NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

Henry Penikas, W. Travis Selmier II

DOES BANKING REGULATION CAUSE COUNTERPRODUCTIVE ECONOMIC DYNAMICS?

BASIC RESEARCH PROGRAM

WORKING PAPERS

SERIES: FINANCIAL ECONOMICS
WP BRP 15/FE/2013

Henry Penikas[1]*, W. Travis Selmier II*[2]

DOES BANKING REGULATION CAUSE COUNTERPRODUCTIVE ECONOMIC DYNAMICS?[3]

This essay aims at highlighting the linkage between current international banking regulation (namely, that produced by the Basel Committee on Banking Supervision) and economic activity, which is proxied by the S&P500 stock market index. It is revealed that the amount of regulatory documents published per year affects stock market performance, but only for the next two years. Discussion on the probable reasons for this is included.

JEL Codes: E58, G20, G32.
Keywords: Basel Committee, Banking Regulation, Standard and Poor's 500 Index, Granger Causality Test.

[1] National Research University Higher School of Economics (Moscow, Russia). International Laboratory of Decision Choice and Analysis. E-mail: gpenikas@hse.ru
[2] Indiana University, Department of Political Science (Bloomington, US). E-mail: wselmier@indiana.edu
[3] The corresponding author would also like to thank Aivazian S. and Aleskerov F. for a discussion of the first version of the paper.

1. Objective

Financial crises have often led to changes in regulatory laws and institutions which lead to a significant increase in regulatory documentation output (Barth, Caprio, Levine (2005); Bhidé (2009). Also see Reinhart and Rogoff (2008)). A large number of documents (guidelines, frameworks, etc.), frequently produced by regulatory bodies in responding to the past crises of 2009-2011, have traced the impact of current regulation on economic activity. Thus far, no existing study has engaged in quantitative analysis of modern regulatory activity through looking at impact of sheer volume of publication, i.e. as measured by the number of pages published per annum. We find a somewhat surprising result through this method: increased production of regulation leads by two years increased economic activity (proxied through the S&P500 stock index in this concise paper). But once regulation production slows, we find economic activity slows with a two-year lag. We fear this may lead to certain perverse incentives which may result in increased regulatory page production rather than attacking the direct underlying issues.

Because of the novelty of the research issue, we would like to elaborate on what articles drove us to perform the analysis presented herein. We would also note that a traditional structured literature review is not applicable for our case. There were two major streams that impacted us: use of publications and search data.

First, *The Economist* initiated publication of R-word index series (Economist (2008); Economist (2011)). This series signals for the number of times the word "**R**ecession" is mentioned in the Financial Times, The Factiva database etc. The concept is that the R-word index is expected to proxy the probability of a potential world economic crisis (that is, the higher the index, the higher would be the probability of an incumbent economic crisis).

Second, the closely-related domain of "nowcasting" is another area of research which informs our approach. The concept of nowcasting is to use the number of searches for particular terms or data in search engines (e.g. Google) as an auxiliary determinant in economic models (for more information, please, see Choi and Varian (2012)).

Our paper proceeds as follows: we look at data collection in Part 2, then engage in a primary visual analysis (please see part 3). We then test causality through regression analysis by applying a Granger test (presented in Part 4). Part 5 provides probable rationales for the economic effects observed.

2. Data

To undertake this research project, two time series of data were collected. As a conventional proxy for economic dynamics (dependent variable), the Standard and Poor's 500 Index (S&P500) was used for the period of 1999-2013. Daily closing prices were averaged to form a yearly number. The website of www.finance.yahoo.com was used as a source for this data.

As for the regulation variable (independent variable), we browsed the website of Basel Committee on Banking Supervision (BCBS). Notably, two main pages were studied: http://www.bis.org/list/bcbs/index.htm and http://www.bis.org/list/jforum/index.htm. Only consultative or final regulatory documents were included in the list of publications. Papers such as statistics bulletins and press releases were excluded from the list. For each of the publications the number of pages was extracted. The collected time series is available in Appendix 1.

