the short run when such demand shifts. The supply of academic research is assumed to be relatively inelastic due to lags involved in funding opportunities, preference immobilities of researchers themselves, slow professional turnover at most departments, and a host of other factors. But given the fact that

economists profess to *care* about the relevance of their research, one could assume that there would be attempts to respond to public policy concerns, at least in a limited way. Perhaps increased research attention to contemporary policy issues can only make its way into the conclusions sections or welfare analyses of broader research papers, but it would be surprising if the context of the real world failed to filter into the research attention of academic papers, at least somewhat. Most people are behaviorally responsive to the environment around them, and economists are no exception. Does their attention to public policy concerns correlate in any way with short run changes in the measures themselves? It is important to emphasize that this paper is not about the *impact* of economics research, per se, than it is much more simply about the *attention* economists devote to non-stationary public policy concerns.

The data for the analysis involves all full-length monographs published in seven top journals in the field of economics from 1960-2010. The corpus of these texts are investigated for trends in terms related to key policy measurements such as “GDP”, “unemployment”, “inflation”, and “bankruptcy”. Frequency analyses of usage of these terms is compared with empirical measurements of the terms themselves. In addition, frequency analyses of these same terms are gathered from other English language based text sources (in particular, Google’s Ngram Viewer) to determine if discussion of them in the wider public is also correlated in any way with use of the terms in the academic literature. The most striking finding is that academic discussion of many of these terms appears correlated more strongly with discussion of them in the wider public, than it is with movements of them in real time. In other words, academic economists are not isolated in their proverbial ivory towers without any windows onto the wider world. There are windows; it is just that the view from these windows appears to overlook the public, more so than it does the marketplace.

## Literature Review

Investigations into the impact and relevance of academic research to public policy concerns have a long history. Milton Friedman (1986), Robert Solow (1997), Maureen Cropper (2000), Rebecca Blank (2002), and Victor Fuchs (2002) are just a few of the noteworthy individuals who have penned short (and sometimes long) missives on the topic. Conferences and symposiums have been convened at respected institutions over the years to try and determine the impact and policy relevance of economics and the other social sciences. A main conclusion of much of this effort is that economists (as well as other social scientists) do seem to *care* if their research has an impact, there just seems to be no answers, and no sure ways to measure, whether or not it does.<sup>1</sup>

The goal of this paper is less ambitious than this main line of research investigating the possible policy effects of academic research. No attempt is made here at determining the optimality, efficiency, relevance, or even the main causative factors of academic research; instead, we investigate whether the *attention* of academic economists is correlated with events as they change in the world around them. As such, this paper can be considered to be behaviorally motivated, as it assumes that economists, like most people, are affected and inspired by the world around them. Economists may be boxed in to research agendas and funding opportunities that focus on yesterday's (or even tomorrow's) problems, but they can still always devote attention to today's issues, to try and make their papers contemporarily relevant in at least a tangential way. The question is, do they?

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<sup>1</sup> There is also a literature on research impact as measured by citation analysis, publication counts, and h-index scores (Hamermesh, 2013; etc.), but this is about the perceived influence of research on other researchers – not necessarily on public policy or policy concerns.

## Theory

The initial assumption from which this paper proceeds is that one goal,  $q_i$ , of academic economics research is to address and possibly impact public policy concerns of the day. Most researchers simultaneously pursue other goals as well ( $q_i ; i = 1, \dots, n$ ), including developing sound theoretical models that help advance the field, satisfying pure intellectual curiosity about topics that interest them, and working to achieve tenure, prestige, and the approval of one's peers. All of these objectives strain the limited attention budget of any individual researcher.

When demand for research attention to certain public policy factors changes – perhaps it increases due to a shock to the system such as a sudden banking crisis, or decreases due to a withering of societal concern (acid rain?) – how responsive is the output of research attention to these changes; in other words, how elastic are researchers' supply curves to the goal of public policy attention? Ultimately, it depends on the individual researcher and a host of factors such as preferences for such output, available institutional resources to devote to such output, and talent and ability in addressing such output, but in the aggregate in the economics profession as a whole, how significant a response in research attention do we see as public policy concerns change? Is there an obvious response in altered research attention, or is the response muted to nonexistent as the result of a nearly inelastic research supply curve?

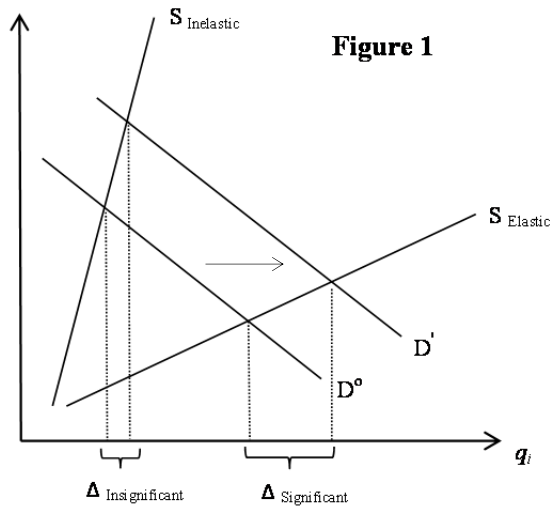


Figure 1 focuses on these demand and supply tensions around the goal of addressing public policy concerns,  $q_i$ . As demand changes, the quantity supplied will also change, but whether or not by a significant amount depends on the elasticity of researchers to (what are assumed exogenous) policy shocks.

## Data

The data for this project constitutes 20,321 articles published in the following seven top-tier academic journals from 1960-2010: *American Economic Review (AER)*, *Econometrica (E)*, *Journal of Economic Literature (JEL)*, *Journal of Economic Perspectives (JEP)*, *Journal of Political Economy (JPE)*, *Quarterly Journal of Economics (QJE)*, and *Review of Economic Studies (RES)*. An effort was made to use observations from the top general-interest journals in the field, and this list was chosen after considering a number of different rankings, including Engemann and Wall (2009), Kalaitzidakis et al. (2001), and a variety of online listings. Not all journals that publish academic research are included in this list, obviously, nor are there any

specific field journals. This should not be a handicap, as it is common in the literature to focus on a select few top journals in the field and make broader conclusions about a discipline from there (Laband and Tollison, 2000; Laband et al., 2002; Card and DellaVigna, 2013; Hammermesh, 2013). Often this is assumed appropriate because it is the top journals that set the trends and research priorities of the lower-ranked journals. The journals utilized in this work are inclusive of the journals most often used in work of the kind that attempts to determine trends, patterns, and influence of academic economics research more broadly.

It may be worth mentioning that the list includes both journals that publish refereed (AER, E, JPE, QJE, RES) and non-refereed (JEP, JEL) articles. The distinction does not seem important in this context when the goal is investigating broad research attention. What is more important is reputation as a top, well-read journal in the field, and the chosen journals are all certainly that. At the end of the empirical section, disaggregated results by journal type (refereed and non-refereed) are also presented, so if there is a concern about a distinction between journal type, the reader can glean any differences that might appear in the results which follow.

All of the articles published in these journals for the years 1960-2010 are in the database. The corpus includes everything research-oriented that has been published in English,<sup>2</sup> including full-length monographs, full-length book reviews,<sup>3</sup> and comments and replies. Entries not included in the dataset include editor's notes, conference announcements and programs, auditor's reports, indexes, and other similar non-research focused entries. Special symposium articles are

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<sup>2</sup> Some of these journals, especially in earlier years, included the occasional article in French or German.

<sup>3</sup> It is worth noting that short book reviews and indexes, as appear primarily in the *Journal of Economic Literature* (JEL), are not included.



included.<sup>4</sup> Given these criteria the corpus includes 20,321 articles, some descriptive information for which can be found in Table 1.

## **Methodology**

This paper utilizes textual analysis for its primary results. Textual analysis (sometimes also called ‘content analysis’ or ‘computational linguistics’) involves the accumulation of large amounts of text (in this case, academic research articles), cleaning and parsing the text with unique algorithms, and then turning the text into a database where the words themselves are statistically analyzed for trends and correlative patterns. Textual analysis as a methodological tool has taken off in the last decade in many social science disciplines (most notably political science and psychology), and it has begun to be utilized in the economics literature as well (Baker et al., 2014; Kosnik 2014a, 2014b; Gentzkow and Shapiro, 2010; Tetlock, 2007; Antweiler and Frank, 2004).

