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The Regulatory Effect

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Abstract

Both the Great Depression and the Great Recession followed systemic banking crises and were characterized by unusually weak and slow recoveries. The prior literature has identified monetary, household demand, and credit effects as contributors to the severe downturns. This paper studies a regulatory effect. In 1933-35 and 2010, Congress enacted far-reaching regulatory reforms that imposed substantial compliance costs on commercial and investment banks and some of their borrowers. I provide evidence that increases in regulation-related costs reduced bank lending in the aftermath of both financial crises and discuss policy implications.

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I. Introduction

The financial crises of 1930-33 and 2007-09 were associated with severe recessions and weak recoveries. There is mounting evidence that recoveries from recessions following financial crises are generally shallower than other recoveries. Reinhart and Rogoff (2009) study a sample of 21 financial crises in developed and emerging-market countries from 1997 to 2008 and find that the resulting rise in unemployment lasts nearly five years on average. Jorda *et al.* (2013) find that recessions following financial crises in 14 advanced economies were costlier than typical recessions. Dwyer and Lothian (2011), however, conclude that the Great Depression and Great Recession are atypical of the U.S. experience. Strong recoveries followed other financial crises from 1882 to 1907.

The prior literature identifies various channels through which financial panics affect the real economy, focusing on the demand for and supply of credit. Jorda *et al.* (2013) emphasize excess credit creation prior to a financial crisis. Mian and Sufi (2014) document unusually steep increases in household borrowing before both the Great Depression and the Great Recession. Falling asset prices made the debt burden excessive, producing large declines in household spending. The causal relation between financial crises and weakness in the real economy runs in both directions. Gorton and Ordonez (2017) note that credit booms are more likely to result in financial crises when they are prompted by transitory rather than durable positive productivity shocks.

Friedman and Schwartz (1963) emphasize the money supply as a transmission mechanism in the Great Depression. The waves of bank failures that began in late 1930 produced a sharp decline in the money supply, triggering debt deflation and declines in personal consumption and private investment, and therefore in the demand for credit.

By contrast, Bernanke (1983b, 2018) focuses on disruption in the supply of credit during and after both crises. Financial distress and firm failures in 1931-33 and 2007-09 disrupted established information links between borrowers and lenders, leading to an increase in information asymmetry and therefore in the cost of intermediation. Rebuilding information links and reducing information asymmetry is time-consuming, which helps to explain the prolonged period of slow growth. The credit explanation does not deny the importance of demand and

monetary factors, but argues that they are insufficient to explain the severity and duration of the economic slowdown.

A third and less-discussed common factor in the two most recent U.S. financial crises is that the acute phase was followed by regulatory change an order of magnitude greater than the rate of change in ordinary times.[1] This paper asks whether these striking increases can help to explain the slow recovery of credit in the two episodes.

It is notable that in the 1930s, credit facilitated by banks and capital markets recovered even more slowly than industrial production. Bank lending and bond underwriting remained anemic for the entire decade. Commercial and investment banking were the principal targets of the first wave of New Deal financial regulation designed to restore public confidence in the financial system. The regulations did not, however, restore the flow of credit.

The story is qualitatively similar for the Great Recession. Bank lending rose in absolute terms from 2009 to 2016, unlike from 1933 to 1939. That rise, however, occurred against the backdrop of an unprecedented flow of government funds into the banking system. These were designed to avoid the credit effects that then-Chairman Bernanke had documented for the Great Depression. They did so imperfectly. Although bank lending recovered in absolute terms, its growth rate remained below the long-term trend for years after the crisis period.

There are reasons to suspect that the dramatic increases in financial and business regulation could be causally related to the weak recoveries in credit formation. New regulations increase the cost of extending credit by diverting financial institutions' funds and management effort from credit assessment to regulatory compliance. Compliance costs are in part fixed, giving larger institutions a built-in advantage and sometimes driving smaller ones from the market. Regulation of business activity similarly raises costs and thereby affects the demand for credit.

Discussions of regulatory impact have focused principally on the latter effect (Higgs 1997; Cole & Ohanian 2004; Sumner 2015). These discussions focus on taxes, labor costs, and other New Deal regulatory interventions that affected business confidence and the demand for investment. Less attention has been paid to regulatory effects on the supply of credit.

[1] The data underlying Figures 3 and 5 indicate that in an average month during the period 1919-1932, Congress added 65 words to federal banking laws; from 1933-1935 inclusive, it added 905 per month. Similarly, bank regulators added 493 new regulatory restrictions per year, on average, from 1970 to 2007; from 2008 to 2014, inclusive, they added 4003 per year.

This paper studies the regulatory effect on the real economy through credit formation and thereby complements the demand, monetary, and credit effects studied in prior literature. It does so primarily by showing a connection between a policy uncertainty index developed by Baker *et al.* (2015) and the path of bank lending during both periods. I supplement the index with a hand-gathered count of the number of words added to U.S. banking law during each month of the interwar period and use it as an additional proxy for regulatory change around the time of the Great Depression.

While neither measure is the best possible proxy for regulatory cost, each has the benefit of being observable monthly. Many other important measures, such as employment in compliance functions and the budget and headcount of regulatory agencies, are only gathered annually. This makes them less than ideal for studying financial crises because causation runs in both directions. Financial market downturns produce regulatory change; the New Deal reforms, the Sarbanes-Oxley Act, and the Dodd-Frank Act are examples. The research question is whether those changes in turn increase compliance costs to an extent that delays the recovery of credit formation. My use of high-frequency (monthly) data is intended to persuade the reader that pending and realized regulatory changes affected contemporaneous decisions by borrowers and lenders.

There is little reason to believe that these effects are as powerful and important as the other demand and supply effects documented in the prior literature. The regulatory changes, while substantial, were not revolutionary. They imposed costs but did not fundamentally alter private lenders' ability to finance private borrowers.

There is nevertheless an important reason to pay attention to the regulatory effect: it is, in principle, avoidable. I discuss ways to reduce the pace of regulatory change after a financial crisis while maintaining sound prudential standards.

The paper proceeds as follows. Section II provides basic facts about production, credit formation, and regulatory change around the time of the two great financial upheavals. Section III discusses related literature on policy-related effects on the post-crisis economy in both periods. Section IV describes the tests of regulatory effects on credit growth during the Great Depression, while Section V does the same for the Great Recession. Section VI suggests policy implications and Section VII concludes.

II. Factual background

A. The Great Depression

Figure 1 illustrates two facts about the Great Depression previously documented by Calvo *et al.* (2006) and others. Shortly after taking office in March 1933, the Roosevelt administration implemented a bank holiday, lent money to undercapitalized banks, and devalued the dollar relative to gold. These measures ended the acute phase of the crisis. Industrial production (the solid line) responded with a sharp recovery beginning in April. This is not likely a coincidence; consumption growth was strongest in farming communities that benefited particularly from dollar devaluation (Hausman *et al.* 2019). The recovery, however, stalled abruptly in July. Until wartime production began in 1940-41, output remained well below the pre-depression trend line.

Bank lending (the dashed line) remained anemic throughout the 1930s. These data measure loans on the books of banks that reported to the Federal Reserve on a weekly basis in 101 cities. They accordingly do not capture the entire universe of depository institutions. They must also be interpreted with caution because the loan measure is a stock rather than a flow. The stock of bank credit can continue to decline even as flow recovers (Biggs *et al.* 2010). Nevertheless, extending the time series as far as 1941 makes it clear that bank lending did not lead the country out of the Depression. As Bernanke (1983b, p. 271) notes, "the recovery of 1933-41 was financed by nonbank sources with bank loans remaining at a low level."

Why did bank lending remain depressed even as production partly recovered? Bernanke's explanation is the increased cost of credit resulting from the disruption of established lending relationships. This paper argues that regulatory change may have further increased the cost of extending new credit. The New Deal reforms that began in mid-1933 included comprehensive new regulatory schemes for banks and securities underwriters. If anemic bank lending was a function only of weak bank balance sheets, bond markets should have taken up some of the slack (Barraza *et al.* 2015). This was not the case in the 1930s. Figure 2 shows new issues of corporate debt securities—a flow, unlike the bank lending data, and accordingly a better measure of new credit formation. New debt issuances were well below their 1920s levels until the second half of 1941.

Financial regulation increased dramatically during the New Deal. Figure 3 provides a simple measure. I manually count the number of words in Title 12, Chapters 1-6 of the U.S.

Code, the core provisions of U.S. banking law, for each month from January 1919 to December 1941. The beginning total for January 1919 comes from those provisions of the Revised Statutes of the United States that would be codified as the relevant chapters of Title 12 in the first (1925) edition of the United States Code. The counts for each month thereafter reflect additions and deletions resulting from every relevant statute enacted in that month, identified from the United States Statutes at Large. There is a sharp leap in banking regulation beginning with the emergency banking legislation of March 1933 and the Banking Act of 1933, enacted in June, continuing through the Banking Act of 1935, and then leveling off.

I focus on banking regulation in part because it offers more monthly variation than securities regulation. The regulation of new issues of corporate securities consists of a single statute, the Securities Act of 1933, enacted in May of that year, and a few minor subsequent amendments. Prior to the Securities Act, federal statutory regulation of securities markets was modest. Subsequently, the Securities Exchange Act of 1934 regulated secondary markets. Statutes enacted in 1935, 1937, and 1940 provided additional regulatory oversight for specialized actors and activities within the securities markets.

B. The 2007-09 Financial Crisis

Figure 4 shows comparable data to Figure 1 for the period 1991-2015. Both industrial production and bank lending are less volatile during this period than in the Depression era, reflecting the extraordinary interventions of the Federal Reserve and the Treasury to keep the financial system from collapse. However, it is notable that lending, in particular, grows more slowly after the global financial crisis than before. Industrial production fails to return to trend after the crisis.

Congress and other regulators responded similarly to the subprime crisis and the banking crisis of 1931-33. The RegData data set described by McLaughlin and Sherouse (2017) counts the total number of words as well as the number of words of restriction, such as “shall,” “must,” and so on, appearing in each subdivision of the Code of Federal Regulations. Figure 5 shows the annual total of regulatory restrictions adopted by one of the three principal federal banking regulators—the Comptroller of the Currency, the Federal Deposit Insurance Corp., and the Board of Governors of the Federal Reserve System. I include regulations adopted by the Bureau of Consumer Financial Protection, an independent agency within the Federal Reserve System, and

the Financial Stability Oversight Counsel, on which the heads of the principal banking regulators sit.

The number of regulatory restrictions increases roughly threefold in the aftermath of the subprime crisis. It is difficult to imagine such an increase not resulting in a rise in compliance costs and therefore in the cost of credit. The consulting firm Federal Financial Analytics (2015) estimates that compliance costs for the six largest U.S. banks roughly doubled from 2007 to 2013.

The effects on bank lending should depend on whether these are one-time or recurring costs and whether they are fixed or marginal (that is, varying with loan volume). That the post-crisis regulations imposed substantial recurring costs is clear from fact that banks hired many new employees for compliance roles after Dodd-Frank (Simkovic & Zhang 2018). The empirical results below shed some light on the question of fixed and marginal costs.

