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'Finance is Not Good for Growth, After All'

Explaining Economists' Changing Publication Habits after the Financial Crisis

Dirk Bezemer*

WORKING PAPER VERSION – PLEASE DO NOT QUOTE OR CIRCULATE

ABSTRACT

In 2007, economists had clear theories and masses of empirical evidence on a positive relation between financial development and economic growth. But in a few years, non-academic consensus opinion (social mood) turned against these theories and evidence. Did this influence economists' reported research findings? We analyze over 1,300 regression coefficients reported in dozens of studies since the 1990s. Controlling for features of the underlying studies, we find significant negative correlation between the size of coefficients and social mood, proxied by Google Trend data. Social mood matters to reported results on the relation between financial development and economic growth.

* Contact: d.j.bezemer@rug.nl. I thank the Institute for New Economic Thinking for supporting this research under grant INO11-00053. Thanks to David Peng who helped with the data collection. Any errors and all opinions are mine.

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1. Introduction

Do economists change their professional opinions based only on theory and empirical evidence? Or are they also influenced by non-academic consensus opinion, also known as social mood? Most of us will think that the answers to these questions are no, they don't and yes, they do. But how do we know?

The post-2007 years provide a rare testing ground for this issue. At stake was the role of the financial sector in the economy, and the relation between financial development and economic growth. Economists had clear theories and masses of empirical evidence on this relation. The theory in 'Money and Banking' textbooks and macroeconomic textbooks explained that banks and financial markets support growth by facilitating an increase in productivity. By channeling funds from savers to investors, re-allocation of productive resources to more efficient uses is facilitated. The theory implies that a better developed financial sector, with fewer market imperfections, supports faster productivity growth – or for short, that 'finance is good for growth'. Macroeconomic models sent the same message. Many had (and have) no financial sector spelled out in the model, but if there is one (e.g. Kyotaki and Moore 1997 and the literature this spawned), it appears in the model as a price friction, thought to represent market imperfections in the financial intermediation process. Again, the more developed financial markets are, the smaller those frictions, and the less interference with agents' optimizing choices leading to the optimum growth path for the economy. More finance is good for more growth.

The voluminous empirical 'finance and growth' literature sent the same message. Financial development, typically measured as the ratio of bank credit to GDP, had

been regressed on GDP per capita growth ever since large cross- country data sets became available in the early 1990s. Over a hundred such studies (reviewed in Ang, 2009) confirmed that the conditional correlation between financial development and income growth was positive, and – applying Arellano-Bond and other instrumental estimators – that the relation was very likely to be a causal one, with the causality running from financial development to income growth.

Then came the 2007 crisis and the post-crisis recessions. In a few years, the social mood turned against these theories and evidence. Since then, theoretical models have been adapted to account more fully for the role of the financial sector in the economy, including the possibility of crisis and lower growth in over-banked economies (Brunnermeier and Sannikov 2015). And an increasing number of published articles within the empirical finance and growth fields report negative, not positive coefficients for the ratio of bank credit to GDP in growth regressions. Interestingly, the negative relation (or lack of a significant positive relation) has now been detected in data stretching back to decades before the crisis, but was - with rare exceptions - never reported before the crisis. It now appears that the cross-country average growth coefficient of credit has been falling quite steadily since the 1980s. But reports of insignificant or negative coefficients quite suddenly appeared after about 2007. This observations motivates the present study. Why do economists change their minds?

In this paper we focus on the empirical, not the theoretical literature. Economists have changed their mind about the finance-growth relation, in the sense that the erstwhile consensus that this relation is positive, has now been replaced by a consensus that the relation can be negative. The question we address in this paper is what the drivers of that change of mind have been. What caused economists to report negative coefficients on the credit-to-GDP ratio? In a (perhaps naïve) empiricist view on how economic science works, the answer to this question would be: 'data'. If that

was reality, there would have been a steady increase in such reports since the 1980s, *quod non*.

