Credit Crunches and the Great Stagflation

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May 2022

Abstract

We show that severe credit crunches contributed to the four successive stagflationary cycles that characterize the Great Stagflation of 1965–1982. The crunches were the result of large outflows of deposits from the banking system that intensified whenever inflation increased. These deposit outflows were due to the Fed's policy of imposing a low ceiling on bank deposit rates, which eliminated the passthrough of the Fed funds rate to deposits and caused real deposit rates to become increasingly negative as inflation rose. Since credit is an input to firms' production, the high cost of credit during the crunches forced firms to raise prices and cut output and employment, i.e., they led to stagflation. Consistent with this theory, we find a tight relationship between declines in deposits and bank credit, the buildup of unfilled manufacturing orders and inflation, and declines in GDP growth, employment and inflation. We then test the theory in the cross section of manufacturing industries sorted by their dependence on bank financing and find that during the credit crunches, more finance-dependent firms raised prices and cut output more, held less inventory, and hired fewer employees. We similarly find these results for firms financed by banks located in areas that were more exposed to deposit outflows. Our findings imply that the supply shocks generated by the credit crunches were an important driver of the Great Stagflation.

Keywords: stagflation, inflation, monetary policy, banks, deposits, Regulation Q

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The "Great Stagflation" (1965–1982) continues to exert an outsized influence on the study of macro and monetary economics and on the practice of monetary policy. This period was characterized by persistently high inflation and frequent recessions, with the defining feature that inflation and output growth were strongly *negatively* correlated, so that the highest levels of inflation coincided with the troughs of recessions. It was this unfamiliar combination of stagnating output and high inflation that came to be known as "stagflation." Due to policymakers' apparent failure to control inflation over such a long period, and to the high level of macroeconomic volatility, the experience of the Great Stagflation still shapes economists' understanding of macro and monetary economics, and on the views of policymakers.

Standard explanations for the persistently high inflation center on the failure of the Federal Reserve to increase interest rates aggressively enough to lower aggregate demand and keep expectations of future inflation from rising (Clarida, Gali and Gertler, 1999). Nevertheless, it is understood that the fluctuations in output growth during this period must have been driven, on net, by negative supply shocks, since output growth was low whenever inflation was high, i.e. there was stagflation (Blinder and Rudd, 2013).

While the early literature on the Great Stagflation was equally concerned with the recessions as with inflation, over time it came to be focused almost exclusively on inflation (Goutsmedt, 2021). Whereas the persistently high inflation came to be viewed as a failure of policy, and was therefore of deep interest to monetary economists, the recessions were mainly viewed has having been caused by exogenous supply shocks, including the oil crises, crop failures, bad measurement, and a slowdown in productivity growth (**?**Orphanides, 2003; Primiceri, 2006). Since these shocks are exogenous, figuring out exactly which ones drove the Great Stagflation recessions is not necessarily important for drawing policy lessons. This may explain why the literature's attention drifted to the demand side, even though there is no real consensus about which factors were the main drivers of the recessions.[1]

In this paper, we show that severe credit crunches, originating in the banking sector, were a significant source of stagflation during each of the inflation-recession cycles that took place during the Great Stagflation. Because they deprived firms of working capital, the credit they need to pay for their up-front costs of materials and labor, the crunches

[1] In the popular narrative, oil tends to take the blame for the recessions. However, in the academic literature several works have strongly disputed this claim (Barsky and Kilian, 2001).

increased firms cost of production. Thus, they acted as repeated negative supply shocks. Just like with other negative supply shocks (e.g., oil), this caused firms to raise prices and cut output, and hence employment. In other words, the credit crunches were a source of stagflation.

What caused the credit crunches? We show that the credit crunches were triggered by very large outflows of deposits from the banking system caused by the banking law known as Regulation *Q*. As discussed in detail in Drechsler, Savov and Schnabl (2020), Reg *Q* imposed ceilings on the rates that banks could pay their depositors. The ceiling rate itself was set by the Federal Reserve and depended on the type of deposit (e.g., savings versus time deposits). Before the end of 1965, the Fed had normally adjusted the ceiling in tandem with rate changes, so that it remained rate above the Federal funds rate. Hence, few banks or deposits were affected by it.

However, beginning in 1965 the Fed increased the Fed funds rate without increasing the Reg *Q* ceiling, constraining deposits to pay a lower rate than they would have otherwise. Though most depositors lacked good alternatives and kept their deposits at banks, substantial withdrawals occurred. This dynamic repeated itself while the deposit ceilings remained in force, which was the case until Reg Q was finally dismantled in 1982. Since banks were (and to this day still are) largely deposit-funded, the large outflows of deposits forced them to cut the supply of credit to the economy. Thus, each time deposit rates hit their ceiling, there was a credit crunch.

We argue that Reg *Q* deposit rate ceiling led to deposit outflows that caused credit crunches, which were a generator of stagflation. We show that this theory is consistent with the evidence from the aggregate data, and then conduct a series of tests using cross-sectional and time variation in the prices, output, and employment of manufacturing industries sorted by their dependance on bank financing, and by the level of exposure to Reg *Q* of the banks in their local area.

We begin with the aggregate evidence. As noted above, the aggregate time series shows a striking negative relationship between inflation and GDP for each of the four inflation cycles that took place from 1965 to 1982. In each cycle, inflation begins to rise just as GDP growth begins to decline, and inflation peaks at almost exactly the same time that GDP growth is at the trough. This tight, negative relationship implies that the dominant, or net, shock driving each of the four cycles was a supply shock; if the dominant shock was demand, it would instead induce a positive inflation-output relation.

Thus, even if interest-rate policy was insufficiently tight to curb high demand, this alone cannot fully explain any of the four cycles. The negative inflation-growth relation also cannot be explained by an increase in inflation expectations, because this would flatten the relation between high inflation and growth, but not invert it.

We document direct evidence for the importance of supply shocks by examining the behavior of unfilled orders in manufacturing. Unfilled orders are orders that are placed and paid for, but have not yet been delivered by manufacturers. We find a strikingly close relation between unfilled orders and inflation over the whole Great Stagflation period: unfilled orders rise and fall in a pattern that closely mimics inflation in both timing and magnitude. In fact, unfilled orders moderately lead inflation throughout, both on the way up and down, consistent with unfilled orders driving inflation.

An increase in unfilled orders implies that suppliers are unable to keep pace with demand. By itself, this could be due to either abnormally high demand or low supply. However, unfilled orders rise at exactly the same time that output growth is *slowing*, and peak when output is shrinking. The picture this paints is of supply disruptions limiting firms' ability to produce and hence causing unfilled orders to pile up. The pattern is inconsistent with high demand being the main driver of unfilled orders, since that would cause output to increase. Conversely, we show that when unfilled orders are declining, output growth is actually increasing, which is consistent with an increase in supply (i.e., an easing of supply disruptions), rather than a fall in demand.

The tight positive relationship between unfilled orders and inflation is evidence that increasing inflation expectations were not the sole cause of increasing inflation. This is because the magnitude and timing of the unfilled order buildups give a very natural explanation for the magnitude and timing of inflation increases throughout the Great Stagflation, while the subsequent decreases in unfilled orders do the same for the decreases in inflation. In contrast, the idea of increases in inflation expectations is that they increase inflation without substantially altering production. Hence, they do not explain the strong co-movement with unfilled orders.

Next, we show that fluctuations in bank deposits and bank credit line up very closely with the inflation-output cycles. Because deposit rates were at or near the Reg Q ceiling after 1965, there was effectively no passthrough of the Fed funds rate to deposit rates. As a result, even though the Fed funds rate tracked the inflation rate closely, increases in inflation reduced the real deposit rate one-for-one. The result was that inflation and deposit growth are inverse images of each other over the whole Great Stagflation period.

Since deposits provided the bulk of banks' financing, their loss forced banks to cut lending. We show that bank credit growth closely follows deposits, plummeting during each of the inflationary cycles. For instance, as inflation rose from a low initial level in 1972 to a peak of around 12% 1974, the annual real growth rate of deposits and bank credit plummeted from +10% to nelow −5%, a very large drop that resulted in a drastic reduction in the availability of new credit. Our theory is that these credit crunches raised firms' cost of production, thereby forcing them to cut output and raise prices.