We organize the unstructured text from each research article within a vector-space model (VSM). In the VSM each element of the vector indicates the occurrence of a word within the document. A collection of documents results in a collection of vectors; 20,321 to be exact in this study.

There is some debate as to whether the elements of the vectors should be transformed in any way, perhaps turned into logs of frequency of use in order to tamp down the raw frequencies. Another option is to weight the elements in some way, such as through an inverse-document frequency transformation.<sup>5</sup> In this paper we have chosen to leave the elements as raw,

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<sup>4</sup> It is worth noting, however, that the *American Economic Review*’s annual *Papers and Proceedings* issue is not included.

<sup>5</sup> An inverse-document frequency transformation (idf) reflects the frequency of a term within a document, but also across all the documents within a corpus. It often works to lower the frequency weight of a word if it is common

unweighted counts of frequency of use. This is because we want single occurrences of terms to count, and we want multiple occurrences of terms to count for relatively more, as a representation of greater attention and focus. All of the following results, therefore, are based on raw term frequency analysis.

In the following section we compare frequency analyses of specific terms in the research articles corpus with various empirical measures of the terms themselves, but also with comparable frequency analyses of the terms in Google's Ngram Viewer (GNV).<sup>6</sup> The GNV is based on the unstructured text of millions of books that Google has scanned and digitized as part of their Google Books Library Project. This project includes books from the year 1500 to 2008, in multiple languages from around the world. Keyword and phrase frequency searches can be done on cuts of the available text, for example over specific years, by certain languages, and with or without smoothing techniques. Searching English-language based text allows even more choice, including focusing on texts published in Great Britain, or the United States, or on those that are fiction or nonfiction.

For this research we focused on Google's *American English 2012* corpus. This is the most up-to-date corpus currently available, and it includes books written in English and predominantly published in the United States. Text searches were also conducted on the more inclusive *English 2012* corpus (which includes books written in English but published anywhere); in all cases the results were nearly identical.

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across the entire corpus, under the assumption that it is thus not a very unique or informationally important word, such as "the."

<sup>6</sup> Google's Ngram Viewer can be found here: <https://books.google.com/ngrams/info>.

## Results

### GDP:

We begin with an analysis of GDP. Figure 2 displays three graphs of GDP measurements: a) is a graph of the frequency of the 1-gram “GDP” in the research articles corpus over time, b) is a graph of real GDP per capita over time, and c) is a graph of percentage changes in real GDP over time.

The most notable observation about “GDP” use in the research articles corpus over time (graph a) is that it jumps around 1990, and continues from there at a sustained level of higher use, relative to that in previous decades. In other words, it appears as though there was a jump in research attention to GDP from 1990 onwards.<sup>7</sup> There does not appear to be any such corresponding jump in actual GDP empirical measurements as found in graphs b and c. However, the Pearson’s correlation coefficient of graphs a and b,  $r_{a,b} = 0.899$ , is high, indicating the simultaneous overall upward trend in both measurements. At the same time, research attention to GDP is certainly uncorrelated with percent changes in its movement, as  $r_{a,c} = -0.219$ .

These correlations were also tested with lags on the GDP measurements of one to five years (i.e.  $r_{a,b-1}$ ,  $r_{a,c-1}$ ,  $r_{a,b-2}$ ,  $r_{a,c-2}$ , ...,  $r_{a,b-5}$ ,  $r_{a,c-5}$ ), in order to test the possibility that published research may respond to policy measures, but with a lag due to the publication process. None of these lagged  $r$ s improves upon the non-lagged results reported above.<sup>8</sup>

In Figure 3 we compare the graph of the frequency of “GDP” in the articles corpus (graph a from Figure 2), to a graph of the frequency of the 1-gram “GDP” in the larger English-language literature over time, as represented by Google’s Ngram Viewer (Michel et al., 2011). Graphs a and b display the results side by side, and graph c overlays one on top of the other.

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<sup>7</sup> It is likely that this jump is related to the fact that the US Bureau of Economic Analysis changed from using GNP to GDP as its main economic indicator in national income and product accounts at around this time.

<sup>8</sup> Numerical results available from the author.

From visual inspection alone, use of the term “GDP” in the two corpora appear to be quite correlated, including the notable jump in use around 1990, and indeed the Pearson’s correlation coefficient is 0.856. The frequency of academic economists’ use of the term “GDP” is remarkably similar to its use by the wider English-language speaking public.<sup>9,10</sup>

### **Unemployment:**

Next we investigate “unemployment”. Figure 4 (similar to Figure 2 for GDP) displays three graphs of unemployment measurements: a) is a graph of the frequency of the 1-gram “unemployment” in the research articles corpus over time, b) is a graph of the U.S. civilian unemployment rate over time, and c) is a graph of the yearly change in the annual U.S. civilian unemployment rate over time.

This time, the graphs related to the empirical measurements of the public policy term (i.e. graphs b and c) appear unrelated to the graph of usage of the term in the economics academic literature. The Pearson’s correlation coefficients are  $r_{a,b} = 0.206$ , and  $r_{a,c} = -0.115$ . Yearly movements and fluctuations in the unemployment rate do not seem to be affecting the amount of academic research attention to the topic of unemployment, at least not in the short run.

When lagged values are compared, however, we see an improvement in the correlation numbers, with  $r_{a,b-3}$  in particular jumping to 0.509.  $r_{a,c-3}$ , however, remains low at 0.190. In this instance, therefore, there is an improvement in the correlations if we allow for a lag, which can be justified due to potentially similar lags in journal publication times.

Figure 5, however, tells an even more compelling story. In comparing attention to “unemployment” in the academic economics literature to use of “unemployment” in the wider

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<sup>9</sup> Again, comparing lagged values of up to five years does not significantly improve the correlation results.

<sup>10</sup> Similar results were found for “GNP” as well.

English-language literature, we find that they follow similar paths. The Pearson's correlation coefficient is now 0.612, and whatever seems to be motivating use of the term in the academics literature, appears to be affecting use of the term in the wider English-language literature as well.<sup>11</sup>

### **Inflation:**

Figure 6 begins the investigation into “inflation”. There was a notable increase in research attention to inflation in the late 1970s and early 1980s, and this corresponds quite well with actual jumps in the U.S. inflation rate around this time. The academic research literature does appear to be responding in the near term to an important event happening in the policy world, namely spiking inflation rates.  $r_{a,b} = 0.469$ , confirming the correlation, and the lagged correlation,  $r_{a,b-3}$ , is even stronger at 0.540. The correlation between attention to inflation in the academic literature and yearly changes in its empirical measurement, however, is minimal ( $r_{a,c} = -0.143$ , and  $r_{a,c-3} = 0.182$ ).

While a correlation exists between academic attention to inflation in the literature, and its annual empirical measurement, the relationship between academic attention to the topic and its use in the wider English language literature, as before, is also strong. Figure 7 displays use of the term “inflation” in both the academic corpus and the wider English-language corpus, and the  $r_{a,b} = 0.521$  (which doesn't improve with any lagged values). In this instance as well, academic attention to certain policy related terms mirrors quite strongly attention to those terms in the wider English-language literature.

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<sup>11</sup> Lagging the Ngram Viewer results does not significantly improve the correlation results.

### **Bankruptcy:**

In Figures 8 and 9 we investigate “bankruptcy”. The first thing to note is that data on bankruptcy rates in the United States before 1980 were unavailable, so our comparison is limited to a three decade time span, instead of a five decade one. The second thing to note is that both of the empirical measurements of bankruptcy rates in the United States (graphs b and c in Figure 8) are relatively uncorrelated with attention to the term in the academic literature,  $r_{a,b} = 0.119$  and  $r_{a,c} = 0.383$  ( $r_{a,b-3} = 0.140$  and  $r_{a,c-3} = -0.081$ ). However, as has happened with all of the previous terms investigated, the correlation between use of the term in the academic literature with use of the term in the wider English-language literature (Figure 9) is strong, in this case with a  $r_{a,b} = 0.530$ .

### **Acid Rain, Social Security, Climate Change, and Health Care Reform:**

The results so far indicate that academic economists’ attention to certain public policy related measures is often correlated with empirical measurements of the measures themselves, particularly if we include measurements lagged by three years. It is likely significant that it is a lag of three years (and not one, two, four or five) that often produces the optimal correlation, as this corresponds reasonably well to the lag involved in journal publication times. Other terms were also tested (including “interest rate”, “recession”, “net exports”, and “budget deficit”), though not presented here for brevity’s sake, and similar results held.