Overall the list of publications comprised about 200 items from 1999 to 2013 with a gross volume of approximately 7,000 pages – or about 25 pages per publication. Given the impact of BCBS on the international banks, one might easily argue that an international banker is expected to be aware of this volume of documentation in order to understand the evolution of regulation and the active, ever-changing guidelines.

Although there are other regulatory authorities which one might argue would be suited for our study, such as the Financial Services Agency at the Bank of England (UK), the European Banking Authority, EBA (EU/UK), the European Central Bank (Belgium), the Office of Currency Control (US), and other local regulators, the Basel Committee was selected as the key, purely international regulatory body that initiates crucial changes in the regulatory format worldwide.

Finally, two time series comprised of 15 data points for the years 1999-2013 are given below in Figure 1. It is necessary to state that authors recognize that the data series are short and all econometric implications need to be carefully treated. Still it is important to mention that more granular time buckets (e.g. months and days) were also considered. But because of S&P500 volatility and non-periodic nature of regulatory documents publication, clear patterns of interdependence were not captured at more granular time scale.

One might argue that we analyze variables of different sorts: 'S&P500' is a *stock* variable (it measures quotes as of particular date); 'pages published' is a *flow* variable (it accumulates information during the period). From one side, averaging S&P500 through a year enables us to synchronize variables. From another side, it is exactly by essence the problem setting when the *flow* of publications is expected to impact the level (*stock*) of economic activity.

3. Visual Analysis

Figure 1 below presents the dynamics of the two datasets described above: Economic dynamics as proxied by the year-average closing price for the S&P500 index (blue line) and the number of pages annually published by the Basel Committee (red line).

Figure 1. Volume of regulatory documents published and two-year lead of stock market performance.

We would highlight that Figure 1 presents stock index performance with a two-year lead (inverse to lag). For example, we show the value for 2011 on the graph which was recorded for the 2013-year S&P500 average. This is made deliberately to show the effect of tight co-movement of the two time series if taken consequently, not simultaneously. For the original data representation (with no shifts and with lagged values also), please consult Appendix 2.

As it follows from Figure 1, two spikes of regulatory activity in terms of a record high volumes of document pages published (i.e. Basel II and III published in 2006 and 2010, respectively) were strongly associated with increases in economic activity in terms of S&P500 year-average values in 2008 and 2012. Sections 4 and 5 provide justification for this two-year forward shift for S&P500 values. Section 4 gives our econometric rationale, whereas section 5 proposes the economic reasoning.

4. Granger Causality Test

In order to verify whether the observed dependence between the amount of regulatory documentation published and economic activity holds true, a Granger causality test was run. The procedure of the test implements regression analysis of current values of one variable against lagged values of another, then compares it against the converse. If one variable's lags have statistically significant coefficients while the other one does not, then we can argue that the first variable causes the other (for more details, please, refer to section 19.6.5 on page 592-593 at Greene (2003)).

A limitation of the approach is that this time series analysis technique does not provide a pure answer for the question of whether something constitutes a reason for another thing, and that the supposed dependent variable is in fact a direct consequence of the first. The Granger causality test only provides statistical justification that one variable for sure takes its value before another. Thus, even if the test supports the idea that one variable Granger causes another, there might be a lurking variable Z impacting both

variables of interest – one immediately and another with some lag. Nevertheless, the test allows one to conclude that one value always precedes another.

Disregarding the limitations of the procedure, the Granger causality test is still the most optimal procedure to test the time series causality. Additional attention only needs to be given when interpreting the results.

Equations 1 and 2 below present the Granger causality test results. T-statistics are given in brackets under the coefficient estimates. The regression output for the respective regression equations is given in Appendix 3.

$$SP(t+2) = \underset{(15.86)}{1014.43} + \underset{(3.72)}{0.45} \cdot BCBS(t) \quad (1)$$

$$BCBS(t+2) = \underset{(1.12)}{607.71} - \underset{(-0.28)}{0.13} \cdot SP(t) \quad (2),$$

where $SP(\cdot)$ stands for the S&P500 annual average close price, and $BCBS(\cdot)$ represents the number of pages published by the Basel Committee on Banking Supervision (BCBS) per annum.

