Credit Crunches and the Great Stagflation

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March 2023

Abstract

We show that severe credit crunches in the banking system contributed to the Great Stagflation of the 1970s. The credit crunches were due to Fed tightening in the presence of a large financial friction: Regulation Q, a banking law that capped deposit rates. Reg Q became binding whenever the Fed raised rates, leading to large outflows of deposits and a contraction in bank lending – a credit crunch. Since firms need credit to produce, the credit crunches acted as negative supply shocks, forcing firms to raise prices and cut output (stagflation). We find that the Reg Q credit crunches align closely with the stagflation cycles in the time series: when Reg Q binds, deposits flow out and bank loan supply shrinks, firms' order backlogs increase, prices rise and output falls. To test the hypothesis that the Reg Q credit crunches led to stagflation, we compare industries based on their dependence on external financing. We find that during the credit crunches finance dependent industries raise prices and shrink output relative to other industries. We find the same result for industries located in areas where banks are more exposed to Reg Q, especially if these industries are finance dependent. Our findings imply that when raising rates cuts off credit to firms, monetary policy affects aggregate supply and not just demand.

JEL Codes: E52, E58, G21, G28
Keywords: Stagflation, inflation, monetary policy, banks, deposits, Regulation Q

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The Great Stagflation was a watershed event in macro and monetary policy. Between 1965 and 1982, the U.S. economy went through four severe downturns, each one accompanied by surging inflation. The combination of high inflation and low growth—"stagflation"—went against the prevailing Keynesian view, according to which inflation and output should move together along a stable Phillips curve. Economists concluded that the Phillips curve is not stable, but shifts up and down based on changes in inflation expectations. By failing to raise interest rates aggressively enough, the Federal Reserve had allowed inflation expectations to drift up and become self-fulfilling (Clarida, Gali and Gertler, 1999, 2000). This view underlies the textbook New Keynesian model (Woodford, 2003; Galí, 2007) and the practice of monetary policy today.

It is still a challenge to explain the "stag" part of the Great Stagflation under this view. While loose monetary policy explains the bursts of inflation, it does not explain why they coincided with recessions. This is because monetary policy is viewed as working through aggregate demand, pushing prices and output in the same direction. Changes in inflation expectations weaken this relationship but do not invert it. To explain the stagflation, the literature evokes a series of exogenous supply shocks (such as oil) that repeatedly hit the economy throughout the period. Because these shocks are exogenous, there is nothing monetary policy could have done about them. This narrative solidified the view that the Fed should take supply as given and focus on managing demand.[1]

In this paper, we argue that the negative supply shocks that led to stagflation were not fully exogenous. Instead, they were due in part to monetary tightening in the presence of a large financial friction. The friction was the infamous banking law known as Regulation Q, which put a hard ceiling on bank deposit rates. The ceiling became binding whenever the Fed raised rates, leading to large outflows of deposits that triggered sharp contractions in lending – credit crunches. Since firms rely on credit to pay for materials and labor up front, the credit crunches disrupted their ability to produce. This negative supply shock led firms to raise prices and cut output, resulting in stagflation.

Our results imply that monetary policy affects supply and not just demand. The ex-

[1] This view was recently expounded by Larry Summers: "Supply is what it is. Monetary policy can't change it. Fiscal policy can't change it, except in the long-run. And so given what supply is, it's the task of demand to balance supply. And if demand is greater than supply, then you're going to have excess inflation and you're going to have the problems of financial excess. So the job of the demand managers, principally the Fed, is to judge what supply is and calibrate appropriately. It's not an excuse for inflation to blame it on supply. It's a reality in the environment that you have to deal with." See https://www.nytimes.com/2022/03/29/podcasts/transcript-ezra-klein-interviews-larry-summers.html.

tent to which it does so depends on frictions in the financial system. When the financial system is constrained such that raising rates chokes off the flow of credit to firms, controlling inflation becomes more difficult and costly to the economy.

Figure 1 gives an overview of the Great Stagflation, with shading according to conventional dating. Panel A shows that inflation (red line) rises in four successive cycles, each peaking higher than the one before. The striking feature is that every inflation cycle is mirrored by a sharp decline in GDP growth (green line). This is the "stag" part of the stagflation. The timing is very close: inflation starts rising just as GDP growth begins to fall, and peaks just as GDP growth bottoms out. This tight negative relationship (higher prices, lower quantities) implies that on net the economy was hit by a supply shock in each cycle.

Panel B of Figure 1 provides evidence of the supply shocks in the manufacturing sector. The figure plots real unfilled orders for manufacturing (excluding defense). Unfilled orders, also known as the order backlog, are committed orders that firms have received but not yet fulfilled. The figure shows that unfilled orders track inflation extremely closely during the Great Stagflation. In fact, they slightly lead inflation, suggesting that firms raised prices as their backlogs grew.

Backlogs can arise due to either high demand or low supply. If demand is the main driver, we would expect output to be high when backlogs are high. The figure shows the opposite: output and unfilled orders are highly negatively correlated throughout the Great Stagflation. This suggests that firms were hit by shocks that disrupted their ability to produce, causing output to fall and unfilled orders to pile up. We argue that these shocks were contractions in credit supply.

Figure 2 shows the source of the credit contractions. The red line in Panel A is the Reg Q ceiling rate on savings deposits, the largest deposit category (other categories had slightly different ceilings but follow the same pattern). The Fed funds rate (blue line) first crosses the ceiling at the onset of the Great Stagflation in late 1965. As the ceiling prevents deposit rates from keeping up, real deposit growth (black line) drops sharply. Later, when the Fed funds rate falls back toward the ceiling, deposit growth rebounds. This pattern repeats in every subsequent cycle, becoming more pronounced as a higher Fed funds rate makes the ceiling bind more tightly over time. The impact is large: annual real deposit growth fluctuates from $+10\%$ to -9%. This pattern ends in 1982, when Reg Q is effectively repealed (see Gilbert, 1986).

Panel B shows that the drop in deposit growth translates roughly one-for-one into a drop in (real) bank credit growth.[2] Since this refers to the *stock* of bank credit, it implies an even bigger drop in the flow of new loans. For instance, when credit growth fell from +6.4% to −4% during the credit crunch of 1969–70, new bank loans shrank by 51%. The tight relationship between deposits and bank credit shows that banks were unable to replace deposits, which are their main source of funding, with other funding. This resulted in repeated credit crunches.[3]

Figure 3 shows that the credit crunches led to tighter credit conditions for firms. We measure the tightness of credit conditions for firm borrowers using the Federal Reserve's quarterly "Changes in Bank Lending Practices Survey" (CBLS), which begins in 1964. The survey asks large commercial banks whether their credit standards for Commercial and Industrial (C&I) loans are tighter, looser, or unchanged from the prior quarter. We construct an index for the tightness of C&I credit standards as the share of banks that report tightening minus the share that report loosening. This construction follows the standard approach used for the "Senior Loan Officer Opinion Survey," which is the successor of the CBLS. The index is a widely used measure of the balance sheet condition and risk appetite of large banks (e.g., Gilchrist and Zakrajšek, 2012).

Panel A plots the C&I credit standards index against real deposit growth. There is a strong negative relationship between the two lines: credit standards tighten when deposit growth is low and ease when it rises. Indeed, changes in deposit growth seem to explain most of the fluctuations in credit standards. This is consistent with the view that low deposit growth leads banks to cut lending. They do so by tightening credit standards, which makes it harder for firms to obtain the financing they need.

While tight credit standards are typically seen as reflecting low credit supply, in principle they could also reflect high credit demand. Fortunately, we can control for credit demand because the CBLS explicitly asks about it. We construct a loan demand index as the net share of banks anticipating higher loan demand. We net out this demand index from the credit standards index to get an index of credit tightness due only to fluctuations in credit supply. We take the negative of this index so that a high value means high loan supply and a low value means low loan supply.

[2] Bank credit is from the Federal Reserve's H.8 release, available on FRED under the acronym TOTBKCR.

[3] The first of these is known as the Credit Crunch of 1966. In fact, the term "credit crunch" was coined to describe this episode (Wojnilower, 1980). While not as prolonged as the later crunches, the Credit Crunch of 1966 is important because it involved few confounding factors, allowing observers to document the role it played in causing the sudden, sharp decline in GDP growth that occurred at the time (Burger, 1969).

Panel B plots this estimated loan supply index. The relationship with deposit growth is striking: changes in loan supply coincide almost perfectly with changes in deposit growth throughout the sample period. C&I loan supply thus shrinks when deposits flow out of the banking system and expands when they flow back in. Together with Figure 2, this shows that Reg Q had a large impact on the supply of loans to firms.

Figure 4 shows that the credit crunches did not just affect bank lending but the entire financial system. Panel A plots the Chicago Fed financial conditions index (red line), a measure of tightness across loan, bond, and equity markets.[4] The index has a strong negative relationship with deposit growth (black line) during the Reg Q period. Thus, when deposits flowed out, financing became very tight across all markets. This is not surprising because banks played a central role in the financial system.[5] Notably, the index spikes higher during Reg Q than in the 2008 financial crisis, highlighting the severity of the credit crunches.

Panel B of Figure 4 plots the Fed funds rate and the Tbill rate. The difference between them, the Fed funds-Tbill spread, measures the liquidity premium of Tbills (e.g., Nagel, 2016). Because Tbills are a partial substitute for deposits, they absorbed some of the deposit outflows triggered by Reg Q. This drove their yields down toward the Reg Q ceiling, greatly increasing the liquidity premium. The premium peaks at 5.37% in 1974, far higher than the 1.35% reached in 2008, reflecting the acute shortage of safe, liquid assets induced by Reg Q. The impact of Reg Q was thus felt throughout the financial system.

Figure 5 looks at the relationship between the credit crunches and the macroeconomy during the Great Stagflation. Panel A shows that deposit growth (black line) and GDP growth (both real) are highly positively correlated. Panel B shows the same holds for deposit growth and employment (green line), which slightly lags output. At the same time, deposit growth and inflation (red line) are highly negatively correlated. Thus, the credit crunches line up very closely with the pattern of stagflation, consistent with our hypothesis that they disrupted firms' ability to produce and led them to cut output and raise prices.

To test this hypothesis further, we exploit cross-sectional variation in exposure to the Reg Q credit crunches. Analyzing the cross section addresses concerns that the time series

[4] The index is a weighted average of 105 indicators of financial activity (see Brave and Butters, 2011, for details). We use the adjusted version, which controls for non-financial conditions. The index starts in 1971.

[5] The Reg Q period led to significant financial innovation, such as growth in the corporate bond market and the emergence of money market mutual funds. We discuss these in Sections 4.2 and 4.3 and find that compared to banks they remained small and were accessible to very few firms.

of inflation and GDP growth could be driven by an omitted variable (e.g., oil shocks) that happens to be correlated with the credit crunches. We use detailed data on 459 manufacturing industries at the four-digit SIC level from the NBER-CES database, a widely used dataset for studying productivity trends in the U.S. Importantly, it contains information on both prices and quantities, allowing us to test for stagflation in the cross section.

We use two sources of industry-level variation in exposure to the credit crunches. The first is based on external finance dependence (Rajan and Zingales, 1998). We measure an industry's external finance dependence for production as the fraction of production costs (materials and labor) that is not covered by profits. The idea is that industries that have large production costs relative to profits lack the internal resources to self-finance production and must therefore rely on external financing. These industries are likely to be more exposed to the Reg *Q* credit crunches.

We validate our measure using balance sheet data from the Quarterly Financial Reports. We find that industries with higher finance dependence have significantly more debt, particularly short-term debt. They are also more bank-dependent, have less cash, and have lower debt service ratios. This shows that finance dependent industries are both more reliant on credit and have fewer resources to absorb a credit supply shock.

We use our measure to test if the Reg *Q* credit crunches produced stagflation. Under this hypothesis, as Reg Q becomes more binding, finance dependent industries should raise prices and cut output relative to non-finance dependent industries. We find strong evidence that this is the case. Finance dependence strongly predicts higher price growth and lower output growth during each of the four Reg *Q* credit crunches (1965–66, 1969–70, 1973–74, and 1978–79). At the peak of the 1973–74 credit crunch, a one-standard-deviation increase in finance dependence predicts 3% higher price growth and 2.6% lower output growth per year, an economically large effect.

Our results are unchanged when we control for changes in the cost of materials and labor, hence finance dependent industries raised output prices relative to input costs, consistent with the hypothesis that the credit crunches acted as a negative supply shock. The results are also unchanged when we control for energy intensity, which shows that they are not due to the oil shocks, and the volatility of prices and output, which rules out differences in cyclicality or price stickiness. Finance dependence also negatively predicts employment, inventories, and investment during the credit crunches. As a placebo, we verify that it does not predict prices and output post Reg *Q*, when there are no credit crunches. Our results thus support the hypothesis that the Reg Q credit crunches disrupted firms' ability to produce, leading them to raise prices and cut output.

Our second set of tests uses variation in the extent to which Reg Q itself was binding for different industries. This variation is based on the fact that Reg Q applied differently to different types of deposits (e.g., large- versus small-time deposits and savings deposits). We use this fact to construct a Reg Q spread for each bank based on the bank's deposit mix. We find that this Reg Q spread is a strong predictor of both deposits and C&I lending (i.e., the credit crunches) across banks.

We map the bank Reg Q spreads to the industry level using data on the locations of each industry's establishments. This implicitly assumes that firms borrow locally, which is plausible in our sample because it predates banking deregulation in the 1980s (Kroszner and Strahan, 2014). Given this assumption, the industry Reg Q spread measures an industry's exposure to Reg Q based on the exposure of its lenders.

We find that high Reg-Q-spread industries raise prices and shrink output and employment relative to low Reg-Q-spread industries. Thus, like finance dependence, the Reg Q spread predicts stagflation across industries. The effects are sizable and significant. They are also robust to the same set of controls. As a final exercise, we interact the industry Reg Q spread with finance dependence. The idea is that an increase in the industry Reg Q spread should matter more for industries that require more external financing. We find that this is the case. These results further support the hypothesis that the Reg Q credit crunches generated stagflation.

The rest of the paper is organized as follows: Section 1 reviews the literature; Section 2 describes the data; Section 3 presents the cross-sectional results; Section 4 discusses other factors; and Section 5 wraps up.

1 Related literature

Our paper is part of the literature on the Great Stagflation of the 1970s. Goutsmedt (2021) provides an illuminating survey. The earliest work by Phelps (1967, 1968) and Friedman (1968, 1977) argues that a rise in inflation expectations had flattened the Phillips (1958) curve. While this work went on to become extremely influential, Goutsmedt (2021) documents that its initial impact on the literature on the Great Stagflation was limited because it could not explain an *inverted* Phillips curve (stagflation). To address this, Gordon (1975) and Phelps (1978) build on the work of Okun (1975) to incorporate supply shocks into a macro model. Gordon (1977), Perry (1978), and especially Blinder (1979, 1982) provide a list of supply shocks that hit the economy in the 1970s: food shortages in 1972–74 and 1978–79, Nixon's price controls in 1971–74, and, most famously, the OPEC oil shocks in 1973 and 1979.[6] What these shocks have in common is that they are exogenous from the perspective of monetary policy. DeLong (1997) calls them "bad luck." Since bad luck can strike at any time, there is nothing to be done about it. It follows that the central bank should take aggregate supply as given and adjust demand so that it falls in line with supply. This view is at the heart of the textbook New Keynesian model (Woodford, 2003; Galí, 2007), which underlies modern macro and policy thinking.

The view that supply shocks are exogenous explains why the literature shifted focus from stagflation to inflation. As Goutsmedt (2021) notes, even the name of the period changed from "the Great Stagflation" to "the Great Inflation" (Blinder and Rudd, 2013, who criticize the shift, use the original name). The literature on the Great *In*flation centers on the Fed's failure to control demand.[7] Clarida, Gali and Gertler (1999, 2000) find that the Fed's response coefficient to inflation was below one, which violates the Taylor (1993) principle and leads to unstable inflation. The coefficient rose above one under Paul Volcker, leading to the disinflation of the 1980s (Goodfriend and King, 2005). By focusing on demand, the Great Inflation literature is again unable to explain the negative comovement between inflation and output. As Clarida, Gali and Gertler (2000) write, "To account for the negative comovement that occurred in the 1970s, it appears necessary also to mix in adverse supply shocks."

Our main contribution is to argue that a type of adverse supply shock arose endogenously due to a friction in the financial system. The friction, Regulation Q, led to severe credit crunches whenever the Fed raised rates. The credit crunches affected supply by disrupting firms' ability to finance production. This implies that the central bank cannot

[6]The oil shocks are best known but also debated. DeLong (1997), Clarida, Gali and Gertler (2000), and Barsky and Kilian (2001) point out that inflation was already high when the oil shocks hit, and that oil shocks outside the 1970s were not followed by high inflation. Related, Bernanke et al. (1997) argue that oil shocks affect the economy mainly through the response of the central bank.

[7]There are many explanations for this failure. Kydland and Prescott (1977) and Barro and Gordon (1983) argue that central bankers have an inflationary bias due to lack of commitment. DeLong (1997) sees the roots of the Great Inflation in the experience of the Great Depression. According to Sargent (1999), policymakers were learning the parameters of the inflation-unemployment tradeoff. Romer and Romer (2002) emphasize shifts in policymakers' beliefs, while Meltzer (2005) focuses on political factors. Orphanides (2003) and Primiceri (2006) argue that the Fed was working with flawed data.

take supply as given and focus on demand, contrary to conventional wisdom. Moreover, the extent to which supply is affected depends on the health of the financial system, specifically on the sensitivity of firm credit to interest rates.

Our paper is thus closely related to the cost channel of monetary policy of Barth and Ramey (2001).[8] Under the cost channel, a higher real policy rate makes it more costly for firms to finance their working capital, leading them to produce less. Barth and Ramey (2001) find evidence of a strong cost channel pre-Volcker but not post. Our hypothesis that the impact of monetary policy on supply was due to the Reg Q credit crunches, not just the real policy rate, naturally explains this change.

Gertler and Gilchrist (1994) find that small firms see a bigger drop in sales and inventories than big firms when monetary policy tightens. They interpret this as due to financial frictions. Kashyap, Lamont and Stein (1994) find similar results for bank-dependent firms versus firms that have access to the bond market. Chevalier and Scharfstein (1996) find that credit-constrained firms raise prices due to increased credit costs in recessions. These papers support the view that bank lending affects firms' ability to produce.

There is also work on the supply effects of credit crunches during financial crises. Gilchrist et al. (2017) find that liquidity-constrained firms raised prices relative to unconstrained firms during the Great Recession, and that this can account for the "missing deflation" of the period (see also Christiano, Eichenbaum and Trabandt, 2015). However, Kim (2021) finds that credit-constrained firms cut prices. The Great Recession is a challenging environment to study the impact of credit on aggregate supply because of the simultaneous collapse in demand and the run on the financial system. The same is true of the Great Depression: Bernanke (1983) notes that bank failures may have affected supply but concludes that the net impact was likely on demand. Similar to Bernanke (1983) in the context of the Great Depression, our work highlights the role of the financial sector in the Great Stagflation.

Our paper contributes to the recent literature that uses geographic variation in inflation and output to identify the slope of the Phillips curve (Beraja, Hurst and Ospina, 2016; Hooper, Mishkin and Sufi, 2019; McLeay and Tenreyro, 2019; Hazell et al., 2020). The variation we use, exposure to Regulation Q, affects both inflation and output, providing

[8]The cost channel builds on the work of Blinder and Stiglitz (1983) and Blinder (1987). In these papers, tighter monetary policy contracts credit by shrinking reserves. The mechanism we propose does not rely on a reserve requirement. It applies more generally when financial frictions make credit supply sensitive to interest rates. This includes different forms of financial repression (Reinhart and Sbrancia, 2015).

a mechanism for their negative relation during the 1970s.

We build on the literature on the bank lending channel of monetary policy (Bernanke and Blinder, 1988, 1992; Kashyap and Stein, 1994, 2000; Bernanke and Gertler, 1995), which focuses on the impact of monetary policy on bank lending. A recent contribution is the deposits channel of Drechsler, Savov and Schnabl (2017). In the deposits channel, banks have market power over deposits that allows them to keep deposit rates low when market interest rates rise. This leads to deposit outflows and a contraction in lending, similar to the mechanism in this paper. The key difference is that banks in the deposits channel *choose* how low to keep their deposit rates, optimally trading off the higher profits earned on deposits against the resulting deposit outflows and contraction in lending. In contrast, under Regulation Q banks were forced to pay the low deposit rates set by the law. This led to larger outflows and a much more severe contraction in lending.

There are a few macro papers on Reg Q.[9] Early contributions by Friedman (1970) and Tobin (1970) argue that Reg Q is deflationary because it shrinks deposits, which are part of the money supply. This monetarist perspective explains why the Fed allowed Reg Q to bind. Mertens (2008) argues that deposit rate ceilings increase the impact of monetary policy on output but does not consider their effect on inflation.

In Drechsler, Savov and Schnabl (2022), we consider the impact of Reg Q on savers. Reg Q blocks the transmission of interest rate hikes to households who save in deposits. Combined with the credit crunches, the monetary policy tradeoff becomes especially adverse: raising rates shrinks supply while failing to reduce demand. Effective monetary policy thus requires a well functioning financial system so that savers and borrowers face the same rate, the rate set by the central bank.