In addition, a high correlation between the terms and their use in the wider English-language literature always held, and often even more strongly. This close relationship between academics use of key terms and their use by the wider public (unlagged) is intriguing. It is investigated further with tests of the correlation between other topical public policy issues that do

not necessarily have precise comparable empirical measurements of their terms, and their use in the two corpora. Figure 10 compares frequency rates of “acid rain”, “social security”, “climate change”, and “health care reform” from the research articles corpus to their frequencies in the GNV. The correlations are all high, with  $r_a = 0.800$ ,  $r_b = 0.616$ ,  $r_c = 0.538$ ,  $r_d = 0.666$ .<sup>12, 13</sup>

It is also noteworthy that the peaks in the frequency rates do appear to correspond to the dates of major legislative or regulatory initiatives in the U.S.: the 1990 Clean Air Act for acid rain, President George W. Bush’s social security reform efforts in 2005, the American Clean Energy and Security Act (the federal-level cap-and-trade bill) of 2009 for climate change, and the Health Security Act of 1993 for health care reform. This implies that the usage frequency rates are likely related to specific policy events on the ground. Further analysis would need to be done to determine any sort of causal relationship between policy and legislative or regulatory change and attention to the topics by academic economists, or for that matter between discussion of these terms in the wider public (as represented by the GNV) and the attention paid them in the academic literature, but it appears that there is a relationship of some form.

### **Refereed versus Non-Refereed Journals:**

In this section we investigate if the results obtained above differ when analyzing solely refereed or non-refereed journals. Figures 11 & 12 display the results for the two sets of policy measures studied. The main result is that there is not much difference. Visually, the levels of attention follow similar paths with, if anything, the *non-refereed* journals (JEL and JEP) slightly

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<sup>12</sup> Note that more specific terms related to these topics (for example “ozone layer” with respect to acid rain and “greenhouse gas emissions” with respect to climate change) show similarly high correlations between the two corpora; in other words, the specific term we use does not seem to be driving the results. The results are broad-based across term use and term topic.

<sup>13</sup> For most of the terms studied, lags did not improve the correlation results; only with climate change did the correlation improve slightly (to  $r_{c-3} = 0.561$ ).

lagging the refereed journals (particularly in Figure 11). The correlations between the two sets of results are always positive and, with lagging, range from 0.249 – 0.970. Overall, the level of research attention to these policy measures follows similar paths in both refereed and non-refereed journals. This may seem surprising as some have suggested that non-refereed journals are deliberately edited with an eye to current events. This may be true, however, the textual results presented here seem to imply that refereed journals are as well.

## Conclusions

From this limited keyword analysis a few overall impressions are drawn. First, that economic discussion of key public policy terms, in the short run, does move in a correlative way with (often lagged) empirical measurements of the terms themselves.<sup>14</sup> This is great news for the economics profession, as it can be pointed to as evidence that economists are discussing real policy concerns in their research in real time.

In addition, the consistency of the lag (three years), when it is relevant, is consistent with average publication lags. Economists are thus actively aware of policy events around them and seek to publish high quality research articles about important policy related topics, it is just that their apparent attention to them is likely often lagged due to the publication process. Speedier publication times would seem to imply a greater perceived relevance of economics research to policy events of the day.<sup>15</sup>

At the same time, economist's attention to policy terms correlates with use of the terms in the wider English-language literature even more strongly and consistently than it does to correlation with measures of the terms themselves. In other words, economists seem to talk

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<sup>14</sup> Although in no instances investigated were percent, or yearly, changes correlative.

<sup>15</sup> This result also argues for the importance of RePEc, SSRN, and other online websites that allow access to scholarly working papers – and their results – *before* final journal publication times.



about important policy events as they happen, but even more so, as everyone else is talking about them as well. The profession seems to be slightly more attuned to the public square, than it does to the marketplace.

Considering future research, there is still an open question as to what motivates research attention overall. The correlative results here were always less than one, leaving room for other motivations to additionally drive research attention, including ideology, passion, funding levels, etc. It would be of interest to construct a more complete picture as to what drives research attention, when, and to what degree.

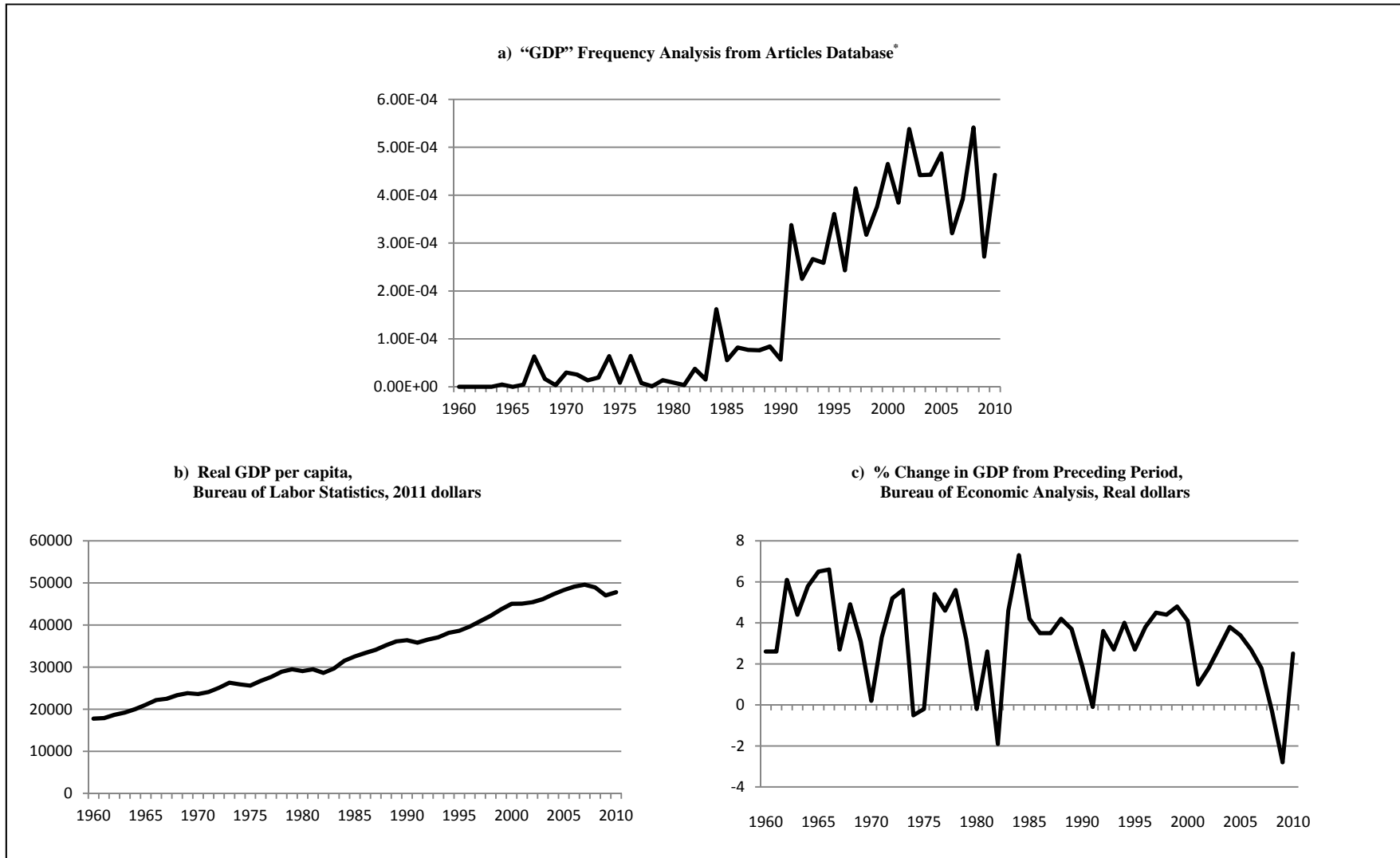
Similarly, it would be of interest to determine why certain policy terms receive more attention than others, both in the academic research sphere but also in the public sphere. What, ultimately, is motivating all of this attention overall? Is it that the public (as well as economists) discuss “acid rain,” “social security,” “climate change,” and “health care reform” when federal legislation related to those topics becomes imminent, or does discussion surrounding those topics jump start from media events and newspaper reporting? Which way does the causation run and what drives attention overall?