Consistent with this theory, we show that GDP fluctuations tracked deposits and bank credit closely during the Great Stagflation. This tight relationship begins right at the outset of the period. Interestingly, at this point the economy was very healthy, with inflation that was still low and real GDP growth at a very high 8%. However, the Fed's initial refusal to raise the Reg Q ceiling with the Fed funds rate created a wedge between the Fed funds rate and deposit rates, which caused a sudden outflow of deposits that forced banks to sharply contract new bank credit. This was immediately followed by a dramatic decline in GDP growth, a phenomenon that was attributed, even at the time, to the large decline in the availability of credit. Indeed, the term "credit crunch" was coined in 1966 to refer to what had happened (Burger, 1969).

If supply disruptions caused firms to cut output, then we should find that the credit crunches also align with changes in employment. We find there is a very strong relation between employment growth and bank credit growth throughout the whole Great Stagflation period. Manufacturing employment, which we analyze in our cross-sectional tests, is even more volatile and closely correlated with the growth of bank credit.

We test the hypothesis that the Reg Q credit crunches led to stagflation in the cross section of industries. Our data comes from the NBER-CES manufacturing database, which contains detailed production data for 459 manufacturing industries at the four-digit SIC level going back to 1958. Importantly, the NBER-CES data contains information on both prices and quantities, allowing us to test for stagflationary effects.

Our first set of tests exploit variation in the degree to which different industries rely on external financing in order to produce output. Following Rajan and Zingales (1998) who focus on external finance dependence for *investment*, we define external finance dependence for *production* as the amount of desired production that cannot be financed through a firm's internal resources. The idea is that some industries have large up-front production costs relative to the profits they generate. These industries are less able to accumulate enough internal resources to finance their production and must therefore rely on external financing. Analogous to Rajan and Zingales (1998) we measure external finance dependence for production—finance dependence for short—as the difference between production costs (materials and labor) and gross margin, divided by production costs. We do so using data before 1965, prior to when Reg Q was binding. A firm with a finance dependence of zero generates enough profits to self-finance its future production after just one period, while a firm with a finance dependence of one generates no profits and will never be able to do so. The average level of finance dependence in our sample is 0.5 with a standard deviation of 0.2.

We validate our measure by relating it to financial characteristics using sector-level (two-digit SIC code) data from the Quarterly Financial Reports (QFR). This is necessary because the NBER-CES data does not contain balance sheet information. Despite the small cross section (there are only 19 sectors), we find a very strong positive relationship between finance dependence and leverage, which confirms that finance dependent industries use more external financing. Moreover, the higher leverage is almost entirely due to short-term debt, which firms use primarily to finance production (long-term debt funds investment). Our measure is thus picking up finance dependence for *production*, as intended. Finance dependent sectors also have a much higher bank share of debt, hence they are also more bank dependent. This makes them especially exposed to bank-driven credit crunches like the ones due to Reg Q. Finally, finance dependent sectors have much lower cash ratios and debt service ratios. This shows that they have fewer internal resources to ride out these credit crunches.

Having validated our measure, we test whether it predicts stagflation in the cross section. Under the hypothesis that the Reg Q credit crunches led to stagflation, we expect finance dependent industries to raise prices and cut output relative to other industries when a credit crunch hits. We start by running yearly cross-sectional regressions of price growth and output growth on finance dependence. Consistent with our hypothesis, finance dependence predicts higher price growth and lower output growth during each of the credit crunches in 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. These large effects show that finance dependence is a strong predictor of stagflation in the cross section.

We run panel regressions to rule out alternative interpretations of our results. First, it could be that finance dependent industries are simply passing through higher input costs. This is not the case: our results are unchanged when we control for material costs and wages. Thus, finance dependent industries are raising their output prices *relative* to their input costs during the credit crunches. This supports the view that the credit crunches are acting as negative supply shocks. We also rule out the oil shocks by controlling for energy intensity (energy cost over output). Another possibility is that finance dependent firms are simply more volatile, but controlling for the volatility of prices or output (measured pre-Reg *Q*) does not affect our results. Neither does controlling for productivity (again measured pre-Reg *Q*), or combining all controls into a single specification. Our results are thus robust to a variety of controls.

We next turn to employment. We find that finance dependent industries cut employment relative to non-finance dependent industries during the credit crunches. The magnitude of the employment losses is significant: a one-standard deviation increase in finance dependence predicts 1.8% lower employment growth at the peak of the 1973–74 credit crunch. This is substantial relative to the aggregate employment losses suffered during the Great Stagflation.

The last two outcome variables we consider are inventories and investment. Under the view that the credit crunches act as a negative supply shock, finance dependent industries should see their inventories shrink. This is indeed what we find. Finally, finance dependence also negatively predicts investment during the credit crunches. This is not surprising because investment is known to be credit-sensitive. We stress, however, that while the marginal impact on investment is large, the dollar impact is small relative to the impact on output because output is much larger than investment (about thirty times in our data). Thus, while the credit crunches reduce demand in the economy through investment, they reduce supply much more through output. This supports the view that the Reg *Q* credit crunches led to stagflation.

Our second set of tests uses a bank-based measure of exposure to the Reg *Q* credit crunches. The measure is a bank's share of deposits that are subject to the Reg *Q* ceilings. This share differs across banks (and S&Ls) and over time because they have different deposit compositions and because Reg *Q* was tweaked repeatedly. Its advantage is that it comes from the deposit franchise, hence it is unlikely to pick up unobserved supply shocks to firms.

The Reg Q share measures a bank's exposure to the credit crunches by capturing its reliance on deposits that tend to flow out when Reg Q becomes binding. Of course, if banks could easily replace their lost deposits with wholesale funding, they could ride out the credit crunches. We show, however, that this is not the case: high Reg Q share banks cut lending sharply relative to others when Reg Q becomes binding. The Reg Q share thus predicts the credit crunches in the cross section.

We map the bank-based Reg Q share to our industry data using information on the locations of each industry's establishments. Specifically, we calculate an industry Reg Q share as a weighted average of the Reg Q shares of the counties where the industry's establishments are located, using their employee count for the weight. This implicitly assumes that firms borrow locally. We argue that this assumption is plausible in our sample because it predates the deregulation of inter- and intra-state banking in the 1980s and 90s (Kroszner and Strahan, 2014). Given this assumption, an industry's Reg Q share measures its exposure to the Reg Q credit crunches through its lenders.

We find that high Reg Q share industries have higher price growth and lower output and employment growth than low Reg Q share industries whenever Reg Q binds. The effects are slightly smaller than for finance dependence but still economically meaningful: a one-standard deviation higher Reg Q share (0.045) leads to 0.8% higher price growth per year when Reg Q binds most strongly. It further leads to a 2.4% decline in output and a 1.9% decline in employment. Given the relatively narrow variation in the measure these are sizable effects.

Thus, the Reg Q share predicts stagflation in the cross section similarly to finance dependence. The results are also robust to the same set of controls. The two sets of results are complementary: finance dependence is a comprehensive firm-based measure while the Reg Q share is a narrower bank-based measure. The fact they yield similar results strengthens the support for the hypothesis that the Reg Q credit crunches led to stagflation.

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 in economics, Goutsmedt (2021) finds that its initial impact on the literature on the 1970s 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 wage-price controls in 1971–74, and, most famously, the OPEC oil shocks in 1974 and 1979.[2] 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 no lesson to be drawn from it. 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.[3]

The view that supply shocks are exogenous explains why the literature shifted focus from stagflation to inflation. Goutsmedt (2021) notes that even the name of the period changed from "the Great Stagflation" to "the Great Inflation". Blinder and Rudd (2013), who use the earlier term, criticize the shift. The literature on the Great Inflation centers on the Fed's failure to control demand.[4] 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 rises above one under Paul Volcker, leading to the disinflation of the 1980s (Goodfriend and King, 2005). The common

[2]The oil shocks are best known but also controversial. 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. They conclude it is unlikely that the oil shocks played a major role. Related, Bernanke et al. (1997) argue that oil shocks affect the economy mainly through the reaction of the central bank and its impact on demand.

[3]It was expounded recently by Larry Summers in a podcast interview with Ezra Klein: "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.