III. Related Literature

There is a long history of qualitative claims that New Deal regulatory and tax policies hindered the recovery by reducing expected returns to business investment and increasing risk (Schumpeter 1939; Roose 1954). Recent empirical analyses focus on price, wage, and competitive distortions stemming from the National Industrial Recovery Act (NIRA) and related policies. Cole and Ohanian (2004) model these distortions and show that the resulting model is consistent with the slow recovery of production and employment from 1934 to 1939. Sumner (2015) provides event-study evidence that wage increases resulting from the NIRA and labor legislation hampered the recovery beginning in the summer of 1933.

Another strand of the literature focuses specifically on policy uncertainty. Bernanke (1983a) argues that when faced with an uncertain economic environment, businesses will delay irreversible investments, an idea further developed in the real options analysis of Dixit and Pindyck (1994). Uncertainty should also affect the supply of bank lending by increasing perceived default risk and therefore the cost of credit (Gilchrist *et al.* 2014). Moreover, a bank can delay making a loan but it is irreversible once extended.

Some papers consider a narrow concept of policy uncertainty related to the enforcement or implementation of new statutes, similar in principle to what Pastor and Veronesi (2011) call "impact uncertainty." Under modern U.S. practice, legislators provide broad policy guidance but

leave details and implementation to specialized agencies. Uncertainty about how agencies will enforce legislative commands can affect asset values and therefore investment decisions (Battalio & Schultz 2011; Bhanot & Larsson 2018).

Pastor and Veronesi (2011) also define a broader concept of "political uncertainty." The idea is that new regulations not only affect the costs and benefits of economic activity directly, but cause economic actors to update their prior beliefs about the future course of policy. As applied to the New Deal, the concept dates at least to Schumpeter (1939), who contends that tax and labor policies deterred investment not only on their merits, but because of the hostility to business that motivated them. The New Deal, he argues, amounted to "a systematic attack on investment opportunity all around" (p. 1045), such that the anticipation of future policy changes multiplied the effects of contemporary policy changes. Numerous commentators during the Great Recession similarly argued that the Obama administration's regulatory policies reflected hostility toward business (Rogers 2015).

Higgs (1997) surveys prior accounts of what he calls "regime uncertainty" associated with New Deal policies and argues that delaying investment was a rational response to it. Although acknowledging that it is difficult to measure uncertainty, he notes that evidence from opinion polls during the New Deal era is broadly consistent with businesses delaying investment because they feared government action that would eliminate or reduce the returns to those investments.

More recently, Baker *et al.* (2015) create an Economic Policy Uncertainty index (EPU) based on a count of articles in a set of major newspapers containing words denoting uncertainty about government economic policies. The simplest version of their index extends back to the beginning of the 20th century. For more recent years, they construct an enhanced index including other uncertainty measures as well as a variety of sub-indexes relating to specific industries, countries, and so on. Of particular interest is a financial regulation uncertainty sub-index (FRPU). The search terms used to create the FRPU include "banking supervision," "financial reform," and "Basel," among others.

There is a growing literature finding that uncertainty has short- to medium-term effects on macroeconomic performance, consistent with the theoretical predictions of the real options literature. Bloom's (2009) influential paper models firms that receive signals about the health of the economy. Firms invest when expected conditions are good, disinvest when bad, and have a

"zone of inaction" in between. Shocks to uncertainty expand the zone of inaction and thereby reduce investment. Empirically, he finds that production and employment fall after a shock to general economic uncertainty, as proxied by stock market volatility, reaching a local minimum 4-5 months after the shock and recovering 7-8 months after.

Gulen and Ion (2015) use the EPU and find that firm-level investment is strongly and negatively associated with uncertainty shocks. The effect is strongest for firms whose potential investments are most irreversible. The authors interpret the result as consistent with firms delaying irreversible investments as predicted by Bernanke (1983a) and others. The effect peaks three to four calendar quarters after the shock and remains negative for up to eight quarters.

These studies focus on the demand for investment in the real economy. The years following the Great Depression and the Great Recession were also, however, marked by substantial regulation of the financial industry that likely affected the supply of credit. These may also hamper recovery from a crisis by reducing credit at precisely the point in the business cycle when it is most needed.

Nodari (2014) studies the effect of the FRPU on the cost of credit. She finds that a shock to the FRPU increases credit spreads and thereby affects the real economy. These effects peak less than ten months after the shock but are persistent rather than transitory.

Figure 6 shows the news-based EPU for the two periods of interest and the FRPU for the more recent period. Not surprisingly, the indexes spike during the acute phases of both crises, early 1933 and late 2008. Other increases, such as that around the time of the dot-com crash, are unsurprising.

Another piece of evidence that financial regulatory uncertainty affects lending is the Federal Reserve's quarterly Senior Loan Officer Opinion Survey on Bank Lending Practices. Among other things, the survey asks loan officers whether their banks are tightening or easing lending standards for several categories of loans and the reasons why. Beginning in the fourth quarter of 2010, the survey added as a possible reason for tightening "Increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards." While the Fed's summary report did not give a reason for the change, it was presumably a response to informal communications from lending officers.

In 2011, 85% of loan officers surveyed at midyear expected residential mortgage lending to remain constant or decrease in the second half of the year; of that group, 57% cited concerns

about legislative, supervisory, or accounting changes as "somewhat" or "very" important factors. Assuming the Fed continues to ask this survey question, it may serve as a useful empirical proxy for regulatory cost.

There are many qualitative and quantitative analyses of the costs and benefits of specific financial regulatory provisions; early and influential examples include Peltzman (1965), Manne (1966) and Benston (1969). Following widespread complaints that the Dodd-Frank Act made it harder for new businesses to raise capital, researchers have also asked whether the regulatory response to financial crises affects financial institutions' willingness to extend credit during the recovery. Behn *et al.* (2016) attempt to estimate the effects of pro-cyclical adjustments in bank capital ratios on bank lending. Kashyap *et al.* (2014) offer an extension of the Diamond and Dybvig (1983) model of bank intermediation that permits theoretical evaluation of the effects of capital and liquidity regulation on the supply of credit.

The lack of reliable, high-frequency data on regulatory intensity and compliance costs, however, is a challenge for empirical research. Regulators periodically survey banks regarding compliance costs (Federal Reserve System & Conference of State Bank Supervisors 2017). Simkovic and Zhang (2018) show that regulatory intensity can be plausibly measured using data on employment in compliance-related fields and demonstrate that such employment increased dramatically in the wake of the Dodd-Frank Act. Measuring regulatory agency headcounts, budgets, and activity levels can also shed light on regulatory intensity (Jackson 2007). These approaches share the limitation that the relevant survey, employment, or budgetary data are generally available only at annual intervals. One could in principle obtain larger data sets by covering a large cross-section of countries, but profound differences in legal and governmental structure make cross-country comparisons of legal change challenging and controversial.

This paper seeks to contribute to the literature by using high-frequency measures, albeit crude, of regulatory cost. For the Great Depression era, I use the news-based EPU measure that is limited to broad policy uncertainty. I supplement it with the monthly count of net additions to banking statutes described above. For the Great Recession era, I again use the broad news-based EPU measure to capture both demand and supply effects on credit. To proxy more directly for regulatory costs to banks, I use the FRPU measure. Unlike the classic event-study methodology that attempts to pinpoint a date or dates on which agents first became aware that new regulation

was likely and measure the impact on stock prices of affected firms, I look for regulatory impacts in macroeconomic aggregates.

There are two important reasons to question whether the EPU is a valid proxy for regulatory cost. First, economic policy is not just regulatory policy; it includes monetary and fiscal policies as well. The FRPU, which attempts to measure uncertainty about financial regulation, is less subject to this objection. Second, the EPU and FRPU are second-moment measures, whereas regulatory cost is a level.

Both objections have less force during and immediately after a financial crisis. Regulation, and financial regulation in particular, is a dominant source of economic policy uncertainty during those periods. After laying blame for the Great Depression on financiers in his 1933 inaugural address, President Roosevelt proposed and promptly implemented a policy of increased regulation of banking and capital markets that historians view as a central feature of the early New Deal.

Financial regulation also played a central role in the policy response to the more recent crisis. We can to some extent quantify its importance. During the period January 1991—July 2007, inclusive, the EPU and the FRPU have a correlation coefficient of 0.58. The correlation rises to 0.83, however, from August 2007, the month BNP Paribas halted redemption on certain investment funds, often identified as the beginning of the crisis, to July 2010, the month of Dodd-Frank's enactment. Regulatory uncertainty, in other words, became a more important source of general economic policy uncertainty during the crisis and post-crisis period.

During a crisis period, the EPU and FRPU contain considerable first-moment information. There is no uncertainty during these periods about the direction of regulatory cost, only about its magnitude. A shock to regulatory uncertainty, then, is largely a change in downside risk. This may account for Nodari's (2014) findings that shocks to the FRPU produce persistent macroeconomic effects that are greater in absolute magnitude during recessions.

IV. Regulatory effects in the Great Depression Era

This section asks whether the EPU and the statutory word count, proxies for regulatory costs, can help explain the monthly path of bank lending during the interwar period. Table 1 provides descriptive statistics for the variables discussed herein. The lending and production measures are scaled so that growth rates reflect annualized percentages. I seasonally adjust the

lending figures using the Census Bureau's methodology prior to further analysis. The seasonal adjustments are very modest.

A. Aggregate lending growth and regulatory cost

The dependent variable of interest is the rate of growth of (seasonally adjusted) bank lending. This variable is the first difference of the log of the dashed line shown in Figure 1. The undifferenced series lacks a persistent time trend but does not appear stationary. The differenced series is more nearly stationary but still has a high first-order autocorrelation and statistically significant although smaller partial autocorrelations to four lags. I add four lagged values of the dependent variable on the right-hand side in the regressions described below.

There is an extreme outlier in the data series on loan growth occurring in March 1933. All commercial banks were unable to originate loans for at least part of the month because of the federal bank holiday. While dealing with the issue is necessarily arbitrary, I follow Bernanke (1983b) in replacing the actual percentage decline in March 1933 with 15% of its value.

I first estimate a baseline regression without the regulatory proxies but with other explanatory variables intended to capture non-regulatory sources of loan supply and demand. Bernanke (1983b) uses the inflation-adjusted aggregate deposits of banks that failed during a given month as a measure of the direct impact of the financial crisis on the supply of credit. I use the same measure but without inflation adjustment, given that price growth is a separate independent variable in my model. Another variable Bernanke employs, the total liabilities of failed businesses, does not add predictive power to the model and so I omit it.

Private investment is an intuitive measure of the demand for loans. Unfortunately, it is not available for all of the interwar period and in any event is measured only quarterly. Of other potential measures of loan demand, only a handful are available at monthly intervals for the period of interest. I use the growth rate of wholesale prices as a measure of the demand for loans. A considerable amount of lending during the interwar period was for inventory management and trade in commodities and finished goods; as prices rose, the nominal size of loans demanded should rise as well. Using the growth rate of industrial production gives similar results as the two series are strongly correlated.

The NBER provides an index of leading indicators for the period that includes housing starts and employment, among others. The index is also highly correlated with wholesale prices and adds no predictive power when added to the price variable. I omit it for parsimony.

Of course, improved business conditions affect the supply of credit as well as demand. Bernanke and Gertler (1989) argue that the strength of borrower balance sheets is an important determinant of information asymmetry between borrowers and lenders and accordingly of banks' willingness to lend.