Other datasets (including corpora from field journals), and other topics should also be investigated to try and understand what grabs the attention of top academic researchers in the field. We do know that academic research attention is itself valuable. Judging by salary levels and rates of output, it can be roughly estimated that a single academic research paper is worth thousands of dollars in opportunity costs, both to the researchers themselves and to the funding university or organization. In order to determine if academic researchers are allocating their scarce and valuable time and resources well, it is first necessary to discover where they are putting their research attention at all. This paper aids in the discussion.

**Table 1 - Article Counts per Decade**

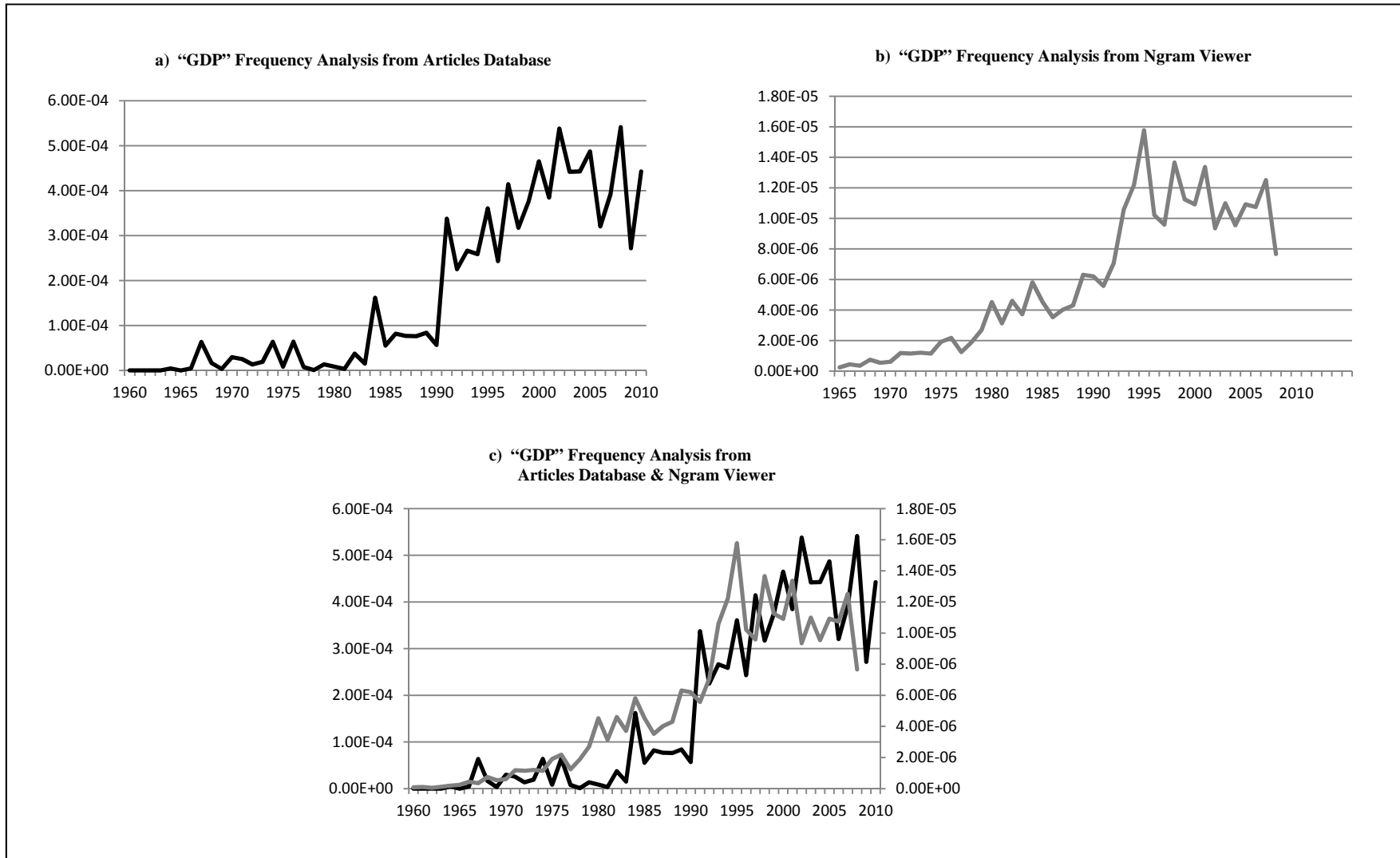
<b>Journal</b>	<b>1960s</b>	<b>1970s</b>	<b>1980s</b>	<b>1990s</b>	<b>2000s</b>	<b>Totals</b>
<b>American Economic Review</b>	693	1,184	1,194	888	1,092	5,051
<b>Econometrica</b>	896	1,105	841	570	671	4,083
<b>Journal of Economic Literature</b>	14	180	142	201	216	753
<b>Journal of Economic Perspectives</b>	0	0	144	615	620	1,379
<b>Journal of Political Economy</b>	1,271	1,181	814	563	460	4,289
<b>Quarterly Journal of Economics</b>	496	539	564	462	457	2,518
<b>Review of Economic Studies</b>	315	534	525	394	480	2,248
<b>Totals</b>	3,685	4,723	4,224	3,693	3,996	20,321

**Figure 2 – Measurements of GDP, 1960-2010**



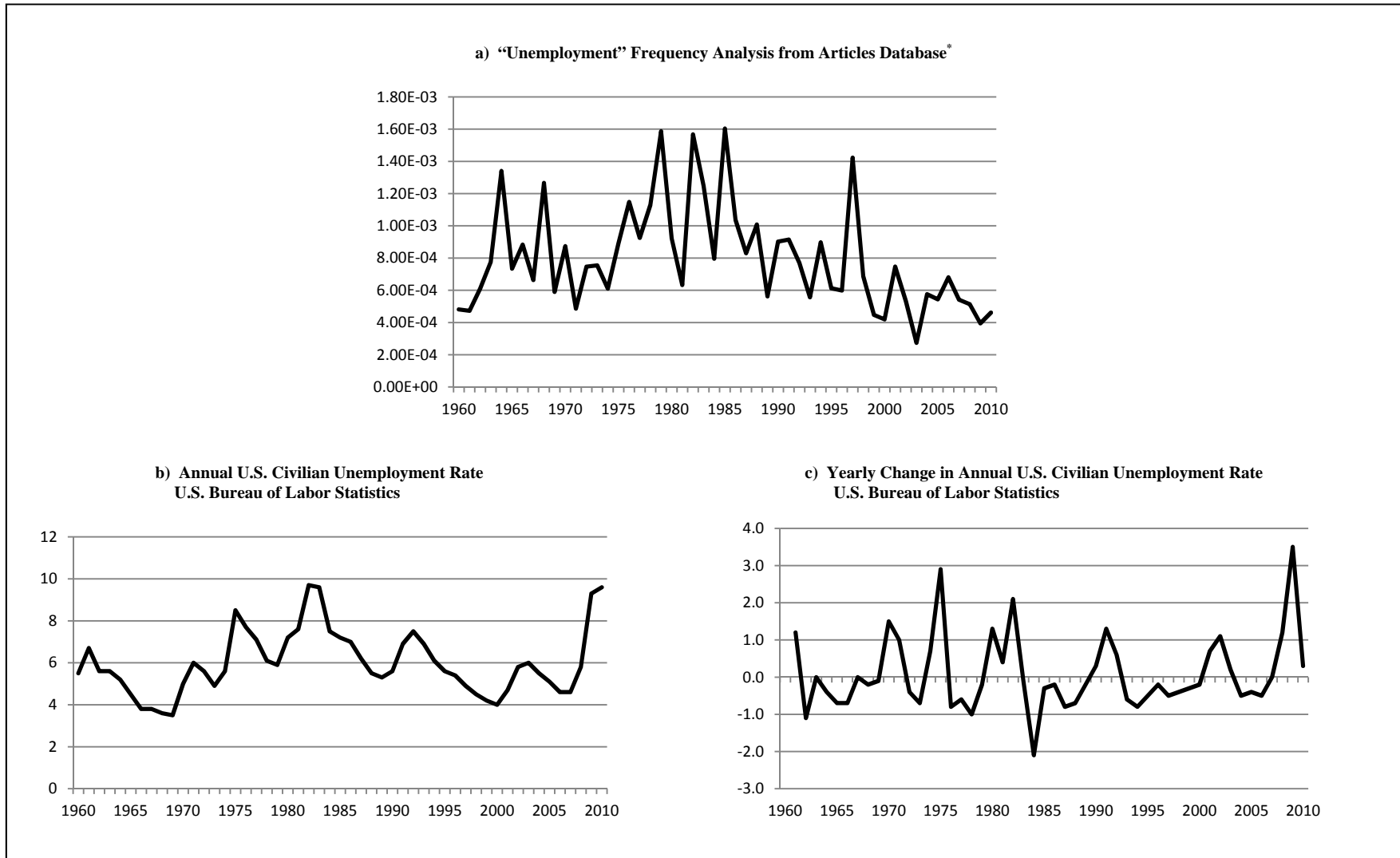
\* The vertical axis in graph a) measures the percent frequency of the 1-gram "GDP" in a 1-gram count of the corpus.