[4]A large literature tries to explain the causes of 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) argues that a slowdown in productivity growth led the Fed to overestimate the output gap. Primiceri (2006) argues that the Fed also underestimated the persistence of inflation.

feature of the Great Inflation literature is that by focusing on demand it is unable to explain negative comovement between inflation and output. For instance, Clarida, Gali and Gertler (2000) write that "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 adverse supply shocks arose endogenously due to a friction in the financial system. The friction, Regulation Q, led to severe credit crunches whenever monetary policy tightened. The credit crunches disrupted firms' ability to finance their production. This led to a contraction in aggregate supply that resulted in stagflation. Under this view, the central bank cannot take supply as given and focus on demand, contrary to conventional wisdom. Moreover, the extent to which monetary policy transmits to supply versus demand depends on the health of the financial system, specifically on the sensitivity of credit to interest rates.

Our paper is thus closely related to the work of Barth and Ramey (2001) on the cost channel of monetary policy. According to the cost channel, a higher real 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 afterward. Our hypothesis that the impact of monetary policy on supply was due to Reg Q naturally explains this result. It also implies that this impact was due to the credit crunches rather than the real rate.[5] Our cross sectional results support this prediction.[6]

Gertler and Gilchrist (1994) find that small firms see a bigger drop in sales and inventories than large 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. These papers' findings support the view that monetary policy impacts aggregate supply through bank lending. Our paper provides a mechanism for this impact and the conditions under which it arises. We further contribute to this literature by analyzing prices and inflation.

A related literature looks at the supply effects of credit contractions that are not driven by monetary policy. Chevalier and Scharfstein (1996) shows that credit-constrained firms raise prices in recessions due to increased credit costs. Looking at the Great Recession, Gilchrist et al. (2017) finds that liquidity-constrained firms raised prices relative to uncon-

[5] As Clarida, Gali and Gertler (1999) show, the real rate rose much higher under Volcker than before.

[6] 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).

strained firms. Christiano, Eichenbaum and Trabandt (2015) show that this helps explain why inflation fell only modestly despite a collapse in aggregate demand. However, Kim (2021) finds a contrasting result: firms that received a negative credit supply shock lowered prices.[7] The Great Recession is a challenging environment for studying the impact of credit on aggregate supply given the simultaneous drop in demand and the run on the financial system. The same is true of the Great Depression: Bernanke (1983) considers the impact of the bank failures on supply but concludes that the net impact was likely on demand. Our analysis of the Great Stagflation period provides external validity for the hypothesis that credit affects supply.

Methodologically, our paper is part of the recent literature using cross-sectional methods in macro: Beraja, Hurst and Ospina (2016); Hooper, Mishkin and Sufi (2019); McLeay and Tenreyro (2019) and Hazell et al. (2020). These papers use regional variation in inflation and output to estimate the slope of the Phillips curve in different periods. Our contribution is to provide a mechanism for why the Phillips curve was inverted during the Great Inflation and test it using cross-sectional methods.

Our paper builds 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). This literature focuses on the impact of monetary policy on bank lending through changes in the supply of reserves. Our contribution is to extend the analysis to inflation and its relationship with output. In addition, focusing on Regulation Q as opposed to reserves helps explain why this relationship changed after the Great Stagflation.

A recent contribution to this literature is the deposits channel of Drechsler, Savov and Schnabl (2017). The central friction in the deposits channel is banks' deposit market power: when the Fed funds rate rises, banks keep deposit rates relatively low (they charge bigger deposit spreads) in order to maximize profits. This leads to outflows of deposits and a contraction in lending. The deposits channel is thus very similar to the mechanism proposed in this paper. The key difference is that banks in the deposits channel optimally choose to forego some lending opportunities in order to extract greater profits on deposits. In contrast, under Regulation Q deposit rates were fixed by law. This led to larger deposit outflows and consequently a more severe contraction in lending. This makes the Reg Q period a useful setting for studying the macro effects of bank lending.

[7] The effect is concentrated in 2008.Q4 and 2009.Q1; it reverts fully by 2009.Q2. Kim (2021) reconciles his findings with Gilchrist et al. (2017) by adding controls, in particular volatility. We follow his lead and control for volatility and find it has no impact.

It also highlights that the severity of these macro effects depends on the severity of the friction in the financial system.

Most work specifically on Regulation Q is in the banking literature. Burger (1969) and Wojnilower (1980) provide a history of the credit crunches and their impact on the economy (see also Bordo and Haubrich, 2010). Gilbert (1986) chronicles the repeal of Reg Q. Koch (2015) shows that the Reg Q ceilings negatively impacted bank lending. We contribute to this literature by looking at the effect of Reg Q on the relationship between inflation and output.

There are a few macro papers on Reg Q. Early contributions by Friedman (1970) and Tobin (1970) argue that Reg Q constrains money growth (deposits are part of monetary aggregates), hence it is likely to be deflationary. This monetarist perspective explains why the Fed allowed Reg Q to bind. Our contribution is to argue that Reg Q negatively affected the supply side of the economy and contributed to stagflation.

Mertens (2008) embeds deposit rate ceilings into a DSGE model and finds that they amplify the impact of monetary tightening on output. This could happen through either demand or supply effects. Our contribution is to to focus on the supply effect, which helps to explain the negative inflation-output relation during the Great Stagflation.

Our paper, Drechsler, Savov and Schnabl (2020), focuses on the demand effects of Reg Q. It argues that while wealthier households withdrew their deposits, most households stayed with the banks. These households received a low real rate once the deposit rate ceilings became binding. The low real rate stimulated demand. The combination of high demand and low supply further explain the high level of inflation. Fundamentally, Reg Q placed a wedge between the rate received by savers, which was depressed by the ceilings, and the rate paid by borrowers who suffered the credit crunches. In this environment, the monetary policy tradeoff becomes particularly adverse: raising interest rates reduces supply by restricting credit to firms while failing to reduce demand due to a low passthrough to household savers. Thus, effective monetary policy requires a well functioning financial system so that savers and borrowers face the same rate, the rate that is set by the central bank. This was not the case during the Great Stagflation.

2 Aggregate Analysis

Panel A of Figure 1 provides a basic overview of the Great Stagflation. It plots the Fed funds rate (black), inflation (red), and real GDP growth (blue) from 1962 to 1986. Inflation and real GDP growth are the year-over-year percentage changes in the CPI and real GDP, respectively. The data are monthly.

As the figure shows, the Great Stagflation is characterized by four cycles in which inflation and the Fed funds rate move up and down together The first, and smallest, begins in 1965, as inflation began to tick up from a low level and the Fed raises the funds rate. GDP growth is the inverse image, falling almost exactly when inflation rises and then rising as inflation falls. This negative relationship between inflation and GDP growth is what came to be called *stagflation*, and the figure shows that it occurred throughout the whole era. Indeed, the figure shows that the first uptick in inflation in 1965–66 coincides with a large, sharp drop in GDP growth. Each of the later three cycles encompass a recession (1966 is not technically a recession), with the last cycle encompassing the "double-dip" recessions of 1980 and 1981.

It is interesting to note that despite the frequent recessions, each of the cycles was followed by a rapid recovery, with a return to GDP growth of above 5%. The recoveries coincided with large declines in inflation. The speed of the recoveries contrasts strongly with the much more gradual recoveries experienced by the U.S. economy since the end of the Great Stagflation.

As discussed above, the occurrence of stagflation implies that each of the cycles is due, on net, to a negative supply shock. This is because the simultaneous fall in output and rise in prices implies an inwards shift in the economy's supply curve. In contrast, a positive demand shock can explain the high inflation, but implies high output growth. To be clear, it is still possible that monetary policy was too loose, or that inflation expectations increased, as the literature has argued. However, to create stagflation either of these must be combined with a negative supply shock.

To investigate further the nature of the supply shocks, we investigate the behavior of unfilled manufacturing orders, excluding defense purchases, over the Great Stagflation. This series is plotted in Panel B of Figure 1. Unfilled orders are orders that are placed and paid for, but have not yet been delivered by manufacturers. The relationship with inflation is striking: unfilled orders are tightly, positively related to inflation in both timing and magnitude over the whole Great Stagflation period. Looking closer, the unfilled orders consistently lead inflation, both on the way up and down, as one would expect if the accumulation of these orders induces firms to increase prices.

An increase in unfilled orders implies that suppliers are unable to keep pace with demand. This could be due to either abnormally high demand by customers, or abnormally low supply by producers. To distinguish this, the figure plots GDP growth. The figure shows that unfilled orders are increasing right as output growth is *slowing*, and reach their peak when output growth is actually shrinking. This relationship points strongly towards manufacturers experienced a decrease in productive capacity, since this would explain why they are actually producing less even even as the amount of unfinished work they need to do is piling up.