Model 1 in Table 2 shows the baseline specification before introducing regulatory proxies. All variables enter significantly with the expected signs. All other things equal, there are fewer loans when there are more bank failures and more loans when wholesale prices are increasing. I test for serial correlation in the residuals with Durbin's (1970) procedure for use when lagged values of the dependent variable are included as independent variables. The test fails to reject the null hypothesis of no serial correlation.

I next introduce the (differenced) EPU as a proxy for costs associated with regulatory uncertainty. A threshold question is whether to add lagged values of the variable and, if so, how many.

The empirical literature relating the EPU and other uncertainty measures to macroeconomic aggregates generally finds that the negative impact increases in magnitude over one to four calendar quarters. We would expect it to take time for the stock of bank loans to adjust fully to changes in policy uncertainty. Based on the results of Gulen and Ion (2015) and Nodari (2014), I use the current and 12 lagged values of (the first difference of) the EPU as independent variables.

The results are shown in Model 2 of Table 2. The estimated coefficients on the lagged EPU variables are cumulated by quarter for readability. In these data, the relation between policy uncertainty and lending is exactly what theory predicts. The estimated effect is negative for every quarter (indeed, the estimated coefficient on every monthly lag except for *t-12* is negative). The effect increases in absolute value from the first to the second lagged quarter and gains statistical significance. The absolute magnitude decreases slightly in the third quarter, then falls and loses statistical significance in the fourth. When the model is re-estimated with 15 lags, the estimated coefficients on the additional lags are positive and their sum is significant, consistent with Gulen and Ion's results.

To get a sense of the economic significance of the result, note that the average monthly change in the EPU is approximately zero with a standard deviation of approximately 33 index

points. In these data, a one-standard deviation shock to the EPU in a given month reduces the growth rate of the stock of loans by 22% over the next year.

One potential issue in interpreting the results is collinearity among the lagged values of the EPU, which can lead to imprecise estimates that are sensitive to changes in specification. In the present case, differencing the EPU eliminates most, but not all, collinearity among the lagged values. The estimated coefficients and standard errors on the other independent variables, however, are not sensitive to changes in specification; they vary modestly as we move from Model 1 to Model 2.

As a robustness check, I re-estimate the model restricting the lag weights on the EPU variables to follow a quadratic pattern using Almon's (1965) procedure. The (unreported) results are similar to those reported for Model 2, suggesting that the result is not being driven by correlations among the lagged values of the EPU variable.

In summary, the tests shown in Model 2 suggest that greater economic policy uncertainty is associated with slower lending growth that is economically and statistically significant during the interwar period. The result is robust to a number of specification changes.

Model 3 of Table 2 substitutes the change in the logged monthly word count of federal banking statutes for the EPU measure. Intuitively, changes in banking law should affect lending principally through a supply effect, unlike general regulatory uncertainty which should affect both the demand for and supply of funds.

Unlike a shock to policy uncertainty, however, the enactment of a statute is anticipated. The statutory enactment process takes time, although that time was compressed considerably during the New Deal era when the President's economic policies had strong support in Congress.

I accordingly change the model specification slightly. First, I use 6 rather than 12 monthly lags of the word count variable, recognizing that banks and borrowers had time to adjust to statutory changes before enactment. Second, I include a forward value of the word count variable. Banks and borrowers might have accelerated transactions had they believed that compliance costs would rise after enactment of a statute.[2] This is particularly true if a meaningful portion of those costs is incurred at the time a new loan is originated. By lending before the legislative change, banks could avoid such costs.

[2] Unlike the Dodd-Frank Act, which delegated the details of policy to regulatory agencies, the New Deal financial reforms included many rules of conduct that became effective at or shortly after enactment.

In fact, we observe that lending rose, on average, in the month prior to an increase in statutory word count. During the six months following an increase, however, lending declined by slightly more than double the anticipatory increase. The result is robust to using the Almon procedure for constraining the lag weights to a quadratic pattern. The results suggest that banks brought lending forward in response to statutory change, then reduced it afterward for a net loss in lending volume.

B. Cross-sectional evidence and extension to securities markets

All other things equal, new regulations tend to burden smaller firms more than larger firms because of the fixed costs associated with compliance. Mahoney (2001) finds that smaller investment banks curtailed their underwriting more than larger, New York-based investment banks following enactment of the Securities Act.

Figure 7 suggests a similar phenomenon around the time of the New Deal banking reforms. It shows the path of bank lending for reporting banks in New York City (solid line) and reporting banks outside New York City (dashed line), both scaled so that January 1922=100. The disaggregated lending data begin in that month. The solid line is more volatile in general, but a persistent gap opens between the two during the height of the New Deal regulatory program.

Table 3 analyzes the same phenomenon using a regression in which the dependent variable is the New York banks' share of total lending, in per cent. The independent variables are forward, contemporaneous, and lagged values of the differenced log of statutory word count, a proxy for changes in regulatory costs. The estimated coefficients on the word count variables show that the lending market share of large (New York-based) banks rises around the time of increases in regulatory intensity. The model may be re-estimated with additional lags of the word count variable without changing the result; the estimated coefficients on the additional lags are insignificant and the fit does not improve.

Investment banks, which operated in impersonal capital markets rather than lending markets, were also affected by the New Deal statutory reforms. The Securities Act of 1933 regulated new public offerings of securities. It is interesting to note that from 1919 until mid-1933, fluctuations in new issues of equity securities closely track movements in stock prices, as shown in Figure 8. There is a sharp break in the relation, however, around the time of the enactment of the Securities Act. Although stock prices move higher in June 1933 and again in mid-1935, there is no corresponding recovery in new stock issues.

The regression result in Table 4 confirms the visual evidence. The model regresses new issues of equity securities against the Cowles Index of stock prices as well as two indicator variables. The first indicator switches from zero to one beginning in October 1929, the month of the stock market crash, and the second beginning in May 1933, the month of enactment of the Securities Act. The results show that equity issuance falls below the level predicted by its prior relation to the Cowles Index beginning at the onset of the financial crisis in October 1929. It then falls by a further statistically significant amount after enactment of the Securities Act, despite the end of the acute phase of the crisis in mid-1933. The result supports the proposition that compliance costs led regulated institutions to curtail their activities.

The fact that both bank lending and the new-issue market were moribund from 1932 through the end of the decade is likely part of the reason it took so long to escape the Great Depression. The analysis so far suggests that the New Deal regulatory program may be a part of the reason that credit did not recover. Added to New Deal regulatory programs that directly increased labor costs and taxes, new financial regulations may have partially counteracted the expansionary effects of fiscal stimulus and dollar devaluation.

V. Regulatory Effects During the Great Recession

The 2007-09 financial crisis, like the Great Depression, sparked enormous changes in financial regulation and was followed by a weak recovery. This section assesses evidence of the connection between the two phenomena, focusing again on bank lending. Table 5 provides summary statistics for all variables used in the analysis.

A. Aggregate lending growth and regulatory cost

As noted in Section II above, bank lending grew during the period 2011-2016, unlike the period 1933-1939. The important question, however, is whether banks were satisfying the economy's credit needs or whether regulatory restrictions were part of the reason that banks held large quantities of low-risk assets following government capital infusions and massive Federal Reserve asset purchases.

As in the Great Depression period, I analyze the path of bank lending, in this case for all months from 1991 to 2015, inclusive. The relevant measure is the growth rate of seasonally adjusted loans and leases held by commercial banks (series LOANS in the Federal Reserve Bank

of St. Louis FRED data), relative to its long-term trend. Once again, this is a stock and not a flow.

Many business loans during this period were revolving credit facilities. During the height of the crisis, corporate borrowers drew down existing lines of credit in order to build a liquidity cushion (Ivashina & Scharfstein 2010). This created further liquidity problems for banks. Accordingly, and counterintuitively, bank lending soared at the height of the crisis before falling substantially, reflecting borrowers' desire for liquidity rather than lenders' desire to extend new credit. There is another spike in lending in the late spring of 2010, which may represent borrowers' response to the pending enactment of the Dodd-Frank Act. Dodd-Frank was expected to, and did, require banks to increase capital and liquidity, which could reduce the availability of credit. Both the October 2008 and the May 2010 increases are substantial outliers that heavily influence any time series tests. As in the Great Depression era tests, I reduce those two monthly changes to 15% of their actual magnitudes.

More generally, the tendency to draw down revolving credit at times of stress means that in these data, bad news for the banking sector or the economy, such as an increase in bank failures or in unemployment, is associated with an immediate increase in bank lending followed by a decline. In the tests described below, I accordingly use values of the independent variables beginning at four (monthly) lags to ignore the immediate drawdowns following bad news. I also take account of autocorrelation at an additional lag in the dependent variable.

As in the prior period, I use the deposits of failed banks, taken from FDIC data and deflated by the consumer price index, as a non-regulatory measure of the supply of bank lending. A possible objection to this measure is that only small banks were permitted to fail during the more recent crisis. Nevertheless, the monthly variation in failures is a reasonable proxy for crisis-related pressures on all bank balance sheets.

I consider several measures of the demand for bank loans among those available at monthly intervals: the Michigan consumer sentiment index, stock returns, and the civilian unemployment rate. I also gather data on bankruptcy filings from the Federal Judicial Center data housed at the Inter-university Consortium for Political and Social Research to create a monthly series of the liabilities of businesses filing for bankruptcy. All of these measures are correlated; the unemployment rate provides the best fit and none of the other variables enters significantly when the unemployment rate is included in the model. Nor does the addition of

other variables materially change the inferences on the regulatory variables when the latter are included. The unemployment rate is an intuitively appealing proxy for loan demand because it represents the demand for a complementary factor of production. I use its first difference as a measure of changes in loan demand not directly related to regulatory change.

Model 1 in Table 6 provides a baseline prior to adding proxies for regulatory cost. As expected, increases in bank failures are associated with less lending (at a four-month lag as described above), as are increases in the unemployment rate.

Model 2 introduces the news-based EPU, constructed similarly to the variable used for the Great Depression period. The estimated coefficients are negative at all lags *t-4* to *t-12*. Their quarterly sums and associated standard errors are reported. As in the Great Depression period, the (negative) impact peaks during the 3rd calendar quarter after an increase in the EPU. A one standard deviation shock to the EPU is associated with a cumulative 6.4% fall in the growth rate of the loan stock, relative to trend, during the second through fourth quarters after the shock.

Model 3 substitutes the FRPU for the EPU. Although imperfect, the FRPU is the best proxy for financial regulatory intensity available on a monthly basis. Unlike the New Deal statutes, the Dodd-Frank Act delegated nearly all of the details of the regulatory response to bank regulators. Again unlike the New Deal era, regulators must engage in a lengthy notice-and-comment process to adopt new rules. Accordingly, as shown in Figure 5, the bulk of the new rules came into force in 2012, notwithstanding that borrowers and lenders would have been aware of the basic outlines of the pending regulatory changes no later than mid-2010. It is accordingly challenging to determine when borrowers and lenders would have begun to react. The FRPU, which peaks at the height of the crisis, falls, then peaks again around the time of Dodd-Frank, better captures the timing of economic agents' changing expectations.

The estimated coefficients on the FRPU variable are negative at all lags *t-4* to *t-12*. The quarterly sums are reported. They increase in magnitude and significance for the three calendar quarters shown. Although the estimated coefficients are small in comparison to those on the EPU variable, the FRPU is substantially more volatile, as can be seen in Figure 6. In these data, a one standard deviation shock to the FRPU produced a 7.7% fall in loan growth compared to the 6.4% fall for a one standard deviation shock to the EPU.