2 Data

Aggregate data: The Fed funds rate is from the Federal Reserve's H.15 release. Inflation is the year-over-year percentage change of the seasonally-adjusted Consumer Price Index (CPI) from the Bureau of Labor Statistics (BLS). GDP is real Gross Domestic Product from the Bureau of Economic Analysis. Employment is total non-farm employment from the BLS' Current Employment Statistics, as is manufacturing employment. The oil price is

[9] Most work on Reg Q is in the banking literature. Burger (1969) and Wojnilower (1980) chronicle the credit crunches and their impact on the economy (see also Bordo and Haubrich, 2010). Gilbert (1986) discusses the repeal of Reg Q. Koch (2015) shows that the Reg Q ceilings negatively impacted bank lending.

the spot price of West Texas Intermediate crude oil, deflated by the CPI. The Chicago Fed Adjusted National Financial Conditions Index is produced by the Federal Reserve Bank of Chicago. Deposits are core non-demand deposits (savings and small time deposits) at commercial banks and thrifts from the Federal Reserve's H.6 release, deflated by the CPI. Bank credit and commercial and industrial loans are from the Federal Reserve's H.8 release, deflated by the CPI. We downloaded all of these series from the Federal Reserve Bank of St. Louis' FRED database. Finally, unfilled orders are from the Census Bureau's Manufacturers' Shipments, Inventories, & Orders release.[10]

Bank lending survey: We use data from the Changes in Bank Lending Practices survey administered by the Federal Reserve quarterly from 1964 to 1981 and available on FRASER, the digital library of the Federal Reserve Bank of St. Louis. The survey is the progenitor of the Senior Loan Officer Opinion Survey (SLOOS) and has the same basic structure. Following the methodology of SLOOS, we compute the net percentage of banks reporting higher loan demand and tighter credit standards for commercial and industrial loans. For loan demand we use the item "Strength of demand for commercial and industrial loans: Anticipated in next 3 months" and for tightness of credit standards we use "Practice concerning review of credit lines or loan applications: New customers." The survey focuses on large banks in financial centers (cities with $150 million or more in business loans in 1964). It contains 80 banks until 1967 and 125 after that.

Deposit rates and ceilings: We obtain the interest rates on six-month Money Market Certificates (MMCs) and Money Market Deposit Accounts (MMDAs) from the Federal Reserve Board's Monthly Survey of Selected Deposits and Other Accounts.[11] We take the average rate across banks in the survey. The Reg Q ceiling rates are from Gilbert (1986) and Santomero and Siegel (1986).

Industry data: Our main industry-level data are annual from the NBER-CES Manufacturing Industry Database. The dataset is an industry-level aggregation of the U.S. Census Bureau's Annual Survey of Manufactures (ASM). Firms in the ASM are drawn from the Census of Manufactures, which covers the universe of manufacturing establishments in the U.S. Importantly, this includes private firms, which are the vast majority.[12] The NBER-

[10]The release is available at https://www.census.gov/manufacturing/m3. We use the seasonally adjusted series for unfilled orders in manufacturing ex defense (MXD). There is a break in the series in January 1968 as defense was not excluded prior to this date. To remove the break we scale the series prior to January 1968 by the average ratio of total (MTM) unfilled orders to MXD unfilled orders during 1968.

[11]The survey is available at https://www.federalreserve.gov/data/mmtd.htm.

[12]It is available at https://www.nber.org/research/data/nber-ces-manufacturing-industry-database.

CES database is thus representative of the entire U.S. manufacturing sector. The data are annual from 1958 and cover 459 manufacturing industries at the four-digit SIC level. Important for our study, they contain information on both prices and quantities. There are price deflators for shipments (sales), materials, investment, and energy. We calculate price growth as the percentage change of the shipments deflator. Output is shipments plus the change in inventories deflated by the shipments deflator. We also use information on materials prices, wages, employment, inventories, and investment. A second source of industry data are the Quarterly Financial Reports from the Census Bureau, which include detailed information on firm balance sheets.[13] They are available at the two-digit SIC code (sector) level starting in 1947.

Bank data: Our bank-level data come from the U.S. Commercial Bank Call Reports. The Call Reports are publicly available back to 1976 through Wharton Research Data Services (WRDS). We used a Freedom of Information Act (FOIA) request to obtain Call Reports covering the Reg *Q* period back to 1959.

Establishment data: We use data on establishments at the county-industry level from the Census Bureau's County Business Patterns database.[14] The data are annual back to 1967. We use this data to aggregate county-level banking measures to the industry level by weighting across counties by industry employment. Since employment is reported in bins, we use the bin midpoints for the weights.

Rated Firms: Our data on credit ratings is from the S&P Capital IQ Credit Ratings dataset.[15] For each year, we record how many firms had a credit rating and how many firms obtained a rating for the first time. The rating we use is the entity-level long-term rating. To ensure the entities are corporations we restrict the sample to entities that appear in Compustat.

Aggregate bank loan and corporate bond issuance: For aggregate bank loan and corporate bond issuance we use Table F.102 of the Financial Accounts of the United States (Federal Reserve Board Z.1 release). The data contains aggregate net new borrowing by nonfinancial businesses from depository institutions (including commercial mortgages), as well as net commercial paper and corproate bond issuance. We also calculate net issuance excluding utilities and oil companies using bond-level issuance data from Mergent Fixed

[13]They are available at https://www.census.gov/econ/qfr/.

[14]See https://www.census.gov/programs-surveys/cbp/data.html.

[15]We use S&P because the vast majority of rated firms had an S&P rating and because it is the only dataset that extends back to the entire Reg *Q* period.

Income Securities Database and SDC Platinum, which we aggregate to the industry level using the issuer's primary SIC classificatio. For best coverage we use the Mergent data for 1965–1969 and SDC Platinum for 1970–1982.

3 Cross-sectional analysis

Our hypothesis is that the Reg Q credit crunches led firms to raise prices and shrink output (stagflation). The reason is that firms need credit to produce; they have to pay for materials and labor up front, before they produce and ultimately sell their output. While some firms generate enough internal resources to cover their production costs, others rely on external financing, i.e., credit. This makes them more exposed to a credit crunch. Our hypothesis predicts that these finance dependent firms should have higher price growth and lower output growth during the Reg Q credit crunches. We test this prediction next.

3.1 Finance dependence

External finance dependence—finance dependence for short—was introduced by Rajan and Zingales (1998), who define it as "the amount of desired investment that cannot be financed through internal cash flows generated by the same business." Since we focus on production instead of investment, we modify their definition slightly to "the amount of desired *production* that cannot be financed through internal cash flows generated by the same business." Rajan and Zingales (1998) argue that finance dependence varies by industry for technological reasons that persist over time. Intuitively, some industries have small margins relative to their production costs and the length of their production cycle. Firms in these industries are likely to need more external financing for production.

Rajan and Zingales (1998) use Compustat data to measure finance dependence as one minus operating cash flow divided by investment (the "one minus" is to get the sign right). We replace investment with production costs, namely the cost of materials (including energy) plus production labor. Since we do not have operating cash flow in the NBER-CES data, we use gross margin (sales minus production costs) to capture firms' internal resources. Thus, our measure of finance dependence for industry i is

$$\text{Finance Dependence}_i \;=\; 1 - \frac{\text{Gross margin}_i}{\text{Production costs}_i}. \tag{1}$$

Intuitively, an industry with a finance dependence of one has no internal resources and must finance its operations entirely from external sources, while an industry with a finance dependence of zero can do so with one year's worth of gross margin. However, since gross margin does not capture overhead costs, an industry with a finance dependence of zero is still likely to require external financing. Thus, we take finance dependence as a relative rather than an absolute measure.

Following Rajan and Zingales (1998), we cumulate each component of our measure over time to dampen temporary fluctuations. We also winsorize at the 5% level to bring in outliers. We measure finance dependence from 1958 (the start of the NBER-CES data) to 1965, when Reg Q first binds. Our finance dependence measure is thus pre-determined with respect to the Reg Q period, which avoids reverse causality in our tests.

3.1.1 Summary statistics

Table 1 shows summary statistics for finance dependence and other variables in the NBER-CES data. The average level of finance dependence is 0.5, i.e., firms can cover up to half their production costs with one year's gross margin. The standard deviation of finance dependence is 0.2, implying substantial cross-sectional variation across the 459 industries. To give a sense of this variation, Table A.1 in the Appendix lists the average finance dependence of each sector (two-digit SIC level). It ranges from 0.26 for "Instruments and Related Products" to 0.70 for "Textile Mill Products".

Table 1 further splits the sample into high (above-median) and low (below-median) finance dependence industries. As of 1965, high finance dependence industries are on average slightly larger in terms of industry employment, output, and capital. They are as productive as low finance dependence industries. They are slightly more volatile, both in terms of prices (2.62% versus 1.89%) and output (10.44% versus 9.48%). They have a similar labor share to low finance dependence industries but a significantly larger materials share (0.58 versus 0.42). This follows naturally from the definition of finance dependence. They have a slightly lower energy intensity (energy cost over output), but for both groups, energy intensity is quite low (0.02). This suggests that energy shocks are unlikely to play a large role.

High finance dependence industries have slightly lower inventory-output ratios (0.15 versus 0.17) and significantly lower capital-output ratios (0.31 versus 0.46), while their investment rate (investment over capital) is the same. Since our measure is constructed to pick up finance dependence for production as opposed to investment, it makes sense that it is related to production costs but not investment.

The last six rows of Table 1 look at industry outcomes after Reg Q becomes binding. High finance dependence industries have marginally higher average price growth (5.84% versus 5.83% per year) despite having lower growth of materials prices (6.30% versus 6.77%). Finance dependent industries also have significantly lower output growth (2.75% versus 3.72%), lower employment growth (0.52% versus 1.32%), and lower inventory and capital growth. This combination of lower output growth and higher price growth (relative to materials cost) suggests that finance dependent industries experienced a negative supply shock during the Reg Q period. Our main tests check if this occurred during the credit crunches.

3.1.2 Firm balance sheets

Our finance dependence measure uses data on firms' sales and costs. As Rajan and Zingales (1998) argue, the advantage of this production-based approach is that it is more likely to be invariant to different financial conditions. Nevertheless, we want to relate our measure to firms' financial outcomes in order to validate it empirically. We cannot do so using the NBER-CES data set because it does not contain financial information. We address this by turning to the Quarterly Financial Reports (QFR), which provide data on firm balance sheets at the sector (two-digit SIC code) level. The QFR data thus give us a smaller cross section (19 sectors versus 459 industries), but one with financial information.

Table 2 relates finance dependence to financial ratios. As in Table 1, we focus on the period from 1958 to 1965, which is before Reg Q becomes binding. Panel A shows summary statistics and Panel B regresses each financial ratio on finance dependence. The average level of finance dependence in Table 2 is slightly higher than in Table 1 because the QFR data do not break out overhead (SG&A) from production costs. The higher level of aggregation shrinks the cross-sectional variation significantly: the standard deviation of finance dependence is 0.04 across sectors versus 0.2 across industries.

Despite the lower variation, clear differences emerge. Finance dependent industries have much higher leverage. From Panel B, the relationship is highly significant despite the small cross section. A one standard deviation increase in finance dependence across sectors is associated with 5.8 percentage points higher leverage. If instead we apply the industry-level standard deviation, the increase is 29 percentage points, which is very large relative to the average (31%). This result provides direct evidence that finance dependent industries use more external financing, validating our measure.

The difference in leverage is concentrated in short-term debt. A one industry standard deviation increase in finance dependence raises the short-term share of debt by 32.5 percentage points. Note that short-term debt is primarily used to finance operations, while long-term debt is more suited to investment. Thus, finance dependent industries appear to be using external financing for production, as intended by our measure.

Table 2 also shows that finance dependent industries have a significantly higher bank share of debt. An increase in finance dependence by one industry standard deviation raises the bank share of debt by as much as 40 percentage points. Finance dependent industries are thus not only external finance dependent but also bank dependent. This further increases their exposure to the Reg Q credit crunches.

We next look at the cash ratio (cash over current liabilities), which captures firms' internal liquidity. Finance dependent industries have significantly lower cash ratios: a one industry standard deviation increase in finance dependence lowers the cash ratio by 35 percentage points, which is very large compared to the average (36%). Finance dependent industries thus lack internal resources, again validating our measure.

Finally, we look at the debt service ratio (operating income over debt due in one year). This is another measure of internal liquidity, this time with respect to a firm's ability to repay its debt if it cannot roll it over. Finance dependent industries have much lower debt service ratios: raising finance dependence by one industry standard deviation lowers the debt service ratio by 8.3. Finance dependent industries are thus much more vulnerable to disruptions in credit supply.

In sum, Table 2 supports the use of finance dependence as a measure of industry exposure to the Reg Q credit crunches.

3.1.3 Yearly cross-sectional regressions

We now test the hypothesis that the Reg Q credit crunches led to higher prices and lower output (stagflation) across industries. Since finance dependence captures exposure to the credit crunches, we expect more finance dependent industries to raise prices and cut output compared to less finance dependent industries during the Reg Q credit crunches.

We begin with yearly cross-sectional regressions of the form:

$$y_{i,t} \quad = \quad \alpha_t + \beta_t \text{FinDep}_i + \delta_t X_{i,t} + \epsilon_{i,t}, \tag{2}$$

where $y_{i,t}$ is either price growth (the percentage change in the sales deflator) or output growth (the percentage change of real output) of industry i in year t. The control $X_{i,t}$ is the growth in industry i's materials prices. We include it to make sure firms are not just passing through higher costs of material inputs. Estimating the coefficients β_t separately by year allows us to see if the effect of finance dependence on prices and output coincides with the credit crunches. We expect β_t to be larger—more positive for prices and more negative for output—when the credit crunches are more severe.

Figure 6 plots the results. The red line is the yearly coefficient for prices (ΔPrices) and the blue line is the coefficient for output (ΔOutput). The light shading around these coefficients shows 90% confidence bands. The dashed line is aggregate (core) deposit growth (ΔDeposits). As shown in Figure 2, it captures the timing and severity of the credit crunches. Finally, the vertical lines in 1965 and 1982 mark the beginning and end of the period during which Reg Q is binding.

Figure 6 shows a clear pattern. The coefficients on finance dependence for predicting prices and output are highly negatively related: finance dependent industries raise prices the most at the same time as they cut output the most relative to other industries. This pattern appears in four cycles during the Reg Q period: in 1965-66, 1969-70, 1973-74, and 1978-79, and not before or after it. These are precisely the Reg Q credit crunches as captured by the dashed line, which plots deposit growth. Thus, finance dependent industries raised prices and cut output by more than other industries during each credit crunch. This supports the view that the Reg Q credit crunches led to stagflation.

To gauge magnitudes, in 1974 the coefficient for prices peaks at 0.15 while the coefficient for output bottoms out at -0.13. Thus, a one-standard deviation increase in finance dependence (0.2) is associated with 3% higher price growth and 2.6% lower output growth. These are economically large effects. Outside this episode, the magnitudes are smaller but still sizable.

3.1.4 Panel regressions

To formally test the impact of Reg Q on finance dependent industries, we run panel regressions of prices and output on the interaction between finance dependence and the Reg Q deposit spread. The Reg Q spread is the difference between the market rate and the Reg Q ceiling rate on deposits. It measures the extent to which Reg Q is binding and hence the severity of the credit crunches. Since Reg Q is essentially binding throughout the Great Stagflation, variation in the Reg Q spread is mostly driven by the Fed funds rate. This allows us to interpret the Reg Q spread as a measure of the tightness of monetary policy with respect to bank credit.

To obtain a single Reg Q deposit spread, we combine the spreads on savings, small time, and large time deposits. The spread on large time deposits is zero because they are not subject to Reg Q.[16] The spreads on savings and small time deposits are shown in Panel A of Figure A.1. The combined Reg Q spread, shown in Panel B of Figure A.1, is a weighted average of these three spreads, using their shares as weights. It rises sharply during each of the four credit crunches, rising from 0% to a peak of 3.5%.

We use the Reg Q spread in panel regressions of the form

$$y_{i,t} \quad = \quad \alpha_t + \gamma_i + \beta \text{RegQSpread}_t \times \text{FinDep}_i + \delta X_{i,t} + \epsilon_{i,t}. \tag{3}$$

The controls $X_{i,t}$ include the fixed characteristics energy intensity (energy costs over output), productivity (TFP), and the volatility of prices and output. We measure these during the same period as finance dependence (i.e. pre-1965) and interact them with the Reg Q spread as we do finance dependence. We also control for contemporaneous wage growth (production payroll divided by hours) and materials price growth. The year fixed effects α_t absorb aggregate economic conditions such as inflation expectations, while the industry fixed effects γ_i absorb industry trends. In addition to prices and output, we expand the set of outcome variables $y_{i,t}$ to include employment, inventory, and investment growth. We run the regressions from 1965 to 1982, the period when Reg Q binds. We cluster standard errors at the industry level.

The coefficient on the interaction term in Equation (3) tests the prediction that finance dependent industries raise prices and cut output when Reg Q becomes more binding as

[16] Large time deposits were formally exempted in June 1970. Prior to that their ceilings were close to the Fed funds rate. Eurodollar deposits, which were never subject to Reg Q, are also a form of large time deposits. We therefore take the large time deposit spread to be zero throughout the period.

a result of Fed tightening. The controls help to rule out alternative sources of negative supply shocks. The most prominent one are the oil shocks of 1973 and 1979 (Blinder and Rudd, 2013), which overlap with two of the Reg Q credit crunches. We capture exposure to the oil shocks with an industry's energy intensity. If finance dependence is somehow picking up this exposure, then controlling for energy intensity (interacted with the Reg Q spread) should diminish its impact.

Among the remaining controls, TFP helps to rule out that finance dependent industries experience greater stagflation because they are less productive. Controlling for the volatility of prices ensures that they do not simply have more flexible prices, and controlling for the volatility of output ensures that they are not simply more cyclical. Controlling for wage and materials price growth ensures that the price effects we estimate are over and above any changes in the costs of these inputs. The identifying assumption of our tests is that finance dependence is uncorrelated with firms' loadings on any remaining unobserved negative supply shocks that coincide with the Reg Q credit crunches.

3.1.5 Prices

Table 3 reports the regression estimates in Equation (3) with price growth as the outcome variable. Each column contains a specification with a different set of controls. The last one includes all controls. We include materials prices in all specifications (as in Figure 6) because we want to know if firms raised output prices *relative* to materials prices.

Column (1) reports a positive and significant coefficient on the interaction between finance dependence and the Reg Q spread. This means that finance dependent industries raise prices relative to non-finance dependent industries when the Reg Q spread is high. Since the Reg Q spread captures the severity of the credit crunches, and finance dependence captures exposure to the credit crunches, this result supports the hypothesis that the Reg Q credit crunches led firms to raise prices.

In terms of magnitudes, the coefficient implies that a 1% increase in the Fed funds rate when Reg Q is binding leads industries with a finance dependence of one (no internal resources) to raise prices by 1.85% relative to industries with a finance dependence of zero (can finance production from one year's worth of profits). Since the Reg Q spread rose by 3–4% during each credit crunch, this is an economically large effect.

The coefficient on the price of materials (0.855) is large and significant, indicating a high passthrough of input costs to output prices. Using it as a control shows that finance dependent firms are not simply passing through higher input costs. They are raising output prices for a given level of input costs, consistent with a financing channel.

Column (2) of Table 3 controls for energy intensity and TFP interacted with the Reg Q spread. Energy intensity has no impact on prices, consistent with the finding in Table 1 that energy expenditures are quite small for these firms (2% on average). The oil shocks are thus unlikely to explain our results. TFP enters with a positive sign, implying that less productive industries actually cut prices relative to more productive industries during the credit crunches. The coefficient on finance dependence is unchanged, which shows that our results are not explained by differences in productivity.

Column (3) controls for the volatility of prices and output. The coefficient on price volatility is positive and significant, consistent with the view that firms with less sticky prices raise them by more during the credit crunches. Output volatility has no impact. The coefficient on finance dependence drops slightly to 1.473 but remains similar. Our results are thus robust to controlling for price stickiness and output volatility.

Column (4) controls for wage growth. This ensures that finance dependent firms are not simply passing higher labor costs through to prices. Since the coefficient on wage growth is close to zero and the coefficient on finance dependence is unaffected, our results are not driven by labor costs.

Column (5) adds all controls simultaneously. None of the coefficients change much. The interaction coefficient on finance dependence and the Reg Q spread remains large and significant at 1.637. The impact of finance dependence on prices during the credit crunches is thus robust with respect to all the controls.

3.1.6 Output

Table 4 shows the results for output growth. From column (1), finance dependent industries have lower output growth when the Reg Q spread is high. The coefficient is -3.760 and highly significant. Thus, a 1% increase in the Fed funds rate when Reg Q is binding leads industries with a finance dependence of one to shrink output by 3.76% relative to industries with a finance dependence of zero, again a large effect.

The opposite signs of the coefficients for prices and output show that finance dependence predicts supply shocks in the cross section of industries (prices and quantities move in opposite directions). The supply shocks are negative when the Reg Q spread is high, hence finance dependence predicts stagflation during the credit crunches.

Column (2) shows that energy intensity predicts higher output growth across industries during the credit crunches. This goes against the hypothesis that the oil shocks explain the decline in output (recall the oil shocks arrived in 1973 and 1979, when the Reg Q spread was high). Productivity (TFP) has a positive coefficient, hence less productive industries cut output relative to more productive industries. Meanwhile, the coefficient on finance dependence remains similar and highly significant at -3.715.

Column (3) controls for the volatility of prices and output, which does not have a significant impact. Column (4) controls for wages and materials prices. Wage growth enters with a positive and significant coefficient, hence industries with higher wage growth see higher output growth. The natural interpretation is that this reflects an increase in labor productivity. Materials prices have a negative impact on output, which is also natural. The coefficient on finance dependence remains unchanged at -3.703.