An alternative explanation is publication bias. There are two versions of the publication bias argument. First, it is hard to get statistically insignificant coefficients (on any relation) published. This implies that publication of the new evidence was delayed until credit-growth coefficients were robustly negative. Another (and complementary) publication bias argument is that it is hard to publish results that go against the consensus. This implies that publication of the new evidence was delayed until there were doubts about the consensus that finance is good for growth, and until there was openness to alternative views. This is the hypothesis we test in this study.

Doubts about the consensus may have come from outside the researchers' peer group, in the wider world where the credit crisis was raging. Or it may have come from inside the academic community, where published discussions of subprime lending, credit crisis, mortgage crisis, liar loans and such were also multiplying. Social mood, expressed in such discussions, may reinforce or weaken publication bias. The change, after 2007, in either or both of the public social mood and the public mood in academe may have liberated empirical economists to publish their findings that finance is not, after all, always good for growth. In this paper we ask if that was the case for the public social mood.

A standard approach to testing publication bias is to run a PET-FAT test of standard errors. For the question at hand, a disadvantage of that method is that this this does not indicate the source of publication bias. Instead, in this paper we developed proxy measures for public social mood and academic social mood by word counts in Google. We then test if reported coefficients were sensitive to these social mood proxies, after controlling for features of their studies (sample periods, estimation methods, etc.) In the empiricists' ideal world, there should not be a correlation. An

economist reporting on the finance-growth relation in data from 1980 to 2005 should report the same results in 2006 as her colleague repeating the study in 2008 - even though by 2008 the credit crisis was all over the internet and was the talk of the day among economists working on financial topics. Naturally, this is not how economists (only human, after all) do their work. We find that social mood proxies do matter to reported results.

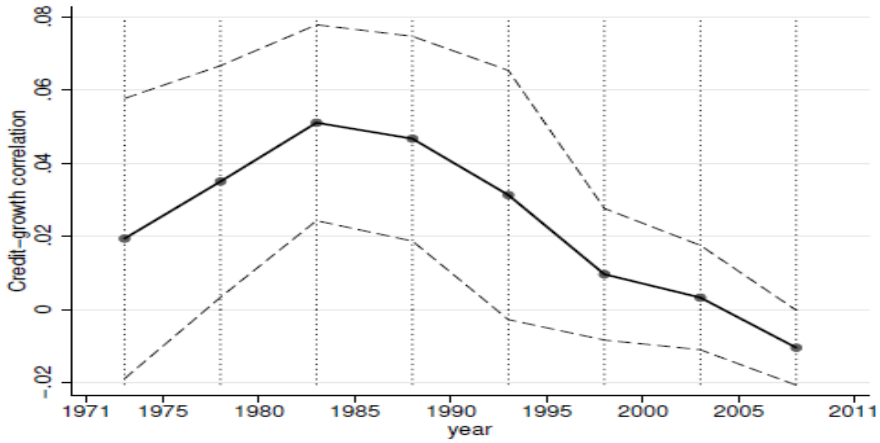
2. The Issue

Starting with King and Levine's 1993 "Schumpeter Might be Right: Finance and Growth", cross-country panel data analysis of financial development confirmed the positive impact of financial development on income growth. King and Levine's 1993 paper showed, in a sample of dozens of countries over 1960-1980, significantly positive correlations between various measures of financial development on one hand and subsequent growth in GDP per capita on the other. In the current state of the art, the size of the financial sector is typically measured by the stock of loan assets on bank balance sheets as a ratio to GDP. Alternative measures are bank branch coverage, population shares with access to banks, or stock market capitalization. Observing these indicators across many countries and years (typically, since 1960), multiple regression analysis of financial development on income growth is then conducted. The conditional correlations of this measure with income growth, controlling for many other variables, suggested that financial-sector development typically leads to higher income growth (for an overview, see Levine 2005).

But since about 2007, the literature started to point in another direction. It has become more common for researchers to find a negative impact of financial-sector growth on income growth, both in economic journals and in policy reports by the IMF and the OECD (Sahay et al, 2015; Cornède et al, 2015). There might be threshold levels above which financial development is negatively correlated to income growth

(Arcand et al 2015 in data since the 1960s until 2005), or no positive relation at all (Bezemer et al 2016 in data since the 1990s until 2011). Over time, that relation seems to have changed strongly. Estimating the average income-growth effect of bank credit for a large sample of countries over a rolling time window, Bezemer et al (2016) find that this effect was positive until the 1990s but indistinguishable from zero since then (Figure 1).