B. Cross-sectional evidence

There are once again qualitative reasons to believe that the above results capture the reaction of lenders and borrowers to increased costs. Banks consistently complained during and after the enactment of Dodd-Frank about increases in compliance costs. Simkovic and Zhang (2018) demonstrate a large rise in employment in compliance-related positions following Dodd-Frank's enactment.

Community banks in particular claimed that Dodd-Frank's compliance costs were excessive (Disalvo & Johnston 2016). Figure 9 shows commercial and industrial loans made by the largest 100 banks as a multiple of those made by all banks not in the top 100. There are two periods of sharp increase in the relative market share of the largest banks. The first comes in the late 1990s, after the federal government eliminated several state-level restrictions on bank consolidation, touching off a wave of bank mergers. The second period begins simultaneously with the enactment of Dodd-Frank. The underlying data, unfortunately, are observed only quarterly.

We do, however, have monthly measures of loans secured by real estate. This is important because mortgage lending standards were a particular focus of the Dodd-Frank Act. Part of Dodd-Frank was the Mortgage Reform and Anti-Predatory Lending Act, which imposed new regulation of mortgage origination standards. The Consumer Financial Protection Bureau created by Dodd-Frank also imposed new standards for mortgage servicing and modification.

Figure 10 shows the share of real estate lending for the sample period. Strikingly, it peaks three months before Dodd-Frank's enactment and then declines steadily. The regression reported in Table 7 analyzes the same phenomenon. The dependent variable is the first difference of the proportion of total loans that are secured by real estate. The variable is autocorrelated at one lag and I accordingly add one lag as an independent variable. The other independent variable is the first difference of the FRPU (multiplied by 10 to produce a more readable estimated coefficient). As the FRPU increases, the relative share of real estate lending declines. Additional lags of the FRPU do not change the inference or improve the fit of the model; their estimated coefficients are insignificant.

In short, measures of regulatory cost have predictive power with respect to the path of bank lending before and after the global financial crisis of 2007-09. As in the Great Depression period, cross-sectional analyses provide additional reason to believe that regulatory policy

induced changes in borrower and lender behavior. Regulation therefore pushed in the opposite direction from fiscal and monetary policy and may have reduced their effectiveness.

VI. Policy Implications

Compliance costs are an unavoidable part of regulation. In principle, the social benefits resulting from fairer, safer, and/or more efficient regulated activities justify the related costs. Differentially large costs on smaller firms that lead to increased concentration in the regulated industry are unintended consequences but also not easily avoided.

By contrast, the pro-cyclicality of post-crisis regulation can be avoided. Regulating just after a crisis with an eye toward reducing financial institutions' risk taking exacerbates the credit cycle. It tells banks and securities firms to reduce their lending, underwriting, and principal trading at precisely the time the economy is struggling to end a contraction. It thereby blunts the impact of expansionary monetary and fiscal policy, as this paper's results suggest.

Dagher (2018) analyzes pro-cyclical regulation, focusing on boom times. During credit expansion, he finds, governments give in to pressure to remove restraints on leverage. This paper focuses on the flip side of the coin; after a crisis, governments rein in financial institutions and in doing so reduce the availability of credit at a time when banks are already reluctant to lend.

Consider the risk-reducing devices that bank regulators implemented after the recent crisis, including enhanced capital requirements, capital surcharges for globally systemically important banks, a mandatory three-year comprehensive capital analysis and review, a liquidity coverage ratio, and more (see Scott (2016) for a comprehensive description and critique). Excessive risk-taking was a problem in 2005. Perhaps it is a problem again today. But it was not a problem in 2010. Having suffered substantial losses during the crisis, banks were eager to solidify their balance sheets without any encouragement from regulators.

Whether measured as a simple ratio of capital to book assets or a ratio of Tier 1 capital to risk-weighted assets, U.S. banks steadily and substantially increased capital from the third quarter of 2008 until the enactment of the Dodd-Frank Act.[3] This reflects, of course, the government's own actions to inject capital into the banking system. But the point is that banks

[3] For total capital to assets, see World Bank, Bank Capital to Total Assets for United States [DDSI03USA156NWDB], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/DDSI03USA156NWDB, August 6, 2018. Tier 1 capital and risk-adjusted assets are available from Wharton Research Data Services' Bank Regulatory data.

were far less eager to convert new funding to new risk than they were during the pre-crisis years. Having been so recently burned, it is implausible to argue that only regulatory supervision kept them from taking extreme risks.

While crises may give legislators and regulators information about new sources of risk that regulation can address, that is not the same thing as saying that new regulations must be implemented during the depths of a crisis. There is a venerable argument that new regulations during a crisis period restore confidence in the markets and thereby promote recovery. This argument has intuitive appeal but lacks empirical support. The New Deal reforms did not produce a recovery in credit formation through regulated entities; that much is obvious from Figures 1, 2, and 7. In fact, as Bernanke notes, unregulated lenders took the lead role in funding businesses during the 1930s. Meanwhile, the depositor runs on banks from 1930 to early 1933 and the withdrawal of wholesale funding from large banks, investment banks, and money market mutual funds from 2007 to early 2009 ended when the federal government intervened to become, explicitly or implicitly, the guarantor of the relevant liabilities. Those interventions preceded the regulatory reforms.

Conceptually, the pro-cyclicality problem is easily solved. Once the economy is in a recession of sufficient severity, there should be a temporary moratorium on the implementation of significant new financial or business regulations. The moratorium could be a fixed period, for example five years, or expire once the economy meets a particular test, such as a return to trend GDP.

This does not mean that Congress and regulators must do nothing during the crisis period. They could design new regulations to be implemented once the economy is back to normal. This would reduce uncertainty but ensure that lenders and borrowers will not face additional compliance costs at the same time as they face other economic headwinds. Regulatory costs would then become countercyclical on average, increasing once an expansion is well under way and holding steady or contracting in the early stage of a recovery. A moratorium on implementation would also ease time pressure on policy makers and alleviate the problem that post-crisis reforms are generally hastily and therefore poorly designed, a problem that Romano (2012) identifies and proposes to solve through automatic sunset provisions.

Absent a formal moratorium provision, regulators could achieve similar results using regulatory cost-benefit analysis. Modern regulatory reforms, such as the Sarbanes-Oxley and

Dodd-Frank Acts, principally empower and instruct the relevant agencies to adopt new regulations. The process for adopting these regulations typically requires an analysis of the costs and benefits of the proposed rules. The agencies could incorporate a time dimension into that analysis, noting that pro-cyclical compliance costs impose a greater burden on the economy as a whole than counter-cyclical ones and accordingly a delay in implementation would maximize the gap between benefits and costs.

As is obvious from Figure 5, most of Dodd-Frank's required regulations were not adopted until 2012-14. There was delay inherent both in the sheer quantity of required rules and the cumbersome administrative machinery now required to adopt them. But it is equally obvious from Figure 6 and from the surveys of lending officers discussed in Section III above that these delays were insufficient to reassure lenders. Many of the statutory deadlines for regulatory action were set for 2011. While observers were (correctly) skeptical that agencies could meet these deadlines, lenders could not predict what costs would increase at what times.

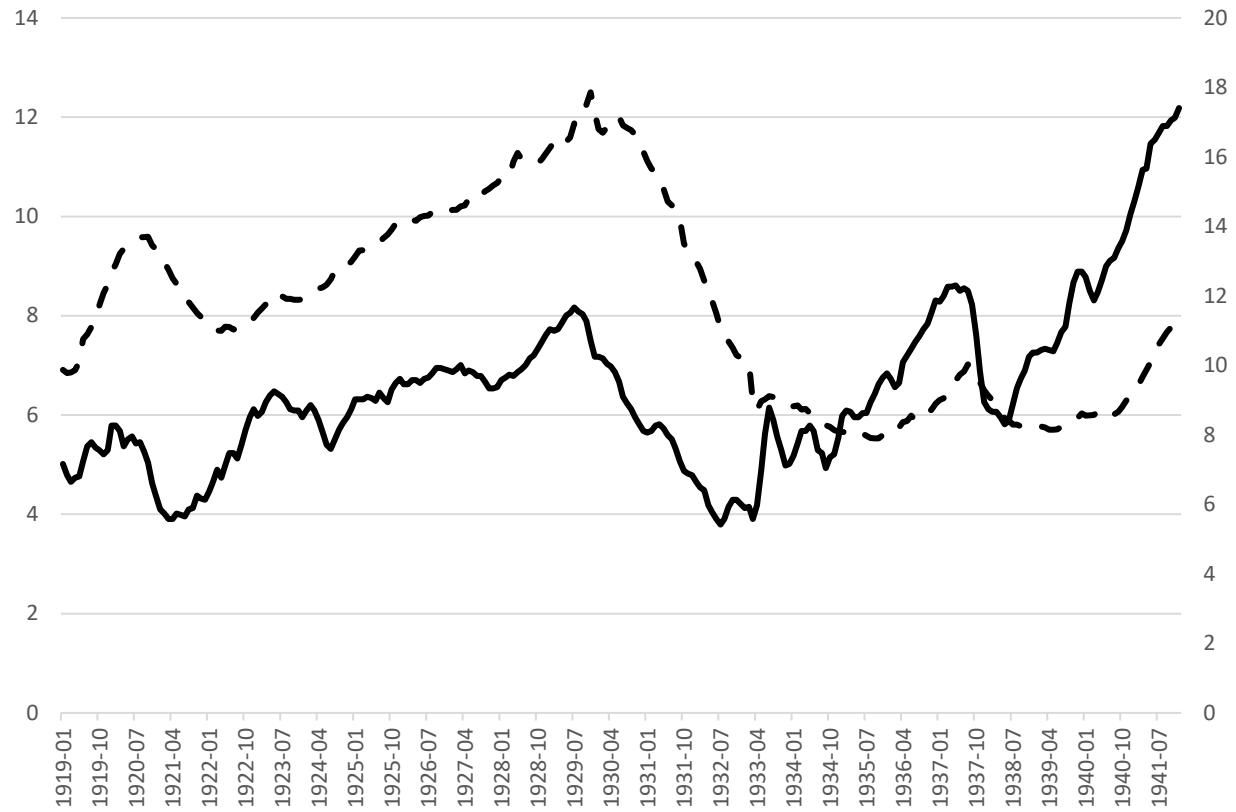
At the time of this writing, the United States is well into an economic expansion. We need not wait for a recession to attempt to put prudential regulation on a countercyclical path. Section 616 of the Dodd-Frank Act directs the Fed to "seek to make [capital] requirements countercyclical, so that the amount of capital required to be maintained by a [bank holding] company increases in times of economic expansion and decreases in times of economic contraction.…" The Fed has not made use of this authority during the current expansion. Indeed, in recent years, large financial firms have begun to argue that the new Basel III/Dodd-Frank capital regime is excessively severe. They have asked the Fed to reduce mandated capital levels and the Fed has indicated a willingness to consider the question. To do so as the economy is growing would reinforce the pro-cyclical pattern. Instead, the Fed should increase capital requirements now and announce that it will relax them immediately at the time of the next recession.