As one may observe, coefficients are statistically significant[4] for the first equation, where the number of pages is the explanatory variable for the S&P500 index value, but for the second equation presenting an inverse relationship this does not hold true. This is why one may conclude that the number of pages of regulatory documents published per annum by BCBS influences stock market performance in two years.

Following our model as presented in equation 1, we predict that the low volume of pages published in 2012 by the Basel Committee may produce a decline in the S&P500 in 2014 of some 150 points from the level of 1550 to 1400 (please, consult Figure 1 for details). This odd result - that a lagging drop in the S&P500 index would result from declining regulatory output - is discussed in the final section.

5. Concluding remarks on the possible nature of revealed dependence

The current research analyzed the dependence of the existing regulation, expressed in terms of pages of regulatory documents published per annum, and economic activity, represented by the S&P500 index.

Though research limitations are definitely worth considering as we have so done (including a small number of observations, a non-stationary time series, and probable effects of spurious regression), we find strong support indicating that regulatory activity positively impacts economic performance. That is to say, the more regulatory documents are published per annum

[4] We wish to again note that because of small series length (i.e. 13 observations when 2 lags were subtracted from 15) we consider error distribution analysis of no use as none of the distribution properties (e.g. Normality) can be reliably verified based on the limited and mostly discrete data.

by the Basel Committee, the higher the value of the S&P500 index one might expect in two years. Although one might consider the observation as generally positive, there are issues which arise. The following list of concerns needs to be addressed by regulators as early as possible:

- Newly-minted regulation, such as monitoring capital adequacy for banks, has a limited life span. That is, its impact fades after a few years and needs to constantly be enhanced. This indicates the time-limited efficacy of regulation.
- This time-limited efficacy occurs over a two-year period, but increasing regulation to refresh and recharge an economic boost may lead to perverse outcomes. In particular, the more regulation issued increases banking transaction costs, and the more restricted the financial area becomes.
- One way to interpret this time-limited efficacy is to ask whether new regulation merely prevents economic agents from extra risk-taking until they manage to adapt (An apt analogy might be the case of penicillin medicine, which lost efficacy after it was discovered in 1928 as the virus required much less time to adapt to new modifications in penicillin formula composition than it did a century ago).
- The unfortunate outcome of such behavior is the constant rise in the number of regulatory documents. If our model is correct then, to sustain economic growth and resilience in the future, more and more regulatory documents need to be published. Any slowdown might result in a crisis, as during the slowdown in regulatory publications, economic agents that are by nature self-adapting would find solutions to benefit even from enhanced and complicated regulations over a few-year period.
- Besides, following a trend of increasing the number of publications, banking would become an area of precedent law that views financial market as a set of cases, but not as a system. Firstly, such vision might be unfavorable, as it does not consider system-wide counterbalancing effects. Secondly, mastering the current publication volume, now approximately 7,000 pages, is somewhat equivalent to studying for a Master's degree or the Chartered Financial Analyst (CFA) program. This extra burden for the economy increase direct transaction costs as noted above, but also forces a banker to spend time studying that bulk of publications.
- Lastly, efficacious regulation should be promulgated independently of the economic environment; that is to say, it is neither impacted by, nor impacts (or in our terms: does not Granger cause, nor is Granger caused by), the economic performance. Otherwise the uncertainty of business activity coupled with environment-dependent regulation, instead of stabilizing economy, would produce an inverse accelerating (procyclical) effect, which

was tailored to be avoided. This is analogous to the so-called "cobra effect" described by Horst Siebert (2001). Siebert described the case that during the Indian campaign, British officers offered one pound per cobra killed, as they wanted the cobra population to be reduced. As a response, locals started breading cobras and selling them to British officers to earn money. In the end the cobra population increased several times, a result definitely counter to the initial policy objectives.

