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REGULATORY EXPENDITURES, ECONOMIC GROWTH AND JOBS: AN EMPIRICAL STUDY

Abstract: With a sluggish economy, high unemployment, and unprecedented deficit spending, growing the economy and curbing federal spending are top priorities in Washington. A now-popular target for reform is regulation, which even President Obama claims to have “stifled innovation” and to have had “a chilling effect on growth and jobs.” In this POLICY BULLETIN, we use fifty years of data and modern econometric methods to provide an estimate of the relationship between government spending on regulatory activity and economic growth and job recovery. We estimate that reducing the size of the regulatory bureaucracy may grow the economy and invigorate the labor market. Even a small 5% reduction in the regulatory budget (about \$2.8 billion) is estimated to result in about \$75 billion in expanded private-sector GDP each year, with an increase in employment by 1.2 million jobs annually. On average, eliminating the job of a single regulator grows the American economy by \$6.2 million and nearly 100 private sector jobs annually. Conversely, each million dollar increase in the regulatory budget costs the economy 420 private sector jobs. Accordingly, as Congress and the President struggle with the difficult decisions of how to shrink federal spending, an excellent place to start would be to investigate responsible cuts in the size of the federal regulatory budget. That said, while regulation imposes costs, regulation may also have social benefits, and this fact should be considered.

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I. Introduction

With unemployment stubbornly near 9% and with total unemployment estimated to be 16%,¹ politicians on both sides of the aisle recognize that getting the American economy growing again is priority number one.² Yet, while Americans are increasingly forced to do with less as their incomes contract, the rise in deficit spending by the federal government proceeds unabated. Since December 2007, the official start of the recession, Americans have witnessed their wages and salaries fall by 2%, but federal government spending has risen 23% with an added \$4 trillion to the nation's debt (a 50% increase).³ In 2009, the federal government outspent its income by \$1.4 trillion, an amount equal to about 70% of its revenues (a \$1.4 trillion deficit on \$2.1 trillion in revenues).⁴ In 2010, the Office of Management and Budget predicts a deficit of \$1.3 trillion, and the deficit for the first quarter of 2011 is on track for another year of deficits exceeding \$1.3 trillion.⁵ Today, a balanced budget would require a federal spending cut of about one-third of the total expenditures. By any meaningful standard, the federal budget is in crisis.

A portion of this government largess goes to feed a myriad of federal regulatory agencies. Indeed, the federal budget for regulatory efforts currently sums to \$60 billion annually, and has trended upward (in real terms), both in its level and as a percentage of Gross Domestic Product

¹ BLS, News Release, USDL-11-0436, THE EMPLOYMENT SITUATION – MARCH 2011 (April 1, 2011), at Tbl. A-15 (available at: <http://www.bls.gov/news.release/pdf/empst.pdf>). A recent study by the Bureau of Labor Statistics (“BLS”) concludes that unemployment rose more sharply in the latest downturn than in any recession since World War II (available at: <http://www.bls.gov/opub/ils/pdf/opbils88.pdf>).

² See, e.g., Remarks of President Barack Obama, Weekly Address (Jan. 1, 2011) (pledging to “do everything I can to make sure our economy is growing, creating jobs, and strengthening our middle class. That’s my resolution for the coming year.”) (available at: <http://www.whitehouse.gov/the-press-office/2011/01/01/weekly-address-democrats-and-republicans-have-shared-responsibility-move>); House Republican Conference, A PLEDGE TO AMERICA at p. 5 (“A plan to create jobs, end economic uncertainty, and make America more competitive must be the first and most urgent domestic priority of our government”) (available at: <http://pledge.gop.gov/resources/library/documents/pledge-a-pledge-to-america.pdf>).

³ Computed using the Federal Reserve Economic Data online database (government spending series FGEXPND, wage and salary series A576RC1, both converted to real terms using GDPDEF) (available at: <http://research.stlouisfed.org>), *id.*, (deficit series GFDEBTN, converted to real terms using GDPDEF).

⁴ *Monthly Budget Review, Fiscal Year 2009*, Congressional Budget Office (Oct. 7, 2009) (available at: <http://www.cbo.gov/ftpdocs/106xx/doc10640/10-2009-MBR.pdf>).

⁵ M. Cruetsinger, *Obama Sends Congress \$3.73 Trillion Budget*, Yahoo News (February 14, 2011)(available at: http://news.yahoo.com/s/ap/20110214/ap_on_re_us/us_obama_budget); *Monthly Budget Review, Fiscal Year 2010*, Congressional Budget Office (Nov. 5, 2010) (available at: <http://www.cbo.gov/ftpdocs/118xx/doc11873/NovemberMBR.pdf>). The estimate of the deficit for the first quarter of 2011 is \$371 billion dollars. *Monthly Budget Review, Fiscal Year 2011*, Congressional Budget Office (Jan. 7, 2011) (available at: http://www.cbo.gov/ftpdocs/120xx/doc12041/December_MBR_Jan2010.pdf).

("GDP"), over the past forty years (see Figure 1 below).⁶ Even today, in these difficult times, increases in the regulatory budget continue to outpace economic growth by a significant amount.⁷

The effects of the U.S. regulatory process on the struggling economy have not gone unnoticed. Republican lawmakers have initiated efforts to "rein in big government and shine light on our federal regulatory process."⁸ Likewise, President Obama has expressed concern that the excess of federal regulations "have stifled innovation and have had a chilling effect on growth and jobs" and promised to "get rid of regulations that have outlived their usefulness."⁹ To this end, the President signed an Executive Order on January 18, 2011, calling for a cost-benefit review of existing federal regulations.¹⁰ Unfortunately, however, given the highly

⁶ S. Dudley and M. Warren, *A Decade of Growth in the Regulator's Budget: An Analysis of the U.S. Budget for Fiscal Years 2010 and 2011*, George Washington University and the Weidenbaum Center on the Economy, Government, and Public Policy, Washington University in St. Louis (2010) and authors' analysis.