VII. Conclusion

The paper has proposed and provided suggestive evidence of a regulatory effect that complements the monetary and credit effects documented in the prior literature. Simple and imperfect proxies for regulatory uncertainty and compliance costs help to explain the path of bank lending during both the Great Depression and Great Recession eras. There is substantial

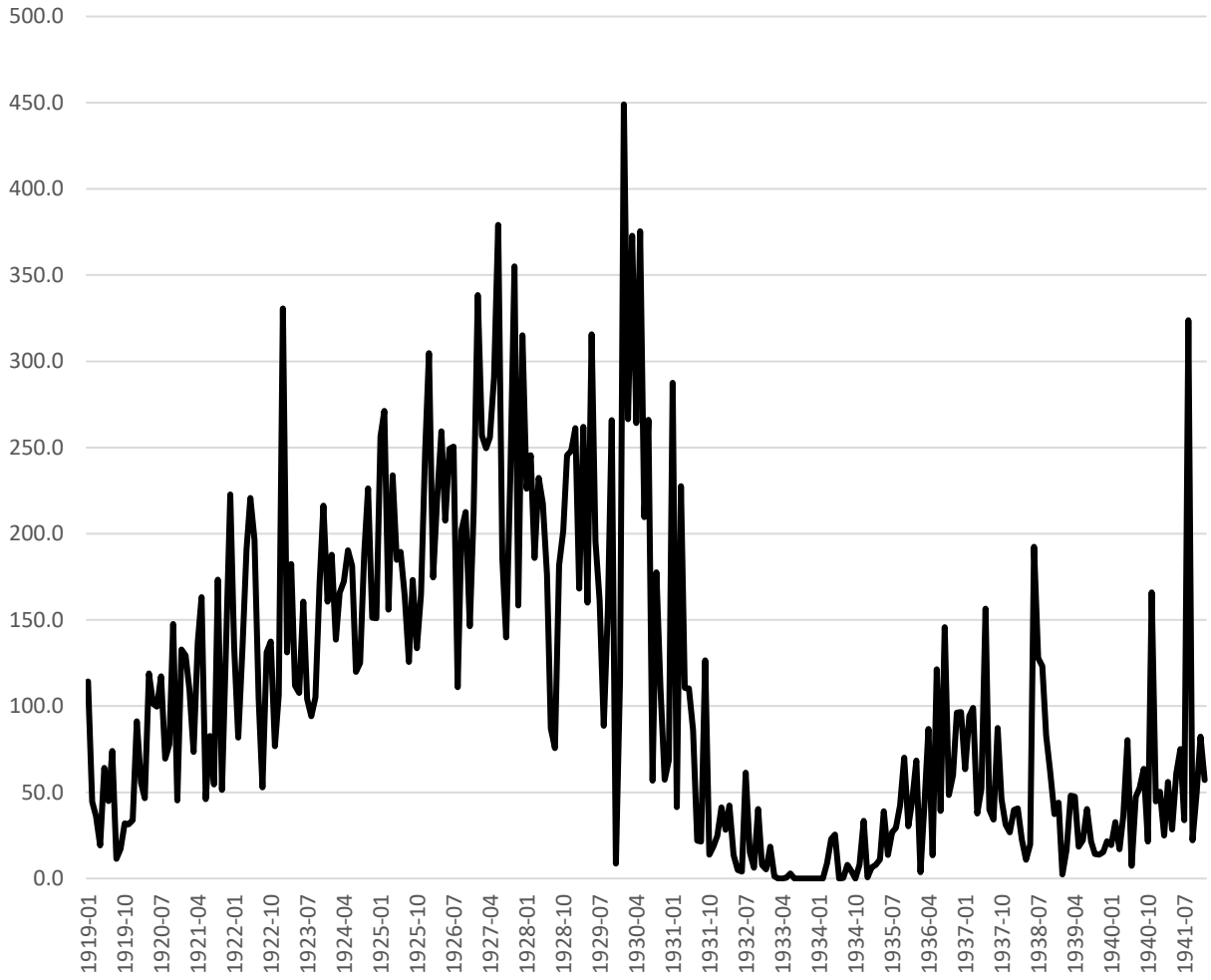
room for further study using improved measures of regulatory intensity. Nevertheless, the results point to the potential benefits of ending the current pro-cyclical tendency of regulatory change by delaying the implementation of new regulations for some period after a financial crisis.

Figure 1. Industrial Production and Bank Lending, by month, 1919-1941



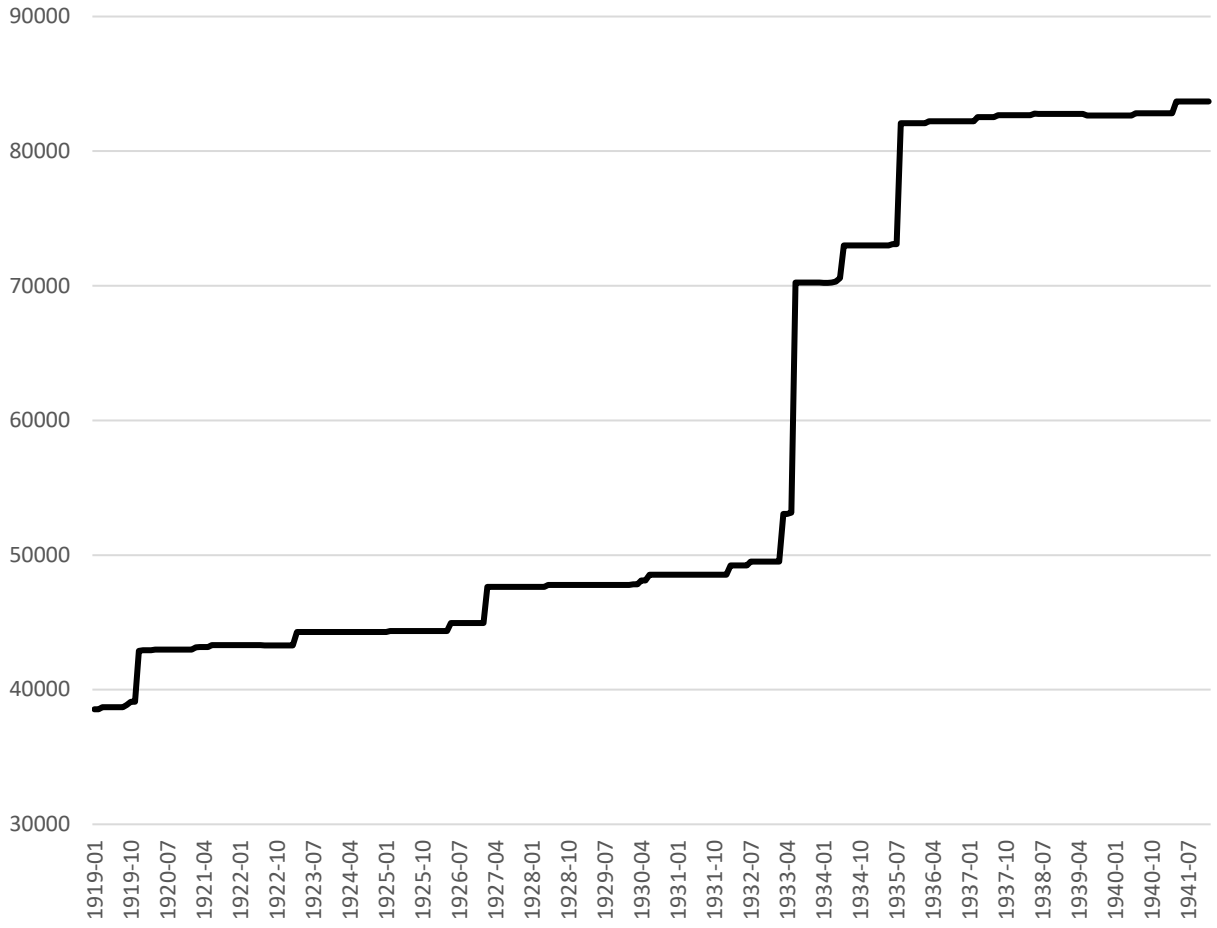
The solid line shows an index of industrial production (left-hand scale) Source: FRED data, series INDPRO. The dashed line shows total loans by reporting member banks, in billions of dollars, seasonally adjusted (right-hand scale). Source: Federal Reserve Annual Reports and Bulletins, various dates.

Figure 2. New issues of corporate debt securities, by month, 1919-1941



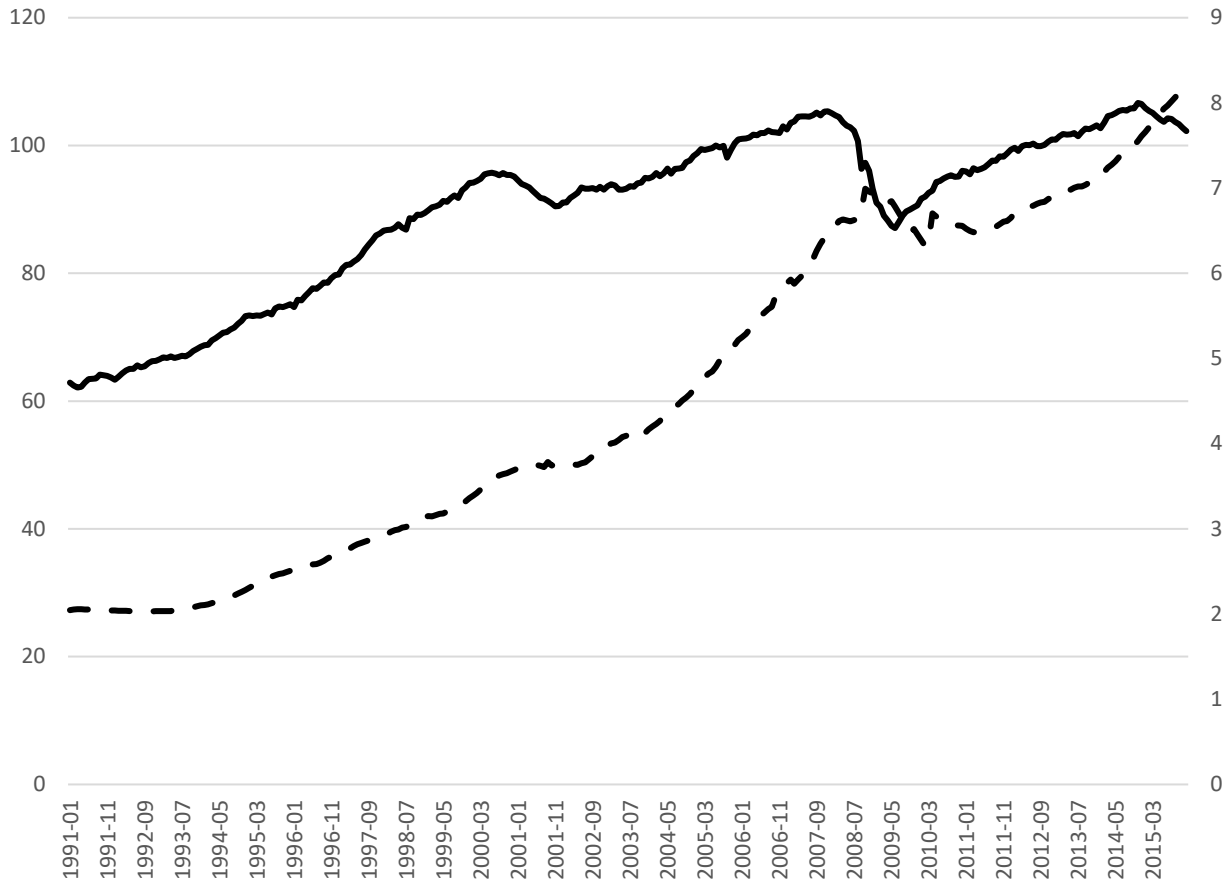
New issues of long-term bonds and notes by U.S. and Canadian corporations, in millions of dollars. Source: FRED data, series M10009M144NNBR.