Hence our key proposal is to consider both the positive aspects of regulation production and the perverse incentives unintentionally created when revising (overcomplicating) the overall regulatory framework for the global financial system. There is strong need to simplify regulation and have a clear system for both regulators and regulated agents.

We might visualize such a system as a cross-roads traffic light system where the lights represent guidelines and structures in a global financial regulatory framework. Consider the evolution of such a system. To the best of our knowledge, the very first cross-road light was created in 1868 (ca. century and a half ago) in London near the Houses of Parliament. From one side, that first traffic light never changed (three colors were always present; only for trams and trains were color changes introduced). From another side, the light was manually switched by a police inspector during first decades, and then it became automated. What makes this analogy interesting is the systemic nature of cross-road traffic light networks in the present stage of development. Use of cross-road traffic lights are minimized, and sometimes done away with, through tailoring road architecture so that there are few, or no, direct intersections of orthogonal lines. Any remaining lights are dynamically timed to enable smooth traffic flow. While redesign of road architecture may require space and expense, the benefits of smooth traffic flow from few or no lights outweigh these costs This is exactly what the world financial system is currently looking for: a new flow architecture is needed that, through logical construction, minimizes accidents (defaults) while providing smooth financial flows.

6. References

- Barth, J.R., G. Caprio, and R. Levine. (2005). *Rethinking Bank Regulation: Till Angels Govern*. Cambridge: Cambridge University Press.
- Bhidé, A. (2009). "An Accident Waiting to Happen," *Critical Review* 21 (2–3), pp. 211-247.
- Choi, H. and Varian, H. (2012). "Predicting the Present with Google Trends". *Economic Record*. Vol. 88, Issue Supplement s1, pp. 2 - 9.
- Economist (2008). "Recession talk is rising". *The Economist*. URL: http://www.economist.com/node/10498907.
- Economist (2011). "The Economist's gauge of gloom". *The Economist*. URL: http://www.economist.com/node/21529079.
- Greene, W. (2003). Econometric Analysis. Fifth Edition. Prentice Hall.
- Reinhart, C. and Rogoff, K. (2008). "Banking Crises: An Equal Opportunity Menace", *NBER Working Paper* No. 14587. URL: http://papers.nber.org/papers/w14587.
- Siebert, H. (2001). Der Kobra-Effekt. Wie man Irrwege der Wirtschaftspolitik vermeidet. Munich: Deutsche Verlags-Anstalt.

Appendix 1. Statistics Collected.

Issue Year	# documents	# pages
1999	5	157
2000	12	317
2001	10	229
2002	7	165
2003	10	199
2004	7	379
2005	11	669
2006	11	696
2007	3	48
2008	11	317
2009	19	774
2010	26	1003
2011	23	746
2012	23	778
2013*	11	403
Gross Total	**189**	**6880**

Source: *Basel Committee on Banking Supervision Website*

(URL: http://www.bis.org/bcbs/publications.htm)

** Data for 2013 ends on April 12, 2013.*

Appendix 2. Data Dynamics.

Original Dynamics (No shifts).