**Figure 3 – Measurements of GDP, 1960-2010**



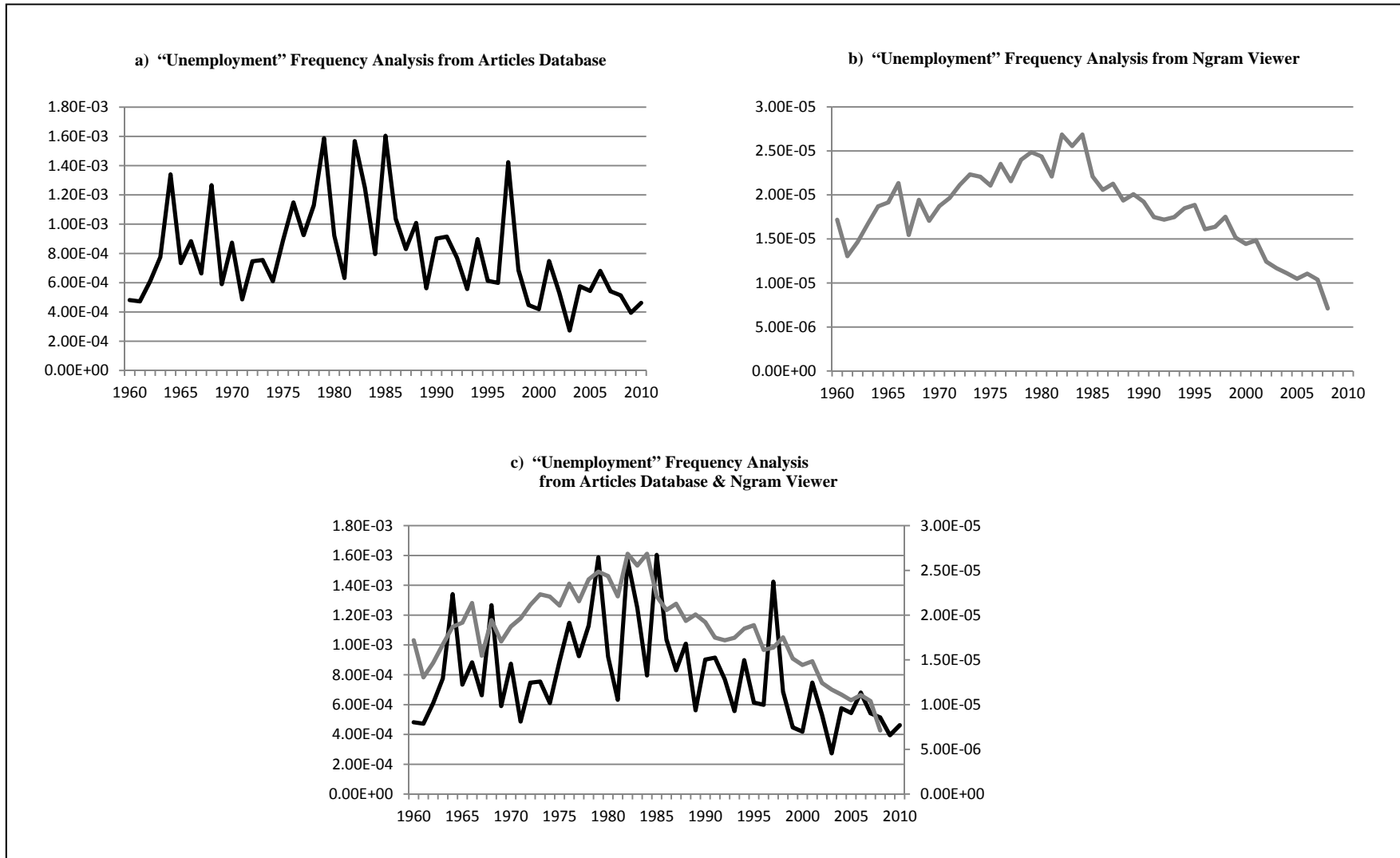
\* The vertical axes in the graphs measure percent frequency in the relative corpora.

**Figure 4 – Measurements of Unemployment, 1960-2010**



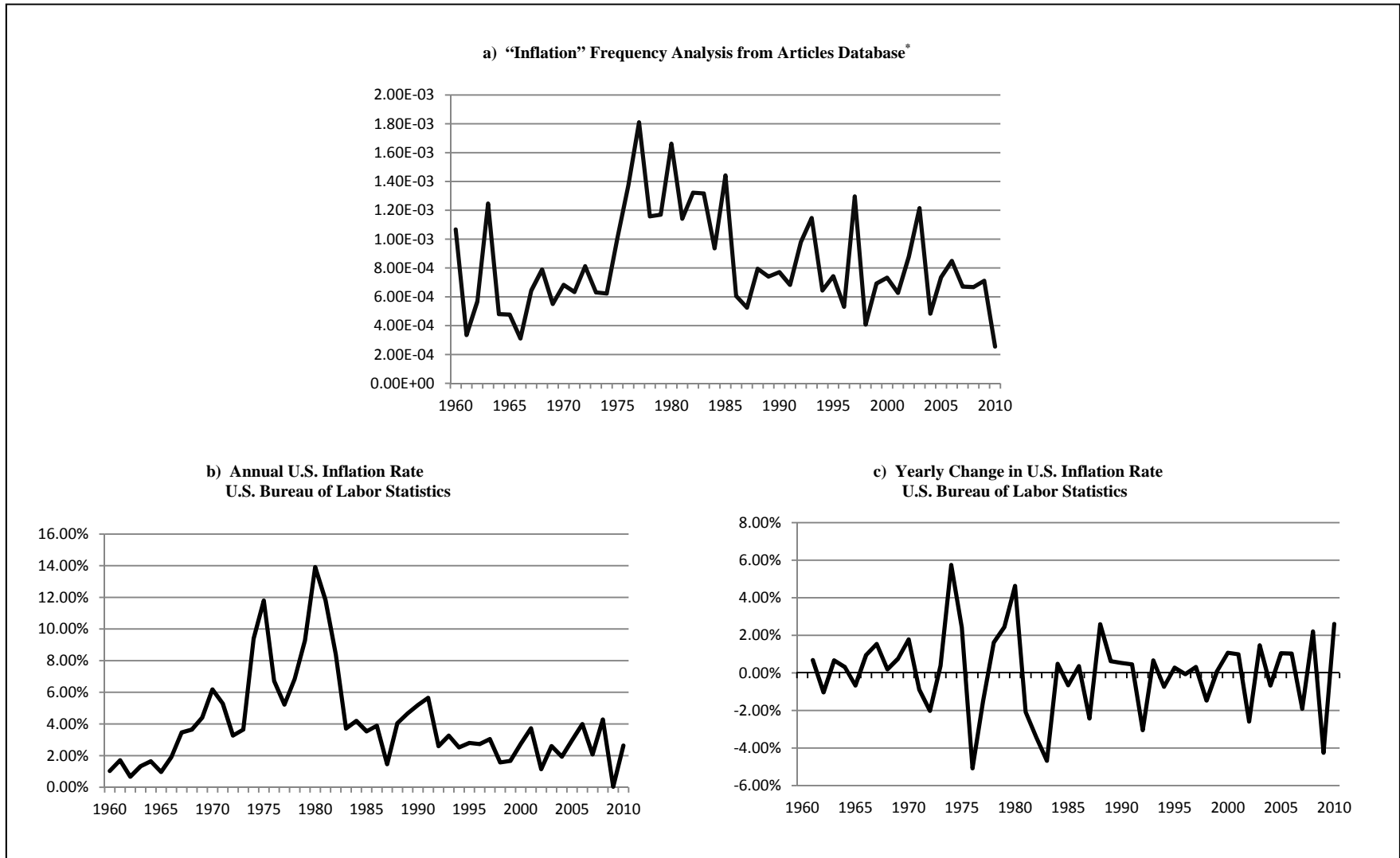
\* The vertical axis in graph a) measures the percent frequency of the 1-gram "unemployment" in a 1-gram count of the corpus.