Figure 1 : The effect of bank credit expansion on income growth, 1970-2011



Source: Bezemer et al (2016).

A variety of explanations have been developed to account for these findings. Beck et al (2014) suggest that banking activities have shifted more into non-intermediation activities not captured by credit as a measure of financial development. This traditional measure will therefore under-record the growth of financial development, and possible miss its effect on income growth. The expansion of household credit is another culprit. Beck et al. (2012), Bezemer et al (2016) and Jorda et al (2015) all find that household credit, most of which is mortgage credit, has no or even a negative impact on growth, increases the probability of crisis, and leads to longer post-crisis slumps. Rousseau and Wachtel (2011) note that often financial-market liberalization

in the 1990s was not preceded by the building of strong regulatory institutions, a requirement, they think, for realizing the growth-enhancing potential of financial development. Arcand et al. (2015) blame the expectation of a bailout in times of crisis, which spurs expansion of the financial sector beyond socially optimal levels. Cecchetti et al (2011) suggest that nonfinancial firms obtain less, note more bank credit during a credit boom such as occurred in the 1990s and 2000s. Especially R&D-intensive industries compete for bank finance with, and lose out from, property and financial markets. As a result, productivity growth and income growth declines even as lending expands.

These recent contributions make much the same points as did pre-crisis studies - from Henry George's (1879) analysis of property speculation and Keynes' (1936) longing for the 'euthanasia of the rentier', to contemporary studies on financialization (Krippner 2005, Epstein 2005,) and on credit boosting asset prices and debt, rather than GDP and living standards (Werner 2005). Some authors noted just before the actual crisis that something might be amiss. "What is happening to the relation between finance and growth?" asked Peter Rousseau and Paul Wachtel, two reputable researchers in the field, already in the title of a 2006 paper.

But this was an exception. In the published literature until about 2012, the question was not asked forcefully, nor were many negative result on financial development reported. This means that academic economists started submitting such findings around 2011, and began to produce these studies in 2009-2010. In 2009 and 2010 the enormity of the 2008 crisis had sunk in with the public, and a fierce debate on the financial excesses that caused the crisis was raging even in the mass media (references). It was then that economists began to discover that financial development is not always good for growth, after all. Was this a coincidence? Or was there perhaps also a role for public opinion in this turnaround?

3. Paradigm Change and Social Mood

The hypothesis we test is that: *awareness of the public salience of the financial crisis decreased reported growth coefficients of financial development in the academic literature*. There are two ways to ground this hypothesis. The first is to use theories of paradigm change (Kuhn, 1962) and the second – which is the focus of this study - is the study of social mood. Theories of paradigm change suggest that researchers are more likely to publish findings in line with *academic* consensus. During a paradigm change, published findings reflect this paradigm change, and researchers follow the new paradigm. The 'normal science' of incremental knowledge acquisition is replaced by a sudden change in academic consensus. The change may be due to a buildup of empirical evidence against the old paradigm passing some threshold barrier, or to the influence of some powerful scientist, or to a new and appealing theory, or to a sudden change in the subject being studied (climate change, financial crisis) or to any or all of the above factors.

The study of social mood is broader. Social mood theory suggest it is *society's* view rather than only the data or academic consensus that determines scientists' published findings. Social mood, the collective mood of individuals, is a primary causal variable in financial, social and indeed scientific trends (Olson 2010). In social mood theory, emotions influence behaviour (Nofsinger 2010). Psychological research posits three mood-related elements of personality (affect, motivation, and personality traits), plus contagion processes which translate individuals' moods in a collective social mood. Robert Shiller's work on financial bubbles as epidemics is probably the best-known application of psychological contagion processes in economics. Shiller's work, strongly reminiscent of Minsky's, describes how beliefs about asset price gains tend to spread and trigger rising borrowing and investment, causing the price gains themselves and justifying the further spread of belief.