Similarly, the recovery phases of the business cycles are consistent with recoveries in productive capacity, since the increases in GDP growth coincide with reductions in unfilled orders. The rapid pace of the rebounds in output are consistent with the dissipation of supply disruptions allowing production to return to normal.

Our theory is that credit crunches were an important driver of the stagflationary cycles of the Great Stagflation. In turn, the credit crunches were caused by bank deposit outflows that were the product of Regulation Q's deposit-rate ceilings. Panel A of Figure 2 plots the Reg Q deposit-rate ceiling for savings deposits, along with the Fed funds rate (blue) and year-over-year growth in core bank deposits (including not just savings but also time and checking deposits).[8]

As the figure shows, the Reg Q rate ceiling becomes binding at the end of 1965, as the Fed raises the funds rate without increasing the ceiling rate. Before this, the Fed had kept the ceiling at or above the Fed funds rate, so banks were able to pay the competitive interest rate. The Fed's decision to keep the rate ceiling unchanged was part of its strategy to curb initial signs of inflation. The reasoning behind this, called "credit control", was that excessive expansion of credit by banks bank was a major driver of inflation. Hence, limiting banks ability to create more credit would curb inflation. By keeping deposit rates from rising, the deposit-rate ceiling would make deposits less attractive and thus curtail banks' abilities to raise them. A related argument followed the quantity theory of money, which holds that inflation is due to excessive growth in the stock of money. Since

[8]As discussed in Drechsler, Savov and Schnabl (2020), there was a separate ceiling rate for time deposits (i.e., Certificates of Deposit), while checking deposits were constrained to pay a zero interest rate.

deposits were the main form of money, decreasing their growth would decrease overall money growth and reduce inflation (Friedman, 1970; Tobin, 1970).

Panel A of Figure 2 shows that the Reg Q ceiling clearly had the intended effect on deposit growth. This can be seen clearly right at the outset. The vertical line shows the first instance when Reg Q became binding. The impact is an immediate sharp drop in deposit growth that continues so long as the Fed funds rate remains above the ceiling. Conversely, when the Fed begins to decrease the funds rate, reducing the wedge between it and deposit rates, deposit growth abruptly turns around and begins increasing. By the time the Fed funds rate briefly goes below the ceiling, deposit growth is back to the high level it was at before the ceiling became binding.

This pattern continues in dramatic fashion throughout the whole period that the Reg Q ceiling is binding, which coincides with the timing of the Great Stagflation. In each of the cycles, the Fed responds to inflation by increasing the funds rate. As inflation and the funds rate increase, the deposit rate remains trapped at the ceiling, making deposits increasingly unattractive. This induces an outflow of deposits which increases in intensity as inflation and the funds rate rise. The process reverses once inflation peaks: as inflation starts to decrease, deposits become less unattractive and deposit growth begins recovering.

The resulting fluctuations in deposit growth are extremely large. For example, in 1972 annual real deposit growth hits 10%, as the Fed funds rate briefly dips below the Reg Q ceiling. By 1974, when the Fed funds rate is over 12%, real deposit growth has fallen below -5%. Indeed, the deposit outflows induced by Reg Q are the largest of the whole post-war era. Panel A also shows what happened when the Reg Q ceiling on savings deposits was lifted at the end of 1982: banks saw huge inflows, as total deposit growth quickly rose to $+13\%$.

The clear impact of the Reg Q ceiling on deposit outflows shows that they are caused by the inability of banks to raise deposits–i.e., by a decrease in deposit supply–rather than a decrease in banks' deposit demand. Similarly, the deposit outflows occur as the price of holding deposits is increasing, due to the Reg Q ceiling. The negative relation between price and quantity shows implies a decrease in deposit supply rather than a decrease in depositor's deposit demand.

Panel B of Figure 2 shows the impact of the deposit outflows on banks' provision of credit. Bank credit growth closely tracks deposit growth. The magnitudes of the two series are almost identical, because banks were overwhelmingly funded by deposits, so a given reduction in deposits forced banks to decrease credit one-for-one. In terms of timing, deposit growth slightly leads bank credit growth, due to the fact that it is driving it.

The sharp reductions in bank credit supply forced firms to ration credit, i.e., it created a credit crunch. Unable to obtain normal amounts of financing, such as for paying up-front costs of production, firms were forced to cut output and raise prices. Thus, credit crunches led to lower output and higher prices–they generated stagflation. Consistent with this theory, Panel A of Figure 3 shows a remarkably close relationship between deposit and GDP growth. The close relationship appears to start right at the point that the Reg *Q* ceiling binds. As deposit growth drops suddenly, so does year-over-year real GDP growth, which plummets from 8.5% to 2.9% in four quarters.

Even at the time, the sharp drop in GDP growth was hypothesized to be due, at least in part, to the credit crunch caused by the outflow of deposits. Indeed, the term "credit crunch" was coined at the time to describe what had transpired. What the literature has not recognized, is that the tight relationship between deposit outflows and GDP growth extends throughout the whole Great Stagflation period, which coincides closely with the time period that the Reg *Q* ceiling was binding.

Panel B of Figure 3 completes the picture by showing that employment growth also follows the pattern of deposit growth, though with a lag. The lag is expected, as deposit growth slightly leads GDP growth, while firms' hiring normally lags increases in output.

A final piece of aggregate evidence is presented in Figure 4, which plots the Chicago Fed's financial conditions index against deposit growth. The financial conditions index captures the tightness of credit in the economy. It includes information on bank loans, as well as credit markets. The index starts in 1971, and we plot it until the present to show the Great Stagflation in context.

The figure shows that financial conditions were extremely tight during the Great Inflation. Moreover, the index spikes whenever deposit growth drops, i.e. during the credit crunches. The index peaks at 5.3 in 1974 and 4.3 in 1982. By contrast, its peak during the 2008 Financial Crisis was 3.4. This shows the severity of the Reg *Q* credit crunches.

3 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 nonfarm employment from the BLS' Current Employment Statistics, as is manufacturing employment. The oil price is the spot price of West Texas Intermediate crude oil as published in the Wall Street Journal, deflated by the CPI. Deposits are core deposits (demand deposits plus savings and small time deposits) at commercial banks and thrifts from the Federal Reserve's H.6 release, deflated by the CPI. Bank credit is from the Federal Reserve's H.8 release, deflated it by the CPI. We downloaded these series from the Federal Reserve Bank of St. Louis' FRED database. Finally, unfilled orders is from the Census Bureau's Manufacturers' Shipments, Inventories, & Orders release.[9]

Industry data: Our main industry data is from the NBER-CES Manufacturing Industry Data-base.[10] The underlying source is the U.S. Census Bureau's Annual Survey of Manufactures. The data are annual going back to 1958 and covering 459 manufacturing industries at the four-digit SIC level. Important for our study, the data contain information on quantities as well as prices. There are price deflators for sales (shipments), materials, investment, and energy. Using these deflators, we calculate real output by deflating output (shipments plus the change in inventories) by the sales deflator. Output growth is the percentage change of real output and price growth is the percentage change of the shipments deflator. We similarly calculate materials price growth using the deflator for materials. The data also contain information on labor. We use production employment and wages to calculate employment growth and wage growth.

A second source of industry data we use are the Quarterly Financial Reports (QFR) from the Census Bureau.[11] These data are available at the two-digit SIC level starting in 1947. They include detailed information on firm balance sheets. This allows us to relate our finance dependence measure to leverage and the composition of debt.

[9] 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.

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

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

Bank data: Our bank data comes from the bank Call Reports for commercial banks and the S&L Financial Reports for S&Ls. Bank Call Reports are publicly available since 1976 through Wharton Research Data Services (WRDS). We used a Freedom of Information Act (FOIA) request to obtain Call Reports back to 1959. The S&L reports are available back to 1966. Drechsler, Savov and Schnabl (2020) provide additional information about the S&L reports and the pre-1976 call reports.

Establishment data: We use data on establishments at the county-industry level from the Census Bureau's County Business Patterns database.[12] The data are annual (in March) going back to 1967. We use this data to map our county-level banking data to the industry level. We do this by averaging across counties and weighting by industry employment. Since employment is reported in bins, we take the bin midpoints for these weights.