Finally, column (5) includes all controls. The coefficient on finance dependence is essentially unchanged at -3.694 and remains highly significant. Combined with the results for prices in Table 3, finance dependence is a robust predictor of stagflation in the cross section of industries during the credit crunches.

The fact that the coefficient for output in Table 4 is larger than for prices in Table 3 implies that revenues fall (output falls more than prices rise). This is consistent with our hypothesis. Our hypothesis further predicts that profits should fall, as finance dependent firms are made worse off by the credit crunches. This prediction applies to profits net of financing costs (net income). Since we do not observe net income, we can only look at gross profits (sales minus operating costs). In Appendix Table A.2, we find a negative insignificant coefficient. Although our hypothesis does not make a direct prediction for gross profits, the point estimate for net profits is likely to be even more negative since finance dependent firms have larger financing costs.

The behavior of profits helps to rule out that our results are due to industries with higher market power reducing markups in response to an input cost shock (De Loecker, Eeckhout and Unger, 2020). This could explain the results in Tables 3 and Table 4 if low finance dependence firms have more market power. However, in that case the gross profits of these firms should fall more. Appendix Table A.2 finds that, if anything, the relationship goes the other way. Our results are thus not driven by differences in the response of markups to a common shock. Instead, they are consistent with finance dependent firms suffering a larger shock to begin with – the credit crunches.

3.1.7 Employment, inventories, and investment

We turn to employment next. Figure 7 runs yearly cross-sectional regressions as in Equation (2) but with employment growth as the dependent variable. The resulting coefficients are plotted in red (with shaded 90% confidence bands). For comparison, the blue line shows the coefficients for output growth from Figure 6. The dashed line plots deposit growth, which captures the Reg Q credit crunches.

The figure shows that finance dependence has a negative impact on employment during the credit crunches, as it does for output. The two coefficients co-move tightly with output slightly leading. Thus, when finance dependent industries cut production during the credit crunches, employment follows.

Table 5 shows the corresponding panel regressions. From column (1), the coefficient on finance dependence is negative and significant at -1.978. Hence, finance dependent industries cut employment relative to non-finance dependent industries when the Reg Q spread is high. Specifically, employment declines by about 2% in an industry with a finance dependence of one versus zero when the Fed funds rate rises by 1% at a time when Reg Q binds. This is smaller than the impact on output but still substantial.

Columns (2) to (5) show that the impact of finance dependence on employment is robust to controlling for energy intensity, productivity, volatility, wage growth, and materials prices. In general, the results for employment look similar to those for output in Table 4, showing that output and employment go hand in hand.

Table 6 runs the same regressions with inventory growth as the dependent variable. The coefficient on finance dependence is negative and highly significant at -5.738. Thus, finance dependent industries see a decline in inventories when the Reg Q spread is high. In terms of magnitude, using the coefficient in column (1), inventories decline by 5.7% for industries with a finance dependence of one versus zero when the Reg Q spread rises by 1%. The impact of finance dependence on inventory growth is robust to the controls we add in columns (2) to (5).

The decline in inventories is further evidence of a negative supply shock. Even though finance dependent industries charge higher prices, their inventories get depleted. This points to a disruption in their ability to produce. Inventories are themselves a factor of production (Ramey, 1989), and since they require financing, a natural explanation for the production shock is a lack of credit.

Table 6 provides further evidence that our results are not driven by industries adjusting their markups differently to the same cost shock. If low finance dependence firms raise prices less because they are reducing their markups, we would expect their inventories to shrink more. However, we see the opposite: inventories shrink more for the industries that raise prices more – the high finance dependence ones. This implies that high finance dependence industries did not raise their markups, instead they suffered a larger increase in production costs.

Finally, Table 7 looks at investment. While investment is not a focus of the paper, we expect finance dependent firms to also cut investment during the credit crunches since firms use external credit to fund investment. This is indeed what we find. From column (1), the coefficient on the interaction between finance dependence and the Reg Q spread is negative and significant. This implies that finance dependent firms cut investment during the credit crunches. The magnitude of the coefficient implies that investment shrinks by 6.1% in an industry with a finance dependence of one versus zero when the Reg Q spread rises by 1%. Thus, investment is even more sensitive to the credit crunches than output. This provides further support for the hypothesis that finance dependent industries were hit harder by the credit crunches.

Note, however, that investment is much smaller than output. Therefore, in dollar terms the output effects we uncover are much larger than the investment effects. In our data, investment is on average 3% of output; hence the implied dollar decline in output is about twenty times larger than the implied dollar decline in investment ($= 3.760/6.124 \times 1/0.03$). Thus, although the credit crunches decrease firms' investment demand, their main impact is to decrease firms' ability to produce.[17]

3.1.8 Post Reg Q sample

We test whether the relationship between finance dependence, prices, and output persists after the Great Stagflation. We expect it to weaken because the repeal of Reg Q removed the friction causing the credit crunches. This gives us a placebo test.

We cannot re-run regression (3) directly in the post-Reg Q sample because the Reg Q spread collapses to zero. However, even though there is no Reg Q, deposit growth remains sensitive to changes in the Fed funds rate, consistent with the deposits channel of monetary policy (Drechsler, Savov and Schnabl, 2017). Under the deposits channel, when the Fed funds rate rises banks widen the spreads they charge on deposits. This

[17] We thank John Campbell for suggesting to compare the investment and output effects.

increases their profits but also leads to deposit outflows that result in less lending. The key difference with Reg Q is that banks under the deposits channel are able to control their deposit outflows because they set their own deposit rates. In contrast, under Reg Q deposit rates are simply capped. This leads to more severe and abrupt deposit outflows that result in credit crunches to firms.[18]

We therefore expect the relationship between deposit growth and the ability of finance dependent firms to produce to weaken post Reg Q. We test this by replacing the Reg Q spread in regression (3) with deposit growth:

$$y_{i,t} \quad = \quad \alpha_t + \gamma_i + \beta \Delta \text{Deposits}_t \times \text{FinDep}_i + \delta X_{i,t} + \epsilon_{i,t}., \tag{4}$$

where $y_{i,t}$ is price or output growth and $X_{i,t}$ are the same controls used in regression (3). Fixed effects and clustering are also the same. We run regression (4) separately in the Reg Q sample from 1965 to 1982 and the post Reg Q sample from 1984 to 2018 (we leave out 1983 because it overlaps with 1982 when computing annual growth rates). For the post Reg Q sample, we update the finance dependence measure to make sure it is not stale by calculating it over 1975–1984 (we similarly update the controls). Finance dependence is highly persistent so the updated measure is 78% correlated with the original.

The results of regression (4) are shown in Table 8 Panel A for prices and Panel B for output. In each panel, columns (1) to (4) are for the Reg Q sample and columns (5) to (8) are post Reg Q. Odd-numbered columns are without controls (equivalent to column (1) in Tables 3 and 4) and even-numbered columns are with all controls (equivalent to column (6) in Tables 3 and 4). Columns (1) and (2) simply reproduce our main results in Tables 3 and 4 with and without controls to serve as a benchmark.

Columns (3) and (4) replace the Reg Q spread with deposit growth. Deposit growth negatively predicts prices and positively predicts output of finance dependent industries in the Reg Q sample. This holds both without controls (column (3)) and with controls (column (4)). Thus, when deposits flow out during the credit crunches, finance dependent firms raise prices and cut output. This provides further support for our main results.

Columns (5) and (6) show that the relationship no longer holds in the post Reg Q sample. The interaction coefficient is small and insignificant for both prices and output,

[18] Post Reg Q, small time deposits actually flow *in* when the Fed funds rate rises. This is because their rates increase much more than the rates on checking and savings accounts. Supera (2021) finds that banks match time deposits with C&I loans because they have the same interest rate sensitivity. This further explains why credit crunches to firms are absent post Reg Q.

whether we include controls or not. Thus, deposit growth no longer predicts the behavior of prices and output of finance dependent firms post Reg Q. This null result serves as a placebo for our main results.

The post Reg Q sample allows us to further rule out that our results are driven by differences in firms' exposure to the business cycle. For example, it could be that finance dependent firms always raise prices and cut output in recessions, regardless of whether there is a credit crunch or not. We do so by replacing deposit growth with GDP growth in the post-Reg Q sample in columns (7) and (8). The resulting coefficients are again small and insignificant, with and without controls. They also have the same sign, so if anything, recessions outside the Reg Q credit crunches impact finance dependent firms' demand rather than supply. Our results are thus unlikely to be driven by differences in business cycle exposure.

3.2 The Reg Q spread in the cross section

Our tests of finance dependence use cross-sectional variation in exposure to the credit crunches interacted with time-series variation in their severity as captured by the Reg Q spread. In this section we take advantage of the fact that the Reg Q spread itself varies in the cross section, specifically across banks. The reason is that Reg Q applied differently to different types of deposits, and banks differ in their deposit mix. This allows us to create a bank-level measure of the Reg Q spread. We map it to our industry data and construct an industry Reg Q spread using the locations of each industry's establishments. This assumes that firms obtained bank funding locally. This is a common assumption in the literature (e.g., Petersen and Rajan, 2002) that is especially plausible in our sample because it predates banking deregulation in the 1980s. As Kroszner and Strahan (2014) discuss, interstate banking (opening branches in different states) was largely prohibited, and even intrastate banking (opening multiple branches in the same state) was rare. Note that to the extent there was non-local lending, it adds measurement error to our industry Reg Q spread.

The advantage of the industry Reg Q spread is that it uses variation coming from banks' deposit franchise. This makes it less likely that our regressions pick up any remaining unobserved industry supply shocks.

The first step in computing the industry Reg Q spread is to compute the exposure of local banks to Reg Q. Our call report data separate the three main types of non-demand deposits: savings, small time, and large time deposits.[19] We also observe the two most important types of deregulated deposits: (i) six-month Money Market Certificates (MMCs), a type of small time deposit introduced in July 1978, and (ii) Money Market Deposit Accounts (MMDAs), a type of savings account introduced in December 1982. Using each bank's own deposit shares as weights, we construct its exposure to Reg Q—the bank Reg Q spread—analogously to the aggregate spread in Section 3.1:

$$\text{Reg}Q\text{Spread}_{b,t} \;\; = \;\; \sum_{d} w^{d}_{b,t} \text{Reg}Q\text{Spread}^{d}_{t}, \tag{5}$$

where $w^{d}_{b,t}$ is bank b's share of deposits of type d on date t and $\text{Reg}Q\text{Spread}^{d}_{t}$ is their Reg Q spread. The deposit types d are non-MMDA savings deposits (also known as passbook savings accounts), non-MMC small time deposits, large time deposits, MMDAs, and MMCs.[20] The Reg Q spreads for passbook savings and non-MMC small time deposits are relative to their Reg Q ceilings (shown in Appendix Figure A.1). The spreads on the deregulated products: MMDAs, MMCs, and large time deposits are zero.

Next, we aggregate the bank-level Reg Q spread to the county level, weighting each bank by its share of C&I loans in the county. This weighting captures the bank's importance for lending to local firms. The final step is to map the county-level Reg Q spread to the industry level. We do so based on the locations of each industry's establishments. Specifically, we calculate each county's share of each industry's total employment. We average these shares over time so our results are not driven by changes in industry locations. We then use them to calculate the industry-level Reg Q spread:

$$\text{Reg}Q\text{Spread}_{i,t} \;\; = \;\; \sum_{c} w_{i,c} \text{Reg}Q\text{Spread}_{c,t}, \tag{6}$$

where $w_{i,c}$ is county c's share of industry i's employment and $\text{Reg}Q\text{Spread}_{c,t}$ is the Reg Q spread in county c. An industry's Reg Q spread captures its exposure to Reg Q based on the exposure of the banks that lend in the areas where it operates.[21]

[19] We exclude demand deposits because their rates were zero both before and after Reg Q was binding.

[20] We first observe large time deposits in 1974, hence we use this date to back-fill their share.

[21] Due to the richness of the call reports, the industry Reg Q spread uses more detail on banks' deposit mix than the aggregate Reg Q spread in Section 3.1. Specifically, it separates MMCs and MMDAs from regulated small-time and savings deposits.

3.3 The Reg Q spread and bank lending

Figure 2 shows that the aggregate Reg Q spread predicts bank lending in the time series. Our bank-level Reg Q spread should do the same in the cross section. A bank with a high Reg Q spread should see lower deposit growth and lower loan growth than a bank with a low Reg Q spread. We check this as a necessary first step. Specifically, we split banks into terciles based on their Reg Q spread at each point in time and calculate the difference in deposit and loan growth between the high and low tercile. This gives us a cross-sectional analog of Figure 2.

The results are shown in Figure 8. Panel A shows the average Reg Q spreads of the high and low terciles.[22] The two are nearly proportional, with the Reg Q spread of the high tercile about 75% larger at each point in time. This difference is small when the Fed funds rate is low and close to the Reg Q ceiling and large when it is high and Reg Q is strongly binding. The gap reaches a peak of 3.7% around 1980. There is thus significant cross-sectional variation in the Reg Q spread during the credit crunches.

Panel B of Figure 8 shows the impact on deposits and lending. The yellow line is the difference in deposit growth between the high and low terciles and the black line is the difference in C&I loan growth. The average Reg Q spread, plotted in dashes, captures the timing of the credit crunches. The Reg Q spread strongly predicts deposit and lending growth in the cross section. When the Reg Q spread is small, high- and low-Reg Q spread banks have similar deposit and C&I loan growth. In contrast, when the Reg Q spread rises, high-Reg Q spread banks see much lower deposit and loan growth than low-Reg Q spread banks. The Reg Q spread thus predicts the credit crunches in the cross section.

Combining Panels A and B, when the Reg Q spread of the high tercile rises by one percent relative to the low tercile, its deposits and C&I lending shrink by about three percent (the point estimates are 2.8% for deposits and 3.4% for C&I loans). These elasticities are similar in magnitude to the aggregate ones in Figure 2. They imply that the Reg Q spread has an economically large impact on deposits and lending.

[22] Note that the Reg Q spreads drop sharply but do not go to zero at the introduction of MMDAs because passbook savings accounts remained regulated until 1986.

3.4 The Reg Q spread and stagflation

Since the Reg Q spread captures exposure to the credit crunches, we can use it to test the hypothesis that the Reg Q credit crunches led to higher prices and lower output. We do so by regressing prices and output growth on the Reg Q spread in the cross section of industries. We run panel regressions of the form

$$y_{i,t} \quad = \quad \alpha_t + \gamma_i + \beta \text{RegQSpread}_{i,t} + \delta X_{i,t} + \epsilon_{i,t}, \tag{7}$$

where $y_{i,t}$ is either price growth or output growth of industry i in year t. The industry Reg Q spread varies both in the time series and the cross section, hence it plays the role of the interaction of finance dependence and the aggregate Reg Q spread in Equation (3). The time fixed effects α_t absorb aggregate economic conditions including the aggregate Reg Q spread, ensuring that β is estimated from cross sectional variation. We use the same set of controls $X_{i,t}$ as in Equation (3). This includes interacting fixed industry characteristics (energy intensity, TFP, volatility of pries and output) with the aggregate Reg Q spread to rule out other industry supply shocks that might have coincided with the credit crunches. We also use the same sample period, 1965 to 1982, and clustering (at the industry level).

The coefficient of interest in Equation (7) is β. It captures the extent to which industries whose lenders are more constrained by Reg Q raise prices or cut output relative to industries whose lenders are less constrained. The identifying assumption is that these industries are not disproportionately affected by unobserved supply shocks that occur at the same time as the increases in their Reg Q spreads.

3.4.1 Prices

Table 9 presents the results for prices. From column (1), the coefficient on the Reg Q spread is positive and significant at 1.575. This means that a 1% increase in the Reg Q spread leads to about 1.6% higher price growth, an economically large impact. This result supports the hypothesis that the Reg Q credit crunches led firms to raise prices.

To compare the estimates in Tables 3 and 9, we have to take into account that Equation (7) does not separate industries by finance dependence, hence it holds for its average level. From Table 1, this average is 0.5, so we have to multiply the coefficient in Table 9 by 2 to compare it to Table 3. This gives 3.15, which is somewhat larger, possibly because the industry Reg Q spread better captures the exposure of each industry. Still, the estimates are similar and the gap is less than a standard error.

Turning to column (2), energy intensity and productivity (TFP) have no explanatory power, nor do they affect the coefficient on the Reg Q spread. In column (3), the volatilities of prices and output have insignificant positive coefficients and also do not impact the main coefficient. The same is true for wage growth in column (4). Finally, column (5) includes all controls. The coefficient on the Reg Q spread is unchanged at 1.621 and remains significant. The results in Table 9 thus show that the Reg Q spread has a robust positive impact on price growth.

3.4.2 Output

Table 10 shows the results for output. From column (1), the coefficient on the Reg Q spread is -4.121 and significant. Thus, industries facing a high Reg Q spread cut output relative to industries facing a low Reg Q spread. Combined with the results for prices in Table 9, the industry Reg Q spread predicts high prices and low output, implying a negative supply shock.

The estimated coefficient on the industry Reg Q spread is economically large: a 1% increase in the industry Reg Q spread leads to a 4.1% decline in output. Multiplying by 2 to compare to Table 4, the coefficient is again somewhat larger but not significantly so. As with finance dependence, the negative impact of the Reg Q spread on output is larger than the positive impact on prices, hence revenues decline.

Column (2) controls for energy intensity and productivity. The coefficient on energy intensity is positive and insignificant, hence there is no evidence that the energy shocks explain the decline in output (recall that the shocks hit in 1973 and 1979 when the aggregate Reg Q spread was high). Productivity has a strong positive impact on output, hence more productive industries produced more during the credit crunches. Neither affects the coefficient on the Reg Q spread.

Column (3) controls for the volatility of prices and output. Price volatility is insignificant and output volatility is marginally significant at the 10% level. The negative sign implies that more volatile industries experienced a larger decline in output. Regardless, the coefficient on the Reg Q spread is unchanged.

Column (4) controls for wages and the price of materials. The results are similar to Table 4. The coefficient on wages is positive, consistent with higher labor productivity, while the coefficient on materials prices is negative, consistent with input cost shocks leading to less output. The coefficient on the Reg Q spread is stable.

Finally, column (5) includes all controls. The coefficient on the Reg Q spread becomes a bit more negative at -4.704 and remains highly significant. The impact of the Reg Q spread on output is thus robust to all of the controls. Like finance dependence, the Reg Q spread predicts prices positively and output negatively across industries. This supports the hypothesis that the Reg Q credit crunches led to stagflation.

3.4.3 The Reg Q spread and finance dependence

Our final test combines finance dependence and the industry Reg Q spread. Finance dependence measures an industry's reliance on external credit, while the industry Reg Q spread measures the exposure of its banks. The two measures are thus complementary. Under the hypothesis that the Reg Q credit crunches led to stagflation, the impact of the Reg Q spread on prices and output should be larger for more finance dependent industries. We test this prediction using panel regressions of the form

$$y_{i,t} = \alpha_t + \gamma_i + \beta \text{RegQSpread}_{i,t} + \gamma \text{RegQSpread}_{i,t} \times \text{FinDep}_i + \delta X_{i,t} + \epsilon_{i,t}. \quad (8)$$

The coefficient of interest is γ. It measures the additional impact of the Reg Q spread for an industry with a finance dependence of one versus zero. All other terms, the sample period, and clustering of standard errors follow our earlier tests.

The identifying assumption in Equation (8) is that there are no unobserved negative supply shocks affecting finance dependent industries with a high Reg Q spread relative to those with a low Reg Q spread. Violating this assumption requires a negative supply shock that is correlated with (i) finance dependence across industries, and (ii) banks' deposit mix across geographical areas. The shock must also coincide with the credit crunches in the time series. Since this is a highly specific set of conditions, the identifying assumption in Equation (8) is weaker than in Equations (3) and (7). This gives a stronger test of our underlying hypothesis.

The results for prices and output are presented in Tables 11 and 12, respectively. From Table 11 column (1), the estimated coefficient on the interaction between the Reg Q spread and finance dependence is 0.758 and highly significant. Thus, a one-percent increase in the Reg Q spread leads to 0.76% higher price growth in an industry with a finance dependence of one versus zero. This shows that the effect of the Reg Q spread on prices is increasing in finance dependence as our hypothesis predicts.

In terms of magnitude, the interaction coefficient is smaller than the one in Table 3 but still sizeable and more precisely estimated. Taking into account the standalone coefficient on the industry Reg Q spread, the predicted increase in prices due to a 100-bps increase in the Reg Q spread for an industry with average finance dependence (0.5) is 1.517% ($= 1.138 + 0.5 \times 0.758$). This is very close to the predicted impact in Table 9 (1.532%).

The coefficient on the interaction of the Reg Q spread and finance dependence changes little as we add controls in columns (2) to (4). It settles at 0.627 and remains significant conditional on all controls in column (5). The result is thus robust to the controls.

Turning to output in Table 12, column (1) shows a large negative coefficient on the interaction between the Reg Q spread and finance dependence. The point estimate is -2.976 and highly significant. Thus, a one-percentage-point increase in the Reg Q spread leads to 3% less output at an industry with a finance dependence of one versus zero. This is a large coefficient although again somewhat smaller than the one in Table 4.

The standalone coefficient on the Reg Q spread is sizable but again insignificant, hence we cannot reject the hypothesis that the Reg Q spread has no impact on output for industries with zero finance dependence. The result is again robust to all the controls, settling in at -3.260 in the most saturated specification in column (5). The impact of the Reg Q spread on output is thus increasing in finance dependence, as predicted.