What Shiller described for market investors, we apply to economists. If scial mood theory describes contagion mechanisms anchored in fundamental personality traits, it would be odd to exempt academic economists from sensitivity to the social mood mechanism. Paraphrasing Nofsinger (2010), we hypothesize that "the general level of optimism/pessimism in society is reflected by the emotions of economists" - and that economists' publications, in turn, reflect their emotions.

This application of social mood theory assumes that researchers are sensitive to their entire social environment - and not just to the data, to theories, or even only to their academic social environment - in selecting research questions and reporting research findings work. We measure social mood by observing how much certain terms negatively related to the financial sector are searched for on the Internet. If discussions of credit bubble, credit crisis and financial fragility on the Internet are increasing, we assume that this is evidence of increasing societal consensus that negative effects of financial-sector expansion are possible. Add to this assumption that academic economists are sensitive to social mood, and social mood theory suggests that this will increase the likelihood that reported growth coefficients of financial development in academic studies are lower than they were before.

4. **Measurement Choices and Data Exploration**

To test this issue, we build on data on income growth coefficients of financial development due to Valickova et al (2015), who constructed this data base to conduct a meta-analysis of credit-growth studies. Valickova et al (2015) report for each coefficient key features of the study it comes from - among others: the number of observations, year of publication, sample size, sample years, whether it is a panel of cross-section study. Their dependent variable is the estimated coefficient value, which indicates the conditional correlation of financial development with income growth. Since in this literature different measures for financial development are

used, Valickova et al (2015) apply a Fisher z-transformation so as to make the values comparable across studies (see Valickova et al (2015:510) for details). We extended their data set to 2012, and use the transformed coefficient as the dependent variable. Table 1 shows descriptive statistics for the study features. Some (10) coefficients turn out to be very large, while the rest (1,324) are all below one. We treated the ten as outliers.

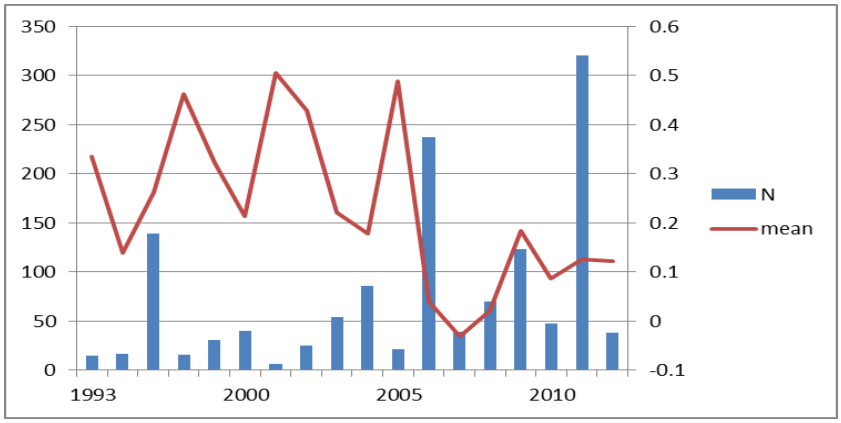
Table 1 : descriptive statistics of income-growth coefficient data

	# observations	mean	s.d.	minimum	maximum
Fisher coefficient	1,334	1.1	11.3	-0.9	196.5
year of publication	1,334	2005.7	5.2	1993.0	2012.0
sample size	1,334	307.3	404.9	14.0	2982.0
panel data dummy	1,334	0.6	0.5	0.0	1.0
start of sample	1,334	1972.1	9.2	1950.0	2002.0
end of sample	1,334	1997.9	7.2	1964.0	2009.0
# estimates in study	1,334	62.0	52.4	1.0	152.0

Source: Valickova et al (2015), extended by the author

Figure 2 shows the number of observed coefficients in each year, and their average value. Note that typically, dozens of coefficients come from the same study and two of the studies report over one hundred coefficients. We controlled for this in the analysis below, to ensure that these studies do not drive the results. Visual inspection suggests that reported coefficient are clearly lower from 2006. We hypothesize that this drop in coefficient values is linked to the change in social mood with regard to financial development and the financial sector due to the credit crisis.