4 Finance dependence and stagflation

We want to test the hypothesis that the Reg Q credit crunches led to stagflation by raising firms' cost of production. This hypothesis is premised on the idea that firms require financing in order to produce. For instance, they have to pay for materials and labor up front, before they produce and eventually sell their finished products. While some firms have sufficient internal resources to meet their production financing needs, others must rely on external financing, i.e. credit. These external finance dependent firms are more exposed to credit crunches. Under our hypothesis, they should see higher price increases and lower output and employment growth when a credit crunch hits.

4.1 Finance dependence measure

External finance dependence—finance dependence for short—was introduced to the literature 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 our focus is 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 and across

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

countries. In our context, some industries have small margins relative to their costs of production and the the time it takes to produce. 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 the difference between investment and operating cash flow divided by investment. 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

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

Like Rajan and Zingales (1998), we cumulate each component over several years to avoid temporary fluctuations. We do so from 1958, the start of the NBER-CES data, to 1965, the last year before Reg Q binds. Our finance dependence measure is thus pre-determined from the perspective of the Reg Q period, which avoids reverse causality. Finally, we winsorize at the 5% level to avoid outliers.

4.1.1 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, which means that firms are able to cover half of their production costs from their gross margin. The standard deviation of finance dependence is 0.2, hence there is substantial cross-sectional variation across the 459 industries. Table A.1 in the Appendix lists the average finance dependence of each sector (two-digit SIC level). It ranges from 0.26 for Printing and Publishing to 0.7 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 employment, output, and capital. Their TFP is the same as that of low finance dependence industries, so they are not less productive. They are slightly more volatile, both in terms of prices (2.61% versus 1.90%) and output (10.42% versus 9.50%). Their labor share is similar but their materials share is significantly larger (0.58 versus 0.42). This follows naturally from the definition of finance dependence. Their energy intensity (energy cost over output) is slightly lower but in any case quite small (0.01). This suggests that energy shocks are unlikely to play a large role here.

Finance dependent industries have slightly lower inventory-output ratios (0.15 versus 0.17) and significantly lower capital ratios (0.31 versus 0.47), while their investment rate (investment over capital) is similar. Recall that our measure is designed to pick up finance dependence for production as opposed to investment. It therefore makes sense that our finance dependent industries have less capital and higher production costs than non-finance dependent industries.

The last six rows of Table 1 look at the performance of high and low finance dependence industries after Reg *Q* becomes binding. High finance dependence industries have higher price growth (6.02% versus 5.74% per year), despite having lower growth of materials prices (6.51% versus 6.90%). Finance dependent industries also have lower output growth (3.34% versus 4.36%), lower employment growth (1.16% versus 1.86), and lower inventory and capital growth. The combination of lower output growth and higher price growth (relative to materials cost) indicates that finance dependent industries experienced a negative supply shock during the Reg *Q* period.

4.1.2 Finance dependence and 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 empirically validate it. Unfortunately, we cannot do so in the NBER-CES data because it does not contain financial variables. We address this by turning to the Quarterly Financial Reports (QFR), which contain data on firm balance sheets at the sector (two-digit SIC code) level. The QFR data thus offers a smaller cross section: 19 sectors versus 459 industries, but with more detail on the financial side (and less detail on the production side, notably no prices).

Table 2 shows the relationship between finance dependence and several financial ratios across sectors. We focus on the same period as in Table 1, 1958 to 1965, before Reg *Q* becomes binding. Panel A reports summary statistics while Panel B runs univariate regressions of each ratio on finance dependence. The average level of finance dependence in Table 2 is slightly higher than in Table 1 because the QFR data does not break out overhead (SG&A) from production costs. Given the higher level of aggregation, the cross-sectional variation is much smaller: the standard deviation of finance dependence across sectors is 0.04 versus 0.2 across industries.

Despite the more limited variation, clear differences emerge. Finance dependent industries have substantially 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 leverage of 31%. The strong impact of finance dependence on leverage provides direct evidence that finance dependent industries use more external financing, validating our measure.

The difference in leverage is concentrated in short-term debt. Using the industry-level standard deviation, the impact of a one-standard-deviation increase in finance dependence on short-term leverage is 32.5 percentage points, which accounts for the entire impact on overall leverage (i.e., there is no impact on long-term debt). Note that short-term debt is primarily used to finance operations, while long-term debt is better suited to investment. Thus, finance dependent industries appear to use external financing for *production*, again validating 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-level standard deviation raises the bank share of debt by as much as 40 percentage points. Thus, finance dependent industries are not only external finance dependent but bank dependent. This further raises their exposure to the Reg Q credit crunches.

The next financial ratio we look at is the cash ratio (cash over current liabilities), which captures firms' internal liquidity. Recall our measure is constructed so that finance dependent industries have fewer internal resources relative to their production needs. Table 2 supports this view by showing that they have significantly lower cash ratios: the impact of an increase in finance dependence by one industry standard deviation is -35 percentage points, which is very large relative to the average cash ratio of 36%. Thus, consistent with our measure finance dependent industries have substantially less internal liquidity, making it harder to ride out credit crunches without disrupting production.

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 pay its debt if it cannot roll it over. The table shows that finance dependent industries have much lower debt service ratios. Raising finance dependence by one industry-level standard deviation lowers the debt service ratio by 8.3 times one-year debt, which is again very large. This shows that finance dependent industries are much more vulnerable to abrupt changes in credit supply.

Overall, Table 2 shows that finance dependent industries use more external financing, particularly short-term bank debt, and have much less internal liquidity. This validates finance dependence as a measure of firms' production exposure to credit crunches.

4.2 Empirical results

We now test the hypothesis that the Reg Q credit crunches led to stagflation. Since finance dependence captures exposure to credit crunches, under this hypothesis finance dependent industries should raise prices and cut output relative to non-finance dependent industries during the credit crunches.

4.2.1 Cross-sectional regressions by year

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 in the quantity of 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 input costs. Allowing the coefficients β_t to vary by year lets us see if they line up with the credit crunches. Specifically, we expect β_t to be larger – more positive for prices and more negative for output – when the credit crunches are more severe.

Figure 5 shows the results of these regressions. 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 we saw in Figure 2, it measures 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 5 shows a clear pattern. The impact of finance dependence on price growth is positive on average, while the impact on output growth is negative. Thus, finance dependent industries raised prices and cut output relative to non-finance dependent industries, i.e. they experienced a negative supply shock. Finance dependence thus predicts stagflation in the cross section of industries.

More striking, the coefficients on prices and output are highly negatively correlated: finance dependent industries raised prices the most at the same time as they cut output the most. The pattern appears four times throughout the period: in 1965-66, 1969-70, 1973-74, and 1978-79, and not before or after it. As the dashed line for deposit growth shows, these are precisely the Reg Q credit crunches. Thus, finance dependent industries were hit with a negative supply shock at every credit crunch. This supports the view that the credit crunches led to stagflation.

To get a sense of 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 magnitudes are large relative to the amount of inflation (12%) and contraction in GDP (2%) at the time, both of which should be taken relative to trend. Outside this episode, the magnitudes are smaller but remain significant as discussed below.

4.2.2 Panel regressions

Despite the strong pattern in Figure 5, it remains possible that finance dependence is correlated with some other source of negative supply shocks during the great Stagflation. The main such shocks discussed in the literature are the oil shocks of 1973 and 1979 (Blinder and Rudd, 2013). It could be that finance dependent industries are more susceptible to these oil shocks. This would not explain the full pattern in Figure 5, which predates the oil shocks, but is nevertheless important to rule out.

We do so by running panel regressions that control for energy intensity, a direct measure of exposure to the oil shocks, as well as other factors. The regressions have the form:

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

The controls $X_{i,t}$ now include energy intensity (energy costs over output), productivity (TFP), and volatility of prices and output. We interact these fixed characteristics with deposit growth in the same way as finance dependence. We also control for contemporaneous wage growth and materials prices, again to make sure that industries are not simply passing through higher input costs. The year fixed effects α_t control for aggregate economic conditions such as inflation expectations, while the industry fixed effects γ_i absorb time-invariant industry characteristics. In addition to prices and output, we expand our analysis by looking at employment, inventory, and investment growth. We run the regressions from 1965 to 1982, i.e. the Reg Q period.