**Figure 5 – Measurements of Unemployment, 1960-2010**



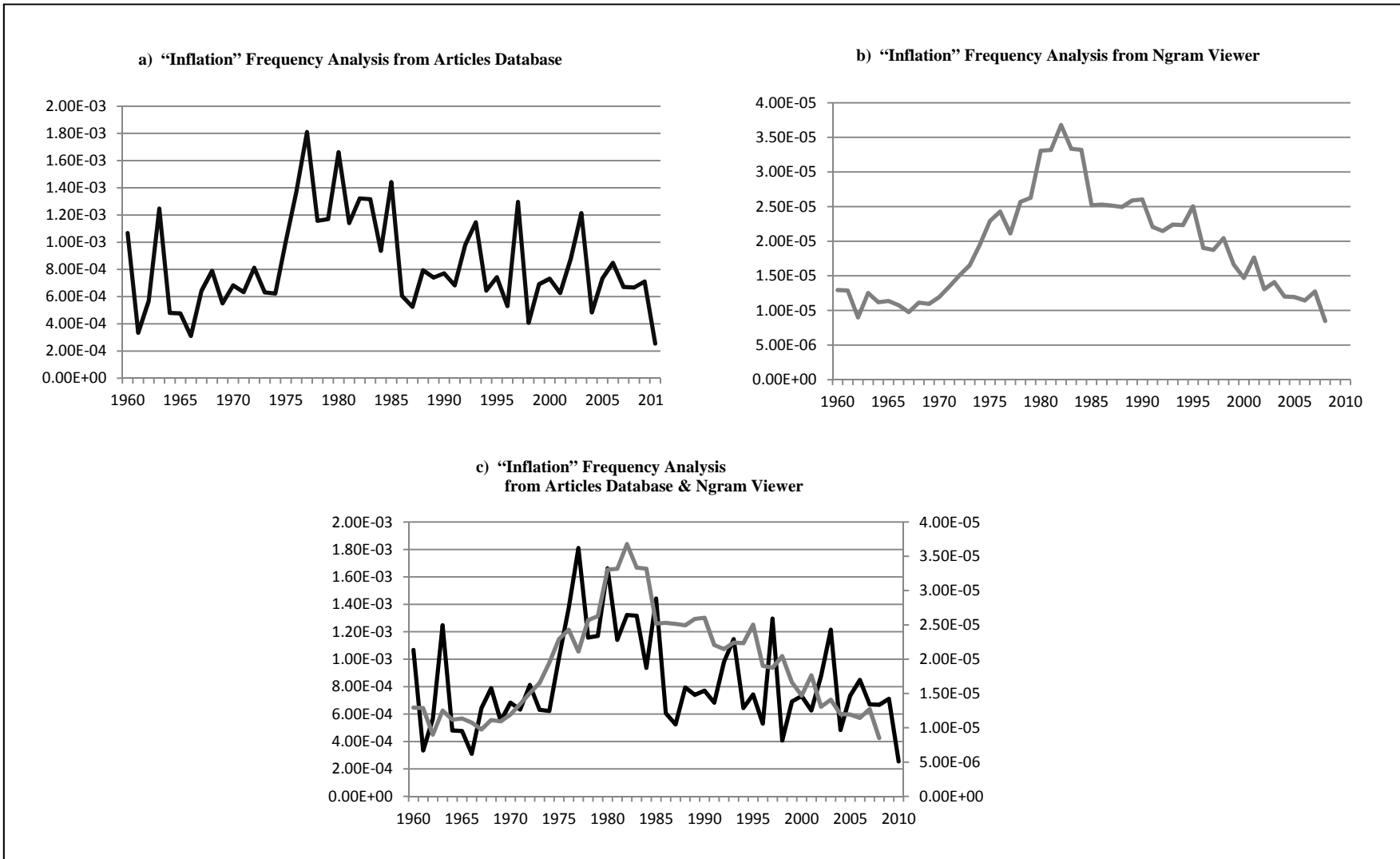
\* The vertical axes in the graphs measure percent frequency in the relative corpora.

**Figure 6 – Measurements of Inflation, 1960-2010**



\* The vertical axis in graph a) measures the percent frequency of the 1-gram "inflation" in a 1-gram count of the corpus.

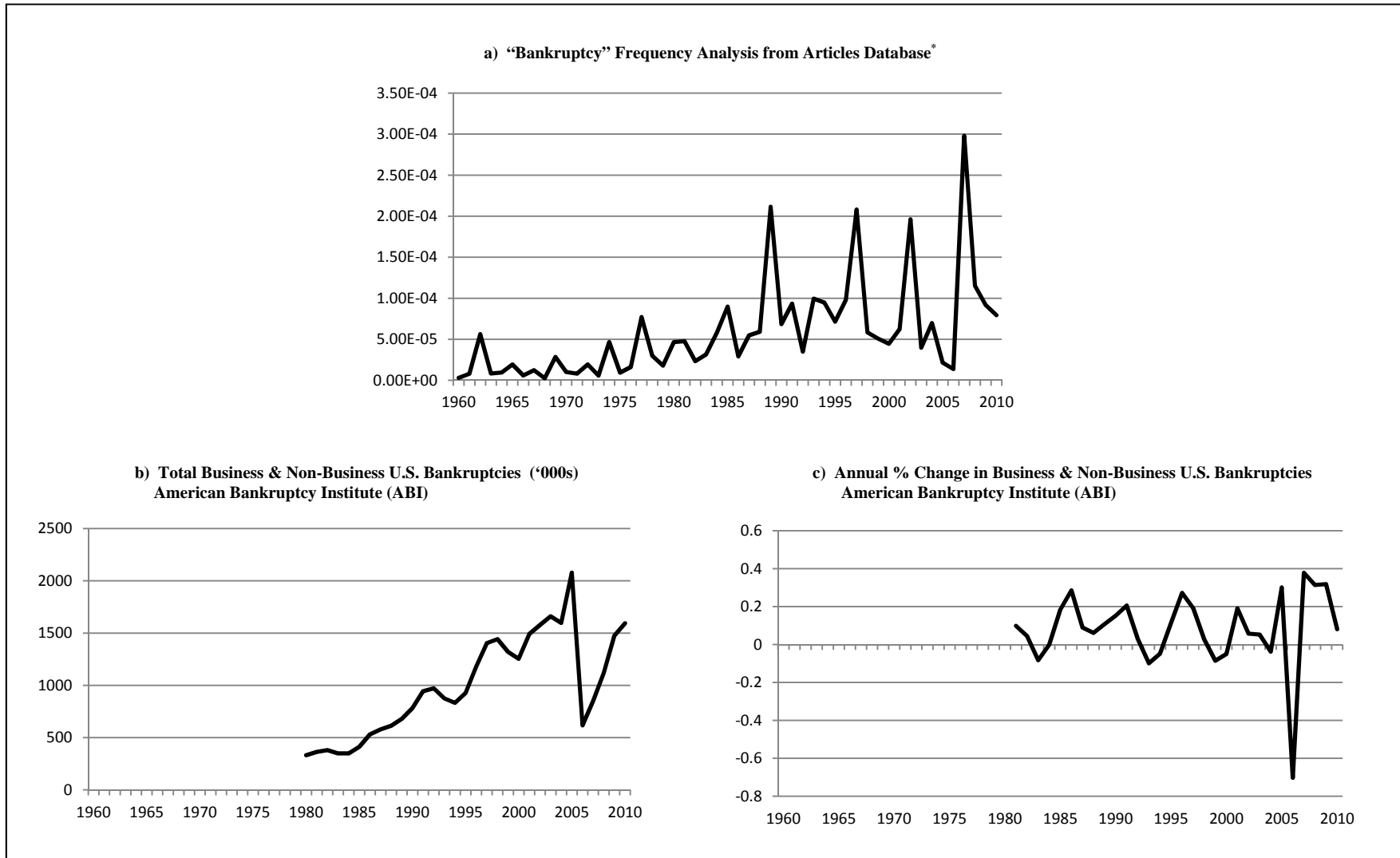
**Figure 7 – Measurements of Inflation, 1960-2010**



\* The vertical axes in the graphs measure percent frequency in the relative corpora.