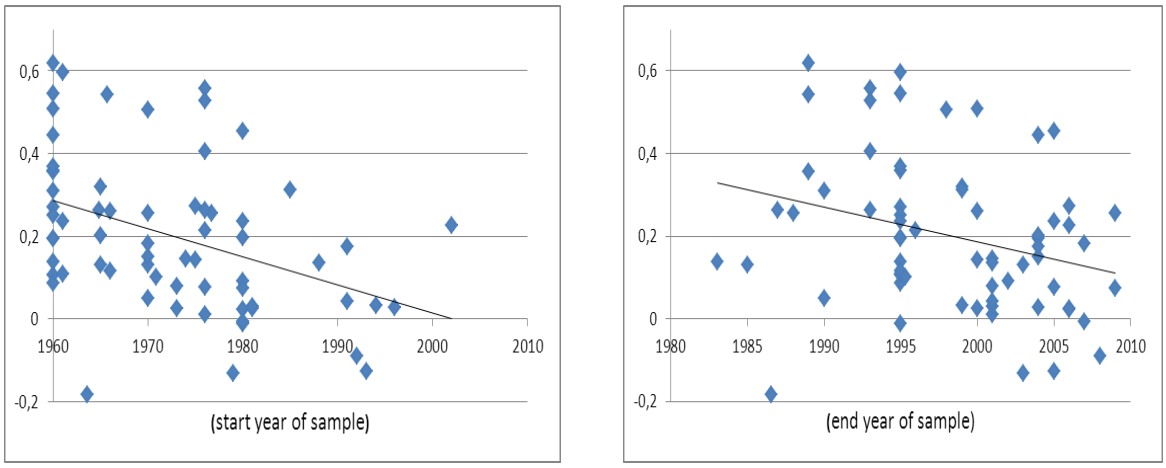
Figure 2: Income growth coefficients of financial development reported in the literature



Source: Valickova et al (2015), extended by the author; 10 outliers with values larger than 1 were excluded.

The Figure does not imply that reported growth coefficients changed after about 2005 because of increased societal awareness of the dangers of financial-sector excess. An alternative explanation is that the growth impact of financial development was truly weakening over time, as also Figure 1 suggested, and that evidence of this was becoming available around 2005. One way to study this is to plot coefficient estimates by start date and end date of the sample (Figure 3).

Figure 3: coefficient estimates by sample start date and end date



Source: Valickova et al (2015), extended by the author.

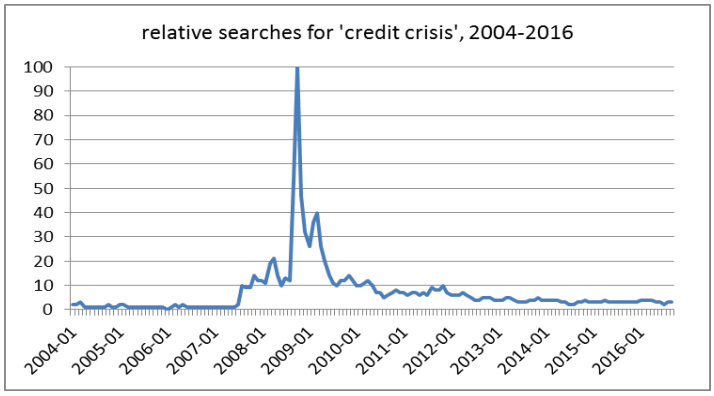
The fitted line is indeed clearly trending down: reported coefficient for later time samples are smaller on average. This may be because the growth impact of financial development was truly weakening over time, but the reason may also be that coefficients for later time samples were also reported later, and therefore subject to changing publication pressures emanating from social mood. We need to ask if coefficients on the same time sample tended to be lower if they were reported later. In the analysis below we will control for start and end dates of the sample period.

As independent variables we use variables that can be expected to explain coefficients, as used in Valickova et al (2015), plus indicators of social mood. As an indicator of social awareness of the financial crisis and its consequences, we collected Google Trend data. Google Trends provides the number of searches done for a term in a year, as a fraction of the total number of searches done on Google in a that year.