⁷ Indeed, prior to taking office, the Obama Administration promised a pro-regulatory stance on business, see E. Williamson, M. Trottman and S. Power, *Obama Signals Tougher Regulations at Federal Agencies*, WALL STREET JOURNAL (Nov. 19, 2008) (available at: <http://online.wsj.com/article/SB122705988036839731.html>), and we have seen this promise fulfilled with, *inter alia*, a 2000-plus page law designed to give health insurance to all Americans (which, for example, also burdens small business with the costly requirement of having to file a 1099 for every vendor paid over \$600 a year), see Patient Protection and Affordable Care Act of 2010, Pub. L. 111-148, 124 Stat. 119, to be codified as amended at scattered sections of the Internal Revenue Code and in 42 U.S.C., and amended by Health Care and Education Reconciliation Act of 2010 (Pub. L. 111-152, 124 Stat. 1029), the creation of the new half-billion-dollar Consumer Finance Protection Bureau ("CFPB"), see S. Reddy, *Consumer Agency's Path Will Be Set by First Chief*, WALL STREET JOURNAL (July 6, 2010) (available at: <http://online.wsj.com/article/SB10001424052748704699604575342992848011622.html>); T. Duncan, *Launch Codes: Guiding Principles for the New Bureau of Consumer Financial Protection* (July 15, 2010) (available at: http://www.law.harvard.edu/news/spotlight/public-service/related/cambridgewintercenter_cfpb_paper.pdf), the extension of government regulation to the Internet, *In re Preserving the Open Internet, Broadband Industry Practices*, see FCC 10-201, REPORT AND ORDER, ___ FCC Rcd ___ (rel. December 23, 2010) and other expansions of regulatory influence. Accordingly, the Administration's commitment to reduced regulation remains an open question. See, e.g., H. Weitzman, *3M Chief Warns Obama over Business Regulation*, FINANCIAL TIMES (Feb. 27, 2011).

⁸ G. Korte, *House Republicans Lead Charge to Reduce Regulations*, USA TODAY (Feb. 11, 2011) (quoting Congressman Pete Sessions, Chairman of the National Republican Congressional Committee) (available at: http://www.usatoday.com/news/washington/2011-02-11-regulations11_ST_N.htm?csp=34news).

⁹ B. Obama, *Toward a 21st-Century Regulatory System*, WALL STREET JOURNAL (January 18, 2011) (available at: <http://online.wsj.com/article/SB10001424052748703396604576088272112103698.html>); Korte, *id*; see also E. Williamson, *Obama Launches Rule Review, Pledging to Spur Jobs, Growth*, WALL STREET JOURNAL (Jan. 18, 2011) (available at: <http://online.wsj.com/article/SB10001424052748703396604576088634252904032.html>).

¹⁰ *Improving Regulation and Regulatory Review*, EXECUTIVE ORDER NO. 13563 (January 18, 2011) (available at: <http://www.whitehouse.gov/the-press-office/2011/01/18/improving-regulation-and-regulatory-review-executive-order>); *Regulatory Planning and Review*, EXECUTIVE ORDER NO. 12866 (September 30, 1993); 44 U.S.C. § 3502(5). However, this Executive Order—by its own terms—specifically excludes "independent agencies" such as the Federal Reserve, the Commodity Futures Trading Commission, the Consumer Product Safety Commission, the Federal

(Footnote Continued...)

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political nature of the regulatory process, past efforts have borne out that such cost-benefit mandates are often easier said than done. Indeed, such mandates do not imply that the agency will perform such a cost-benefit analysis competently or dispassionately and, given the mandatory deference required by a *Chevron* standard of review, courts are generally unwilling to overturn the factual analysis of an expert agency.¹¹ Similarly, considering the massive scale of regulatory intervention in the U.S. economy, having Congress conduct a meaningful cost-benefit review of the myriad of federal regulations to determine which ones that are “job killers” and have “outlived their usefulness” will also consume a substantial amount of resources and perhaps lead nowhere.

An alternative and simpler approach might be to reduce the overall size of the regulatory bureaucracy by curbing federal spending on such efforts, an approach that also has a direct and favorable effect on the federal budget. An important question to ask regarding this alternative is if regulatory agencies are forced to “do more with less,” would the prioritization of regulatory intervention, in turn, spur economic growth and job creation? The purpose of this POLICY BULLETIN is to inform the policy debate by quantifying, using modern econometric methods, the relationship between government spending on regulatory activity and the important goals of economic growth and job recovery. To do so, we evaluate fifty years of data on the regulatory budget, GDP, and jobs. Our findings can be summarized as follows:

The size of the regulatory budget (as a share of GDP) is statistically and inversely related to economic growth and the number of private sector jobs. Thus, reducing the size of the regulatory state is a promising means for cutting spending and growing the economy. Our estimates indicate that, over a five-year window, even a small 5% reduction in the regulatory budget (about \$2.8 billion) will result in \$376 billion (\$75 billion annually) in expanded GDP and expand employment by 6.2 million jobs (1.2 million annually). On average, eliminating the job of a single regulator grows the American economy by \$6.2 million and 98 private sector jobs *annually*. The macroeconomic benefits of curtailing regulation, in our estimation, are very large. These effects run in both directions—an expansion in federal regulatory bureaucracy reduces

Communications Commission, the Federal Deposit Insurance Corporation, the Federal Energy Regulatory Commission, the Federal Housing Finance Board, the Federal Maritime Commission, the Federal Trade Commission, the Mine Enforcement Safety and Health Review Commission, the National Labor Relations Board, the Nuclear Regulatory Commission, the Occupational Safety and Health Review Commission, the Postal Regulatory Commission, and the Securities and Exchange Commission, all of which are profligate promulgators of regulations over major sectors of the American economy.

¹¹ See, e.g., *Consumer Elec. Ass’n v. FCC*, 347 F.3d 291, 303 (D.C. Cir. 2003) (Roberts, J.) (noting that “‘cost-benefit analyses epitomize the types of decisions that are most appropriately entrusted to the expertise of an agency’” (quoting *Office of Comm’n of United Church of Christ v. FCC*, 707 F.2d 1413, 1440 (D.C.Cir.1983))); see also *Motor Vehicle Mfrs. Ass’n of Am. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983) (“a court is not to substitute its judgment for that of the agency”).

economic growth and kills jobs. Unlike expenditures on roads and education, which arguably have positive multiplier effects, the continued and sizeable expansions in the federal regulatory budget appear to be working against an economic turnaround and also contribute to higher unemployment. Each million-dollar increase in the regulatory budget costs the economy 420 private sector jobs. Accordingly, as Congress and the President struggle with the difficult decisions of how to shrink federal spending, an excellent place to start would be to investigate responsible cuts in the size of the federal regulatory bureaucracy.¹²