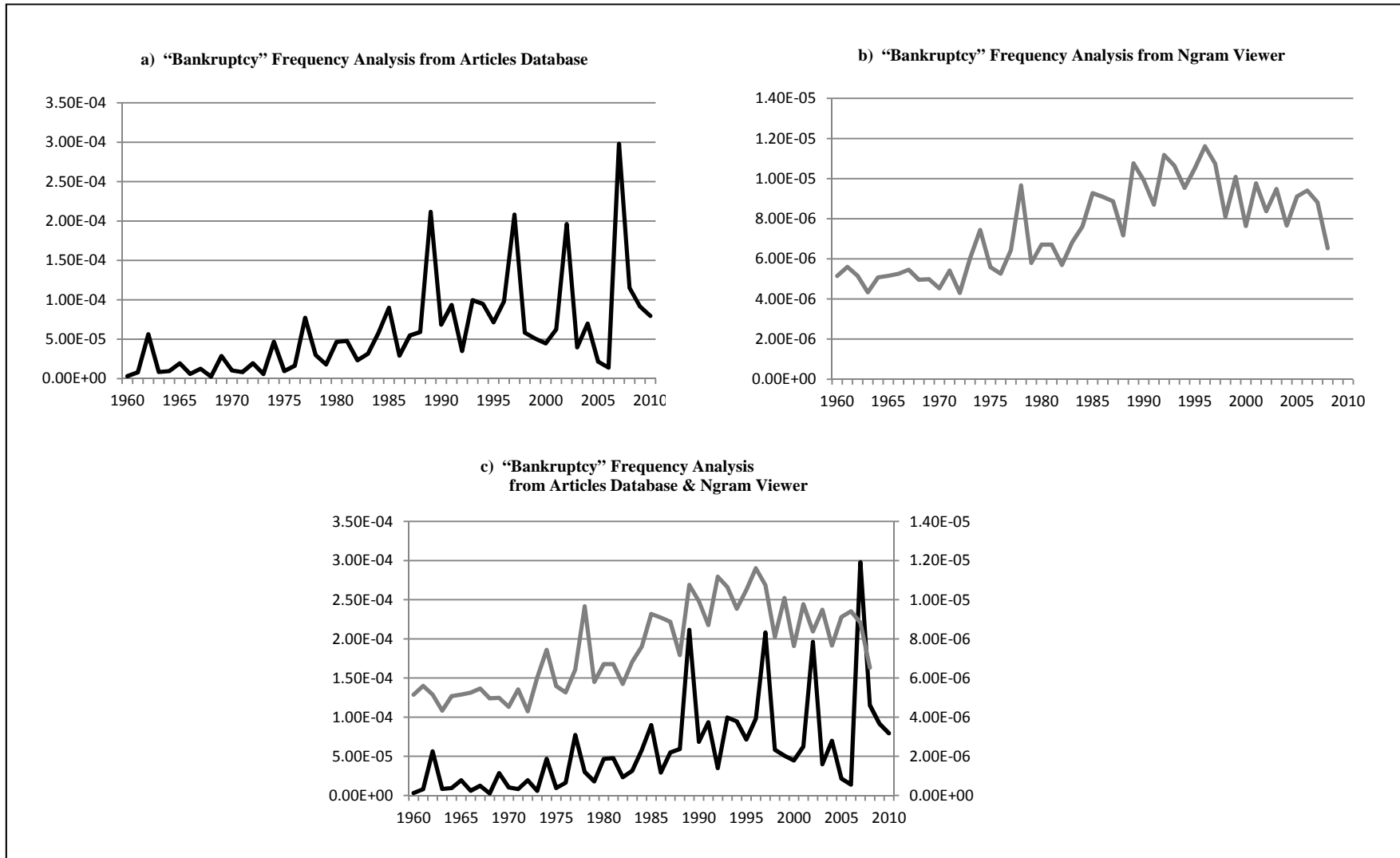


**Figure 8 – Measurements of Bankruptcy, 1960-2010**



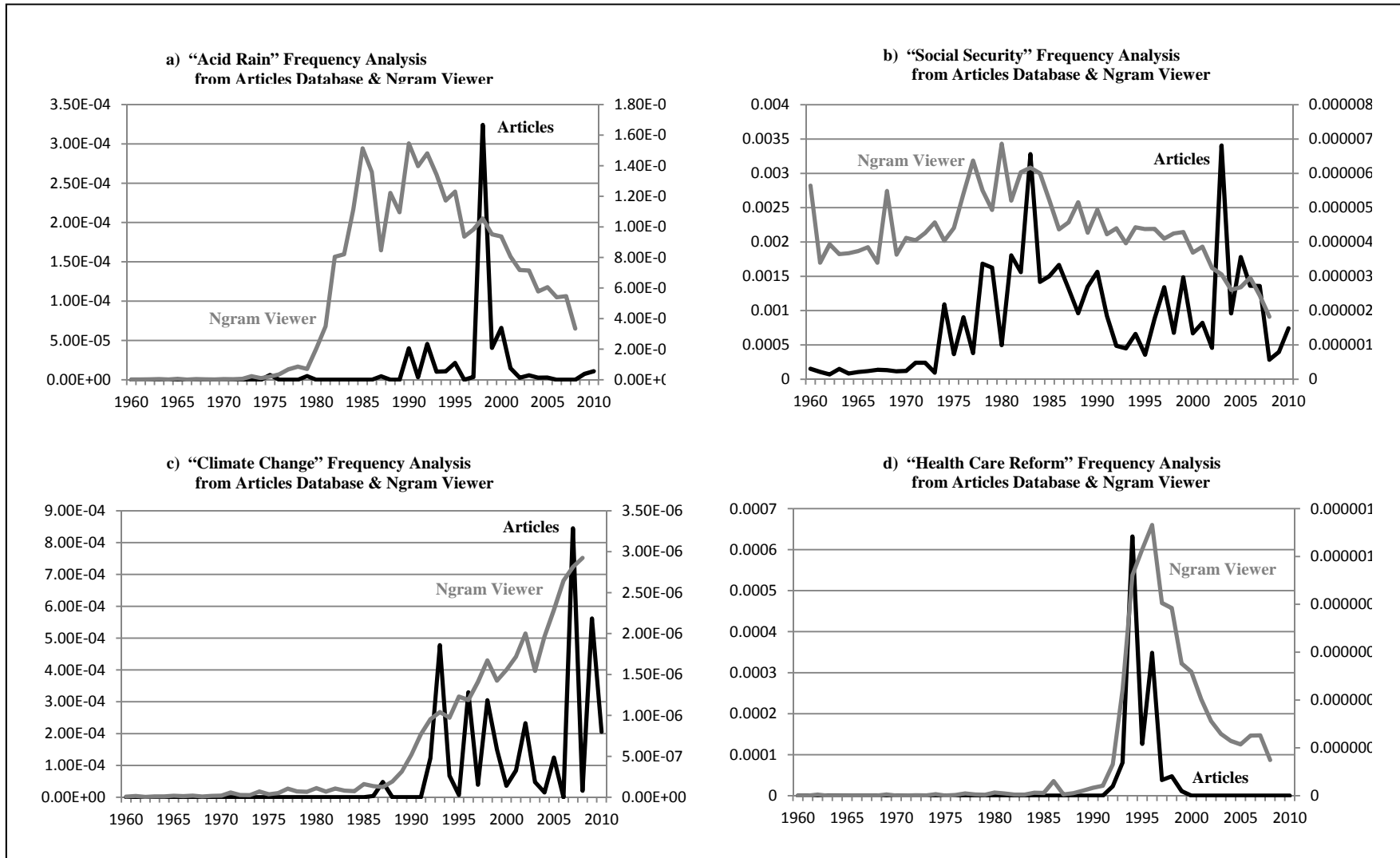
\* The vertical axis in graph a) measures the percent frequency of the 1-gram "bankruptcy" in a 1-gram count of the corpus.