Internet browsing habits reflected in Google Trend data have been used to measure the public's experiences, demands and opinions on topics as diverse as private consumption (Vosen and Schmidt, 2011), tourism demand (Xi et al, 2017), unemployment (Askitas and Zimmermann, 2009; Smith 2016) and automobile purchases (Carrière-Swallow and Labbé 2013; Fantazzini and Toktamysova, 2015). We apply Google Trend search data to measure 'issue salience' (Lee et al, 2015) – the extent to which some topic is considered an important issue. Internet searches, reflecting the public's motivation to search for information, can be interpreted as measures of issue salience in a population. Mellon (2013) provides a detailed discussion on the validity of internet search indices. He shows how indicators based on Google search data from 2004-2010 for macroeconomics, terrorism, immigration and fuel prices are consistent with, but superior - in coverage, frequency and detail - to widely used measures of issue salience such as Gallup's "most important problem" measure taken from polls data.

The data used in this paper are monthly data from Google Trend over 2004-2012. We collected these relative frequency data per month over 2004-2012 for the following words and phrases: credit crisis, banking crisis, financial fragility, mortgage crisis, subprime crisis. For instance, 'credit crisis' was most often searched for in October 2008, hence the value for October 2008 is 100. Figure 4 shows monthly relative search frequencies.

Figure 4: Example of Google Trends search results



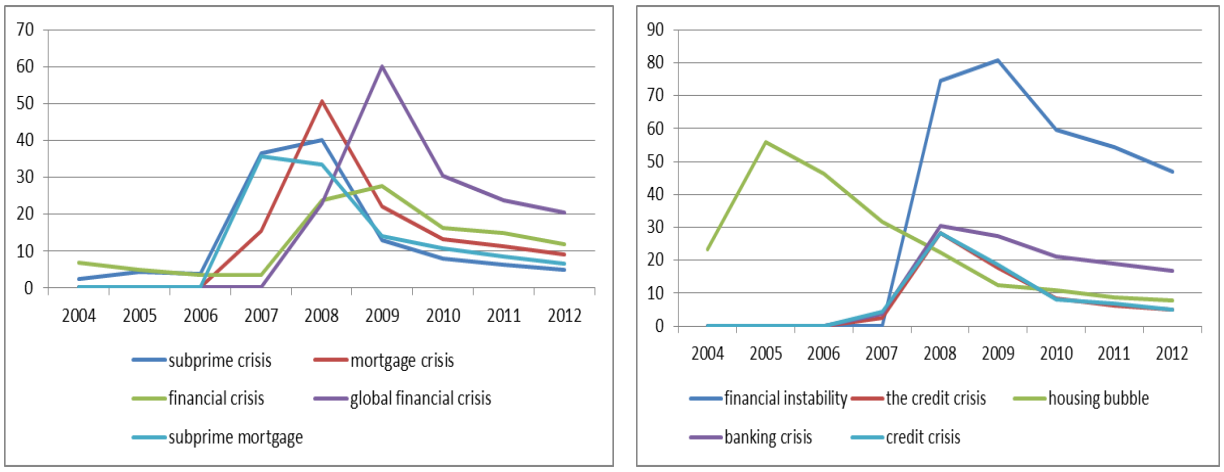
Source: Google Trends accessed May 2016

We transformed these monthly data to annual data so that e.g. the average value for 'credit crisis' for the year 2008 turns out to be 28 (the average of 100 and the other monthly values in 2008). We did this for nine other terms reflecting aspects of financial sector excess and its consequences, among them the great financial crisis. The results are shown in Figure 5. Note that absolute values for different search terms cannot be compared; it is a search term's score over time which provides an indication of changing issue salience.

The data reflect that in the public's eye, the salience of financial sector excess and financial crisis increased strongly from 2006 ('subprime mortgage',) and reflects the sequence of unfolding events, as 'housing bubble', 'subprime crisis' 'mortgage crisis' and '(global) financial crisis' peak one after the other. None of the relative search counts has fallen back to 2004 levels: although the financial crisis may be over, its

salience is still larger than it was before the crisis. The high average scores for 'financial instability' in 2008 and 2009 indicate that public interest did not decline much over the months within each year, and this persisted until 2012 – relative scores remain 50-60% of the maximum score. Public awareness of crisis has abated more, but public awareness of instability was still high in 2012.