II. Regulation and the Macroeconomy: An Empirical Analysis

While there is a vast literature measuring the impact of regulation on the behavior of individuals, households, and firms,¹³ assessing the role of regulation on the macroeconomy using econometric methods is a relatively young field. One of the earliest efforts, *Regulation and Macroeconomic Performance* (1996) by Brian Goff, used statistical methods to test a causal effect of regulation on economic output in the United States.¹⁴ The study concluded that regulation reduced economic output. More recently, Dawson and Seater (2007) and Dawson (2007) take a highly aggregated view of regulation and use modern time-series econometric methods to quantify the relationship between regulation and macro-level economic outcomes.¹⁵ In both studies, regulation is measured as the number of pages in the *Code of Federal Regulations* ("CFR"), and a linkage is found between regulation and a variety of macroeconomic series over the period 1949 to 1999. Dawson and Seater (2007) find that regulation has statistically and economically significant effects on output, productivity, labor, physical capital, and investment. Other studies on this topic often use more narrow measures of regulation, but typically find that

¹² A recent study by the Government Accountability Office ("GAO") indicates that significant savings could be realized by reductions in unnecessary duplication, overlap and fragmentation of federal programs, including programs at regulatory agencies. See OPPORTUNITIES TO REDUCE POTENTIAL DUPLICATION IN GOVERNMENT PROGRAMS, SAVE TAX DOLLARS, AND ENHANCE REVENUE, GAO-11-318SP (March 2011) (available at: <http://www.gao.gov/new.items/d11318sp.pdf>).

¹³ There are literally thousands of papers and books covering the topic, with entire academic journals devoted to the topic (e.g., THE JOURNAL OF REGULATORY ECONOMICS). For a flavor of some of the work, see, e.g., R. Ekelund Jr., THE FOUNDATIONS OF REGULATORY ECONOMICS (1998) and G. Fromm, STUDIES IN PUBLIC REGULATION (1983)

¹⁴ B. Goff, REGULATION AND MACROECONOMIC PERFORMANCE (1996). The expanse of this literature can be widened further if we include works which show that institutions are important contributors to economic activity. See, e.g., R. Hall and C. Jones, *Why Do Some Countries Produce So Much More Output per Worker than Others?* 144 QUARTERLY JOURNAL OF ECONOMICS 83-116 (1999); D. Acemoglu, S. Johnson, and J. Robinson, *The Colonial Origins of Comparative Development: an Empirical Investigation*, 91 AMERICAN ECONOMIC REVIEW 1369-1401 (2001).

¹⁵ J. Dawson, *Regulation and the Macroeconomy*, 60 KYKLOS 15-36 (2007); J. Dawson and J. Seater, *The Macroeconomic Effects of Federal Regulation*, Working Paper (May 2007) (available at: <http://econ.appstate.edu/RePEc/pdf/wp0516.pdf>).

regulation does attenuate economic activity.¹⁶ For example, Djankov, McLiesh, and Ramalho (2006) study business regulations as a determinant of economic growth, finding some evidence supporting the hypothesis that countries with business-friendly regulations experience higher economic growth.¹⁷ Such studies are not limited to the United States. Berger and Danninger (2005), for example, find that lower levels of labor and product market regulation foster employment growth across OECD member countries.¹⁸

Like Dawson (2007), and Dawson and Seater (2006), we measure regulation at an aggregate level and focus on macroeconomic outcomes. Specifically, “regulation” is measured using the size of the federal regulatory budget in relation to the size of the economy being regulated. This measure is intended to provide a financial gauge of (changes in) the level of federal regulatory activity, on the assumption that regulation, as a public activity, is conducted by employees using capital equipment and so on. The idea is that the degree of *effective* regulation is not identical to some assessment of what the regulations require; rather, it is regulation which is effectively enforced that has economic effects. Such enforcement activities require employees tasked with this work, and these efforts can be quantified by the expenditures on them. In this respect, we view our measure as a useful alternative to page counts and similar variables. Likewise, mere counts of the *numbers* of federal employees engaged in regulatory activities, while potentially useful, fail to account for the human capital those employees might possess, and that capital affects the degree to which regulations that exist in theory are applied in practice. Thus, we view an employee who receives higher compensation, and greater enforcement tools, as potentially more effective in carrying out regulatory policy. By normalizing these expenditures to the size of economic activity, we control for the size of the regulatory challenge the regulators face, and we view this challenge as roughly proportional to the size of economy.

It should be recognized that the use of virtually any cardinal measure of regulatory activity is likely to be imperfect, and our approach is no exception. However, the widespread failure of many federal regulations to be effectively enforced compels us to use a measure which reflects the actual resources expended on regulation, rather than the “wishful thinking” so often

¹⁶ Some research evaluates the efficacy of various definitions of regulation. See, e.g., G. Nicoletti and F. Pryor, *Subjective and Objective Measures of the Extent of Governmental Regulations* (2001) (available at: <http://ssrn.com/abstract=285494>).

¹⁷ S. Djankov, C. McLiesh, and R. Ramalho, *Regulation and Growth* (2006) (available at: <http://ssrn.com/abstract=893321>). A review of some of the literature is provided in Dawson and Seater (2007), *supra* n. 15.

¹⁸ H. Berger and S. Danninger, *Labor and Product Market Deregulation: Partial, Sequential, or Simultaneous Reform?*, International Monetary Fund (IMF) Working Paper WP/05/227 (December 2005)(available at: <http://www.imf.org/external/pubs/ft/wp/2005/wp05227.pdf>).

enshrined in the relevant rules and statutes. Another benefit of looking at the regulatory budget is that spending is today an important policy target, and policymakers are likely to be very interested in how spending changes influence outcomes such as economic growth and jobs.

We note that our study is very different than studies that measure the costs of regulation using non-econometric methods. Other approaches to measuring the costs of regulation include expenditure evaluation studies, engineering cost analyses, productivity studies, and general equilibrium analyses.¹⁹ For example, a recent study by Crain and Crain (2010), commissioned by the Small Business Administration, focuses on the compliance costs of federal regulations, and the authors conclude that the cost of regulation in the U.S. was \$1.75 trillion in 2008.²⁰ Many of the different approaches to the problem are discussed in Robert Hahn's 1998 paper published in the *JOURNAL OF ECONOMIC PERSPECTIVES*.²¹ Furthermore, while our analysis is limited to federal spending on regulatory agencies, some studies have considered the effect of state and local regulatory activity.²² We do not review those studies here.

A. Data

In order to assess the relationship between regulation and the macroeconomy, we first gather data on the time series of interest. Since time series data has a natural temporal ordering, we must evaluate the stochastic properties of the series. With this understanding, we can then select an appropriate empirical method that permits the estimation of the relationships of interest. Our analysis considers the relationship between federal spending on regulatory effort and two macroeconomic series: real per-capita Gross Domestic Product ("GDP") and private-sector employment. We subtract total government expenditures from GDP so that the variable measures only private-sector domestic product.²³

¹⁹ J. Guasch and R. Hahn, *The Costs and Benefits of Regulation: Implications for Developing Countries*, 14 *THE WORLD BANK RESEARCH OBSERVER* 137-58 (1999).