Taken together, the results in Tables 11 and 12 show that our two measures of exposure to the Reg Q credit crunches reinforce each other in predicting prices and output. This provides further evidence that the Reg Q credit crunches led to stagflation.

4 Discussion

We address the most frequently asked questions about the impact of the Reg Q credit crunches on inflation and output during the Great Stagflation.

4.1 Oil Shocks

The conventional view treats the supply shocks that are needed to account for the Great Stagflation as exogenous (e.g., Blinder, 1982). The most commonly cited such shocks are the oil price shocks of late 1973 and 1979 (e.g., Clarida, Gali and Gertler, 2000). Since oil is an important input for many industries, the increase in its price is a negative supply shock. Yet while the oil shocks almost certainly exacerbated the stagflation, a number of papers point out that they cannot have been the main driver (DeLong, 1997; Barsky and Kilian, 2001). We review and expand on the two main reasons for this.

Figure 9 plots the real price of oil against inflation and GDP growth. Panel A plots year-over-year inflation and GDP growth, and Panel B plots them quarterly (at an annual rate) to show exact timing. Vertical lines mark the two oil shocks.

The first reason the oil shocks cannot have been the main driver of the Great Stagflation is that they arrived halfway through it. As Figure 9 shows, the real price of oil was flat or decreasing during the first two of the four stagflationary cycles (1966–67 and 1969–70). It was lower in December 1973, on the eve of the first oil shock, than it had been in the early 1960s. Therefore, oil played no role in the first half of the Great Stagflation (1965–1973). In contrast, the Reg *Q* credit crunches align closely with all four stagflation cycles of the Great Stagflation period (1965–1982).

The second reason is that the third and fourth stagflation cycles were already well underway by the time each oil shock hit. The first oil shock came on January 1, 1974, when OPEC increased the price of a barrel of oil from \$4.31 to \$10.11. Yet as Figure 9 shows, inflation was already high by this time on both an annual and quarterly basis. GDP growth had also fallen substantially. Specifically, by 1973 Q3 quarterly inflation had reached 10% and real GDP growth had fallen to -2.1% from 10.3% in 1973 Q1. The 1973–75 stagflation cycle was thus well underway prior to the first oil shock.

The pattern is similar for the 1979 oil shock, which occurred after the overthrow of the Shah of Iran. The price of oil began rising in May 1979, from \$15.85 to \$18.10, reaching a peak of \$39.50 in April 1980. Yet as the figure again shows, inflation was already high before these price increases, and GDP growth was already low. Specifically, in 1979 Q1 inflation was 12.3% and GDP growth was 0.7% (versus 6.5% in 1978).[23] Hence, stagflation was also underway prior to the second oil shock. This again shows that while the oil shocks contributed to the Great Stagflation, they were not the main driver.

[23]Figure 9 also shows a precipitous but short-lived drop in real GDP growth in 1980 Q2. The literature argues that the severity of this drop was due to credit controls imposed in March 1980 (Owens and Schreft, 1995). The controls were lifted in July 1980, leading to a sharp rebound.

4.2 Corporate bonds and commercial paper

The Reg Q credit crunches would not have impacted the economy if firms could replace bank loans with corporate bonds and commercial paper. To see if this was the case, Table 13 summarizes the flow of net new lending across banks and bond markets using data from the Financial Accounts of the United States. Column (1) looks at regular business loans (C&I loans), while column (2) adds in commercial real estate (CRE) loans since many firms borrow against their real estate assets.[24] The next three columns look at the bond market: commercial paper in column (3), total corporate bond issuance in column (4), and corporate bond issuance excluding utilities and oil companies in column (5). We view commercial paper as a substitute for short-term bank loans, and corporate bonds as a substitute for long-term and CRE loans.

The table shows that commercial paper issuance is very small compared to bank lending: it averages only $1 billion per year during the Great Stagflation versus $11.17 billion in C&I loans and $27.04 billion in C&I plus CRE loans. Corporate bond issuance is more substantial at $10.74 billion on average. However, as the last column shows, three quarters of that issuance was by utilities and oil companies (with utilities accounting for the bulk). Bond issuance excluding these averages $2.93 billion, only about a tenth of total bank lending.

In addition to being relatively small, corporate bond issuance also varies too little to offset the credit crunches in bank lending. For instance, during the 1973–75 credit crunch, bank lending decreased from $48.13 to $3.26 billion, while bond issuance excluding utilities and oil companies increased from $1.15 to $6.39 billion. Thus, increased bond issuance offset only about one ninth of the decline in bank lending.

Although bond issuance did not make up for the drop in bank lending, the largest increases in bond issuance do occur during the four credit crunches (1966–67, 1969–70, 1973–75, and 1978–80). This is consistent with firms substituting to the bond market if they have access to it. As argued in Kashyap, Stein and Wilcox (1993), the substitution provides additional evidence that credit was down due to low supply (due to Reg Q), not low demand. Indeed, the strongest years for bond issuance, 1970 and 1975, are also the weakest for bank lending.

It is important to recognize that only a very small number of the largest, safest firms

[24] Although secured by real estate, CRE loans are mostly used for general business purposes as opposed to real estate development (Chaney, Sraer and Thesmar, 2012).

have access to the bond market. Thus, in addition to reducing total credit, a credit crunch also reallocates credit towards these firms. Since they are likely to be the least constrained to begin with, rather than the ones with the greatest need, credit crunches also reduce allocative efficiency.

To get a sense of how widespread bond market access is, we tabulate the number of firms that had a credit rating in each year, since having a credit rating is a necessary condition for issuing bonds. Figure A.2 plots the total number of rated firms and the number of newly rated firms each year (the data are from Capital IQ). In 1975, there were 481 rated firms in the U.S. In comparison, there were 4,775 publicly-listed firms. Thus, even among firms large enough to be publicly listed, only around 10% had access to the bond market (of these, a significant fraction were utilities). In addition, listed firms are a very small fraction of all firms. Doidge, Karolyi and Stulz (2017) report that there were more than 340,000 firms with 20+ employees in the U.S. in 1977. Hence, 99.9% of firms did not have access to the bond market and were therefore dependent on banks.[25] Interestingly, Figure A.2 shows that after each credit crunch there is a jump up in the number of newly-rated firms (1967, 1971 1975, and 1980). Firms thus sought access to the bond market during the credit crunches.

4.3 Money market funds

A related question is whether households replaced deposits with money market mutual funds (MMFs) during the Great Stagflation. Since MMFs are not banks, they were not bound by Reg Q and could pay any yield they wished. In fact, MMFs were created in 1971 precisely as a way for depositors to circumvent the Reg Q deposit ceilings (Rosen and Katz, 1983). Inflows into MMFs would be a concern for our analysis if they somehow offset the contraction in bank lending to firms. There are in principle two ways this could happen: if MMFs lend their funds back to banks in the wholesale market, or if MMFs lend directly to firms in the bond market.

In practice, MMFs were very small until the tail-end of the Great Stagflation. While they grew at a fast rate, they remained negligible compared to banks until the very end

[25] While access to the bond market has expanded since the 1970s, it remains the case that the vast majority of firms cannot issue bonds and are bank dependent. For example, in 2016 there were 3,537 publicly listed firms in the U.S. according to the CRSP/Compustat database, of which 1,055 had a credit rating. Hence, about 30% of publicly listed firms have a credit rating. In comparison, there were more than 615,000 firms with 20+ employees in the U.S. in 2015 (Doidge et al., 2018).

of the decade. Specifically, at the end of 1978 MMF assets were only 0.7% of total deposits (see Flow of Funds Table L.108). By the end of 1980 they were 4.2%, a large increase, but still very small compared to banks. Hence, MMFs were far too small to have displaced banks or to have had much impact on aggregate lending.

More directly, our analysis takes into account the two ways MMFs impacted lending because we analyze *all* bank lending to firms, and because in Section 4.2 we look directly at commercial paper issuance. To the extent that MMFs recycled funds back to banks (via wholesale funding), this additional funding allowed banks to make more loans to firms and already shows up in our analysis of bank lending. To the extent that firms issued commercial paper to MMFs in the bond market, this shows up in our analysis of commercial paper issuance in Section 4.2. However, Table 13 shows that firms' commercial paper issuance was far too small to undo the credit crunches.

Although MMFs did not undo the credit crunches, they helped to eventually bring about the end of Reg Q. By 1982 Q3, years of rapid growth had made MMFs reach 11.1% of deposits. The competitive threat they posed was now clear and banks and S&Ls lobbied Congress to deregulate deposits so they could meet this threat. This pressure was a major factor in the passage of the Garn-St. Germain Depository Institutions Act of 1982, which permitted the creation of money market deposit accounts (MMDAs). MMDAs were unregulated savings deposits intended to be "directly equivalent to and competitive with money market mutual funds" (Gilbert, 1986; Garcia, 2013). This deregulation effectively marked the end of Reg Q.[26]

4.4 International experience

While the U.S. has been the focal point of the Great Stagflation literature, many advanced economies also experienced stagflation during this era. For example, the U.K. had very serious stagflation over 1973–75, with inflation rising to 26% and real GDP growth falling to -3.4%. It is therefore interesting to ask whether the other advanced economies that experienced stagflation also had financial regulations similar to Reg Q.

The answer is yes. Reg Q is an example of a "credit control," a regulation imposed by the monetary authorities to control the price and quantity of credit in the economy. In the post-war era, credit controls became popular with many central banks who viewed

[26]Some minor restrictions remained until 1986; restrictions on checking deposits remained until 2011.

them as powerful tools for achieving "monetary stability" and countering inflation (Dorrance and White, 1962). Hodgman (1973) provides a detailed description of the many credit controls imposed by the U.K., France, Italy, Belgium, and the Netherlands during the 1960s and 70s. In the U.K., the influential report by the Radcliffe Committee (Radcliffe Report, 1959) set the policy tone for the years that followed, arguing that credit controls were an important tool for countering inflation as standard monetary measures were insufficient.[27]

The most common credit controls were systems of ceilings on bank deposit rates, on bank lending rates, and on the amount of bank lending. Though they differ in which part of the bank they affect directly, each type of ceiling ultimately restricts the flow of credit from banks and thus ends up having a similar impact. For instance, a ceiling on deposit rates reduces a bank's lending by preventing it from raising more deposits, while a ceiling on its lending ends up reducing the amount of deposits it needs to raise and hence the deposit rates it offers. All three types of ceilings were imposed at various times by each of the U.K., France, Italy, Belgium, and the Netherlands (Hodgman, 1973).

Reinhart and Sbrancia (2015) argue that in the post-WWII period, credit controls kept real interest rates artificially low across the advanced economies and hence played an important role in liquidating the large quantities of government debt that had been accumulated during the war. Because these policies were so widely employed from 1945 to 1980, they refer to this period as the "heyday of the financial repression era." Moreover, they show that during this period real interest rates were significantly lower than during the more free-market periods that came before and after.[28] The removal of Reg Q was part of a broad wave of financial deregulation that swept over the advanced economies beginning in the early 1980s.

Thus, the use of credit controls for monetary policy—Regulation Q in the US—was by no means special to the U.S. Rather, it was commonplace throughout the advanced economies. Credit controls and heavy government involvement in the banking sector were viewed as important for effective monetary and financial stabilization policy. Thus, while we focus on the U.S. in this paper, it is plausible that a similar credit crunch channel operated in other advanced economies during the Great Stagflation.

[27] Aikman, Bush and Taylor (2018) argue that the views of the Radcliffe Report were substantially influenced by the legacy of Keynes, who believed that adjustments in the short rate alone were not powerful enough to achieve economic stabilization.

[28] They estimate that ex-post real interest rates in the advanced economies were negative for about half the years 1945-1980, compared to less than 15% of the time since the early 1980s.

A related literature going back to the 1970s studies financial repression in developing economies. The term was coined by McKinnon (1973) and Shaw (1973) to describe the combination of ceilings on deposits and lending with forced holdings of government debt that was common among developing economies. Governments used financial repression to direct subsidized credit to favored industries, typically nationalized industries and the export sector (McKinnon and Mathieson, 1981). The literature argues that these policies hinder growth and development by distorting the allocation of credit in the economy. By making deposit rates low, financial repression also reduced savings and investment (Roubini and Sala-i-Martin, 1992). There is substantial overlap between this literature and our finding that Reg Q contributed to stagflation.

The literature also finds that financially repressed countries have higher inflation (Roubini and Sala-i-Martin, 1992). It attributes this to the government's desire to lower its borrowing cost. Our findings provide a complementary mechanism: Reg Q, a form of financial repression, negatively impacted aggregate supply. This mechanism can help explain the high inflation seen in other countries with financial repression.

4.5 Comparison with the Global Financial Crisis

The most recent credit crunch in the U.S. was the 2008 Global Financial Crisis (GFC). A natural question is whether it had a negative impact on aggregate supply.

There is evidence that it did. The literature finds that the drop in home prices that triggered the GFC damaged banks' balance sheets. This led them to contract credit to firms in addition to housing. The lack of credit hurt firms' ability to produce. Chodorow-Reich (2014) finds that firms whose lenders were more impacted by the GFC were much less likely to obtain new loans and had to pay higher spreads. These more credit-constrained firms cut employment by more than other firms and shut down more of their establishments.

Giroud and Mueller (2017) also study the impact of credit supply on firms' real outcomes during the GFC. They compare firms by their leverage and find that more levered firms reduced employment and closed establishments relative to less levered firms. This is true within industry and within zip code, which controls for demand factors. They argue that their results are due to highly-levered firms being more financially constrained. Consistent with this, these firms were less likely to raise additional short- and long-term debt, and cut back more on investment. Hence, their evidence also points to credit constraints reducing supply during the GFC.

Neither Chodorow-Reich (2014) nor Giroud and Mueller (2017) observe firms' prices. Gilchrist et al. (2017) do observe them and find that liquidity-constrained firms raised prices relative to unconstrained firms. They argue that this could account for the "missing deflation" of the period, the fact that while inflation declined it did not result in outright deflation as models predicted (Christiano, Eichenbaum and Trabandt, 2015). The reason models predicted deflation was the very large drop in consumer demand due to the collapse in home prices (Mian, Rao and Sufi, 2013; Mian and Sufi, 2014). Thus, though the evidence indicates that tightened credit reduced firm supply during the GFC, the net impact on inflation was dominated by the decline in aggregate demand.

There are two other important differences between Reg Q and the GFC. The first is that the GFC was caused by a run on the shadow banking system and Reg Q was not. During the GFC, investors became concerned about the solvency of shadow banks (uninsured financial institutions). This made them withdraw their funds and deposit some of them with insured banks. Reg Q was the opposite: the deposit rate ceilings led to an outflow of insured deposits into uninsured instruments. The result was that the GFC and Reg Q affected different types of credit: the GFC primarily cut off non-prime mortgages while Reg Q cut off traditional business loans.

The second difference is in the effectiveness of monetary policy during the GFC versus Reg Q. Under Reg Q, when the Fed raised rates it opened up a wedge between the deposit rate earned by savers and the loan rate paid by borrowers, many of whom were rationed (recall the tight credit standards in Figure 3). This wedge made the return to saving low and the cost of borrowing high. A well-functioning banking system equates these two rates, but Reg Q prevented this. As long as Reg Q was in effect, monetary policy was in a bind: by raising rates to fight inflation, it made the wedge even bigger.

In contrast, monetary policy did not drive such a wedge in the GFC. Banks were able to equate the cost of deposits with the return to lending. When the Fed cut rates in 2008, deposit rates fell substantially as did lending rates (after accounting for credit risk). Consistent with the deposits channel of monetary policy (Drechsler, Savov and Schnabl, 2017), the Fed's rate cuts encouraged deposits to flow into banks, helping to offset the credit crunch. Thus, monetary policy was able to soften the impact of the GFC, whereas it exacerbated the credit crunches under Reg Q.

5 Conclusion

The Great Stagflation triggered a sea change in economic policy and thinking. A key feature was the negative relation between inflation and output – the stagflation. To explain it, the literature evoked a series of exogenous aggregate supply shocks such as the oil shocks. Because these shocks are exogenous, there is nothing to be learned from them. The focus therefore shifted to aggregate demand, and the period became better known as the Great *In*flation.

We provide a new explanation for the "Stag-" part of the Great Stagflation. We argue that it was due, in part, to severe credit crunches triggered by the banking law known as Regulation Q. Reg Q placed a cap on bank deposit rates that became binding whenever the Fed raised rates. This triggered large outflows of deposits from banks, resulting in a series of credit crunches.

We argue that the credit crunches acted as negative supply shocks to firms. Firms use credit to finance their operations, to pay for materials and labor up front, before they produce and earn revenue from sales. When credit dries up, firms effectively face higher production costs, which leads them to raise prices and cut output. This is how credit crunches can lead to stagflation.

We show that the credit crunches align very closely with the ups and downs of the Great Stagflation, from its beginning in 1965, which is when Reg Q first binds, to its end in 1982 when Reg Q is repealed. As a further test, we compare manufacturing industries that rely more heavily on external financing to ones that do not. We find that these finance dependent industries raised prices and cut output by more during the credit crunches. The same is true of industries located in areas where banks were more exposed to Reg Q, especially when the industries are finance dependent. These results support the hypothesis that the Reg Q credit crunches contributed to the stagflation.

A key implication of our findings is that the negative supply shocks that hit the economy were not fully exogenous. They were in part due to the Fed's own efforts to reduce inflation by raising rates in the presence of Reg Q. This does not mean that the Fed should not have raised rates. Rather, it explains why the Fed found it so difficult to control inflation, and the economic cost so high. Fed chair Arthur Burns lamented this in "The Anguish of Central Banking" (Burns, 1979), a speech much derided as an exercise in excuse making. But perhaps some sympathy is called for as Burns' efforts were thwarted by a backfiring financial system. The lesson, of course, is to fix it. In particular, it is important that Fed tightening not choke off credit to firms. Only then does monetary policy transmit solely through aggregate demand—as conventional wisdom would have it—and the supply side can safely be taken as given.

References

Aikman, David, Oliver Bush, and Alan M Taylor. 2018. "Monetary Versus Macroprudential Policies: Causal Impacts of Interest Rates and Credit Controls in the Era of the UK Radcliffe Report." National Bureau of Economic Research.

Barro, Robert J, and David B Gordon. 1983. "Rules, discretion and reputation in a model of monetary policy." *Journal of Monetary Economics*, 12(1): 101–121.

Barsky, Robert B, and Lutz Kilian. 2001. "Do we really know that oil caused the great stagflation? A monetary alternative." *NBER Macroeconomics Annual*, 16: 137–183.

Barth, Marvin J, and Valerie A Ramey. 2001. "The cost channel of monetary transmission." *NBER Macroeconomics Annual*, 16: 199–240.

Beraja, Martin, Erik Hurst, and Juan Ospina. 2016. "The aggregate implications of regional business cycles." National Bureau of Economic Research.

Bernanke, Ben S. 1983. "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression." *American Economic Review*, 73(3): 257–276.

Bernanke, Ben S, and Alan S Blinder. 1988. "Credit, Money, and Aggregate Demand." *American Economic Review*, 78(2): 435–439.

Bernanke, Ben S, and Alan S Blinder. 1992. "The Federal Funds Rate and the Channels of Monetary Transmission." *American Economic Review*, 82: 901–921.

Bernanke, Ben S, and Mark Gertler. 1995. "Inside the Black Box: The Credit Channel of Monetary Policy." *Journal of Economic Perspectives*, 9(4): 27–48.

Bernanke, Ben S, Mark Gertler, Mark Watson, Christopher A Sims, and Benjamin M Friedman. 1997. "Systematic monetary policy and the effects of oil price shocks." *Brookings Papers on Economic Activity*, 1997(1): 91–157.

Blinder, Alan. 1982. "The anatomy of Double-Digit Inflation." *Inflation: Causes and Effects (Chicago: University of Chicago Press, 1982)*.

Blinder, Alan S. 1987. "Credit Rationing and Effective Supply Failures." *The Economic Journal*, 97(386): 327–352.

Blinder, Alan S, and Jeremy B Rudd. 2013. "The Supply-Shock Explanation of the Great Stagflation Revisited." In *The Great Inflation: The Rebirth of Modern Central Banking*. 119–175. University of Chicago Press.

Blinder, Alan S, and Joseph E Stiglitz. 1983. "Money, Credit Constraints, and Economic Activity." *American Economic Review*, 73(2): 297–302.

Blinder, A.S. 1979. *Economic Policy and the Great Stagflation. Economic Theory, Econometrics, and Mathematical Economics*, Academic Press.

Bordo, Michael D., and Joseph G. Haubrich. 2010. "Credit crises, money and contractions: An historical view." *Journal of Monetary Economics*, 57(1): 1 – 18. Carnegie-Rochester Conference Series on Public Policy: Credit Market Turmoil: Implications for Policy April 17-18, 2009.

Brave, Scott A, and R Andrew Butters. 2011. "Monitoring financial stability: A financial conditions index approach." *Economic Perspectives*, 35(1): 22.

Bryan, Michael. 2013. "The great inflation." *Federal Reserve History*, 22.

Burger, Albert E. 1969. "A historical analysis of the credit crunch of 1966." *Federal Reserve Bank of St. Louis Review*, , (September 1969).

Burns, Arthur F. 1979. "The anguish of central banking." *The 1979 Per Jacobsson Lecture*, *Belgrade, Yugoslavia, September 30, 1979*.

Chaney, Thomas, David Sraer, and David Thesmar. 2012. "The Collateral Channel: How Real Estate Shocks Affect Corporate Investment." *American Economic Review*, 102(6): 2381–2409.