Figure 3. Number of words in U.S. banking law, by month, 1919-1941



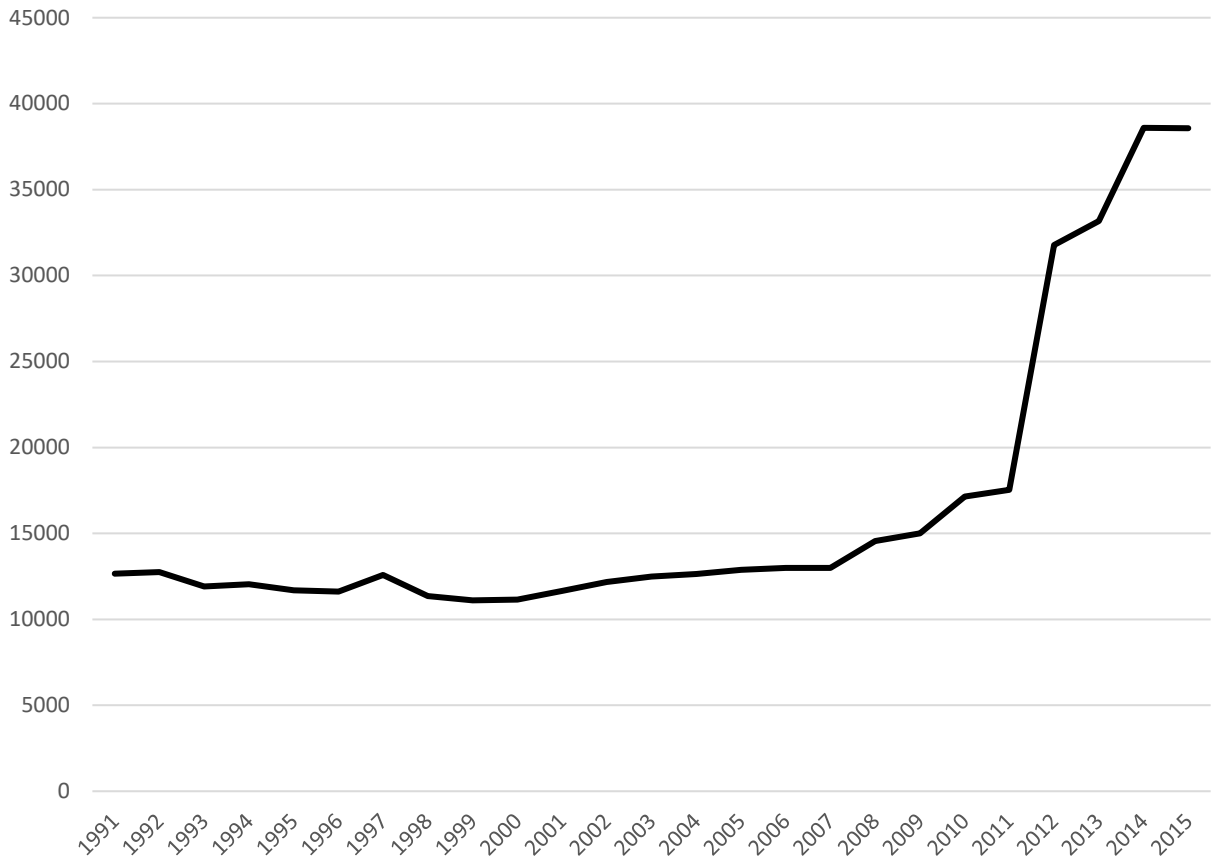
Number of words contained in Title 12, Chapters 1-6 of the United States Code and predecessor statutes. Source: author's count.

Figure 4. Industrial Production and Bank Lending, by month, 1991-2015



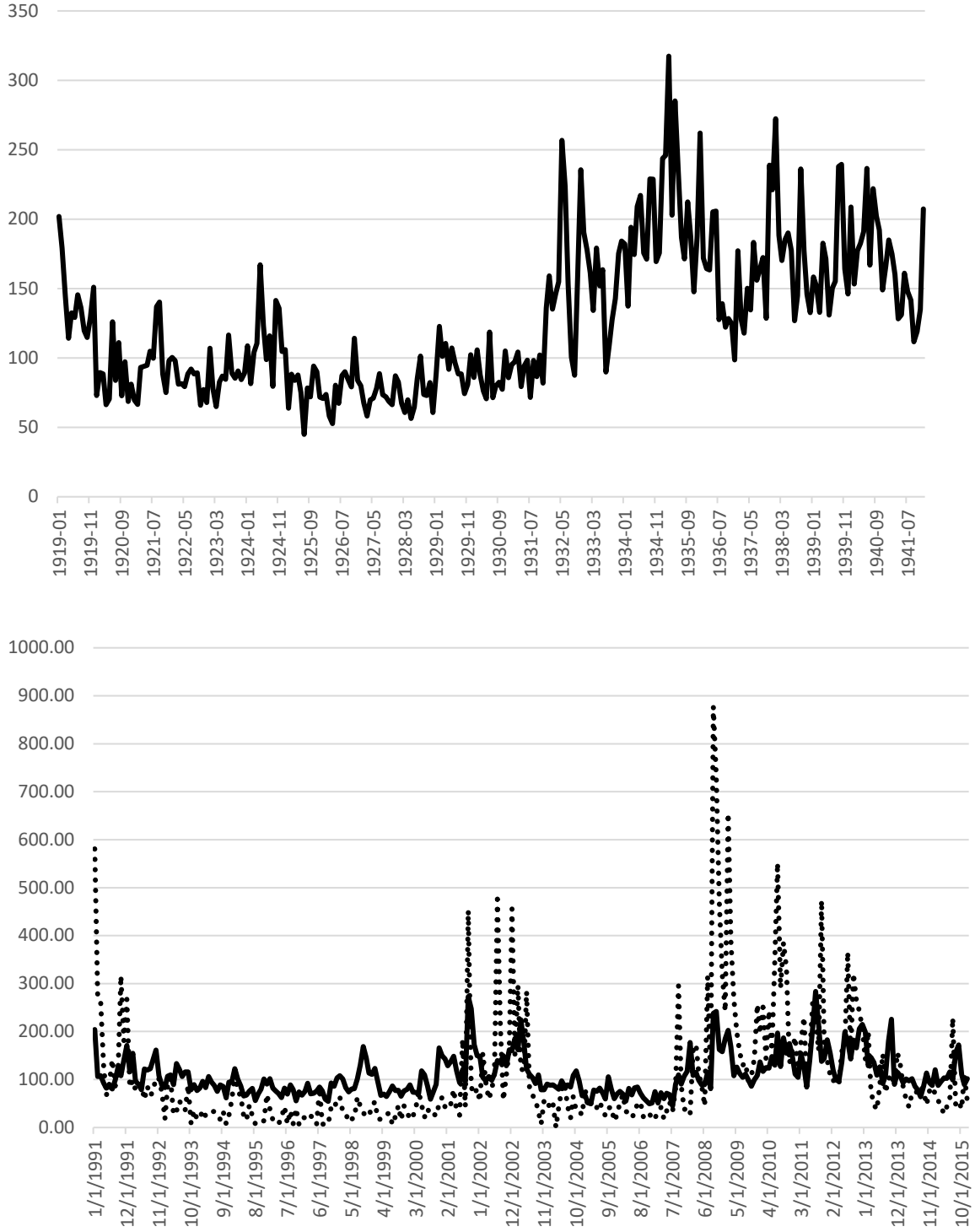
The solid line shows an index of industrial production (left-hand scale). Source: FRED data, series INDPRO. The dashed line shows loans and leases in bank credit, all commercial banks, seasonally adjusted, in trillions of dollars (right-hand scale). Source: FRED data, series LOANS.

Figure 5. Restrictions contained in banking regulation, annual, 1991 – 2015



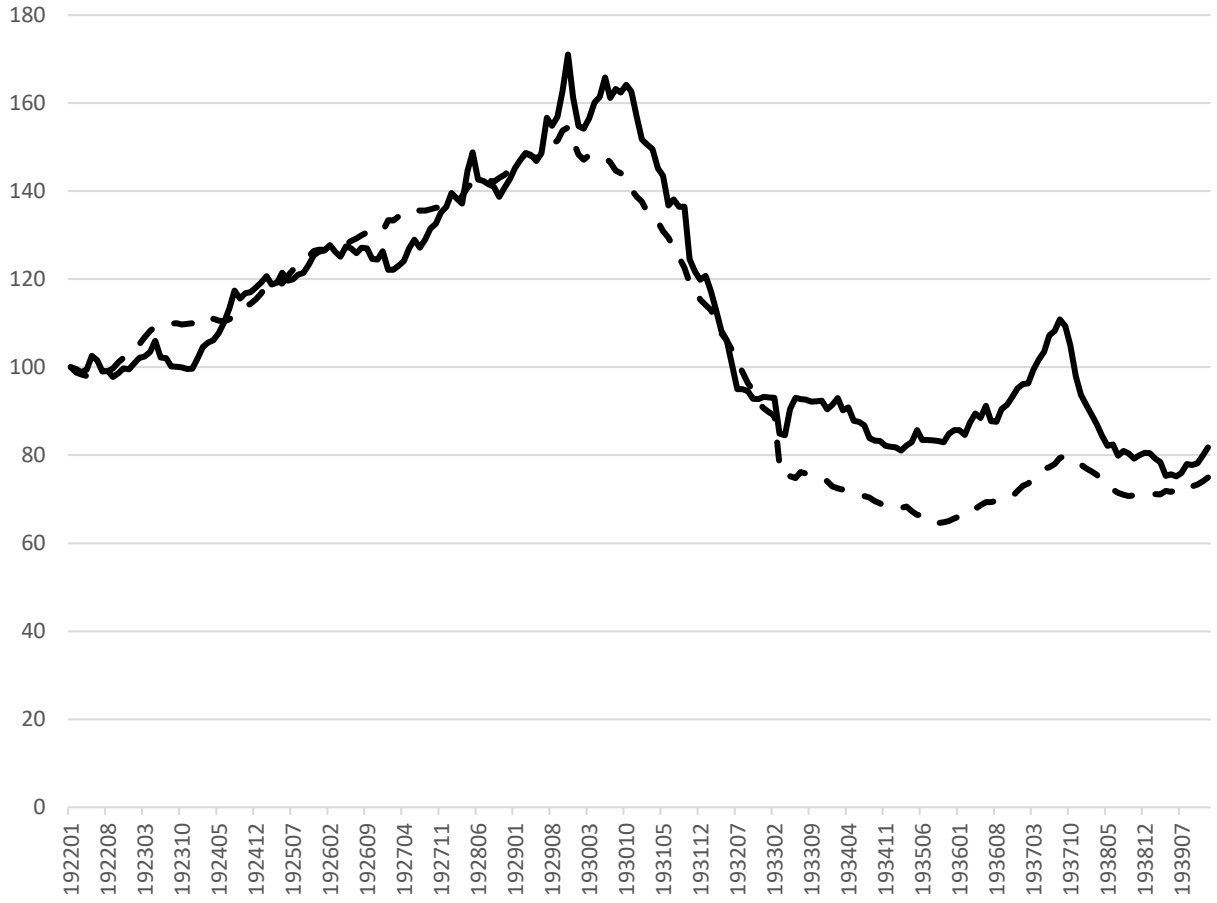
Count of words “shall,” “must,” “may not,” “required,” and “prohibited” in regulations contained in Title 12 of the Code of Federal Regulations and promulgated by the Comptroller of the Currency, the Federal Deposit Insurance Corp., or the Board of Governors of the Federal Reserve System and related entities. Source: https://quantgov.org/regdata/