²⁰ N. Crain and M. Crain, *The Impact of Regulatory Costs on Small Firms*, Small Business Administration, Office of Advocacy (2010) (available at: <http://archive.sba.gov/advo/research/rs371tot.pdf>).

²¹ R. Hahn, *Government Analysis of the Benefits and Costs of Regulation*, 12 *JOURNAL OF ECONOMIC PERSPECTIVES* 201-10 (1998).

²² See, e.g., J.A. Eisenach et al., *The Impact of State Employment Policies on Job Growth: A 50 State Review*, UNITED STATES DEPARTMENT OF COMMERCE (2011) (available at: http://www.uschamber.com/sites/default/files/reports/201103WFI_StateBook.pdf).

²³ Regulatory spending is part of government spending. By excluding government spending from GDP, we limit our attention solely to private sector output and avoid definitional linkages.

For our measure of regulation (g_t), we use data on the federal government's budget for regulatory activity, which is reported for the past fifty years in Dudley and Warren (2010).²⁴ We are interested in the size of the regulatory influence on the economy, so we express the budget as a share of private-sector GDP, with both series measured in real terms.²⁵ For the macroeconomic series, data is extracted from the Federal Reserve Economic Data online repository.²⁶ Economic activity is measured as real per-capita GDP (y_t) less government spending, and employment is measured by the private-sector jobs (l_t).²⁷ All series are measured annually and cover the period 1960 through 2009 (50 years).²⁸ In the statistical analysis, all variables are expressed as natural logarithms.

B. Trends, Cycles and Unit Roots

As is common in the study of macroeconomic data, we decompose the trend and cyclical components of each data series using the Hodrick-Prescott filter ("HP Filter") for visual inspection.²⁹ All three variables— g_t , y_t , and l_t —exhibit positive trends. Since the measure of regulatory severity is expressed as a share of GDP, a positive trend in g_t implies that government spending on regulation is growing faster than GDP. Over the past 50 years, the total regulatory budget has grown 5.1% annually over the period, whereas GDP growth has been only about 3.1%.³⁰ The regulatory budget has outpaced GDP growth by about 65%.

The filtered series g_t , defined as the regulatory budget as a share of private-sector GDP, is illustrated in Figure 1, with the extracted trend illustrated by the solid line. The actual series is illustrated by the dashed line. While the trend has moved up and down over the sample period, the general direction is clearly positive (with a growth rate of 2.2% annually). Over the past few years, the dashed-line in the figure shows that the regulatory budget is on the rise.

²⁴ *Supra* n. 6.

²⁵ We extract government spending from GDP for both calculations.

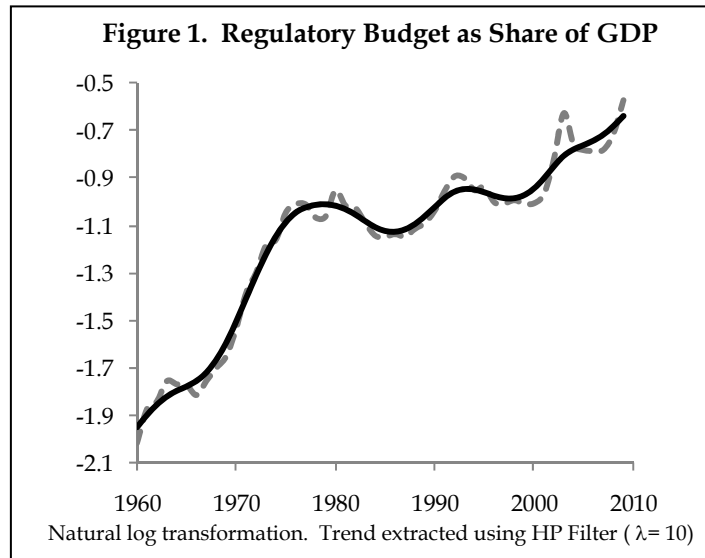
²⁶ <http://research.stlouisfed.org/fred2>.

²⁷ GDP is measured by series GDP. Government spending is measured using total government spending measured by series GEXPND. Both series are converted to real terms by the series GDPDEF, and GDP is converted to per-capita data using the series POP. Employment is measured by the series USPRIV.

²⁸ This period exhausts the availability of the regulation variable.

²⁹ The HP Filter is widely used, especially in studies of the Real Business Cycle theory. See, e.g., R. Hodrick, and E. Prescott, *Postwar U.S. Business Cycles: An Empirical Investigation*, 29 JOURNAL OF MONEY, CREDIT, AND BANKING 1-16 (1997); A. Harvey and A. Jaeger, *Detrending, Stylized Facts and the Business Cycle*, 8 JOURNAL OF APPLIED ECONOMETRICS 231-47 (1993). We use a smoothing parameter set by 10.

³⁰ These growth rates are computed using the constant growth model. D. Gujarati, BASIC ECONOMETRICS (1995), pp. 169-70.



In Table 1, we summarize the relationships between the cyclical components of all three series. The two macroeconomic variables, y_t and l_t , exhibit positive co-movements with each other ($\rho = 0.841$), which is not surprising. However, both the GDP and jobs series share negative correlations with the regulation variable g_t (-0.373, -0.548). That is, as regulation is expanding, GDP and jobs are in a down cycle. This negative correlation provides some evidence that curbing regulation improves the macroeconomic fundamentals in the short run. Also provided in Table 1 are the correlation coefficients of the cyclical components computed using quadratic detrending. The results are comparable to those obtained using the HP Filter.