Chevalier, Judith A, and David S Scharfstein. 1996. "Capital-Market Imperfections and Countercyclical Markups: Theory and Evidence." *American Economic Review*, 703–725.

Chodorow-Reich, Gabriel. 2014. "The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-9 Financial Crisis." *Quarterly Journal of Economics*, 129(1): 1–59.

Christiano, Lawrence J, Martin S Eichenbaum, and Mathias Trabandt. 2015. "Understanding the great recession." *American Economic Journal: Macroeconomics*, 7(1): 110–67.

Clarida, Richard, Jordi Gali, and Mark Gertler. 1999. "The science of monetary policy: a new Keynesian perspective." *Journal of Economic Literature*, 37(4): 1661–1707.

Clarida, Richard, Jordi Gali, and Mark Gertler. 2000. "Monetary policy rules and macroeconomic stability: evidence and some theory." *Quarterly Journal of Economics*, 115(1): 147–180.

De Loecker, Jan, Jan Eeckhout, and Gabriel Unger. 2020. "The rise of market power and the macroeconomic implications." *Quarterly Journal of Economics*, 135(2): 561–644.

DeLong, J Bradford. 1997. "America's peacetime inflation: the 1970s." In *Reducing inflation: Motivation and strategy*. 247–280. University of Chicago Press.

Doidge, Craig, Andrew G. Karolyi, and Rene M. Stulz. 2017. "The U.S. listing gap." *Journal of Financial Economics*, 123: 464–487.

Doidge, Craig, Kathleen M. Kahle, Andrew G. Karolyi, and Rene M. Stulz. 2018. "Eclipse of the Public Corporation or Eclipse of the Public Markets?" *Journal of Applied Corporate Finance*, Winter: 8–16.

Dorrance, Graeme S., and William H. White. 1962. "Alternative Forms of Monetary Ceilings for Stabilization Purposes." *Staff Papers*, 9: 317–342.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2017. "The deposits channel of monetary policy." *Quarterly Journal of Economics*, 132(4): 1819–1876.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2022. "The Financial Origins of the Rise and Fall of American Inflation." *Working Paper*.

Friedman, Milton. 1968. "The role of monetary policy." *American Economic Review*, 58(1).

Friedman, Milton. 1970. "Controls on interest rates paid by banks." *Journal of Money, Credit and Banking*, 2(1): 15–32.

Friedman, Milton. 1977. "Nobel lecture: inflation and unemployment." *Journal of Political Economy*, 85(3): 451–472.

Galí, Jordi. 2007. *Monetary policy, inflation, and the business cycle: an introduction to the new Keynesian framework and its applications.* Princeton University Press.

Garcia, Gillian. 2013. "Garn-St Germain Depository Institutions Act of 1982."

Gertler, Mark, and Simon Gilchrist. 1994. "Monetary policy, business cycles, and the behavior of small manufacturing firms." *Quarterly Journal of Economics*, 109(2): 309–340.

Gilbert, R Alton. 1986. "Requiem for regulation q: What it did and why it passed away." *Federal Reserve Banks of St. Louis Review*, 68.

Gilchrist, Simon, and Egon Zakrajšek. 2012. "Credit spreads and business cycle fluctuations." *American Economic Review*, 102(4): 1692–1720.

Gilchrist, Simon, Raphael Schoenle, Jae Sim, and Egon Zakrajšek. 2017. "Inflation dynamics during the financial crisis." *American Economic Review*, 107(3): 785–823.

Giroud, Xavier, and Holger M. Mueller. 2017. "Firm Leverage, Consumer Demand, and Employment Losses During the Great Recession." *Quarterly Journal of Economics*, 132(1): 271–316.

Goodfriend, Marvin, and Robert G King. 2005. "The incredible Volcker disinflation." *Journal of Monetary Economics*, 52(5): 981–1015.

Gordon, Robert J. 1975. "Alternative responses of policy to external supply shocks." *Brookings Papers on Economic Activity*, 1975(1): 183–206.

Gordon, Robert J. 1977. "Can the Inflation of the 1970s be Explained?" *Brookings Papers on Economic Activity*, 8(1): 253–279.

Goutsmedt, Aurélien. 2021. "From the Stagflation to the Great Inflation: Explaining the US Economy of the 1970s." Forthcoming.

Hazell, Jonathon, Juan Herreno, Emi Nakamura, and Jón Steinsson. 2020. "The slope of the Phillips Curve: evidence from US states." National Bureau of Economic Research.

Hodgman, Donald. 1973. "Credit Controls in Western Europe: An Evaluative Review." *Credit Allocation Techniques and Monetary Policy*, 11: 137–161.

Hooper, Peter, Frederic S Mishkin, and Amir Sufi. 2019. "Prospects for Inflation in a High Pressure Economy: Is the Phillips Curve Dead or is It Just Hibernating?" *NBER Working Paper*.

Kashyap, Anil K., and Jeremy C. Stein. 1994. "Monetary Policy and Bank Lending." In *Monetary Policy. NBER Chapters*, 221–261. National Bureau of Economic Research.

Kashyap, Anil K., and Jeremy C. Stein. 2000. "What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?" *American Economic Review*, 90(3): 407–428.

Kashyap, Anil K, Jeremy C. Stein, and David W. Wilcox. 1993. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance." *American Economic Review*, 83: 78–98.

Kashyap, Anil K, Owen A Lamont, and Jeremy C Stein. 1994. "Credit conditions and the cyclical behavior of inventories." *Quarterly Journal of Economics*, 109(3): 565–592.

Kim, Ryan. 2021. "The effect of the credit crunch on output price dynamics: The corporate inventory and liquidity management channel." *Quarterly Journal of Economics*, 136(1): 563–619.

Koch, Christoffer. 2015. "Deposit interest rate ceilings as credit supply shifters: Bank level evidence on the effects of Regulation Q." *Journal of Banking and Finance*, 61: 316 – 326.

Kroszner, Randall S, and Philip E Strahan. 2014. "Regulation and deregulation of the US banking industry: causes, consequences, and implications for the future." In *Economic Regulation and Its Reform: What Have We Learned?*. 485–543. University of Chicago Press.

Kydland, Finn E, and Edward C Prescott. 1977. "Rules rather than discretion: The inconsistency of optimal plans." *Journal of Political Economy*, 85(3): 473–491.

McKinnon, Ronald I. 1973. *Money and Capital in Economic Development.* Brookings Institution press.

McLeay, Michael, and Silvana Tenreyro. 2019. "Optimal inflation and the identification of the Phillips curve." National Bureau of Economic Research.

Meltzer, Allan H. 2005. "Origins of the Great Inflation." *Federal Reserve Bank of St. Louis Review*, 87(2): 145–176.

Mertens, Karel. 2008. "Deposit rate ceilings and monetary transmission in the US." *Journal of Monetary Economics*, 55(7): 1290–1302.

Mian, Atif, and Amir Sufi. 2014. "What Explains the 2007–2009 Drop in Employment?" *Econometrica*, 82(6): 2197–2223.

Mian, Atif, Kamalesh Rao, and Amir Sufi. 2013. "Household Balance Sheets, Consumption, and the Economic Slump." *Quarterly Journal of Economics*, 128(4): 1687–1726.

Nagel, Stefan. 2016. "The liquidity premium of near-money assets." *Quarterly Journal of Economics*, 131(4): 1927–1971.

Okun, Arthur M. 1975. "Inflation: Its Mechanics and Welfare Costs." *Brookings Papers on Economic Activity*, 6(2): 351–402.

on the Working of the Monetary System, Committee. 1959. "Report."

Orphanides, Athanasios. 2003. "The quest for prosperity without inflation." *Journal of Monetary Economics*, 50(3): 633–663.

Owens, Raymond E, and Stacey L Schreft. 1995. "Identifying credit crunches." *Contemporary Economic Policy*, 13(2): 63–76.

Perry, George. 1978. "Slowing the Wage-Price Spiral: The Macroeconomic View." *Brookings Papers on Economic Activity*, 9(2): 259–299.

Petersen, Mitchell A, and Raghuram G Rajan. 2002. "Does distance still matter? The information revolution in small business lending." *Journal of Finance*, 57(6): 2533–2570.

Phelps, Edmund S. 1967. "Phillips curves, expectations of inflation and optimal unemployment over time." *Economica*, 254–281.

Phelps, Edmund S. 1968. "Money-wage dynamics and labor-market equilibrium." *Journal of Political Economy*, 76(4, Part 2): 678–711.

Phelps, Edmund S. 1978. "Commodity-supply shock and full-employment monetary policy." *Journal of Money, Credit and Banking*, 10(2): 206–221.

Phillips, Alban W. 1958. "The relation between unemployment and the Rate of change of money wage rates in the United Kingdom, 1861–1957 1." *Economica*, 25(100): 283–299.

Primiceri, Giorgio E. 2006. "Why inflation rose and fell: policy-makers' beliefs and US postwar stabilization policy." *Quarterly Journal of Economics*, 121(3): 867–901.

Rajan, Raghuram G, and Luigi Zingales. 1998. "Financial Dependence and Growth." *American Economic Review*, 559–586.

Ramey, Valerie A. 1989. "Inventories as Factors of Production and Economic Fluctuations." *American Economic Review*, 79(3): 338–354.

Reinhart, Carmen M, and M Belen Sbrancia. 2015. "The liquidation of government debt." *Economic Policy*, 30(82): 291–333.

Romer, Christina D., and David Romer. 2002. "The evolution of economic understanding and postwar stabilization policy." *Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City*, 11–78.

Rosen, Kenneth T., and Lawrence F. Katz. 1983. "Money Market Mutual Funds: An Experiment in Ad Hoc Deregulation: A Note." *Journal of Finance*, 38(3): 1011–17.

Roubini, Nouriel, and Xavier Sala-i-Martin. 1992. "Financial repression and economic growth." *Journal of Development Economics*, , (39).

Santomero, Anthony M, and Jeremy J Siegel. 1986. "Deposit deregulation and monetary policy." *Carnegie-Rochester Conference Series on Public Policy*, 24: 179–224.

Sargent, Thomas J. 1999. *The Conquest of American Inflation.* Princeton University Press.

Shaw, Edward S. 1973. *Financial Deepening in Economic Development.* Oxford University Press.

Supera, Dominik. 2021. "Running out of time (deposits): Falling interest rates and the decline of business lending, investment and firm creation." *Working paper*.

Taylor, John B. 1993. "Discretion versus policy rules in practice." Vol. 39, 195–214, Elsevier.

Tobin, James. 1970. "Deposit interest ceilings as a monetary control." *Journal of Money, Credit and Banking*, 2(1): 4–14.

Wojnilower, Albert M. 1980. "The Central Role of Credit Crunches in Recent Financial History." *Brookings Papers on Economic Activity*, 11(2): 277–340.

Woodford, Michael. 2003. *Interest and prices: Foundations of a theory of monetary policy.* Princeton university press.

Table 1: Industry summary statistics

Summary statistics at the industry level. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. Employment is in thousands. Output is sales plus the change in inventories in millions of 1965 dollars. TFP is five-factor total factor productivity. The volatilities of output and prices are the standard deviations of real output growth and the growth of the shipments deflator from 1958 to 1965. The labor share is production labor costs divided by output. The materials share and energy intensity are calculated analogously. The investment rate is real investment over real capital. The bottom rows are averages of yearly growth rates during the Reg *Q* period from 1965 to 1982. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level.

			Finance dependence			
	All		Low		High	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Finance dependence	0.50	(0.20)	0.34	(0.15)	0.66	(0.08)
Levels, 1958–1965:						
Employment	35.75	(50.61)	32.15	(41.43)	39.33	(58.21)
Output (1965 $)	946.03	(1,854.81)	754.79	(923.41)	1,136.44	(2,441.05)
Capital stock	1,234.94	(3,806.29)	1,063.79	(1,765.33)	1,405.35	(5,080.80)
TFP	0.90	(0.28)	0.90	(0.29)	0.90	(0.28)
σ(Prices)	2.25	(1.55)	1.89	(1.15)	2.62	(1.79)
σ(Output)	9.96	(5.78)	9.48	(5.65)	10.44	(5.88)
Labor share	0.17	(0.07)	0.18	(0.07)	0.17	(0.07)
Materials share	0.50	(0.13)	0.42	(0.08)	0.58	(0.11)
Energy intensity	0.02	(0.02)	0.02	(0.02)	0.01	(0.01)
Inventory/Output	0.16	(0.08)	0.17	(0.08)	0.15	(0.08)
Capital/Output	0.39	(0.27)	0.46	(0.31)	0.31	(0.21)
Investment rate	0.08	(0.04)	0.08	(0.03)	0.08	(0.04)
Growth rates, 1965–1982:						
Δ Prices	5.83	(2.22)	5.83	(2.04)	5.84	(2.39)
Δ Materials prices	6.53	(1.48)	6.77	(1.32)	6.30	(1.59)
Δ Output	3.24	(4.25)	3.72	(4.37)	2.75	(4.08)
Δ Employment	0.92	(2.86)	1.32	(2.92)	0.52	(2.74)
Δ Inventories	4.34	(6.16)	4.87	(4.47)	3.83	(7.44)
Δ Capital	4.11	(2.73)	4.23	(2.73)	3.99	(2.73)
# Industries	459		229		230	

Table 2: Finance dependence and balance sheet characteristics

This table uses the Quarterly Financial Reports (QFR) to relate finance dependence to financial characteristics. The QFR reports are available at the two-digit SIC level starting in 1947. We calculate finance dependence in the QFR data in the same way as in the NBER-CES dataset (and over the same period from 1958 to 1965). The QFR measure of costs includes SG&A (selling, general, and administrative expenses), which makes the measure higher on average. The balance sheet characteristics are measured in 1965. Leverage is the ratio of debt over equity. The short-term share of debt is short-term debt over debt. The bank share of debt is bank debt over debt. The cash ratio is cash and securities over current liabilities. The debt service ratio is operating income divided by debt due in one year. Panel A shows average and standard deviations for all sectors and sectors with below- and above-median finance dependence. Panel B regresses each balance sheet characteristic on finance dependence.

Panel A:

			Finance dependence			
	All		Low		High	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Finance dependence	0.91	(0.04)	0.88	(0.02)	0.94	(0.02)
Leverage	0.31	(0.09)	0.26	(0.06)	0.37	(0.08)
Short-term share of debt	0.23	(0.12)	0.18	(0.11)	0.28	(0.11)
Bank share of debt	0.38	(0.11)	0.31	(0.10)	0.45	(0.09)
Cash ratio	0.36	(0.13)	0.41	(0.15)	0.30	(0.09)
Debt service ratio	3.39	(2.03)	4.76	(1.85)	1.87	(0.67)
# Sectors	19		10		9	

Panel B:

	Leverage	Short-term share of debt	Bank share of debt	Cash ratio	Debt service ratio
	(1)	(2)	(3)	(4)	(5)
Finance dependence	1.450***	1.625**	2.008***	−1.753**	−41.440***
	(0.460)	(0.726)	(0.598)	(0.790)	(9.362)
Constant	−1.012**	−1.255*	−1.451**	1.957**	41.169***
	(0.419)	(0.662)	(0.546)	(0.721)	(8.541)
Obs.	19	19	19	19	19
R^2	0.369	0.228	0.399	0.225	0.535

Table 3: Finance dependence and prices

Panel regressions of prices on finance dependence and the Reg Q spread:

$$\Delta\text{Prices}_{i,t} \;=\; \alpha_t + \gamma_i + \beta\text{Reg}Q\text{Spread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Price growth is the percentage change of industry i's shipments deflator in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and output growth are from 1958 to 1965 (output is shipments plus the change in inventories deflated by the shipments deflator). Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔPrices				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread × Fin. dep.	1.850***	1.991***	1.473***	1.855***	1.637***
	(0.367)	(0.377)	(0.344)	(0.366)	(0.357)
Reg Q spread × Energy int.		0.105**			0.100**
		(0.047)			(0.045)
Reg Q spread × TFP		0.595*			0.497
		(0.325)			(0.335)
Reg Q spread × $\sigma(\Delta\text{Prices})$			15.893**		14.454**
			(6.599)		(6.540)
Reg Q spread × $\sigma(\Delta\text{Output})$			0.047		0.394
			(0.808)		(0.799)
ΔWage				0.019	0.018
				(0.015)	(0.015)
ΔMaterials price	0.855***	0.852***	0.848***	0.855***	0.846***
	(0.069)	(0.069)	(0.067)	(0.069)	(0.067)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.587	0.588	0.588	0.587	0.589

Table 4: Finance dependence and output

Panel regressions of output on finance dependence and the Reg Q spread:

$$\Delta\text{Output}_{i,t} = \alpha_t + \gamma_i + \beta \text{RegQSpread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Output growth is the percentage change of industry i's output (shipments plus the change in inventories deflated by the shipments deflator) in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔOutput				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread $\times$ Fin. dep.	-3.760^{***}	-3.715^{***}	-3.703^{***}	-3.670^{***}	-3.694^{***}
	(0.817)	(0.817)	(0.853)	(0.838)	(0.871)
Reg Q spread $\times$ Energy int.		0.065			0.108
		(0.094)			(0.093)
Reg Q spread $\times$ TFP		1.446			1.453^{*}
		(0.884)			(0.848)
Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			0.226		8.523
			(10.327)		(10.020)
Reg Q spread $\times$ $\sigma(\Delta\text{Output})$			-1.886		-1.955
			(3.127)		(3.062)
ΔWage				0.145^{***}	0.147^{***}
				(0.043)	(0.043)
ΔMaterials price				-0.290^{***}	-0.298^{***}
				(0.048)	(0.047)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.249	0.249	0.249	0.260	0.261

Table 5: Finance dependence and employment

Panel regressions of employment on finance dependence and the Reg Q spread:

$$\Delta\text{Employment}_{i,t} = \alpha_t + \gamma_i + \beta \text{Reg}Q\text{Spread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Employment growth is the percentage change of industry i's total employment in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔEmployment				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread $\times$ Fin. dep.	-1.978^{***}	-1.890^{***}	-2.029^{***}	-2.045^{***}	-1.996^{***}
	(0.580)	(0.575)	(0.596)	(0.578)	(0.587)
Reg Q spread $\times$ Energy int.		0.073			0.062
		(0.050)			(0.051)
Reg Q spread $\times$ TFP		0.667			0.576
		(0.547)			(0.544)
Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			3.276		1.395
			(5.874)		(5.853)
Reg Q spread $\times$ $\sigma(\Delta\text{Output})$			-0.804		-0.179
			(1.921)		(1.939)
ΔWage				-0.217^{***}	-0.217^{***}
				(0.042)	(0.042)
ΔMaterials price				0.036	0.033
				(0.023)	(0.023)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.235	0.236	0.235	0.244	0.244

Table 6: Finance dependence and inventories

Panel regressions of inventories on finance dependence and the Reg Q spread:

$$\Delta\text{Inventory}_{i,t} = \alpha_t + \gamma_i + \beta\text{RegQSpread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Inventory growth is the percentage change of industry i's inventories (deflated by the shipments deflator) in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔInventory				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread × Fin. dep.	−5.738***	−5.794***	−4.791***	−5.680***	−4.870***
	(1.111)	(1.139)	(1.045)	(1.102)	(1.030)
Reg Q spread × Energy int.		0.014			0.105
		(0.140)			(0.119)
Reg Q spread × TFP		1.982*			2.551**
		(1.160)			(1.199)
Reg Q spread × $\sigma(\Delta\text{Prices})$			−44.034**		−36.225**
			(18.012)		(17.148)
Reg Q spread × $\sigma(\Delta\text{Output})$			2.919		3.378
			(3.954)		(4.116)
ΔWage				0.004	0.007
				(0.057)	(0.057)
ΔMaterials price				−0.335***	−0.321***
				(0.072)	(0.069)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.105	0.105	0.106	0.110	0.111

Table 7: Finance dependence and investment

Panel regressions of investment on finance dependence and the Reg Q spread:

$$\Delta\text{Investment}_{i,t} \;=\; \alpha_t + \gamma_i + \beta\text{RegQSpread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Investment growth is the percentage change of industry i's investment (deflated by the investment deflator) in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔInvestment				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread $\times$ Fin. dep.	−6.124**	−5.729**	−6.289**	−6.062**	−5.696**
	(2.445)	(2.501)	(2.573)	(2.438)	(2.642)
Reg Q spread $\times$ Energy int.		0.305			0.315
		(0.290)			(0.287)
Reg Q spread $\times$ TFP		2.122			2.267
		(2.141)			(2.152)
Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			6.042		−0.997
			(34.394)		(34.579)
Reg Q spread $\times$ $\sigma(\Delta\text{Output})$			0.690		1.938
			(10.100)		(10.394)
ΔWage				0.229	0.231
				(0.141)	(0.141)
ΔMaterials price				0.015	0.009
				(0.131)	(0.131)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.088	0.089	0.088	0.089	0.089

Table 8: Finance dependence post Reg Q

Panel regressions during and post Reg Q:

$$\Delta Y_{i,t} = \alpha_t + \gamma_i + \beta Z_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t},$$

where $\Delta Y_{i,t}$ is price or output growth of industry i in year t and Z_t is the Reg Q spread, deposit growth, or GDP growth. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights); it is zero post Reg Q. The controls are as in column (5) of Tables 3 and 4. Finance dependence and the controls are calculated over 1958–1965 for the Reg Q sample and 1975–1984 for the post Reg Q sample. Standard errors are clustered by industry. The data are from the NBER manufacturing database, which covers 459 manufacturing industries. The Reg Q sample is from 1965 to 1982 and the post Reg Q sample is from 1984 to 2018.