Interacting finance dependence with deposit growth in Equation (3) tests the prediction that finance dependent industries raised prices and cut output during the credit crunches, i.e. it captures the pattern in Figure 5. The identifying assumption is that finance dependence is uncorrelated with any remaining unobserved negative supply shocks that coincide with the credit crunches. Note that demand shocks do not present a concern since we observe prices and output moving in opposite directions.

4.2.3 Prices

Table 3 presents the results for prices. Each column contains a different specification with a different set of control variables. The last column includes all control variables. We include materials prices in all specifications (as we did in Figure 5) because we want to know if firms raised output prices *relative* to their input prices.

Column (1) shows a negative and significant coefficient on the interaction of finance dependence and deposit growth. This means that finance dependent industries reduce prices relative to non-finance dependent industries when deposit growth is high. Conversely, when deposit growth is low, as in a credit crunch, they raise prices. Since finance dependence measures exposure to the credit crunches, this result supports the hypothesis that the credit crunches led firms to raise prices.

To gauge magnitudes, recall from Figure 2 that deposit growth falls by about 15 percentage points from peak to trough during the credit crunches. Multiplying by the coefficient in column (1), we get a that a one-standard deviation higher finance dependence (0.2) is associated with about 1% higher price growth on average during the Reg Q period. This is smaller than the peak effect in Figure 5 but still economically significant.

Column (2) of Table 3 controls for energy intensity and TFP (taken in 1965) interacted with deposit growth. 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 of the 1970s are thus unlikely to explain our results. TFP comes in with a negative sign, implying that less productive industries cut prices relative to more productive ones during the credit crunches. The coefficient on finance dependence, however, is unchanged. Our results are thus not driven by differences in productivity.

Column (3) controls for the volatility of prices and output, taken during the pre-Reg *Q* period from 1958 to 1965. These controls help to address the concern that finance dependent industries have less sticky prices or more volatile output so that they always respond more to whatever shocks are occurring. The coefficient on price volatility is negative, consistent with the view that firms with less sticky prices raise them more during the credit crunches. Output volatility has no impact, however. The coefficient on finance dependence is little affected, dropping only slightly to -0.289. Our results are thus not driven by differences in price stickiness or volatility.

Column (4) controls for contemporaneous wage growth (production labor cost divided by production hours). This ensures that finance dependent firms are not simply passing higher labor costs through to prices. The coefficient on wage growth is close to zero and the coefficient on finance dependence is unaffected, hence labor costs are not driving our results. Finally column (5) includes all controls. None of the coefficients change much. The coefficient on finance dependence remains significant at -0.303. Thus, the impact of finance dependence on prices during the credit crunches is robust and stable with respect to the controls.

4.2.4 Output

Table 4 shows the results for real output growth. From column (1), finance dependent industries have higher output growth when deposits flow in, hence they have lower output growth during the credit crunches, when deposits flow out. The coefficient is 0.845 and highly significant. 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 moving in opposite directions). Moreover, the supply shocks are negative during the credit crunches (prices rise and quantities fall), hence finance dependence predicts stagflation. This is consistent with the aggregate time series and the hypothesis that the Reg *Q* credit crunches led to stagflation.

The fact that the coefficient for output (0.845) is larger than that for prices (-0.353) implies that profits decline (output falls more than prices rise). This shows that firms are worse off, consistent with a negative supply shock. In terms of economic magnitude, a one-standard deviation increase in finance dependence is predicted to reduce output by 2.5% during a credit crunch, a relatively large amount.

Column (2) of Table 4 shows that energy intensity predicts higher output growth during the credit crunches, which goes against the hypothesis that the oil shocks (which arrived during credit crunches in 1973 and 1979) explain the decline in output. Productivity (TFP) has a negative coefficient, hence less productive industries cut output relative to more productive industries during the credit crunches. Recall that the corresponding coefficient in Table 3 is also negative, hence TFP appears to predict demand shocks in the cross section of industries rather than supply shocks. Regardless, the coefficient on finance dependence remains similar and significant at 0.753.

Column (3) controls for the volatility of prices and output, which do not have a significant impact. Column (4) controls for wages and materials prices. Wage growth comes in positive and significant, 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 0.833. Finally, column (5) includes all controls and the coefficient on finance dependence remains stable and significant at 0.773. Thus, the impact of finance dependence on output is robust to the controls.

4.2.5 Employment, inventories, and investment

We turn to employment next. Figure 6 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). The blue line shows the coefficients for output growth from Figure 5 for comparison. The dashed line is the growth in aggregate U.S. employment.

The figure shows that finance dependence has a negative impact on employment during the Reg Q period, as it does for output. Moreover, the coefficients for employment and output co-move tightly with output slightly leading. Thus, when a credit crunch hits and finance dependent firms cut their output, their demand for labor shrinks and employment follows.

The peak coefficient for employment is again in 1974 (-0.09), hence a one-standard deviation increase in finance dependence predicts 1.8% lower employment growth during this episode. This is large relative to the fluctuations in aggregate employment seen in the dashed line. The dashed line further shows that the cross-sectional impact of finance dependence on employment lines up with the aggregate dynamics of employment growth. This supports the view that the credit crunches contributed to the employment losses of the Great Stagflation.

Table 5 shows the corresponding panel regressions. From column (1), the coefficient on finance dependence is positive and significant at 0.463. Thus, finance dependent industries cut employment relative to non-finance dependent industries when deposits flow out during the credit crunches. The magnitude is such that employment growth declines by 1.4% for a one-standard deviation increase in finance dependence in a typical credit crunch, slightly smaller than the peak in Figure 6 but still substantial.

Columns (2) to (5) of Table 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 very similar to those for output in Figure 6 with the coefficient about half the size. This again shows that output and employment go hand in hand.

Table 6 runs the same regressions as Tables 3–5 but with real inventory growth as the dependent variable. The coefficient on finance dependence is positive and significant. Thus, finance dependent industries see a decline in inventories when deposits flow out during the credit crunches. This is further evidence that they experience a negative supply shock since a negative demand shock would lead inventories to increase. The picture thus emerges that finance dependent industries are struggling to produce during the credit crunches: their output is shrinking and their inventories are running down.

The impact of finance dependence on inventory growth is robust to the controls we add in columns (2) to (5). In terms of economic magnitude, using the coefficient in column (1), a one-standard deviation increase in finance dependence leads to a 3.5% decline in inventories during a typical credit crunch.

Finally, Table 7 looks at investment. While investment is not a focus of our paper, it is reasonable to expect finance dependent firms to also cut investment during the credit crunches. This is indeed what we find. From column (1), the coefficient on the interaction of finance dependence and deposit growth is positive and significant, hence finance dependent firms cut investment when deposits flow out during the Reg *Q* period. The magnitude of the coefficient is such that investment shrinks by 4% during a credit crunch for a one-standard deviation increase in finance dependence. This shows as investment is slightly more sensitive to the credit crunches than output.

Note, however, that investment is much smaller than output, hence the output effects we uncover are ultimately much larger than the investment effects despite the slightly larger coefficient for investment. In our data, investment is on average only 3% of output, hence the implied dollar decline in output is twenty times larger than the implied dollar decline in investment ($= 0.845/1.346 \times 1/.03$). This helps to see why the credit crunches play out as a net negative supply shock: while investment, which is part of the demand side of the economy, falls, output, which is part of the supply side, falls much more.

Taken together, our results on finance dependence show that it strongly predicts stagflation in the cross section. Finance dependent firms raise prices and cut output, employment, inventories, and investment during the Reg Q credit crunches. Since finance dependence measures firms' exposure to the credit crunches, these results support the hypothesis that the Reg Q credit crunches led to stagflation.

5 Reg Q share and stagflation

Finance dependence is a firm-level characteristic that gives us variation in exposure to the credit crunches. In this section we use a bank-level characteristic as a second, complementary source of such variation. The bank-level characteristic is the share of a bank's deposits that are subject to the Reg Q deposit rate ceilings. We call it the bank's Reg Q share. Because it comes from banks' deposit franchise, the Reg Q share is less likely to be correlated with any remaining unobserved supply shocks to firms.

5.1 The Reg Q share

We construct the Reg Q share using historical information on the types of deposits that were subject to rate ceilings at different points in time.