Figure 5: Google Trends Relative Search Counts (annual average)



Source: Google Trends, accessed May 2016

Below we will analyze three terms directly indicating issue salience of 'the' crisis: 'banking crisis', 'credit crisis' and 'subprime crisis' (Table 3). We have observations over 1993-2012 for each word ranging from zero to an annual average for monthly searches of 30% to 50% of the number of times they were searched in the top month. Matched to the Valickova et al growth coefficients, this yields 982 observations in the regressions below. In an average month, 'banking crisis' and 'subprime crisis' were searched only 10% and 13% of the number of times they were searched in the top month. The frequency of searches for 'credit crisis' was more persistent (xx%).

Table 2 : Google Trend descriptive statistics

search term	# observations	mean	s.d.	min	max
banking crisis	982	13.6	11.2	0	30.5
credit crisis	tba				
subprime crisis	982	10.9	13.0	0	50.6

Source: Google Trends, accessed May 2016

5. Analysis

We estimate the conditional correlations of the public salience of these terms with finance-growth impacts reported in academic studies. These correlations were never positive and often significantly negative Here we show results for three terms directly indicating issue salience of 'the' crisis: 'banking crisis', 'credit crisis' and 'subprime crisis'. We estimated equations of the form:

$$C_{ijt} = K + \alpha \cdot G_t + \beta_i \cdot X_{ij} + \varepsilon_i$$

Where C_{it} is the coefficient value for coefficient j in study i published in year t, G is Google Trends relative search frequency of some term for year t, ε is a white noise error term and X_{it} are features of the study from which the coefficient comes: year of publication, sample size, panel or cross section study, estimation method, and sample start and end years. The standard errors of estimated α coefficients are clustered by study; this corrects for possible heteroskedasticity.

In Table 3 we report preliminary results for these three terms. Recall that controlling for study features, in an strictly empiricist view on the empirical literature there should not be a significant conditional correlation between the relative frequency of these terms and the size of reported credit-growth coefficients.

The results in the Table clash with this view. The suggested interpretation of negative estimates for α is that public opinion matters to reported results on the relation between financial development and economic growth. The more the public searches for, and presumably talks about, the crisis, the more likely it is that researchers report lower and possibly even negative effects of financial-sector expansion on income growth.

Table 3 : Credit Crisis Issue Salience and Reported Finance-Growth Coefficients

VARIABLES	**benchmark specification**	**with relative frequency word count for …**		
		'credit crisis'	**'banking crisis'**	**'subprime crisis'**
year of publication	-0.002	-0.003	0.007	-0.004
	-0.004	*-0.008*	*-0.01*	*-0.008*
sample size	-0.000*	-0.000*	-0.000*	-0.000*
	0	0	0	0
panel data dummy	-0.118***	-0.109***	-0.109***	-0.109***
	-0.032	*-0.04*	*-0.04*	*-0.041*
# regressors	-0.001	-0.004	-0.004	-0.004
	-0.004	*-0.004*	*-0.004*	*-0.004*
# estimates in study	-0.001***	-0.002***	-0.002***	-0.002***
	0	0	0	0
sample start year	-0.004**	-0.006***	-0.006***	-0.005***
	-0.001	-0.001	-0.001	-0.001
sample end year	0.001	0	0	0
	-0.002	-0.002	-0.002	-0.002
'credit crisis'		-0.004**		
		-0.002		
'banking crisis'			-0.004*	
			-0.002	
'subprime crisis'				-0.003**
				-0.001
Constant term	10.542	17.838	-1.328	20.212
	-8.271	-17.027	-19.892	-17.077
# observations	1,324	981	981	981
# studies (panels)	67	44	44	44

Notes: One, two and three asterisks indicate statistical significance at p-level below 10%, 5% and 1%, respectively. Source: Valickova et al (2015), extended by the author.

The estimation results suggest that not all regressors should be in the model, as several are highly insignificant. For instance, leaving out the control variable '# regressors' or 'end year of the sample' results in better models. It does not change the findings on issue salience.