Panel A: ΔPrices

	Reg Q				Post Reg Q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reg Q spr. × Fin. dep.	1.995***	1.637***						
	(0.584)	(0.357)						
ΔDeposits × Fin. dep.			−0.312***	−0.227***	0.020	0.046		
			(0.090)	(0.057)	(0.039)	(0.035)		
ΔGDP × Fin. dep.							0.132	0.024
							(0.113)	(0.095)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Time, Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	15,906	15,899	15,906	15,899
R^2	0.300	0.589	0.300	0.589	0.183	0.354	0.183	0.355

Panel B: ΔOutput

	Reg Q				Post Reg Q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reg Q spr. × Fin. dep.	−3.760***	−3.694***						
	(0.817)	(0.871)						
ΔDeposits × Fin. dep.			0.691***	0.703***	−0.125	−0.150		
			(0.135)	(0.146)	(0.134)	(0.141)		
ΔGDP × Fin. dep.							0.407	0.502
							(0.347)	(0.331)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Time, Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	15,906	15,899	15,906	15,899
R^2	0.249	0.261	0.250	0.262	0.129	0.137	0.129	0.140

Table 9: Industry Reg Q spread and prices

Panel regressions of prices on the industry Reg Q spread:

$$\Delta\text{Prices}_{i,t} \;=\; \alpha_t + \gamma_i + \beta\text{RegQSpread}_{i,t} + X_{i,t} + \epsilon_{i,t}.$$

Price growth is the percentage change of industry i's shipments deflator in year t. The industry Reg Q spread is the average Reg Q spread of banks in the counties where an industry operates (we weight banks by C&I loans within a county and counties by industry employment within an industry). A bank's Reg Q spread is the average spread on savings, small time and large time deposits using the bank's shares of each type as weights. The aggregate Reg Q spread weights across counties by total manufacturing employment. Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔPrices				
	(1)	(2)	(3)	(4)	(5)
Industry Reg Q spread	1.575**	1.617**	1.600**	1.561**	1.621**
	(0.719)	(0.708)	(0.726)	(0.718)	(0.712)
Agg. Reg Q spread $\times$ Energy int.		-0.019			-0.015
		(0.029)			(0.028)
Agg. Reg Q spread $\times$ TFP		0.267			0.274
		(0.255)			(0.261)
Agg. Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			5.196		4.894
			(4.919)		(4.908)
Agg. Reg Q spread $\times$ $\sigma(\text{Output})$			1.104*		1.147*
			(0.664)		(0.666)
ΔWage				0.023	0.023
				(0.018)	(0.018)
ΔMaterials price	0.853***	0.853***	0.851***	0.853***	0.851***
	(0.076)	(0.076)	(0.075)	(0.076)	(0.075)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,477	6,477	6,477	6,477	6,477
R^2	0.580	0.580	0.580	0.580	0.581

Table 10: Industry Reg Q spread and output

Panel regressions of output on the industry Reg Q spread:

$$\Delta\text{Output}_{i,t} = \alpha_t + \gamma_i + \beta\text{RegQSpread}_{i,t} + X_{i,t} + \epsilon_{i,t}.$$

Output growth is the percentage change of industry i's output (shipments plus the change in inventories deflated by the shipments deflator) in year t. The industry Reg Q spread is the average Reg Q spread of banks in the counties where an industry operates (we weight banks by C&I loans within a county and counties by industry employment within an industry). A bank's Reg Q spread is the average spread on savings, small time and large time deposits using the bank's shares of each type as weights. The aggregate Reg Q spread weights across counties by total manufacturing employment. Energy intensity is energy costs divided by output. TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔOutput				
	(1)	(2)	(3)	(4)	(5)
Industry Reg Q spread	-4.121^{**}	-4.309^{***}	-4.306^{***}	-4.242^{**}	-4.704^{***}
	(1.652)	(1.556)	(1.621)	(1.652)	(1.528)
Agg. Reg Q spread $\times$ Energy int.		0.034			0.060
		(0.060)			(0.059)
Agg. Reg Q spread $\times$ TFP		1.264^{**}			1.150^{*}
		(0.617)			(0.607)
Agg. Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			2.018		4.939
			(6.476)		(6.251)
Agg. Reg Q spread $\times$ $\sigma(\text{Output})$			-3.409^{*}		-3.318^{*}
			(1.910)		(1.897)
ΔWage				0.124^{**}	0.126^{**}
				(0.049)	(0.049)
ΔMaterials price				-0.258^{***}	-0.264^{***}
				(0.051)	(0.051)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,477	6,477	6,477	6,477	6,477
R^2	0.226	0.227	0.227	0.236	0.238

Table 11: Industry Reg Q spread, finance dependence, and prices

Panel regressions of prices on the industry Reg Q spread and finance dependence:

$$\Delta\text{Prices}_{i,t} = \alpha_t + \gamma_i + \beta\text{RegQSpread}_{i,t} \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Price growth is the percentage change of industry i's shipments deflator in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The industry Reg Q spread is the average Reg Q spread of banks in the counties where an industry operates (we weight banks by C&I loans within a county and counties by industry employment within an industry). A bank's Reg Q spread is the average spread on savings, small time and large time deposits using the bank's shares of each type as weights. The aggregate Reg Q spread weights across counties by total manufacturing employment. Energy intensity, TFP, and the standard deviations of prices and real output growth are measured as of 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔPrices				
	(1)	(2)	(3)	(4)	(5)
Ind. Reg Q spread $\times$ Fin. dep.	0.758***	0.745**	0.624**	0.768***	0.627**
	(0.282)	(0.291)	(0.255)	(0.281)	(0.271)
Ind. Reg Q spread	1.138	1.136	1.244*	1.118	1.220*
	(0.746)	(0.744)	(0.740)	(0.745)	(0.736)
Agg. Reg Q spread $\times$ Energy int.		-0.002			-0.001
		(0.031)			(0.031)
Agg. Reg Q spread $\times$ TFP		0.254			0.268
		(0.255)			(0.259)
Agg. Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			3.705		3.399
			(4.944)		(4.959)
Agg. Reg Q spread $\times$ $\sigma(\text{Output})$			0.998		1.058
			(0.658)		(0.661)
ΔWage				0.025	0.024
				(0.018)	(0.018)
ΔMaterials price	0.853***	0.853***	0.852***	0.853***	0.852***
	(0.076)	(0.076)	(0.075)	(0.076)	(0.075)
Time, Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,477	6,477	6,477	6,477	6,477
R^2	0.580	0.580	0.581	0.580	0.581

Table 12: Industry Reg Q spread, finance dependence, and output

Panel regressions of output on the industry Reg Q spread and finance dependence:

$$\Delta\text{Output}_{i,t} = \alpha_t + \gamma_i + \beta\text{RegQSpread}_{i,t} \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Output growth is the percentage change of industry i's real output in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The industry Reg Q spread is the average Reg Q spread of banks in the counties where an industry operates (we weight banks by C&I loans within a county and counties by industry employment within an industry). A bank's Reg Q spread is the average spread on savings, small time and large time deposits using the bank's shares of each type as weights. The aggregate Reg Q spread weights across counties by total manufacturing employment. Energy intensity, TFP, and the standard deviations of prices and real output growth are measured as of 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔOutput				
	(1)	(2)	(3)	(4)	(5)
Ind. Reg Q spread × Fin. dep.	−2.976***	−3.089***	−3.100***	−2.986***	−3.260***
	(0.663)	(0.660)	(0.698)	(0.667)	(0.697)
Ind. Reg Q spread	−2.406	−2.313	−2.536	−2.519	−2.621*
	(1.645)	(1.552)	(1.620)	(1.659)	(1.550)
Agg. Reg Q spread × Energy int.		−0.035			−0.011
		(0.062)			(0.060)
Agg. Reg Q spread × TFP		1.320**			1.179**
		(0.600)			(0.595)
Agg. Reg Q spread × σ(ΔPrices)			9.356		12.712**
			(6.739)		(6.460)
Agg. Reg Q spread × σ(Output)			−2.876		−2.852
			(1.822)		(1.807)
ΔWage				0.120**	0.120**
				(0.049)	(0.049)
ΔMaterials price				−0.260***	−0.267***
				(0.050)	(0.050)
Time, Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,477	6,477	6,477	6,477	6,477
R^2	0.229	0.230	0.230	0.239	0.241

Table 13: Sources of external financing

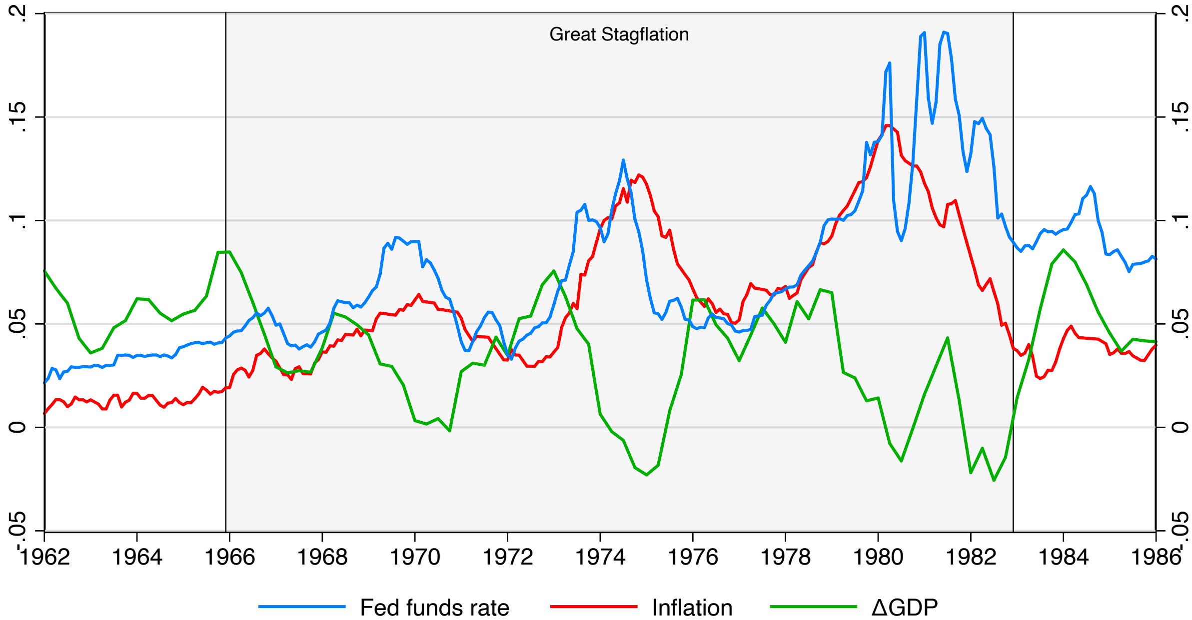
The table shows aggregate figures for originations of bank loans and corporate bonds during the Reg Q period from 1965 to 1982, reported in billions of 1965 dollars. Bank loans are from the U.S. Financial Accounts, Table F.102, "Nonfinancial Business; Depository Institution Loans N.E.C.; Liability, Transactions" (series FA143168005.A). Bank loans and CRE adds commercial mortgages, "Nonfinancial Business; Total Mortgages; Liability, Transactions" (series FA143165005.A). Commercial paper is "Nonfinancial Corporate Business; Commercial Paper; Liability, Transactions" (series FA103169100.A). Corporate bonds are "Nonfinancial Corporate Business; Corporate Bonds; Liability, Transactions" (series FA103163003.A). Corporate bonds ex. utilities and oil excludes corporate bond issuance by utilities (SIC codes 4000 to 4999) and oil companies (SIC codes 1300 to 1399). Industry-level issuance is from the Mergent Fixed Income Securities Database (1965 to 1969) and SDC Platinum (1970 to 1982).

Year	Bank loans	Bank loans & CRE	Commercial paper	Corporate bonds	Corp. bonds ex. util. & oil
1965	12.45	22.07	−0.33	4.85	0.70
1966	10.47	20.23	0.80	9.88	0.73
1967	7.41	14.29	1.32	13.73	3.14
1968	10.11	22.56	1.09	11.53	1.20
1969	10.39	20.59	0.94	10.12	0.94
1970	5.17	19.46	1.42	15.81	5.66
1971	5.14	23.88	−0.69	14.57	4.51
1972	11.57	39.05	0.54	9.13	1.96
1973	22.44	48.13	0.97	6.30	1.15
1974	18.56	33.44	2.54	12.07	3.82
1975	−6.10	3.26	−1.66	15.58	6.39
1976	1.90	16.05	0.78	12.45	2.60
1977	12.03	33.48	0.84	11.70	1.91
1978	16.67	37.68	1.26	9.90	1.71
1979	19.40	39.16	3.74	7.17	2.40
1980	11.08	25.98	1.46	10.19	4.12
1981	14.79	33.09	4.97	8.38	3.84
1982	17.56	34.34	−2.00	10.00	5.89
Mean	11.17	27.04	1.00	10.74	2.93

Figure 1: The Great Stagflation

Panel A shows the Fed funds rate, inflation, and real GDP growth (ΔGDP). Gray shading covers the Great Stagflation using conventional dating (e.g., Bryan, 2013). Inflation and ΔGDP are year-over-year. Inflation is based on the Consumer Price Index (CPI). Panel B shows unfilled orders, inflation, and ΔGDP. Unfilled orders are from the Census Bureau's Manufacturers' Shipments, Inventories, & Orders (MSIO) survey. We use seasonally adjusted unfilled orders for manufacturing excluding defense after 1968 and all manufacturing before 1968 when defense is not reported separately. We deflate unfilled orders by CPI. CPI is indexed to 1982–1984, hence unfilled orders is in billions of 1982–1984 dollars. The data are monthly from 1962 to 1986 (GDP is quarterly).

Panel A:



Panel B:

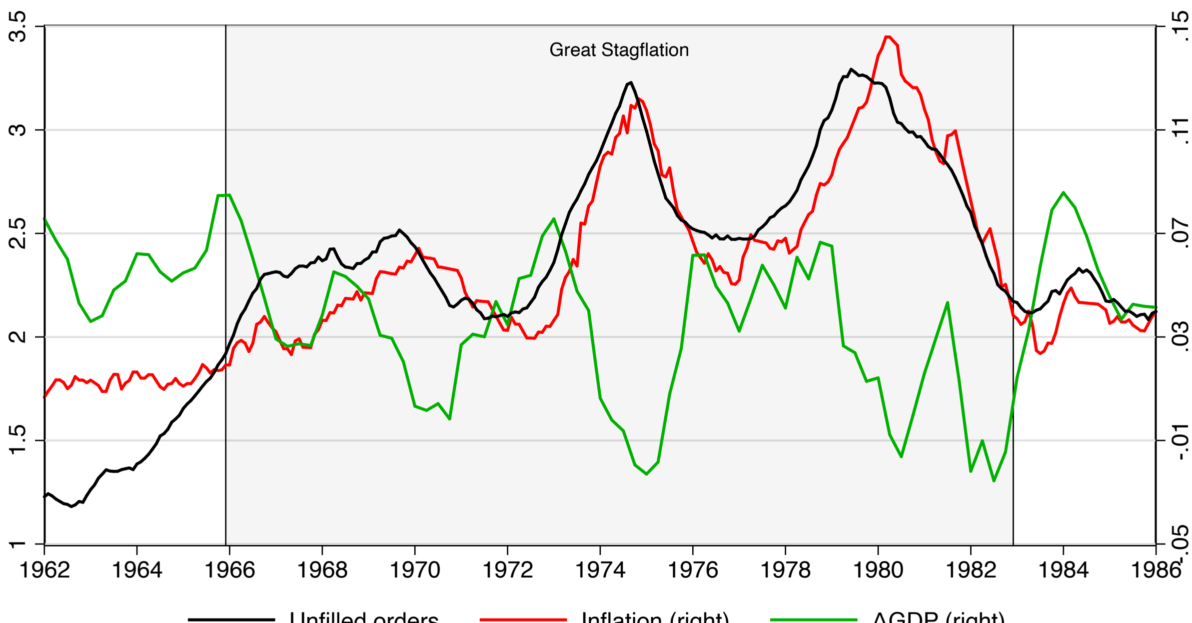
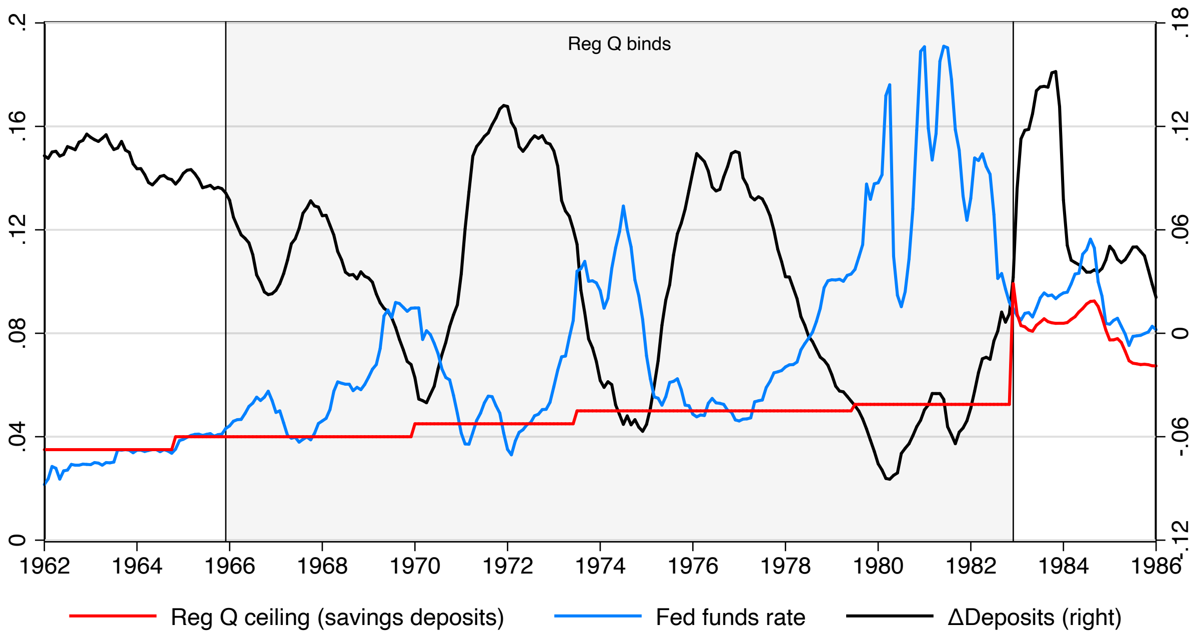


Figure 2: The Reg Q Credit Crunches

Panel A shows the Reg Q ceiling rate on savings deposits, which becomes the rate on MMDAs (a type of deregulated savings account) in December 1982. Also shown is core deposit growth (savings and small time deposits). Gray shading covers the period when Reg Q is binding: from December 1965 when the ceiling first binds to December 1982 when MMDAs are introduced. Panel B shows the growth in bank credit (loans and securities), from the Federal Reserve's H.8 release. Deposits and bank credit are deflated by the CPI. The data are monthly from 1962 to 1986.