5.1.1 Historical background:

Regulation Q initially applied to all deposits, retail and wholesale. The only exception were Eurodollar deposits, which were exempt because they were booked overseas (Burger, 1969). The first big change was in 1970, when most large time deposits (denominations of $100,000 or more) were exempted (Santomero and Siegel, 1986). The next one was in 1978, when Money Market Certificates (MMCs) with denominations of $10,000 or more were introduced. MMCs technically had a ceiling rate but it was set to the six-month Treasury Bill rate, hence they were effectively exempt (Gilbert, 1986). Finally, at the end of 1982 Money Market Deposit Accounts (MMDAs), a type of savings account with no ceiling, were introduced and effectively ended Regulation *Q* (Gilbert, 1986).

5.1.2 Reg *Q* share construction:

We compute the Reg *Q* share as the ratio of non-exempted deposits to total deposits. We do so first at the county level. The Reg *Q* share in county c at time t is

$$\text{Reg}Q\text{Share}_{c,t} = \frac{\text{Deposits}_{c,t} - \text{Exempted deposits}_{c,t}}{\text{Deposits}_{c,t}}. \quad (4)$$

Our data does not capture every type of exempted deposits at every date but it does capture the three main types: large time deposits, MMCs, and MMDAs. We therefore define exempted deposits as their sum.[13] We first observe large time deposits in 1974, hence we use this date to back-fill the Reg *Q* share. MMCs and MMDAs appear at the time of their introduction. We use total non-demand deposits for the denominator, i.e. we exclude checking accounts which paid no interest both before and after our period.

The next step is to map the county-level Reg *Q* share to the industry level. We do so using the locations of each industry's establishments. Specifically, we calculate the Reg *Q* share of industry i by taking a weighted average of the county Reg *Q* shares, using the employment of industry i in county c for the weight:[14]

$$\text{Reg}Q\text{Share}_{i,t} = \sum_c \left(\frac{\text{Employment}_{i,c}}{\text{Employment}_i}\right) \text{Reg}Q\text{Share}_{c,t}. \quad (5)$$

This mapping implicitly assumes that banks lend locally. This is a common assumption in the literature (e.g. Petersen and Rajan, 2002). It is also particularly plausible for the period we study because it predates banking deregulation in the 1980s. As Kroszner and Strahan (2014) discuss, interstate banking (opening branches in different states) was

[13] Thus, we are missing Eurodollar deposits but it is likely that they flowed to the same banks that had a lot of large time deposits (Morris and Walter, 1998).

[14] We fix the weights in 1975 so that our results are not driven by changes in employment. We use 1975 because the establishment data is collected in March, hence this is the closest date to the first date (December, 1974) for which we have large time deposits in the bank and S&L data.

largely prohibited, and even intrastate banking (opening multiple branches in the same state) was rare. It is thus plausible to assume that lending was mostly local. To the extent it was not, it acts as measurement error in our regressions.

5.2 Reg Q share and credit crunches

Given this assumption, the Reg Q share of industry i captures the extent to which it is exposed to the credit crunches through the exposure of its lenders. The higher the Reg Q share, the larger the deposit outflows these lenders will experience when Reg Q becomes binding, and hence the larger the credit crunch that the industry will face.

We confirm this by running yearly regressions of loan growth on the Reg Q share at the county level (recall we do not have loans at the industry level):

$$\Delta \text{Loans}_{c,t} = \alpha_t + \beta_t \text{Reg}Q\text{Share}_{c,t} + \epsilon_{i,t}. \quad (6)$$

The results are reported in Figure 7. In addition to loan growth (red line) we include asset growth (blue line), which captures the whole balance sheet. The shading around each line denotes its 90% confidence interval. The figure starts in 1967 because that is the first year for which we have loan data.

The figure also shows the deposit spread for savings deposits (black line). It is the difference between the Fed funds rate and the rate on savings deposits. The rate on savings deposits is their Reg Q ceiling rate until MMDAs are introduced in 1982, at which point it becomes the MMDA rate. The deposit spreads measures the incentive for depositors to withdraw their deposits, and hence the extent to which Reg Q binds.

Figure 7 shows a strong negative relationship between the coefficient on the Reg Q share and the deposit spread. When the deposit spread is close to zero, the coefficient on the Reg Q share is also close to zero. This is because when Reg Q is not binding there is little incentive to withdraw non-exempt deposits. This allows lending in counties with a high and low Reg Q share to grow at the same rate.

In contrast, when the deposit spread widens, loan and asset growth fall sharply in counties with a high Reg Q share versus a low Reg Q share. This occurs at each credit crunch in the sample. Once the deposit spread narrows, growth reverts. Thus, the Reg Q share predicts the credit crunches in the cross section.

Banks can in principle make up for deposit outflows by bringing in exempted large time deposits (i.e., wholesale funding). The results in Figure 7 show that this type of substitution is very limited. The reason is that most banks (and all S&Ls) have little or no access to wholesale funding (the average county Reg Q share is 90%). A likely explanation for this is that wholesale funding is uninsured, which makes investors unwilling to supply it elastically (Stein, 1998). The Reg Q share therefore measures not only the current fraction of non-exempt deposits but also access to exempt deposits during a credit crunch. This helps to explain why it predicts lending so strongly.

5.3 Industry Reg Q share and stagflation

We now test if industries with high Reg Q share lenders have higher price growth and lower output growth during the Reg Q credit crunches. We run panel regressions similar to Equation (3) but with two changes. The first is that we use the industry Reg Q share instead of finance dependence as the main right-hand variable. The second is that we use the deposit spread instead of aggregate deposit growth as the source of time series variation. We do this because the Reg Q share already captures information about deposits and as Figure 7 shows, the deposit spread drives its predictive power for the credit crunches.

Thus, the regressions we run have the form:

$$y_{i,t} = \alpha_t + \gamma_i + \beta \text{DepositSpread}_t \times \text{RegQShare}_{i,t-1} + \delta X_{i,t} + \epsilon_{i,t}, \quad (7)$$

where $y_{i,t}$ is price or output growth. We use the same controls, specifications, and time period as in Tables 3–7. We add the un-interacted Reg Q share to the controls since it is not absorbed by the fixed effects. The coefficient of interest is β. It captures the extent to which industries whose lenders have a high Reg Q share raise prices or cut output relative to other industries when Reg Q becomes more binding. The identifying assumption is that there are no unobserved negative supply shocks that hit high Reg Q share industries when the deposit spread widens.

5.3.1 Prices

Table 8 presents the results for prices. From column (1), the coefficient on the Reg Q share interacted with the deposit spread is positive and significant at 1.823. Thus, high Reg Q share industries raise prices relative to low Reg Q share industries when the deposit spread increases. This result supports the hypothesis that the Reg Q credit crunches led firms to increase prices during the Great Stagflation.

In terms of magnitude, the coefficient implies that a one-standard deviation higher Reg Q share (0.045) leads to 0.8% higher price growth when the deposit spread rises by 10 percentage points. This effect is economically meaningful but smaller than the impact of finance dependence in Section 4. One reason for this is that the Reg Q share has a significantly smaller standard deviation than finance dependence. Thus, finance dependence is a more powerful predictor of prices in the cross section, while the Reg Q share is a more direct measure of exposure to Reg Q. The two are thus complementary.

The stand-alone coefficient on the Reg Q share (without the interaction) is close to zero, hence high Reg Q share industries have similar price growth as low Reg Q share industries when Reg Q is not binding. The coefficient on materials prices is large and significant, as expected. Firms thus pass through most of the increase in material costs to output prices.

Turning to column (2), energy intensity and productivity (TFP) play no role on their own, nor do they affect the coefficient on the Reg Q share. In column (3), the volatilities of prices and output have insignificant positive coefficients and also do not impact our main coefficient. The same is true of wage growth in column (4). Finally, column (5) includes all controls. The coefficient on the Reg Q share dips slightly to 1.782 and remains significant. The results in Table 8 thus show that the Reg Q share interacted with the deposit spread has a robust impact on price growth.

5.3.2 Output

Table 9 shows the results for output. The coefficient on the interaction of the Reg Q share and the deposit spread in column (1) is negative and significant. This shows that high Reg Q share industries cut output relative to low Reg Q share industries when the deposit spread widens. Combined with the results for prices in Table 8, the Reg Q share predicts high prices and low output during the Reg Q credit crunches, i.e. it predicts stagflation in the cross section.

The magnitude of the coefficient suggests that a one-standard deviation higher Reg Q share leads to 2.4% less output when the deposit spreads increases by 10 percentage points, a substantial amount. As in the case of finance dependence, the negative impact on output is larger than the positive impact on prices, hence profits decline and firms are made worse off by the credit crunches.