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Table 1. Cross-Correlations of the Cyclical Components

Cross-Correlations (HP Filter, $\lambda = 10$)				
	y_t	l_t	g_t	Standard Deviation
y_t	1.000			0.024
l_t	0.841	1.000		0.016
g_t	-0.373	-0.548	1.000	0.042
Cross-Correlations (Quadratically Detrended)				
	y_t	l_t	g_t	Standard Deviation
y_t	1.000			0.043
l_t	0.767	1.000		0.026
g_t	-0.331	-0.604	1.000	0.132

As noted above, the choice of econometric method depends on the stochastic properties of the data. Turning to the issue of stationarity, we note that the Augmented Dickey-Fuller (“ADF”) tests reject the null hypothesis for the differenced variables at conventional significance levels. However, the null is not rejected for the data in levels.³¹ The series are I(1). In light of this evidence, we use a vector autoregressive (“VAR”) model with difference variables to quantify the impact of regulation on the macroeconomic series.³²

C. Vector Autoregressive Analysis and Impulse Response Functions

We propose the following trivariate VAR(p) model with

$$x_t = B(L)x_{t-1} + Cu_t \tag{1}$$

where $x_t = [\Delta g_t, \Delta l_t, \Delta y_t]'$ is a 3×1 vector of variables, $B(L)$ denotes a 3×3 lag polynomial matrix, $u_t = [u_t^g, u_t^l, u_t^y]'$ is a 3×1 vector of structural shocks, and C is a 3×3 matrix that describes the contemporaneous relationships among these variables. We are especially interested in dynamic responses of the real per capita GDP (y_t) and the number of private jobs (l_t) when there is an unexpected shock to the regulatory budget share (u_t^g).

Assuming that the system is invertible, Equation (1) can be rewritten as the following infinite order vector moving average representation.

³¹ For the differenced data, the ADF test statistics for y_t , l_t , and g_t are (-4.8, -4.1, -5.1) with just a constant term and (-4.9, -4.8, and -5.0) with a constant and trend.

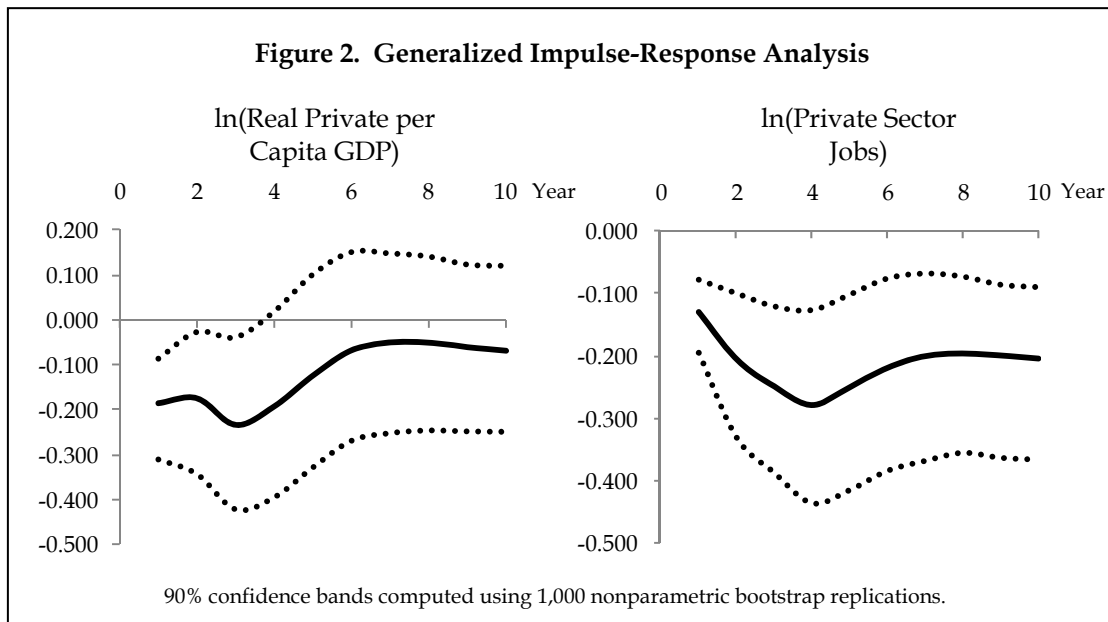
³² The model does not include cointegrating relations between these variables. The GIRFs show the effects on GDP fade significantly by the fifth year, suggesting the absence of a long-run relationship. Based on the Engle-Granger tests of cointegration, we did not find evidence of a cointegrating relation.

$$\tilde{x}_t = D(L)Cu_t = \sum_{s=0}^{\infty} D_s Cu_{t-s} \tag{2}$$

where $D(L) = (I - B(L))^{-1}$, $D_0 = I$, and $D(L)C$ is the moving average polynomials matrix that provides impulse-response functions. The impulse response function describes the reaction of a dynamic system in response to an external change or “shock.” As Beard, Jackson, Kaserman, and Kim (2010) show, the orthogonalized impulse-response function by Sims (1980) coincides with the generalized impulse-response function (“GIRF”) proposed by Pesaran and Shin (1998), which is ordering free, if one is interested in the responses to a regulatory shock.³³ The scaled n -period ahead GIRF of the *differenced* variable is,

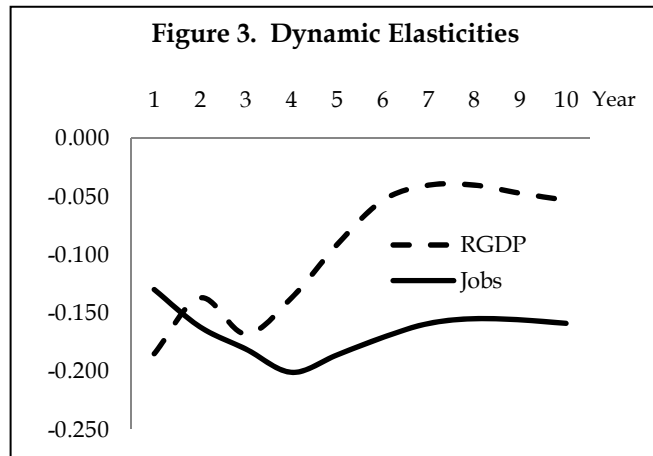
$$GIRF_j(n) = \sigma_{jj}^{-1} Dn \Sigma e_j, \quad j = 1, 2 \tag{3}$$

where Σ denotes the least squares variance-covariance matrix, σ_{jj} is the j^{th} diagonal element of Σ , and e_j is a 2×1 selection vector with 1 as its j^{th} element and zero elsewhere. Cumulative summation of the GIRF produces response functions of the *level* variables, which are our primary tool of analysis.



³³ T. R. Beard, J. Jackson, D. Kaserman, and H. Kim, *Time-Series Analysis of U.S. Kidney Transplantation and the Waiting List: Donor Substitution Effects*, Forthcoming in *EMPIRICAL ECONOMICS* (Published Online First in 2010)(available at: <http://www.springerlink.com/content/18510334r145457x/>); C. Sims, *Macroeconomics and Reality*, 48 *ECONOMETRICA* 1-48 (1980); H. Pesaran and Y. Shin, *Generalized Impulse Response Analysis in Linear Multivariate Models*, 58 *ECONOMICS LETTERS* 17-29 (1998).