Panel A:



Panel B:

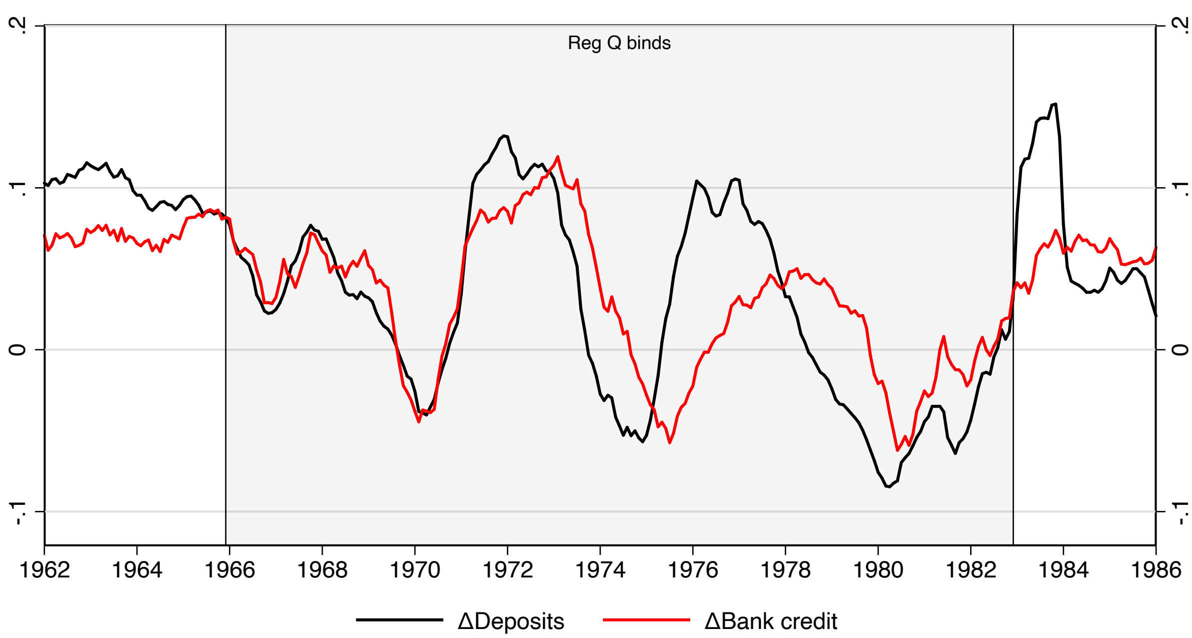
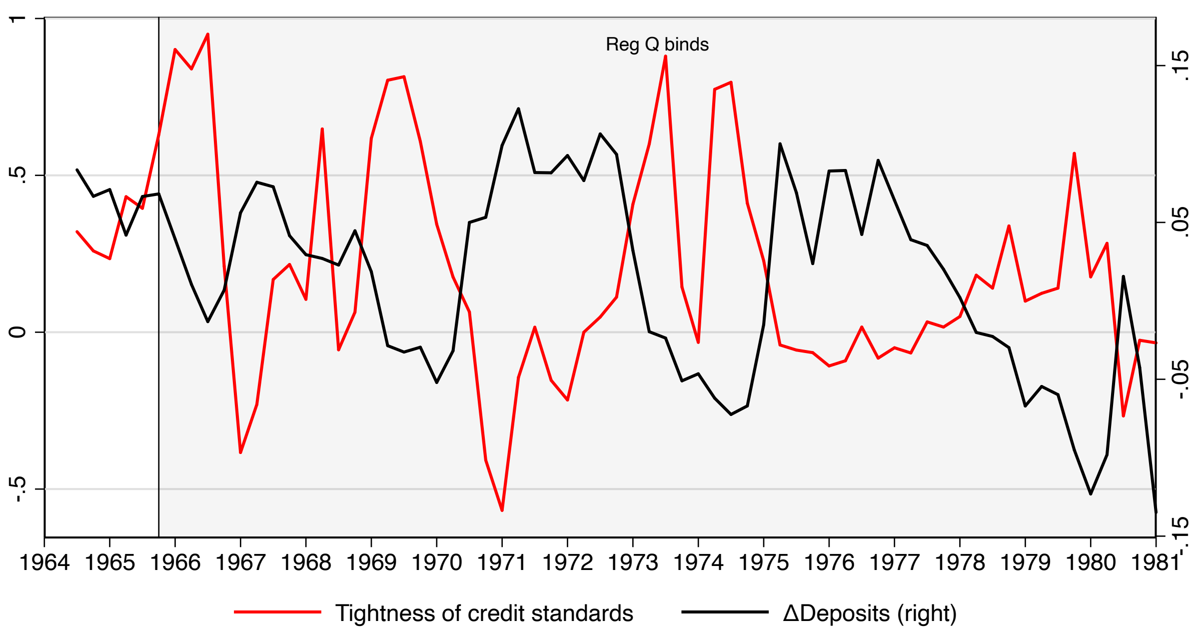


Figure 3: C&I Loan Supply

The figure plots deposit growth against the tightness of credit standards (Panel A) and estimated loan supply (Panel B) for commercial and industrial (C&I) loans. The data are from the Federal Reserve's Changes in Bank Lending Practices Survey. Tightness of credit standards is based on "Practice concerning review of credit lines or loan applications: New customers." We convert it to a net percentage as in the modern Senior Loan Officer Opinion Survey. Estimated loan supply subtracts the net percentage tightening credit standards from the net percentage reporting higher "Strength of demand for commercial and industrial loans: Anticipated in next 3 months." Gray shading covers the period when Reg Q is binding. The data are quarterly from 1964 to 1981.

Panel A:



Panel B:

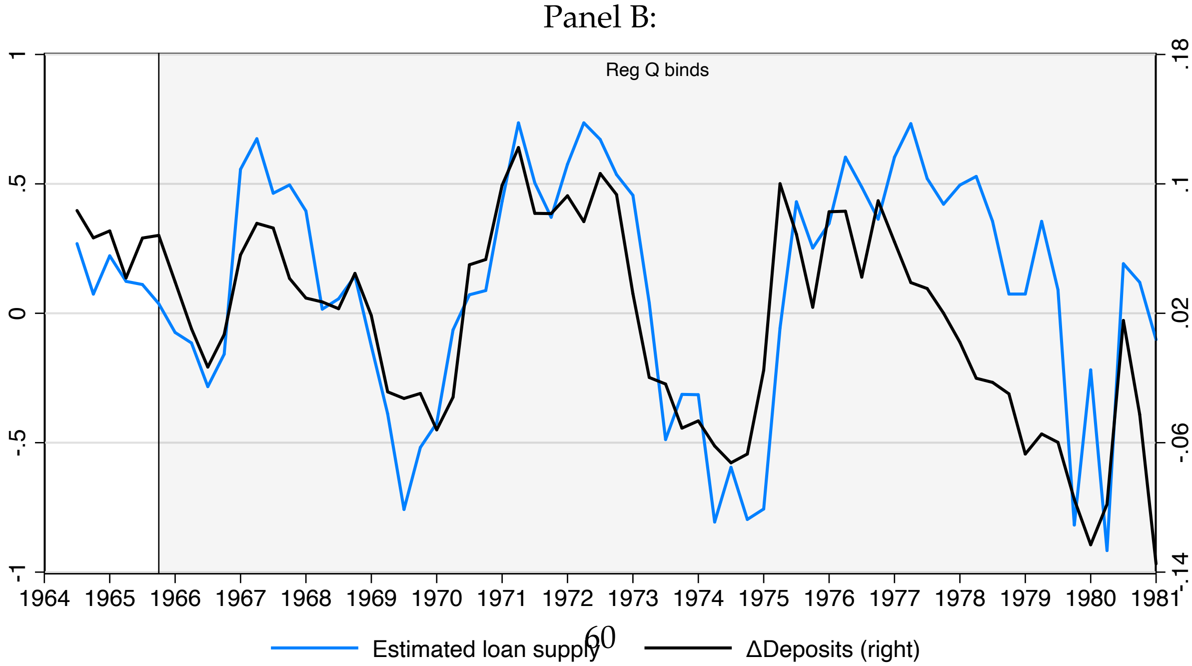
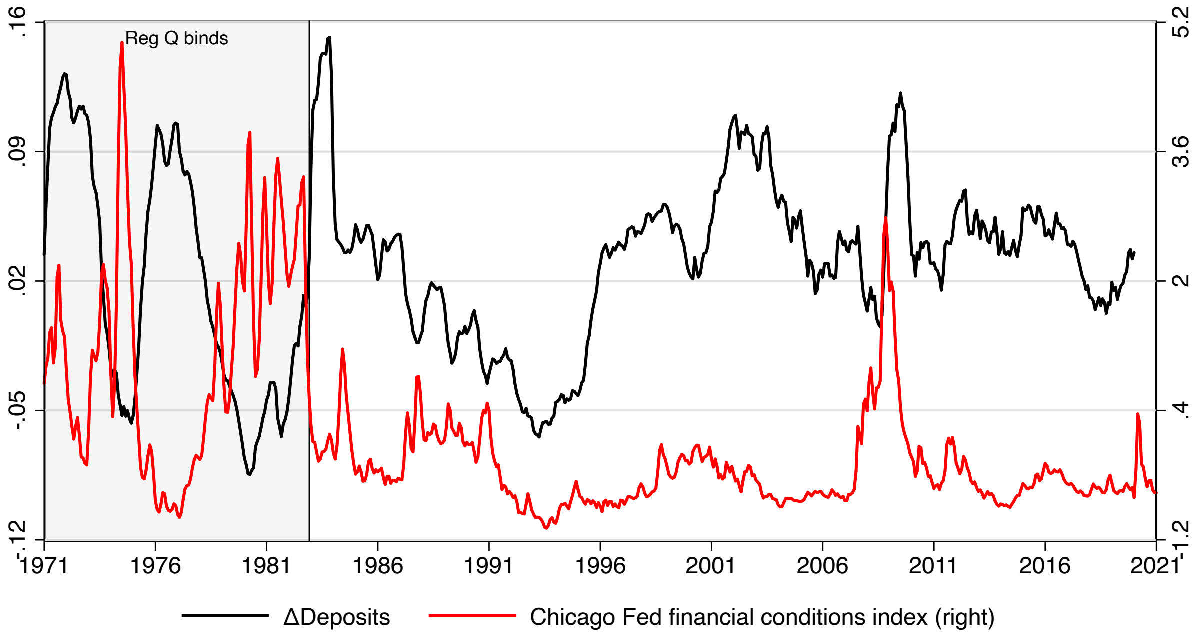


Figure 4: Credit Crunches and Financial Conditions

The figure plots deposit growth against the Chicago Fed Adjusted National Financial Conditions Index (Panel A) and the three-month Treasury Bill rate and the Fed funds rate (Panel B). The Chicago Fed index measures the tightness of financial conditions across U.S. debt, equity, and loan markets. The adjusted version controls for economic conditions. Gray shading covers the period when Reg *Q* is binding. The data are monthly from 1962 (1971 for the Chicago Fed index) to 2021.

Panel A:



Panel B:

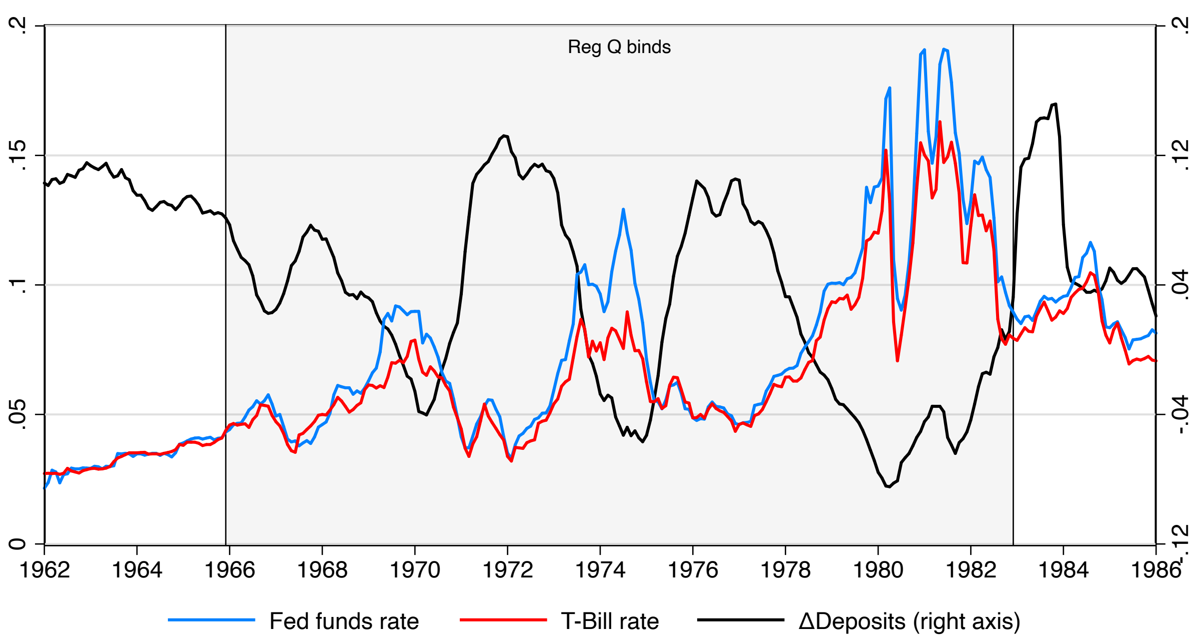
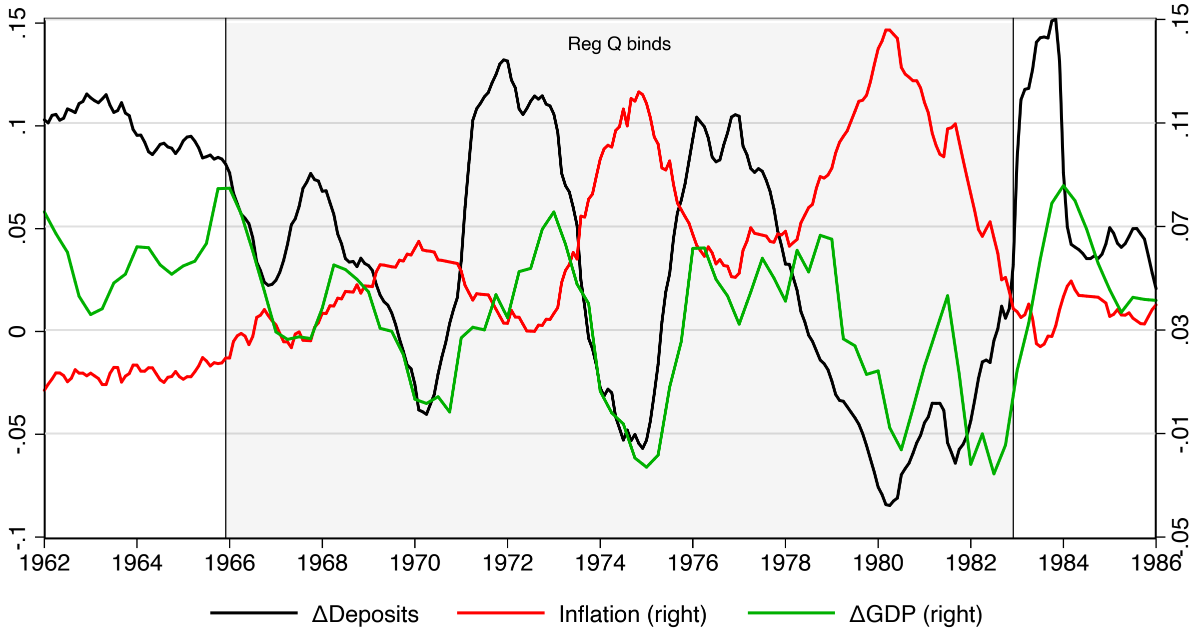


Figure 5: Credit Crunches and the Great Stagflation

Panel A shows (core) deposit growth (checking, savings, and small time deposits), inflation, and GDP growth. Inflation and GDP growth are the year-over-year percentage changes in the Consumer Price Index (CPI) and real GDP, respectively. Panel B adds employment growth, the year-over-year percentage change in non-farm employment. Gray shading covers the period when Reg *Q* is binding. The data are monthly from 1962 to 1986.

Panel A:



Panel B:

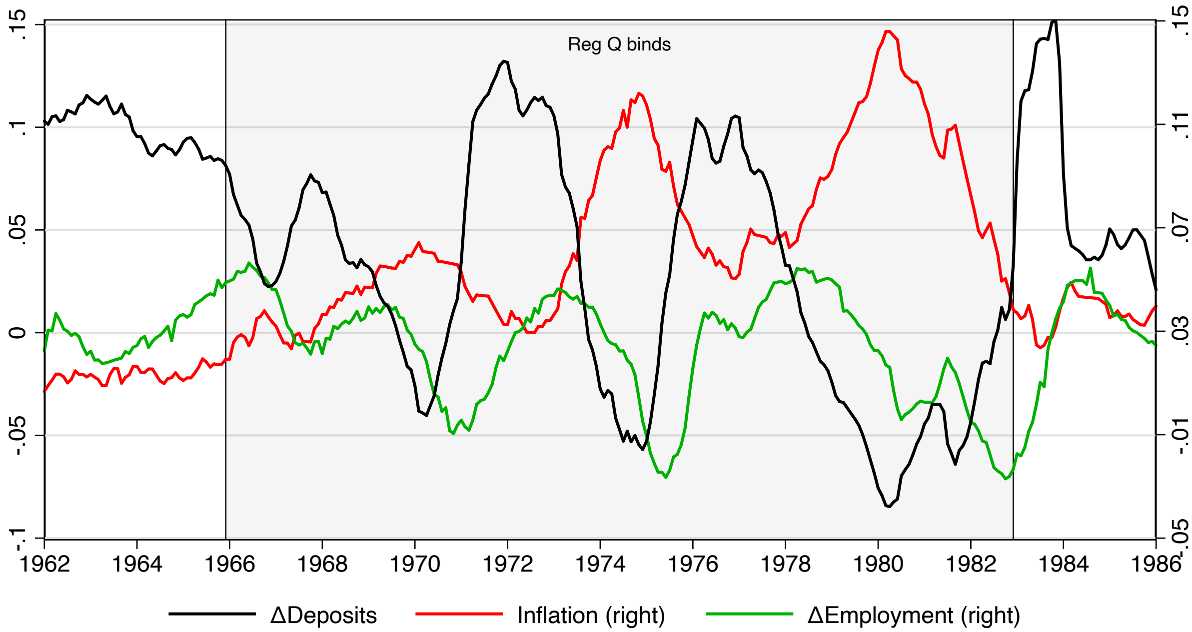


Figure 6: Finance dependence, prices, and output

The figure plots the coefficients β_t from yearly cross-sectional regressions of price growth (red) and output growth (blue) on finance dependence at the industry level:

$$y_{i,t} \;=\; \alpha_t + \beta_t \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Price growth is the percentage change of industry i's shipments deflator in year t. Output growth is the percentage change of industry i's real output (shipments plus the change in inventories deflated by the shipments deflator) in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The regressions control for materials price growth, the percentage change of industry i's cost of materials deflator. Shading denotes 90% confidence intervals. The dashed line is real deposit growth with values on the right axis. The data are from the NBER manufacturing database, which covers 459 manufacturing industries.

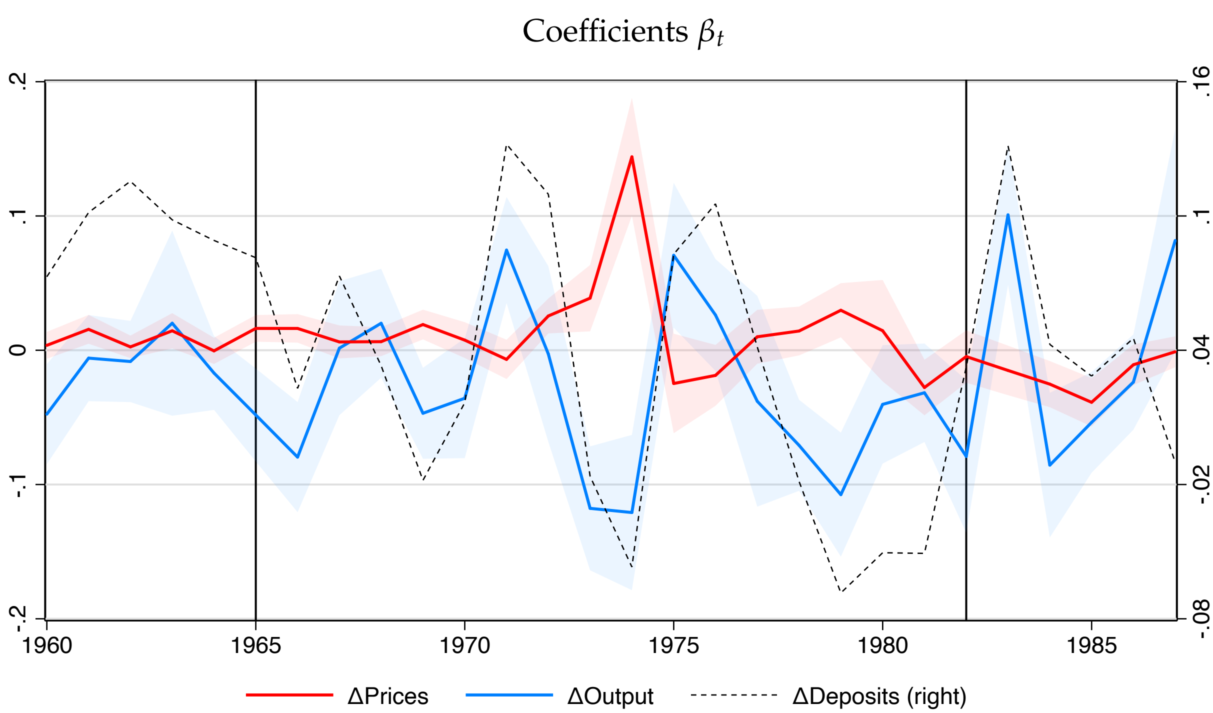


Figure 7: Finance dependence and employment

The figure plots the coefficients β_t from yearly cross-sectional regressions of employment growth on finance dependence at the industry level:

$$\Delta\text{Employment}_{i,t} \;=\; \alpha_t + \beta_t \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. Shading denotes 90% confidence intervals. Also shown are the coefficients for output growth from Figure 6 (blue line), and aggregate real deposit growth (dashes) with values on the right axis. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level.