Figure 6. Economic policy uncertainty indexes, by month, 1919-1941 and 1991-2015



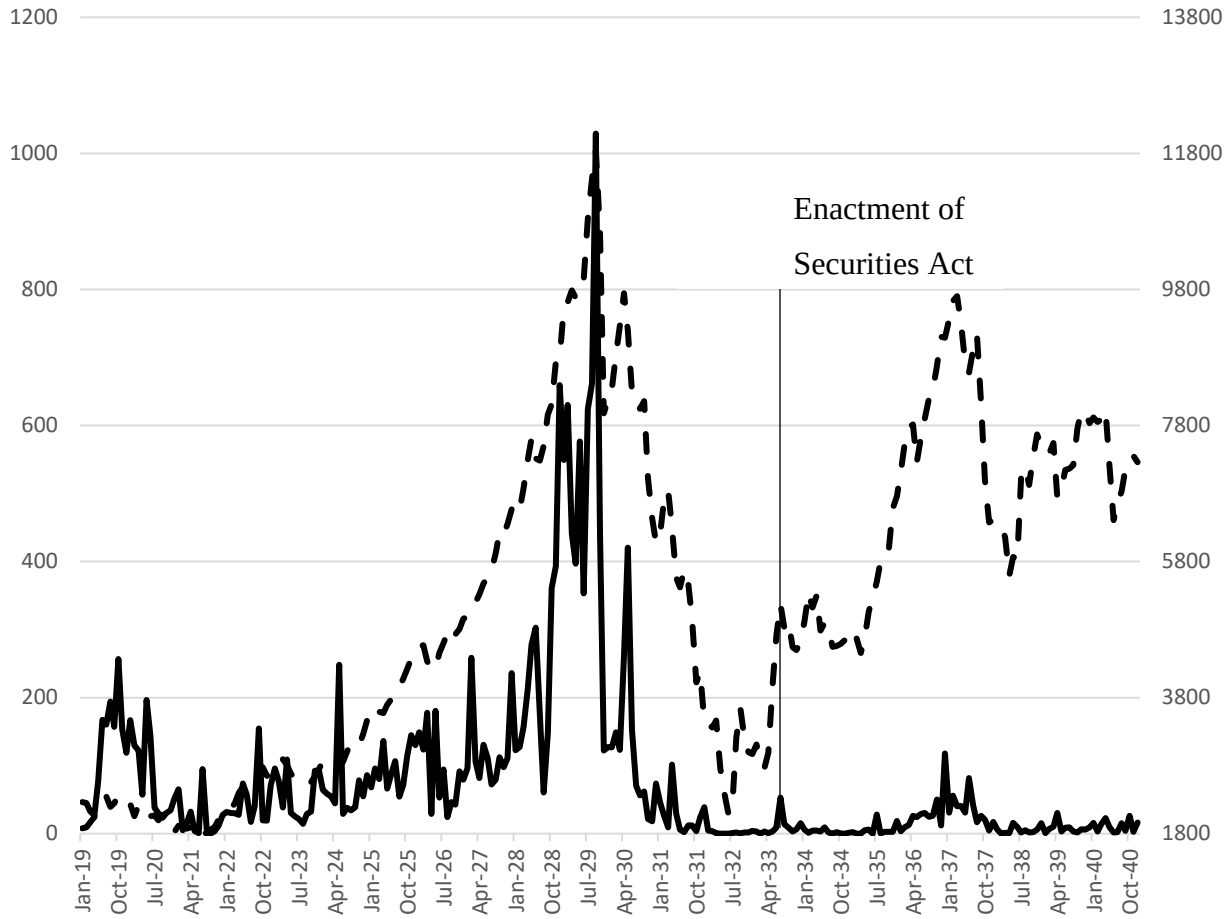
The top chart shows the news-based Economic Policy Index of Baker, Bloom, and Davis (2015). The bottom chart shows the same index (solid line) and the financial regulation sub-index (dotted line) from the same source.

Figure 7. Lending by New York and non-New York-based banks, by month, 1922-1939



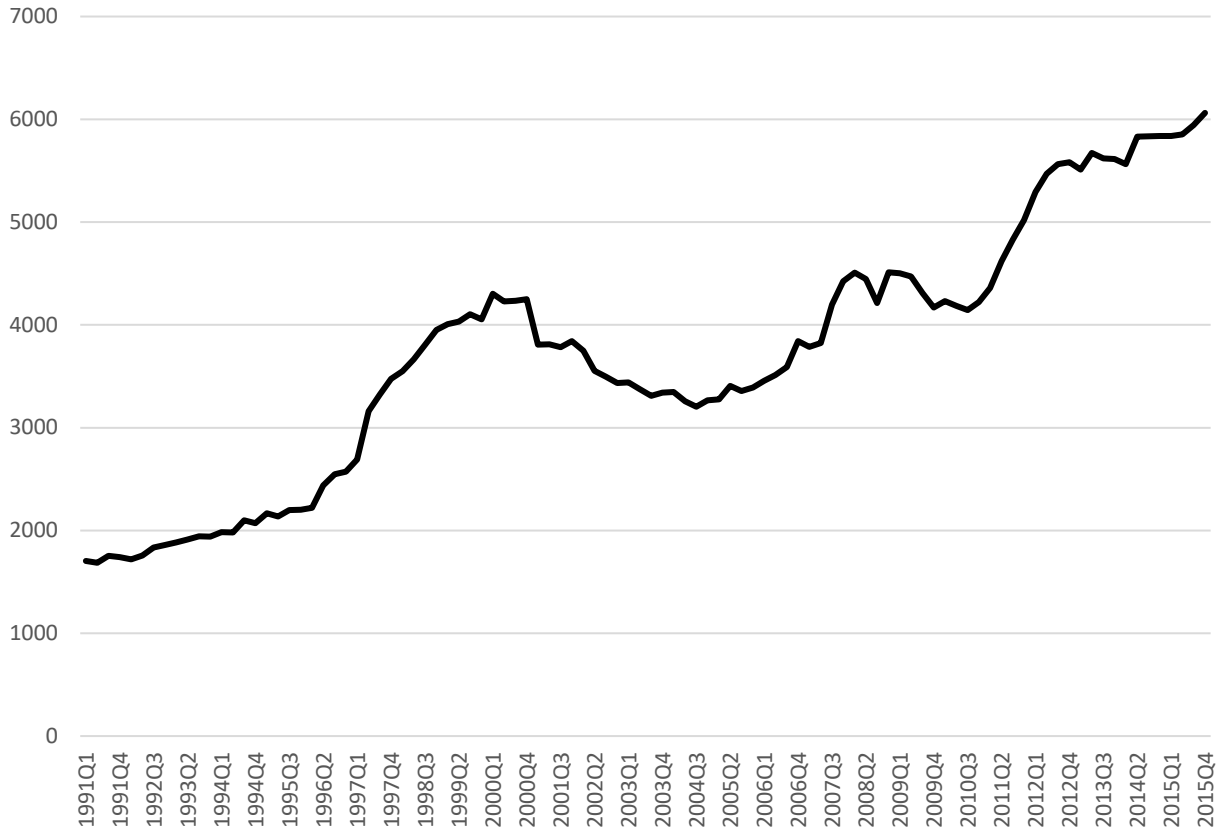
The solid line shows loans on the books of New York-based banks that reported weekly to the Federal Reserve. The dashed line shows loans on the books of all other weekly reporting banks. Both are scaled so that January 1922=100. Source: Federal Reserve Annual Reports and Bulletins, various issues.

Figure 8. New issues of equity securities and stock prices, by month, 1919-1940



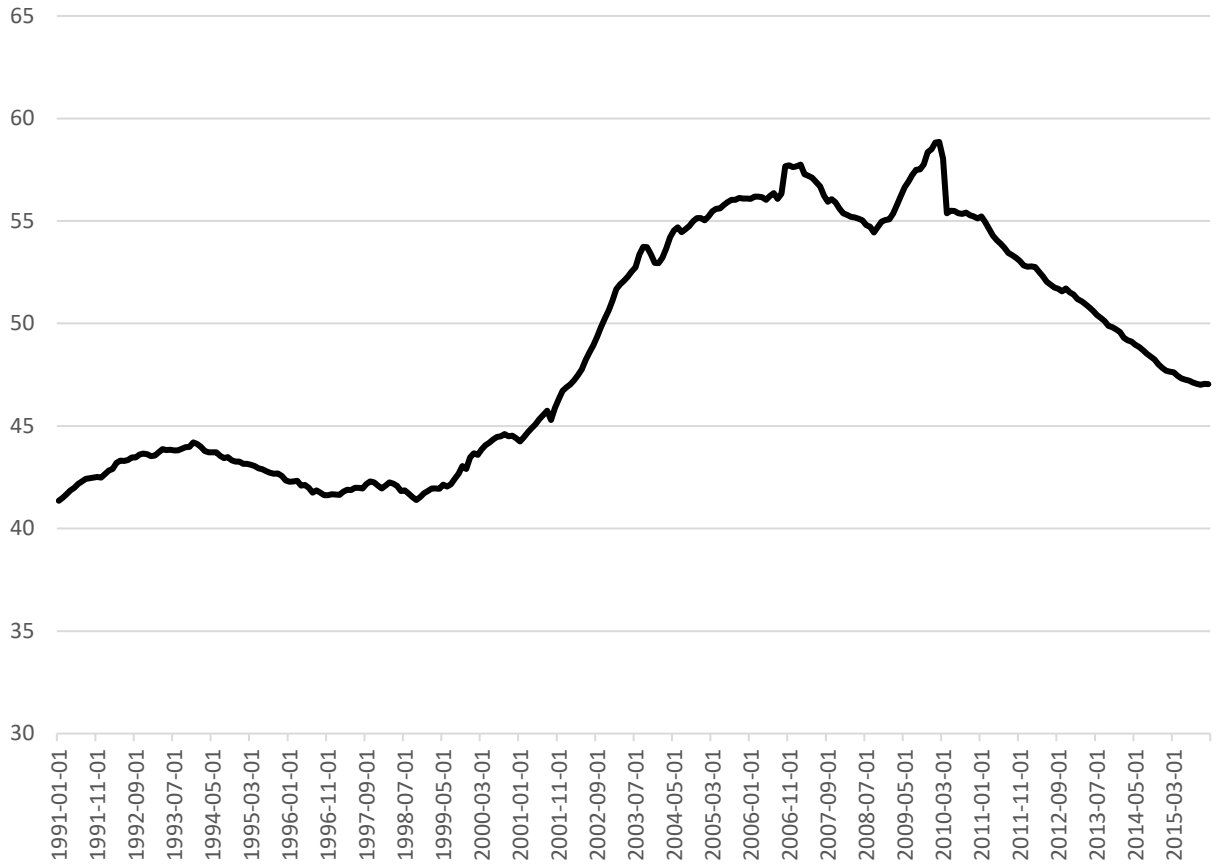
The solid line represents the volume of new issues of equity securities by U.S. and Canadian issuers in the United States, in millions of dollars (left-hand scale). Source: FRED data, series M10011M144NNBR. The dashed line represents the Cowles index of stock prices (right-hand scale). The vertical line marks the May 1933 enactment of the Securities Act of 1933.