This trivariate VAR and the GIRFs are estimated using fifty years of data on the series of interest. The GIRFs are illustrated in Figure 2. Note that the response functions are based on a positive shock to regulatory spending in the first period (which persists), with regulatory severity (g_t) ordered first in the trivariate VAR. The solid line is the point estimate of the GIRF and the dashed lines are the 90% confidence bands obtained using 1,000 nonparametric bootstrap replications.³⁴ The impulse response function for labor is computed in an identical manner. As shown in the figure, the response of both GDP and labor to a one-period positive shock in the regulatory budget is negative. That is, increases in regulatory effort in the U.S. reduce both per-capita GDP and the number of jobs. For GDP, but not jobs, the impulse response softens statistically at about four years (the confidence band includes zero), so we limit our computations to the five-year window.³⁵ Since regulation is expected to increase the cost of doing business and these costs will eventually be reflected in final output prices, the decaying impact on GDP is somewhat expected.



Dynamic elasticities are another way to illustrate the results. As is standard, the elasticity is defined as the percentage change in the one variable (in this case, GDP or jobs) given a percentage change in another variable (in this case, the regulatory budget). Figure 3 illustrates these dynamic elasticities. Both the elasticities are negative indicating, as detailed above, that changes in GDP and jobs are negatively related to changes in the regulatory budget. By cutting the regulatory budget, increases in both economic activity and jobs are expected. Note also that

³⁴ Often, in such models, a one standard deviation bootstrapped confidence bands are used. See, e.g., J. Cochrane, *Permanent and Transitory Components of GNP and Stock Prices*, 109 QUARTERLY JOURNAL OF ECONOMICS 241-65 (1994).

³⁵ The stronger effect on jobs is somewhat expected, since firms and individuals must expend resources to comply with regulatory obligations. Some of the expenditures will be captured in GDP.

elasticity for jobs is much larger than that for GDP. In the first few years, the elasticity for GDP is just under 0.20 in absolute value (e.g., a 10% decrease in the regulatory budget results in a 2% increase in GDP), but over time diminishes to about 0.05 in absolute value. The elasticity for jobs, alternately, rises sharply from about 0.13 in the first to 0.20 in the third year, and settles at about 0.16 in the longer run. While these elasticities are inelastic (i.e., less than 1.0 in absolute value), the enormous size of both GDP and private jobs results in very large economic impacts from even small changes in the regulatory budget. We discuss the magnitude of these effects in the next section.

III. Quantifying the Effect of Cuts in the Regulatory Budget

In the previous section, we found that changes in the regulatory budget have an effect both on the per-capita GDP and jobs—an increase in the regulatory budget reduces both. The full response to the shock occurs over time, so the size of the effects must be computed as the present value of the loss in GDP and the cumulative loss in jobs. We consider reductions in the regulatory budget rather than increases, since the present policy debate seems focused on cutting rather than increasing government spending. We note, however, that the GDP and jobs consequences of a regulatory budget change are symmetric; that is, the job loss from a 5% *increase* in the regulatory budget is equal to the job gains from a 5% *decrease* in the budget.

Simulations are conducted assuming 5%, 10%, and 16% reductions in the regulatory budget. The 16% level is chosen because over the past 10 years a balanced federal budget would have required a 16% reduction in government spending, on average. (In 2009, a 37% spending cut would have been required to balance the budget.) Thus, a 16% overall cut assumes a proportional reduction to the regulatory budget. For computing the impulse responses, the reductions in the regulatory budget are assumed to occur in the first year but persist over time.³⁶ In 2009 dollars, the regulatory budget is assumed to be \$56 billion in the initial period. A 5% reduction, therefore, is equal to \$2.8 billion. Based on the statistical analysis and in an effort to present a conservative estimate, we limit our attention to a five-year window, and discount the future at a rate of 3.1% as recommended by the Office of Management and Budget.³⁷ The results are summarized in Table 2 and are expressed in 2009 dollars. GDP is measured exclusive of government spending, so these impacts accrue to the private sector. Given the specification of

³⁶ The future of regulatory expenditures are influenced by the other variables in the VAR.

³⁷ The discount rate is the government recommended discount rate for social projects evaluated over a five-year window. See OMB Circular No. A-94, APPENDIX C (Revised December 2009) (http://www.whitehouse.gov/OMB/circulars/a094/a94_appx-c.html). The five-year window is also sensible since the error band on the impulse response includes zero after five years.

the model, the GDP responses are estimated at the per-capita level; these are converted to total GDP based on a forecast of population.³⁸

Table 2. Effects on GDP from Reductions in the Regulatory Budget (\$ Billions, 2009 Dollars)			
Regulatory Budget Adjustment	- 5%	- 10%	- 16%
GDP Effect Year 1	\$84	\$168	\$267
GDP Effect Year 2	\$78	\$155	\$247
GDP Effect Year 3	\$104	\$207	\$328
GDP Effect Year 4	\$87	\$172	\$274
GDP Effect Year 5	\$57	\$113	\$181
Five-Year Total GDP Increase (PV)	\$376	\$747	\$1,189
Avg. Annual GDP Increase	\$75	\$149	\$238

As shown in Table 2, curbing regulatory spending can have substantial effects on the economy. For a 5% reduction in the regulatory budget, the increase in GDP is \$376 billion (in present value) over the five-year window. On average, the \$2.8 billion reduction in the regulatory budget generates \$75 billion in additional GDP per year, implying a \$27 gain for every \$1 decline in the regulatory budget. A 10% cut in the regulatory budget—or about \$5.6 billion—provides for an additional \$149 billion in GDP annually over the five-year window. A pro-rata budget balancing cut of 16%—about \$9 billion—results in a present value gain of *over one trillion dollars* (\$1,189 billion) over five years, or about \$238 billion annually. Whether or not the regulatory budget could be cut responsibly by 16% is beyond the scope of this paper.

The impact on jobs is also impressive, as shown in Table 3. For a relatively small budget cut of 5%, the increase in private jobs is about 1.2 million annually (on average). In the final year of the simulation, there are 1.3 million new jobs due to the reduced regulation. A 10% reduction in the regulatory budget, which implies a return to 2007 levels, leads to an increase of 2.4 million new jobs annually, and nearly 3 million jobs in the fifth year. A pro-rata cut in the budget produces a sizeable 3.75 million jobs per year (on average), with 4.2 million jobs in the fifth year. The reduction in regulatory agency jobs resulting from the budget cuts are provided in the final row of the table.

³⁸ A growth rate of 1% is estimated using a constant growth model (which is roughly equal to the average growth rate in recent years).