Panel A: ΔEmployment

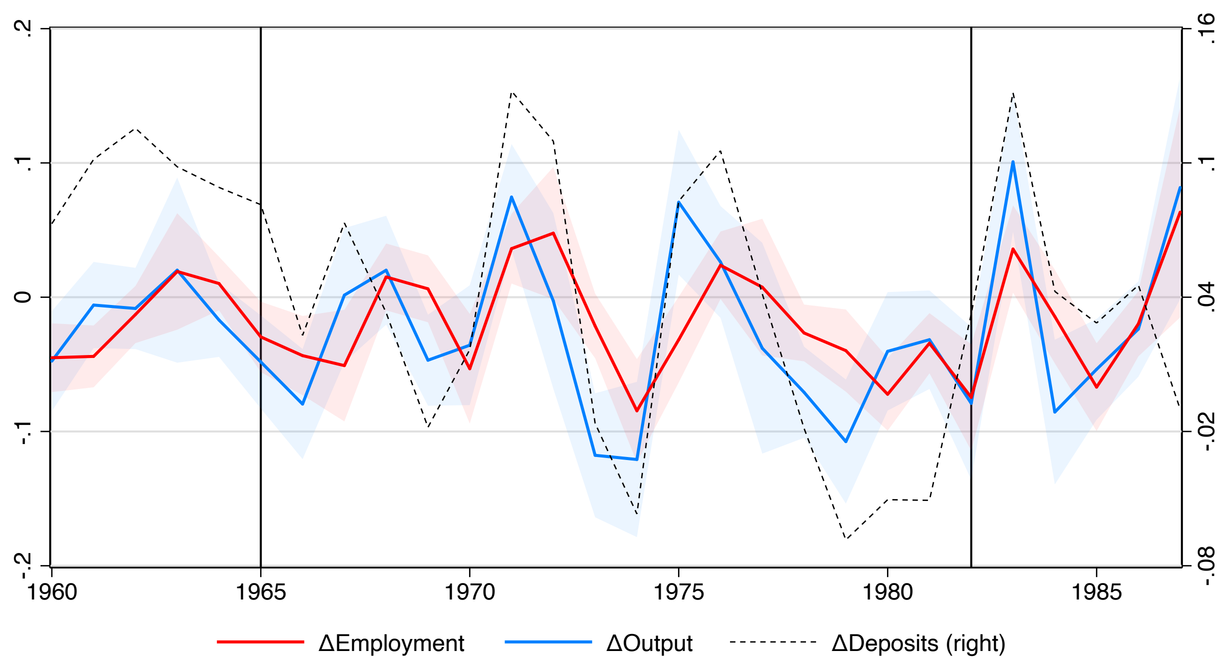
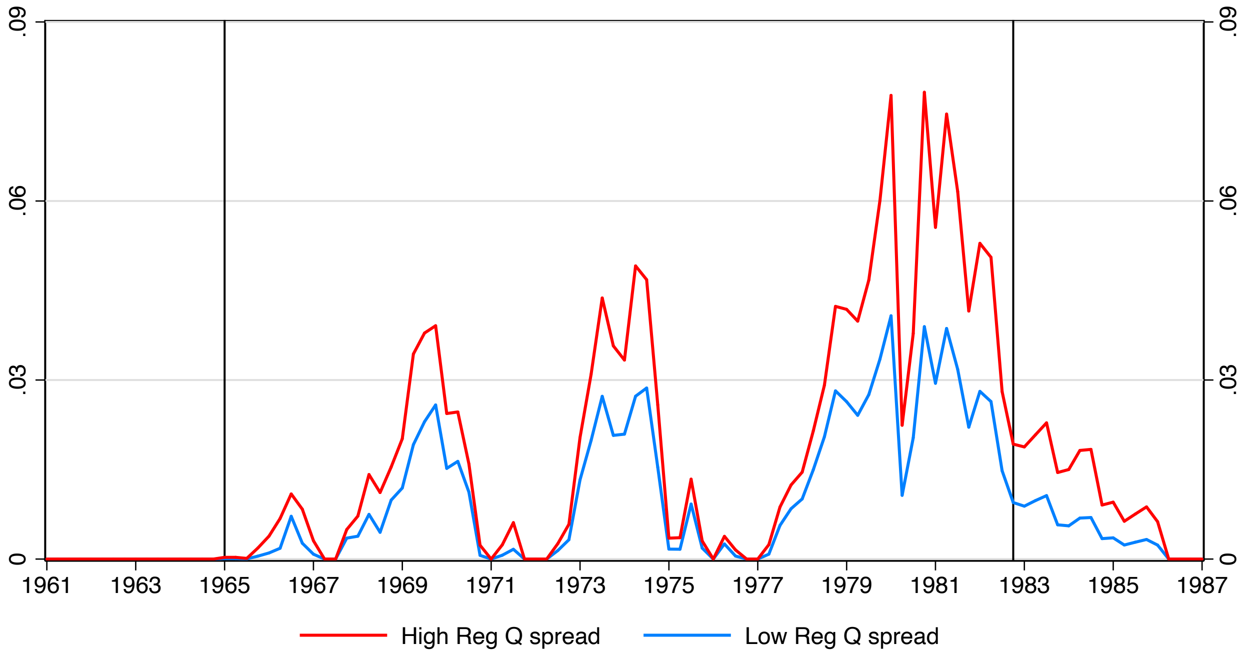


Figure 8: Bank Reg Q spread, deposits, and lending

The figure plots the Reg Q spreads (Panel A) and differences in deposit and C&I loan growth (Panel B) for banks with high and low Reg Q spreads. The Reg Q spread is calculated for each bank based on its shares of different types of deposits (e.g., savings, small time, and large time) and their Reg Q ceiling spreads. For this figure we split banks into terciles by their Reg Q spread each period and calculate the average Reg Q spread (Panel A) and differences in deposit and C&I loan growth between the high and low terciles (Panel B). The data are from the bank Call Reports, 1961 to 1987.

Panel A: Reg Q spread, high and low tercile



Panel B: Deposit and loan growth, high minus low tercile

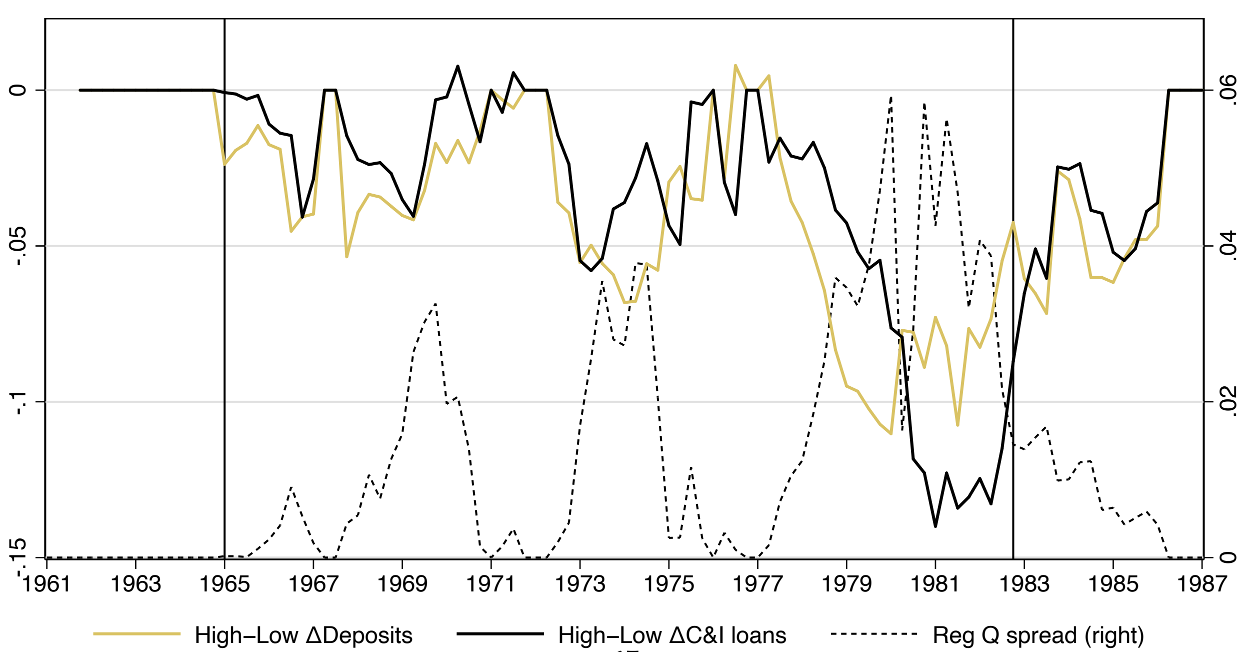
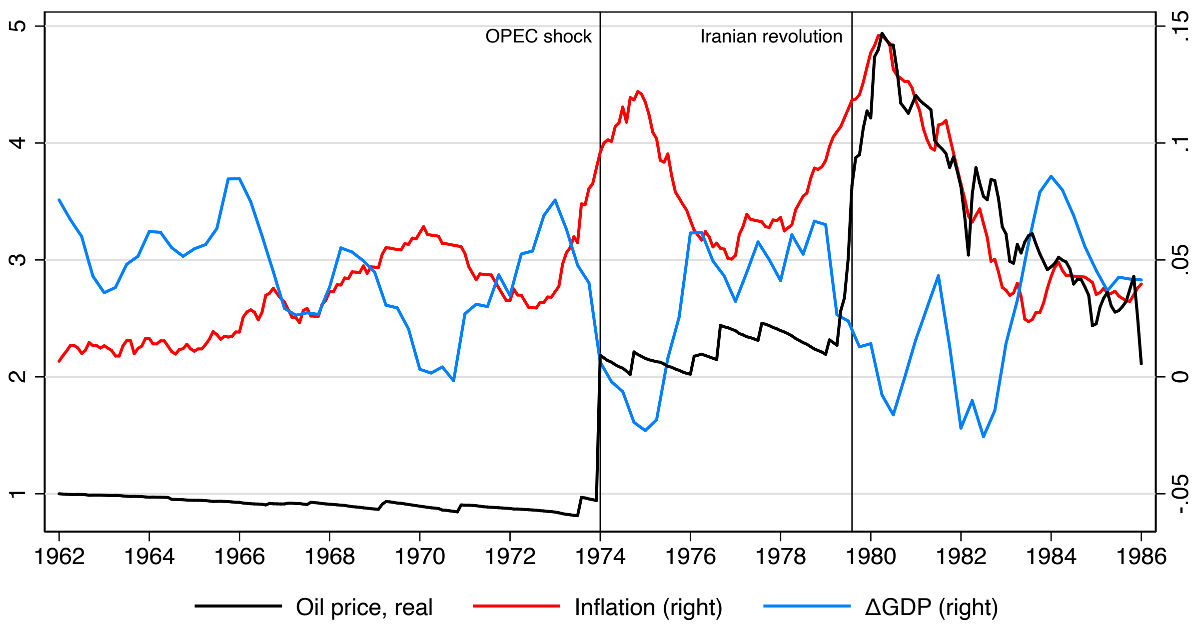


Figure 9: Oil

The figure plots the real price of oil, inflation, and GDP growth in annual (Panel A) and quarterly (Panel B) data. The real price of oil is the price of a barrel of West Texas Intermediate crude oil divided by CPI. Inflation is the percentage change in CPI and GDP growth is the percentage change of real GDP. The lines "OPEC shock" and "Iranian revolution" mark the oil price jumps of January 1974 and August 1979, respectively. The data are monthly from 1962 to 1986.

Panel A: Annual



Panel B: Quarterly

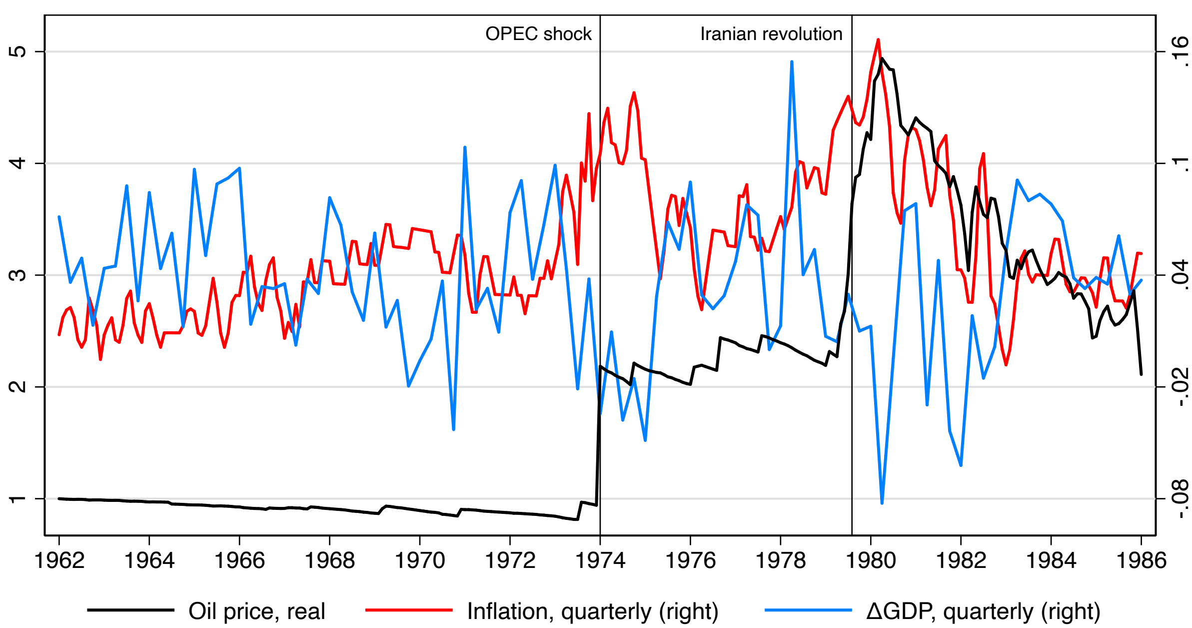


Table A.1: Finance dependence by sector

The table shows finance dependence at the two-digit SIC level. Finance dependence is one minus industry *i*'s gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. We first calculate finance dependence at the four-digit SIC level then average it within two-digit SIC sectors. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level.

	SIC2	Fin. Dep.
Apparel & Other Textile Products	23	0.66
Chemical & Allied Products	28	0.29
Electronic & Other Electric Equipment	36	0.38
Fabricated Metal Products	34	0.53
Food & Kindred Products	20	0.58
Furniture & Fixtures	25	0.57
Industrial Machinery & Equipment	35	0.40
Instruments & Related Products	38	0.26
Leather & Leather Products	31	0.63
Lumber & Wood Products	24	0.69
Miscellaneous Manufacturing Industries	39	0.46
Paper & Allied Products	26	0.59
Petroleum & Coal Products	29	0.64
Primary Metal Industries	33	0.63
Printing & Publishing	27	0.33
Rubber & Miscellaneous Plastics Produ	30	0.50
Stone, Clay, & Glass Products	32	0.40
Textile Mill Products	22	0.70
Tobacco Products	21	0.43
Transportation Equipment	37	0.60

Table A.2: Finance dependence and profits

Panel regressions of gross profits on finance dependence and the Reg Q spread:

$$\Delta\text{Gross profits}_{i,t} = \alpha_t + \gamma_i + \beta \text{Reg}Q\text{Spread}_t \times \text{FinDep}_i + X_{i,t} + \epsilon_{i,t}.$$

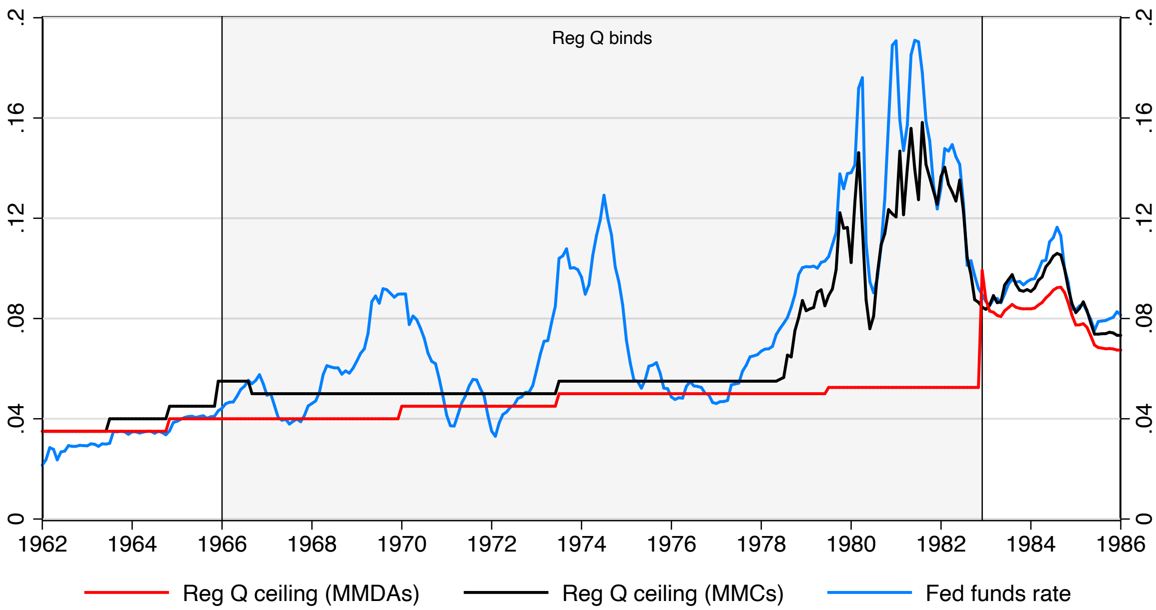
Gross profit growth is the percentage change of industry i's gross profit (sales minus production costs) in year t. Finance dependence is one minus industry i's gross profit (sales minus production costs) divided by production costs (materials and labor), averaged over 1958 to 1965 and winsorized at the 5% level. The Reg Q spread is the weighted average spread between market rates and the Reg Q ceiling rates on savings, small time, and large time deposits (using their shares as weights). Energy intensity is energy costs divided by shipments (each deflated by its deflator). TFP is total five-factor productivity in 1965. The standard deviations of price growth and real output growth are from 1958 to 1965. Wage growth is the percentage change of hourly production wages (production wages divided by hours worked). Materials price growth is the percentage change of industry i's cost of materials deflator. Standard errors are clustered by industry. The data are from the NBER-CES manufacturing database, which covers 459 manufacturing industries. The sample is the Reg Q period from 1965 to 1982.

	ΔGross profit				
	(1)	(2)	(3)	(4)	(5)
Reg Q spread $\times$ Fin. dep.	-0.325	-0.459	-0.980	-0.352	-0.983
	(0.778)	(0.781)	(0.782)	(0.761)	(0.765)
Reg Q spread $\times$ Energy int.		-0.047			-0.086
		(0.110)			(0.107)
Reg Q spread $\times$ TFP		1.541**			1.387**
		(0.619)			(0.627)
Reg Q spread $\times$ $\sigma(\Delta\text{Prices})$			26.888***		16.707*
			(9.736)		(9.006)
Reg Q spread $\times$ $\sigma(\Delta\text{Output})$			0.546		1.418
			(1.713)		(1.715)
ΔWage				0.028	0.027
				(0.038)	(0.038)
ΔMaterials price				0.205***	0.198***
				(0.045)	(0.045)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	8,262	8,262	8,262	8,262	8,262
R^2	0.118	0.119	0.120	0.125	0.127

Figure A.1: Reg Q ceiling rates and the Reg Q spread

The figure plots the Reg Q ceiling rates on savings and small time deposits (Panel A) and the Reg Q spread (Panel B). The ceiling rate on savings deposits is replaced by the rate on Money Market Deposit Accounts (MMDAs) in December 1982. The ceiling rate on small time deposits is replaced by the rate on six-month Money Market Certificates (MMCs) in July 1978. The Reg Q spread is an average of the spreads on savings, small time, and large time deposits, using their shares as weights. The spread on savings deposits is the Fed funds rate minus their ceiling rate until the introduction of MMDAs and zero after. The spread on small time deposits is the six-month TBill rate minus their ceiling rate until the introduction of MMCs and zero after. The spread on large time deposits is zero. Gray shading covers the period when Reg Q binds. The data are monthly from 1962 to 1986.

Panel A:



Panel B:

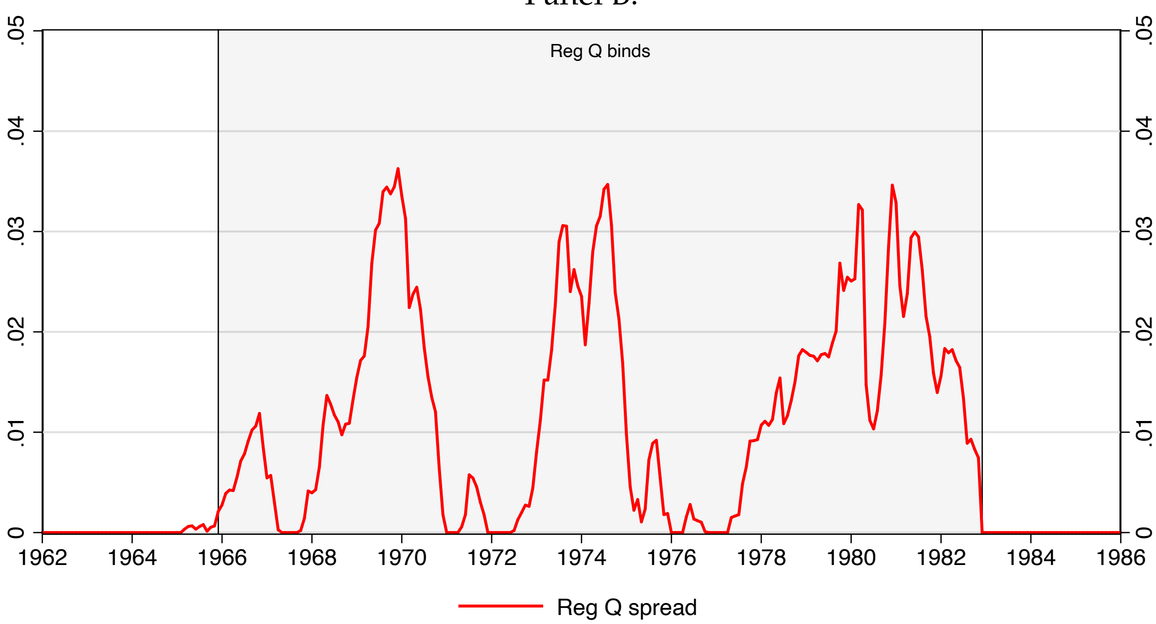


Figure A.2: Number of Firms with a Credit Rating

The figure plots the total number of firms with a credit rating from S&P each year ("Total rated"), and the number of firms that are rated for the first time in that year ("First rated"). The data are from the Capital IQ S&P Credit Ratings dataset. Vertical lines mark the period when Reg *Q* binds. The sample is 1960 to 1984.