Figure 9. Business loans made by banks among the top 100 in size as a multiple of loans by all other banks, by month, 1991-2015



The figure shows commercial and industrial loans made by banks among the 100 largest by assets, observed quarterly and not seasonally adjusted (FRED data, series ACILT100), divided by commercial and industrial loans made by banks not among the 100 largest (FRED data, series ACILOB).

Figure 10. Loans secured by real estate as a percentage of all loans and leases in bank credit, by month, 1991-2015



The figure shows loans secured by real estate, all commercial banks (FRED series REALLN) as a percentage of all loans and leases in bank credit, all commercial banks (FRED series LOANS).

Table 1. Summary Statistics, Depression-era variables

Summary statistics and pairwise correlations for the main variables used in Section IV of the study. Observations are monthly for a sample period from January 1919 through December 1941 except as noted below.

The variables are the rate of growth, in per cent, of seasonally-adjusted bank loans (source: Federal Reserve Bulletins and Annual Reports, various issues); the first difference of the deposits of suspended banks, in millions of dollars (FRED series M09039USM144NNBR, beginning January 1921); the growth rate of the wholesale price index, in per cent (FRED series M0448CUSM350NNBR); the first difference of the Economic Policy Uncertainty index of Baker et al. (2016); the first difference of the author's hand count of the number of words in federal banking statutes; and the first difference of loans held by NY-based reporting banks divided by all loans of reporting banks (Source: Federal Reserve Bulletins and Annual Reports, various issues, beginning January 1922).

Panel A: sample variables

	N	*Mean*	*Std. Dev.*	*Min*	*Max*
Growth rate of bank loans	275	0.971	16.685	-60.672	75.332
First difference, deposits of suspended banks	251	-0.090	62.249	-472.624	429.275
Growth rate of wholesale prices	275	-1.569	21.660	-120.966	72.153
First difference, EPU index	275	0.020	33.149	-114.527	110.407
First difference, log words in banking statutes	275	0.003	0.020	-0.002	0.279
First difference, NY banks' market share	239	0.000	0.439	-1.424	1.465

Panel B: correlation matrix

	Loans	Lagged loans	Deposits susp. banks	Price growth	EPU	Log words	
Growth rate of bank loans	1.000						
Same, lagged one period	0.653	1.000					
First diff., deposits susp banks	-0.029	0.117	1.000				
Growth rate of wholesale prices	0.389	0.318	-0.038	1.000			
First difference, EPU index	-0.046	-0.001	0.021	-0.069	1.000		
First difference, log words	0.018	0.114	0.078	0.168	0.002	1.000	
First difference, NY bank mkt share	0.502	0.025	-0.022	0.191	-0.025	0.152	1.000

Table 2. Regressions: Growth rate of commercial bank loans, 1921-1941.

All variables as described in Table 1.

Variable	*Model 1*	*Model 2*	*Model 3*
Growth rate of bank loans, *t-1*	0.430**	0.405**	0.451**
	(0.063)	(0.065)	(0.065)
Growth rate of bank loans, *t-2*	0.062	0.045	0.046
	(0.068)	(0.068)	(0.070)
Growth rate of bank loans, *t-3*	0.073	0.057	0.089
	(0.066)	(0.067)	(0.069)
Growth rate of bank loans, *t-4*	0.157**	0.147*	0.135*
	(0.060)	(0.060)	(0.062)
First difference, deposits of failed banks, *t*	-0.035**	-0.034*	-0.028*
	(0.013)	(0.013)	(0.013)
First difference, deposits of failed banks, *t-1*	-0.039**	-0.032*	-0.023
	(0.013)	(0.013)	(0.015)
Growth rate of wholesale prices, *t*	0.188**	0.161**	0.196**
	(0.050)	(0.051)	(0.052)
Growth rate of wholesale prices, *t-1*	0.024	0.031	0.049
	(0.049)	(0.049)	(0.050)
First difference, Economic Policy Uncertainty index (DEPU), *t*		-0.046	
		(0.025)	
DEPU, *t-1* + DEPU, *t-2* + DEPU, *t-3*		-0.164*	
		(0.075)	
DEPU, *t-4* + DEPU, *t-5* + DEPU, *t-6*		-0.249**	
		(0.084)	
DEPU, *t-7* + DEPU, *t-8* + DEPU, *t-9*		-0.172*	
		(0.085)	
DEPU, *t-10* + DEPU, *t-11* + DEPU, *t-12*		-0.066	
		(0.069)	
First difference, log word count in banking statutes, *t+1*			92.280*
			(40.342)
First difference, log word count in banking statutes, summed coefficients for *t* through *t+6*			-214.792*
			(91.562)

N	250	250	249
Adjusted R-square	0.508	0.528	0.520
p-value, Durbin test for serial correlation	0.342	0.363	0.210

Standard errors in parentheses. **, * denote significance at the 1% and 5% levels, respectively.

Table 3. Regression: First difference, share of total loans held by New York-based banks

All variables as described in Table 1.

Variable	Estimated coefficient
First difference, log word count in banking statutes, *t+1*	3.788**
	(1.360)
First difference, log word count in banking statutes, *t*	3.289*
	(1.360)
First difference, log word count in banking statutes, *t-1*	-0.878
	(1.360)
Adjusted R-square	0.044

Standard errors in parentheses. **, * denote significance at the 1% and 5% levels, respectively.

Table 4. Regression: New issues of equity securities

The dependent variable is the volume, in millions of dollars, of new equity securities issued in the United States by U.S. and Canadian companies for each month from January 1919 to December 1940, inclusive (FRED series M10011M144NNBR). Cowles Index is the level of the Cowles Index of stock prices (Source: Cowles (1939) and supplements). Financial crisis period takes the value 1 for all months beginning in October 1929 and zero otherwise. Regulatory period takes the value 1 for all months beginning in May 1933 and zero otherwise.

Variable	Estimated coefficient
Cowles Index	0.041**
	(0.002)
Financial crisis period	-128.232**
	(14.903)
Regulatory period	-93.840**
	(15.487)
Constant	-34.772**
	(12.058)
Adjusted R-squared	0.603

Standard errors in parentheses. **, * denote significance at the 1% and 5% levels, respectively.

Table 5. Summary Statistics, Great Recession-era variables

Summary statistics and pairwise correlations for the main variables used in Section V of the study. Observations are monthly for a sample period from January 1991 through December 2015 except as noted below.

The variables are the growth rate, in per cent, of loans and leases in bank credit, all commercial banks (FRED series LOANS), detrended; the first difference of deposits of failed insured banks, in billions of dollars (source: FDIC, beginning October 1991), deflated by the consumer price index; the first difference of the civilian unemployment rate, in per cent (FRED series UNRATE), the first difference of the Economic Policy Uncertainty Index of Baker et al. (2015); the first difference of the Financial Regulation Policy Uncertainty Index from the same source; and the first difference of real estate loans, all commercial banks (FRED series REALLN) divided by loans and leases in bank credit, in per cent.

Panel A: sample variables

	N	*Mean*	*Std. Dev.*	*Min*	*Max*
Detrended growth rate of bank loans	299	-0.908	6.428	-21.109	20.925
First diff., inflation-adjusted deposits of failed banks	290	-0.025	2.316	-12.688	12.872
First diff., civilian unemployment rate	299	-0.005	0.156	-0.500	0.500
First diff., EPU index	299	-0.255	18.791	-81.116	103.770
First diff., FRPU	299	-1.762	103.717	-367.869	785.262
First diff., real estate share of lending	299	0.019	0.269	-2.658	1.346

Panel B: correlation matrix

	loan growth	Deposits failed	Unempl.	EPU	FRPU	r.e. share
Detrended growth rate of bank loans	1.000					
First diff., infl. adj. deposits failed banks	0.055	1.000				
First diff., civ. unemployment rate	-0.156	-0.058	1.000			
First diff., EPU index	0.099	0.124	0.022	1.000		
First diff., fin. regulation EPU index	0.184	0.294	-0.107	0.329	1.000	
First diff., real est. share of lending	-0.103	-0.093	0.088	-0.148	-0.147	1.000

Table 6. Regressions: Detrended growth rate of commercial bank loans, 1991-2015.

All variables as described in Table 5.

Variable	*Model 1*	*Model 2*	*Model 3*
Growth rate of bank loans, *t-1*	0.357**	0.345**	0.322**
	(0.061)	(0.061)	(0.060)
Growth rate of bank loans, *t-2*	0.107	0.111	0.125*
	(0.063)	(0.063)	(0.062)
Growth rate of bank loans, *t-3*	-0.000	-0.034	0.014
	(0.064)	(0.063)	(0.063)
Growth rate of bank loans, *t-4*	0.170**	0.222**	0.196**
	(0.062)	(0.062)	(0.064)
Growth rate of bank loans, *t-5*	0.081	0.083	0.096
	(0.058)	(0.059)	(0.059)
First difference, deposits of failed banks, *t-4*	-0.366*	-0.361*	-0.308
	(0.163)	(0.162)	(0.166)
First difference, deposits of failed banks, *t-5*	-0.311	-0.331*	-0.365*
	(0.161)	(0.160)	(0.167)
First difference, civilian unemployment rate, *t-4*	-6.314**	-5.050**	-4.685*
	(1.887)	(1.918)	(1.912)
First difference, civilian unemployment rate, *t-5*	-4.006*	-2.320	-2.849
	(1.938)	(1.954)	(1.940)
First difference, Economic Policy Uncertainty index (DEPU), *t-4* + DEPU, *t-5*, + DEPU, *t-6*		-0.104**	
		(0.037)	
DEPU, *t-7* + DEPU, *t-8* + DEPU, *t-9*		-0.150**	
		(0.042)	
DEPU, *t-10* + DEPU, *t-11* + DEPU, *t-12*		-0.086*	
		(0.038)	
First difference, Financial Regulation Uncertainty index (FRPU), *t-4* + FRPU, *t-5* + FRPU, *t-6*			-0.014
			(0.009)
FRPU, *t-7* + FRPU, *t-8* + FRPU, *t-9*			-0.022*
			(0.010)
FRPU, *t-10* + FRPU, *t-11* + FRPU, *t-12*			-0.039**
			(0.009)

N	285	285	285
Adjusted R-square	0.438	0.464	0.466
p-value for Durbin serial correlation test	0.182	0.190	0.393

Standard errors are in parentheses. **, * denote significance at the 1% and 5% levels, respectively.

Table 7. Regression: First difference, real estate share of lending

All variables as described in Table 5.

Variable	Estimated coefficient
First difference, Real estate share, *t-1*	0.433**
	(0.052)
10 x First difference, FRPU, *t*	-0.041**
	(0.013)
N	298
Adjusted R-squared	0.203

Standard errors are in parentheses. **, * denote significance at the 1% and 5% levels, respectively.

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