Table 3. Effects on Private Sector Jobs from Reductions in the Regulatory Budget			
Regulatory Budget Adjustment	- 5%	- 10%	- 16%
New Private Sector Jobs Year 1	703,226	1,401,888	2,234,301
New Private Sector Jobs Year 2	1,104,430	2,197,551	3,494,534
New Private Sector Jobs Year 3	1,322,742	2,629,057	4,175,238
New Private Sector Jobs Year 4	1,480,034	2,939,465	4,663,991
New Private Sector Jobs Year 5	1,330,555	2,644,487	4,199,555
Average Annual Increase in New Private Sector Jobs	1,188,197	2,362,490	3,753,524
Reduction in Federal Regulatory Agency Jobs	- 12,109	- 24,217	- 38,747

As noted above, the model is symmetric. Thus, the increase in jobs following a reduction in the regulatory budget is the same as the decrease in jobs following an increase in the budget. Note that the annual budget for the new CFPB, created by the Obama administration in 2010, is about \$500 million, which is roughly equivalent to a 1% shock to the regulatory budget. On average, and for illustrative purposes only, this addition to the budget is expected to reduce GDP by about \$75 billion over the next five years, or \$15 billion annually. If the CFPB is an average regulatory agency, then the approximate 2,200 new federal employees at the CFPB will reduce the private sector job count by about 238,000 jobs *per year*.³⁹

A. Effect Per Regulator

Another way to evaluate the results is to express the macroeconomic cost of regulation on a per-regulator basis. To do so, we need to translate a given budget increase into a change in the number of “regulators.” We use least squares regression for this purpose, regressing total regulatory employees on a constant term and the total (real) regulatory budget (in millions) as the regressor.⁴⁰ The estimated coefficient over the sample period is about 4.3, implying that about 4.3 regulatory agency employees are hired for each additional million dollars added to regulatory budget. (Note that the CFSB is expected to employ about 2,200 persons with an annual budget of about \$500 million, which is equal to about 4.4 persons per million dollars.)⁴¹

³⁹ Notably, these calculations assume the CFPB is “average” and the losses are not based on the CFPB’s actual or expected influence on the economy; the new agency’s actual impact could be smaller or larger.

⁴⁰ The size of the budget and the number of employees are highly correlated ($\rho = 0.98$).

⁴¹ T. Duncan, *Launch Codes: Guiding Principles for the New Bureau of Consumer Financial Protection*, Cambridge Winter Center for Financial Institutions Policy (July 15, 2010)(available at: http://www.cambridgewinter.org/Cambridge_Winter/Archives/Entries/2010/10/4_LAUNCH_CODES.html); S.

(Footnote Continued...)

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For computational purposes, we assume the relationship is 4.3 new regulatory employees for each new million in regulatory budget. Thus, a 5% reduction in the regulatory budget reduces agency employment by about 12,109 jobs (see Table 3).

Regulatory Budget Adjustment	- 5%	- 10%	- 16%
Reduction in Federal Regulatory Agency Jobs	- 12,109	- 24,217	- 38,747
Average Annual Increase in GDP	\$75 Billion	\$149 Billion	\$238 Billion
Ratio of New GDP per Lost Federal Regulatory Agency Job	\$6,200,000:1	\$6,200,000:1	\$6,200,000:1
Average Annual Increase in New Private Sector Jobs	1,188,197	2,362,490	3,753,524
Ratio of New Private Sector Jobs per Lost Federal Regulatory Agency Job	98:1	98:1	98:1

Since the decrease in agency employees is (assumed to be) directly proportional to the reduction in the regulatory budget, the gains to GDP and jobs per regulator is equal across shocks of different sizes. As shown in Table 4, we can summarize the results as follows. As the size of the regulatory budget decreases, each lost regulator results in a gain of \$6.2 million in annual GDP, and each lost regulatory position is offset by 98 private sector jobs. Switching to the mindset of a budget *increase*, we can conclude that the annual cost of a new regulator is about \$6.2 million in GDP and 98 private sector jobs. In 2009, U.S. per-capita GDP was roughly \$46,000, meaning each regulator destroys the economic output equivalent of about 134 persons and eliminates the jobs of nearly as many. These effects are sizeable.

B. *Regulatory Multiplier*

It is also possible to compute a multiplier for regulatory spending. Since jobs multipliers are typically expressed in annual jobs per million of expenditure, we compute the regulatory budget multiplier in the same manner. As shown in Table 3, a \$2.8 billion reduction in the regulatory budget increases private sector jobs by approximately 1.19 million jobs. It also

Reddy, *Consumer Agency's Path Will be Set by First Chief*, WALL STREET JOURNAL (July 6, 2010) (available at: <http://online.wsj.com/article/SB10001424052748704699604575342992848011622.html>).

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reduces the regulatory agency employment count by about 12,109 jobs (see Table 4). On net, then, each \$1 million in regulatory spending causes a loss of 418 (net) jobs. This multiplier is very large relative to the typical input-output multiplier (e.g., the multiplier for Construction is about 20 to 30), confirming the significant effect of regulatory spending.⁴²

C. Robustness

In addition the trivariate VAR discussed above, other formulations of the model and variables were considered. Estimation alternatives included bivariate and quad-variate VAR, where investment was added as a third macroeconomic outcome for the latter. The estimated effects were not greatly affected, though the bivariate VAR tended to produce larger impacts. We also considered alternative formulations of the GDP and jobs variables, but again the effects were not significantly different from those reported here.⁴³

	Sample 1960-2009		Sample 1970-2009		Sample 1980-2009	
	GDP (Bil.)	Jobs	GDP (Bil.)	Jobs	GDP (Bil.)	Jobs
Year 1	\$84	703,226	\$94	706,212	\$99	666,630
Year 2	\$78	1,104,430	\$105	1,183,556	\$157	1,538,878
Year 3	\$104	1,322,742	\$141	1,431,911	\$168	1,785,028
Year 4	\$87	1,480,034	\$122	1,536,669	\$143	1,604,068
Year 5	\$57	1,330,555	\$91	1,314,481	\$122	1,311,584
Five-Year Total Increase	\$376	5,940,986	\$504	6,172,827	\$629	6,906,188
Avg. Annual Increase	\$75	1,188,197	\$101	1,234,565	\$126	1,381,238

While it is generally desirable to use as much data as available, particularly for time-series analysis, we also estimated the model on two more recent subsamples of the data. This sample limitation could be justified on grounds that newer regulatory activity is different than the old,

⁴² See, e.g., E. Ehrlich, J. Landefeld, and B. Barker, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce (March 1997) (available at: <http://www.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf>).