**Figure 9 – Measurements of Bankruptcy, 1960-2010**



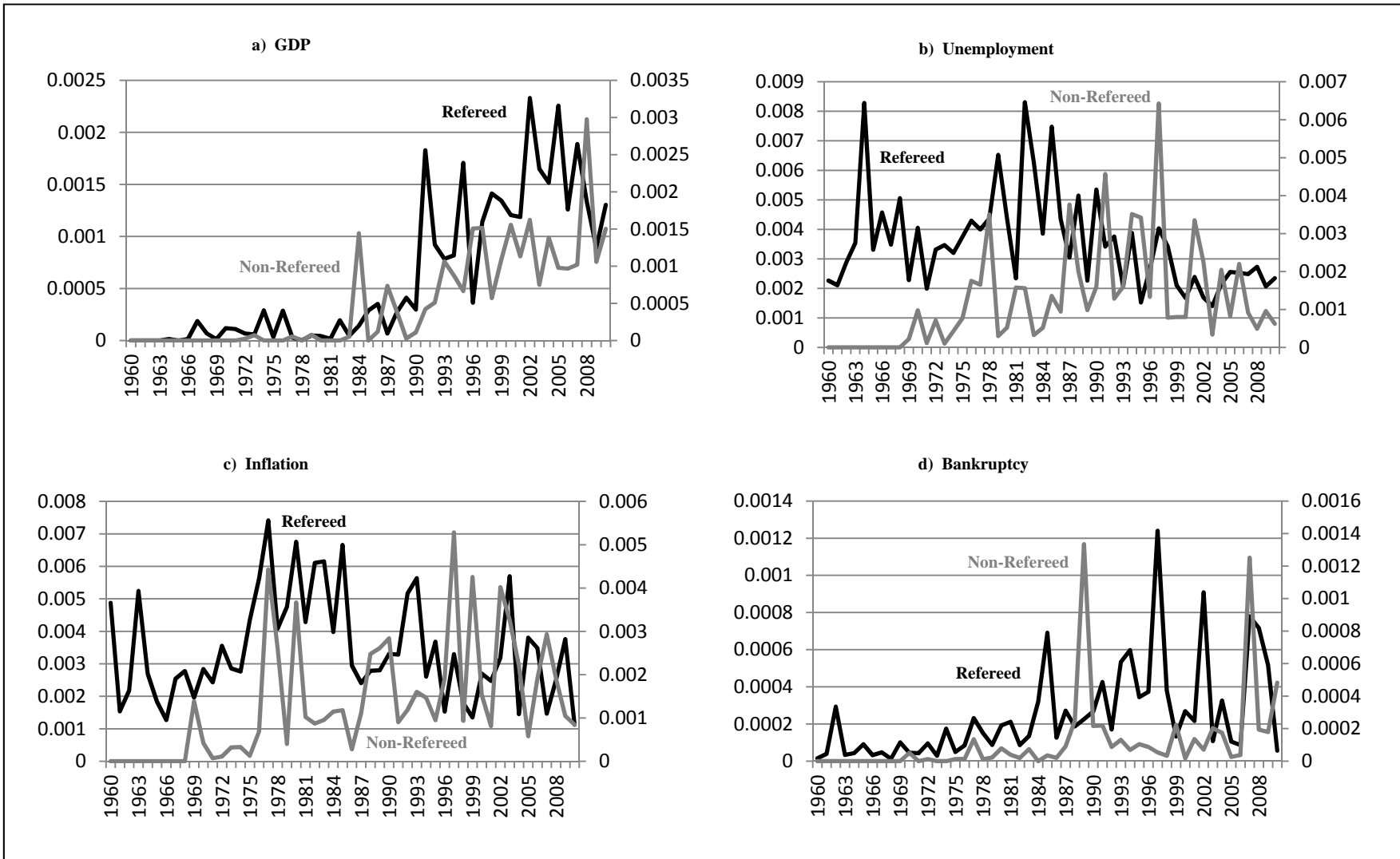
\* The vertical axes in the graphs measure percent frequency in the relative corpora.

**Figure 10 – Other Policy Related Term Measurements, 1960-2010**



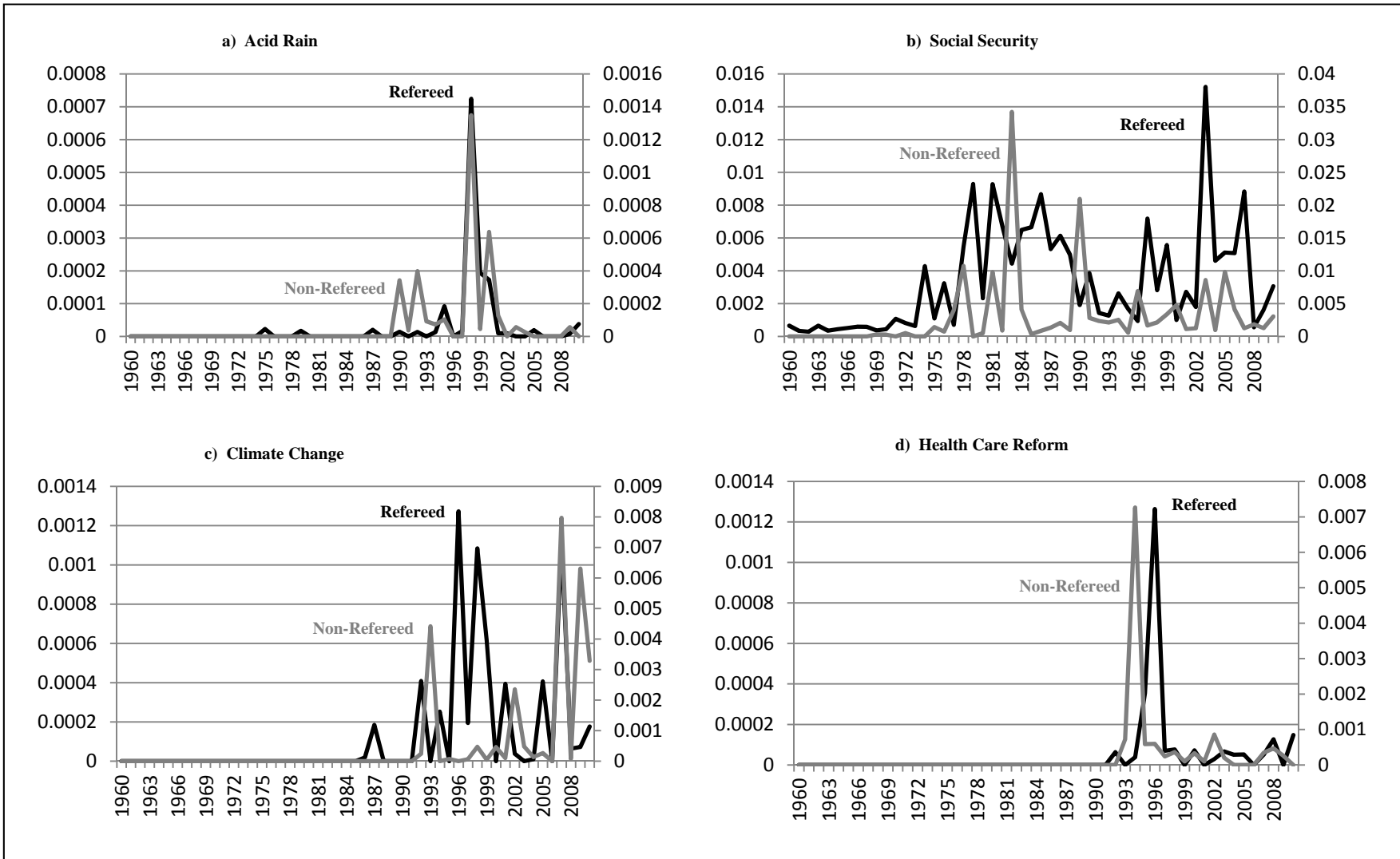
\* The vertical axes in the graphs measure percent frequency in the relative corpora.

**Figure 11 – Measurements of GDP, Unemployment, Inflation, Bankruptcy 1960-2010**



\* The vertical axes in the graphs measure percent frequency in the relative corpora.

**Figure 12 – Measurements of Acid Rain, Social Security, Climate Change, Health Care Reform 1960-2010**



\* The vertical axes in the graphs measure percent frequency in the relative corpora.

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