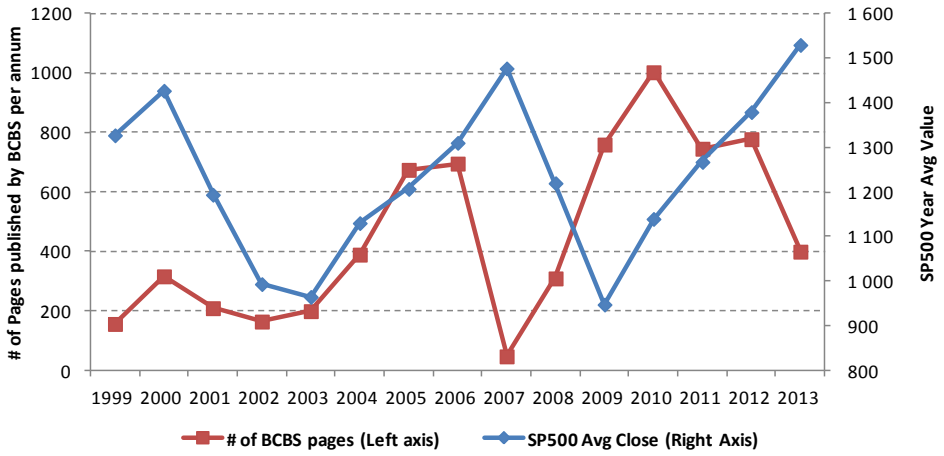

Figure 2. Volume of regulatory documents published and current value of stock market performance.

S&P500 Shift, T-2

Figure 3. Volume of regulatory documents published and two-year lag of stock market performance.

S&P500 Shift, T-4

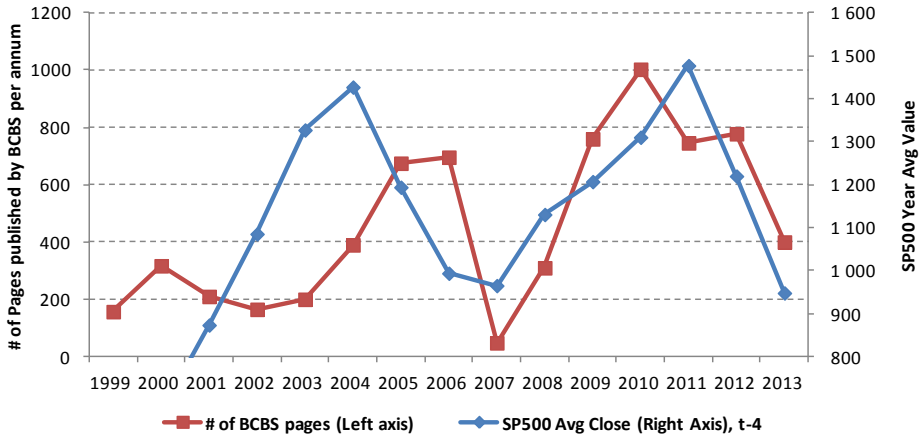

Figure 4. Volume of regulatory documents published and four-year lag of stock market performance.

Annex 3. Regression Estimates for Granger Causality Test.

Equation (1)
SP(t+2) – explained (dependent) variable;
PBCBS(t) – explanatory variable;

Regression Output

Regression Stats	
multiple R	0.75
R-squared	0.56
Adjusted R-squared	0.52
S.E.	127.36
Obs.	13

ANOVA

	df	***SS***	***MS***	***F***	***F sign***
Model	1	224053.62	224053.62	13.81	0.00
Residual	11	178418.79	16219.89		
Total	12	402472.41			

	Coef.	***S.E.***	***t-stat***	***P-Value***	***Lower 95%***	***Upper 95%***
Intercept	1014.43	63.96	15.86	0.00	873.66	1155.20
Coefficient	0.45	0.12	3.72	0.00	0.19	0.72

Equation (2)
PBCBS (t+2) – explained (dependent) variable;
SP (t) – explanatory variable;

Regression Output

Regression Stats	
multiple R	0.08
R-squared	0.01
Adjusted R-squared	-0.07
S.E.	302.86
Obs.	15

ANOVA

	df	***SS***	***MS***	***F***	***F sign***
Model	1	7264.87	7264.87	0.08	0.78
Residual	13	1192417.13	91724.39		
Total	14	1199682.00			

	Coef.	***S.E.***	***t-stat***	***P-Value***	***Lower 95%***	***Upper 95%***
Intercept	607.71	541.20	1.12	0.28	-561.48	1776.90
Coefficient	-0.13	0.46	-0.28	0.78	-1.12	0.86

Henry Penikas
National Research University Higher School of Economics (Moscow, Russia).
International Laboratory of Decision Choice and Analysis.
E-mail: gpenikas@hse.ru

Any opinions or claims contained in this Working Paper do not necessarily reflect the views of HSE.