⁴³ For example, we considered GDP including government spending and non-farm employment. Since the regulatory budget is government spending and does result in government jobs, we felt excluding government spending from GDP and focusing on private sector employment was appropriate.

such as the relatively recent expanse of environmental regulation, changes in labor law, and regulatory responses to globalization. As shown in Table 5, limiting the sample to more recent decades leads to much larger effects on GDP. For the thirty-year period 1980 through 2009, the five-year present value of GDP growth in response to a 5% decline in the regulatory budget is \$504 billion, which is about 34% larger than the estimate using the full sample. Over the last 30 years, however, the effect is \$629 billion, which represents a 67% increase. The effect on jobs is relatively stable across the samples, with the largest difference of 17% between the largest and smallest samples. These results suggest that regulation has had a more deleterious effect on GDP in recent decades. Nevertheless, to provide conservative estimates, we rely on the results from the full sample.

IV. Caveats

These findings must be interpreted with some care. In many cases, the explicit and legitimate purpose of regulation is to reduce economic activity. For example, environmental regulation is intended to reduce the economic output of industries by raising the cost of production methods that cause environmental damage.⁴⁴ (A potentially legitimate role for environmental regulation does not, however, excuse all activity by the Environmental Protection Agency—an agency widely held to be the most proficient job killer in the federal government.⁴⁵) Occupational regulations raise the cost of labor (if binding), inevitably reducing jobs and output relative to an unregulated economy. In fact, very little regulation in the modern economy is aimed at expanding economic output. Nevertheless, regulation may have benefits, so it is best to think of it in terms of some *optimal* level of regulation, where the marginal benefit of intervention equals its marginal cost.⁴⁶ Our analysis does not permit the conclusion that regulation is optimal, insufficient, or excessive, but goes to the costs of regulation. As such, this work should be viewed only as an input in the cost-benefit test of expanding or reducing the nation's regulatory effort and budget.⁴⁷

⁴⁴ If an alternative, less costly method were available, then the firms would obviously use it. Thus, the “tax” on certain production techniques must increase the apparent cost of production, but maybe rightfully so.

⁴⁵ See, e.g., J. Timmons and Gov. B. McDonnell, *Proposed EPA Rules Could Hurt Job Growth*, Congress Blog, THE HILL (Jan. 24, 2011) (available at: <http://thehill.com/blogs/congress-blog/energy-a-environment/139633-proposed-epa-rules-could-hurt-job-growth>); F. Upton and T. Phillips, *How Congress Can Stop the EPA's Power Grab*, WALL STREET JOURNAL (Dec. 28, 2010; see also M. Whittington, *EPA to Regulate Milk Spills Just like Oils Spills*, Yahoo News (February 5, 2011) (available at: http://news.yahoo.com/s/ac/20110205/pl_ac/7790580_epa_to_regulate_milk_spills_just_like_oil_spills).

⁴⁶ As observed by Democrat Congressman Elijah Cummings (D-MD), “[w]e need to expand the scope of our inquiry to include the benefits of regulation, as well as the costs.” Korte, *supra* n. 8.

⁴⁷ C.f., G. Kessler, *Is Obama Bad for Business?* WASHINGTON POST.COM (Jan. 14, 2011) (available at: http://voices.washingtonpost.com/fact-checker/2011/01/is_obama_bad_for_business.html).

Furthermore, regulations are heterogeneous, with some being more costly than others, and some being more beneficial than others. Ideally, those regulations that create substantial costs with low benefits would be eliminated first. This ordering of regulations by net benefit may be difficult and costly. Moreover, assigning such thoughtfulness to regulatory agencies does not sync with the view that regulation is excessive and harmful. Perhaps with more limited budgets, however, regulatory agencies would be forced to focus on high-benefit, low-cost regulations, as the limit on resources would not permit excursions into frivolous regulatory action. Our findings, importantly, do not rely on the assumption of rational behavior by regulators, and measures the generic response of GDP and jobs to changes in the total regulatory budget.

Theoretical groundwork for some practical analysis of curtailing regulatory intervention in the economy is perhaps offered by the influential paper by Blanchard and Giavazzi (2003), in which a theoretical model of the effects of regulation on the macroeconomy is presented.⁴⁸ In particular, Blanchard and Giavazzi distinguish between “product market regulation,” which affects competitive conditions in industries, and “labor market regulation,” which affects rent distribution by altering the bargaining position of workers. They are thus able to offer some advice regarding the most productive “order” in which to deregulate. In particular, they suggest beginning with product market deregulation. An analysis of this sort could be quite useful in the current environment.

Finally, it must be stressed that we have employed a rather simple closed model of the economy. There may very well be other relevant variables we have ignored, and if these variables are correlated with our measure of regulation, then the estimated effects may be biased to some degree. Whether this bias is positive or negative is unknown. As such, our estimates should be viewed as a benchmark and perhaps preliminary. Further research on the important topic of government spending and the size of the regulatory budget is, as always, recommended.

V. Conclusion

It is widely recognized by both political parties that government spending must be curtailed in an effort to stem the unprecedented rise in the federal budget deficit. Likewise, there is bipartisan support for reducing regulation in the U.S. economy, with even President Obama recognizing that the regulatory state is impeding economic growth and hurting job creation. With unemployment stubbornly near 9%, and with few signs of new job growth, the federal

⁴⁸ O. Blanchard and F. Giavazzi, *Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets*, 118 QUARTERLY JOURNAL OF ECONOMICS 879-908 (2003).

government is now actively searching for ways to stimulate private sector job creation as well as economic growth.

In this POLICY BULLETIN, we quantify the impact on GDP and job growth of reductions in the regulatory budget. Using econometric methods, we estimate that reductions in the federal regulatory budget have sizeable effects on both GDP and jobs. A 5% reduction in the regulatory budget, which equals about \$2.8 billion in spending, increases GDP by roughly \$75 billion and the number of jobs by about 1.2 million annually. A 10% cut in the regulatory budget adds \$149 billion to GDP annually and expands employment by 2.4 million jobs in each year. In recent years, however, the size of the regulatory budget has risen sharply, with the Obama Administration proposing numerous new regulatory agendas. This expansion in the regulatory budget is demonstrated here to be a drag on the economy and job creation. Each regulator (or employee of a regulatory agency) costs the American economy, at the margin, \$6.2 million in economic output and about 98 private sector jobs each year. Accordingly, if policymakers wish to stimulate jobs and reduce federal spending, then responsibly trimming the regulatory budget may be a viable option.

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