Reverse causality is possible, but unlikely. Note that we study contemporaneous correlations between issue salience and research findings. Given the time lag between research and publication, it is not plausible that issue salience increased

because researchers were first publishing new findings. It is much more compelling that publications like Krugman's 2009 "How Did Economists Get it So Wrong?" and the Internet discussions on the credit/banking/subprime crisis that followed, spurred researchers to rethink their consensus that more banks were bound to benefit the economy.

6. Summary, Preliminary Conclusions, Limitations, Future Work

In 2007, economists had clear theories and masses of empirical evidence on a positive relation between financial development and economic growth. But in a few years non-academic consensus opinion (social mood) turned against these theories and evidence. Did this influence economists' reported research findings? Yes. We analyze over 1,300 regression coefficients reported in dozens of studies since the 1990s. Controlling for features of the underlying studies, we find significant negative correlation between the size of coefficients and social mood, proxied by Google Trend data. Public opinion matters to reported results on the relation between financial development and economic growth.

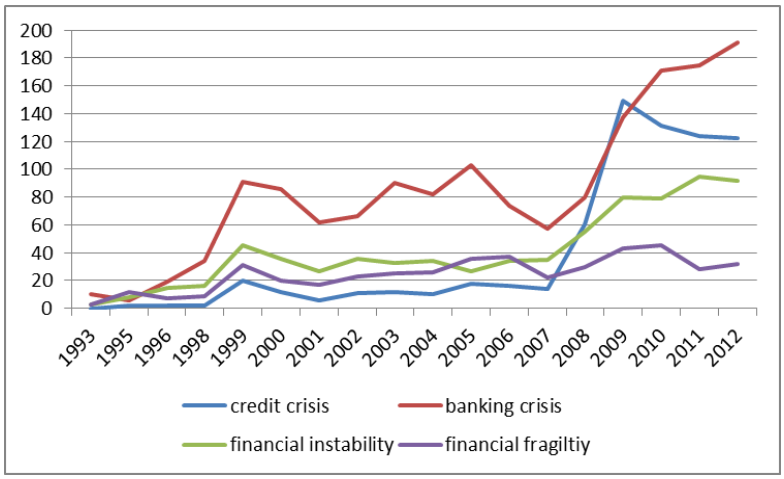
Much work remains to be done to probe the robustness of this claim, and if it survives, to extend its empirical foundations. In this paper we have cherry-picked the strong results in the Table. How sensitive are the findings to using similar words? We used relative frequency – but one might argue that simple counts, or relative frequency each year, or cumulative measures better reflect public salience. The Google Trends application Insights for Search (Vosen and Schmidt 2011) allows for more Google metrics that just relative frequency. The claim in this paper is in effect a claim on time dependent publication bias. This can be tested in a FAT-PET test. Citations and journal impact factors may play a vital role in the speed with which public salience pressures researchers to publish new results. And in additional to public salience, academic salience may play a role. If enough colleagues question the

consensus, does that increase the likelihood of publishing non-consensus findings. In the Appendix we make a start on this by constructing simple word counts of papers in the economic journal data base *EconLit*. Are the effects similar for positive and negative finance-growth coefficients, and if we extend the data to 2016? All this is to say that this is a work in progress.

Appendix: Measuring Academic Social Mood

An analysis for *academic* social mood could be constructed by citation or publication data. We collected word counts per year in the text of and from academic journal and working papers from the economic literature data base *EconLit*: credit crisis, banking crisis, financial fragility (we will expand this in a next version of this paper) Tables xxx and xx present the development over time of the keywords in *Google Trends* and *EconLit*. The difference in measure (relative frequency versus simple counts) results indifferent patterns (peaked versus rising). It is striking that in the academic data, word counts for 'banking crisis' and 'financial instability' are rising and not declining even until 2012. For 'credit crisis' and 'financial fragility', we see peaks in 2008 and 2010, respectively. The fact that 'credit crisis' peaks in the same year both in Google Trends and in Econlit suggests that the timing of the salience of the issues in academic and general discussions was quite similar. 'Financial instability' seems to be most sensitive to the 2007 crisis: it is stable before and steadily rising afterwards.

Figure A1: EconLit Abstract Word Counts



Source: EconLit, accessed May 2016

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