The stand-alone coefficient on the Reg Q share is positive and marginally significant. Thus, there is weak evidence that high Reg Q share catch up slightly when Reg Q stops binding. The catch-up effect is relatively small, however.

Column (2) controls for energy intensity and productivity (measured in 1965). The results mirror those in Table 4 (recall deposit growth and the deposit spread have opposing signs). The coefficient on energy intensity is positive and marginally significant. This goes against the hypothesis that the oil shocks drove declines in output (recall the shocks arrive in 1973 and 1979 when the deposit spread is positive). Productivity has a strong positive impact on output, hence ex-ante more productive industries did better during the credit crunches. These effects have no impact on the coefficient on the Reg Q share, however, which increases slightly in magnitude to -5.570.

Column (3) controls for the volatility of prices and output. Price volatility is insignificant but output volatility comes in with a negative sign. Thus, industries with more volatile output contracted more during the credit crunches. The coefficient on the Reg Q share is unchanged.

Column (4) adds wage growth and the growth of materials prices. Wage growth has a positive impact on output, similar to Table 4. The natural interpretation of this result is that it reflects a higher productivity of labor. Materials prices come in with a negative coefficient, which is also natural and echoes Table 4. The coefficient on the Reg Q share remains stable.

Finally, column (5) includes all controls. The coefficient on the Reg Q share settles at -5.727 and stays significant. Thus, the impact of the Reg Q share on output during the credit crunches is robust to the controls. Combined with the results on finance dependence, we find that both firm-based and lender-based measures of exposure to Reg Q predict stagflation in the cross-section of industries. This supports the hypothesis that the Reg Q credit crunches led to stagflation.

5.3.3 Employment

Our final set of results in Table 10 examine employment. Column (1) shows that employment in high Reg Q share industries falls when the deposit spread widens. The coefficient is significant at -4.137, which is slightly smaller than the output coefficient in Table 9. The economic magnitude is substantial: a one-standard deviation increase in the Reg Q share reduces employment by 1.9% when the deposit spread increases by 10 percentage points.

This is large relative to the aggregate employment losses during the credit crunches.

The stand-alone coefficient on the Reg *Q* share is positive and significant, hence there is evidence that some of the employment losses recover when Reg *Q* stops binding. Column (2) shows that energy intensity and productivity have a positive impact on employment during the credit crunches. This again lines up with the results for output in Table 9. The coefficient on the Reg *Q* share is unaffected.

The same holds in column (3) where we control for price and output volatility, and in column (4) where we control for wages and materials prices. Finally, the coefficient in the combined specification in column (5) is -4.192, essentially unchanged from column (1). Thus, the industry Reg *Q* share has a robust negative impact on employment during the Reg *Q* credit crunches. This supports the view that these credit crunches contributed to the employment losses of the Great Stagflation.

6 Conclusion

The Great Stagflation was a period of macroeconomic instability. Along with the economic turmoil, it triggered a sea change in economic policy and thinking. While the literature initially tried to explain the puzzling negative relation between inflation and employment—the *stag*flation—over time the focus drifted to inflation alone. The period thus became better known as the "Great Inflation."

We provide a new explanation for the "Stag-" in 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 hard ceilings on bank deposit rates. As inflation rose, the ceilings became binding, and this triggered large outflows of deposits from banks. The result was a series of massive credit crunches.

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

We show that the credit crunches align very closely with the timing of the Great Stagflation from its beginning in 1965, which is also when Reg *Q* first became binding, to its end in 1982, when Reg *Q* was finally fully repealed.

We test our hypothesis in the cross section of manufacturing industries. We sort industries based on their dependence on external finance for production, which we measure using data on costs and profits. We find that high finance dependence industries raise prices and cut output substantially relative to low finance dependence industries during the Reg Q credit crunches. They also cut employment, and their inventories and investment shrink. These results indicate that the credit crunches acted as a negative supply shock to firms.

Our final set of results sorts industries based on the exposure of their lenders to Reg Q. We find that this measure of exposure also predicts stagflation in the cross section: high-exposure industries raise prices and cut output and employment relative to low-exposure industries. Taken together, our results support the hypothesis that the Reg Q credit crunches led to stagflation.

What are the implications of our results for the current high-inflation environment? First, as there is no Reg Q on the books, they imply that stagflation is less likely. The broader message is that the health of the financial sector affects the impact of monetary policy on inflation and output. When the financial sector is constrained as under Reg Q, tightening monetary policy is more costly and can even raise inflation as it reduces output. The economy's "sacrifice ratio" increases. By contrast, when the financial sector is healthy, monetary tightening can reduce inflation more easily as there is no credit-crunch induced stagflation effect.

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Table 1: Industry summary statistics

Summary statistics at the industry level. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured from 1958 to 1965 and winsorized at the 5% level. Employment is in thousands. Output is sales (shipments) 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 sales 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 from 1965 to 1980. 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)	32.07	(41.35)	39.43	(58.32)
Output (1965 $)	946.03	(1,854.81)	753.96	(921.48)	1,138.94	(2,446.10)
Capital stock	1,234.94	(3,806.29)	1,071.68	(1,765.53)	1,398.92	(5,090.99)
TFP	0.90	(0.28)	0.90	(0.29)	0.90	(0.28)
σ(Prices)	2.25	(1.55)	1.90	(1.16)	2.61	(1.79)
σ(Output)	9.96	(5.78)	9.50	(5.65)	10.42	(5.89)
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)	0.47	(0.32)	0.31	(0.19)
Investment rate	0.08	(0.04)	0.08	(0.03)	0.08	(0.04)
Growth rates, 1965–1980:						
Δ Prices	5.88	(2.46)	5.74	(2.09)	6.02	(2.78)
Δ Materials prices	6.71	(1.60)	6.90	(1.34)	6.51	(1.81)
Δ Output	3.85	(4.31)	4.36	(4.38)	3.34	(4.18)
Δ Employment	1.51	(2.94)	1.86	(3.04)	1.16	(2.80)
Δ Inventories	4.61	(6.70)	5.04	(4.79)	4.18	(8.17)
Δ Capital	4.37	(2.78)	4.40	(2.67)	4.35	(2.89)
# Industries	459		230		229	

Table 2: Finance dependence and balance sheet characteristics

The 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 price growth on deposit growth interacted with finance dependence:

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

Price growth is the growth of an industry's price of shipments deflator. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Deposit growth is the growth rate of core deposits (checking plus savings and small time deposits). Energy intensity is energy costs as a fraction of shipments (both deflated by their respective deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965 (real output is shipments plus the change in inventories deflated by the shipments deflator). Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level. The sample is from 1965 to 1982.

	ΔPrices				
	(1)	(2)	(3)	(4)	(5)
ΔDep. × Fin. dep.	−0.353***	−0.362***	−0.289***	−0.353***	−0.303***
	(0.072)	(0.076)	(0.068)	(0.072)	(0.071)
ΔDep. × Energy intensity		−0.006			−0.006
		(0.006)			(0.006)
ΔDep. × TFP		−0.180***			−0.157**
		(0.069)			(0.069)
ΔDep. × σ(ΔPrices)			−3.485***		−3.091**
			(1.308)		(1.289)
ΔDep. × σ(Output)			0.179		0.114
			(0.307)		(0.306)
ΔWage				0.018	0.017
				(0.015)	(0.016)
ΔMaterials price	0.855***	0.853***	0.849***	0.854***	0.848***
	(0.069)	(0.068)	(0.068)	(0.069)	(0.068)
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 real output growth on deposit growth interacted with finance dependence:

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

Real output is shipments plus the change in inventories deflated by the shipments deflator. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Deposit growth is the growth rate of core deposits (checking, savings, and small time deposits). Energy intensity is energy costs as a fraction of shipments (both deflated by their respective deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level. The sample is from 1965 to 1982.

	ΔOutput				
	(1)	(2)	(3)	(4)	(5)
ΔDep. × Fin. dep.	0.845***	0.753***	0.875***	0.833***	0.773***
	(0.167)	(0.169)	(0.177)	(0.169)	(0.181)
ΔDep. × Energy intensity		−0.041**			−0.043***
		(0.017)			(0.016)
ΔDep. × TFP		−0.353**			−0.412***
		(0.155)			(0.147)
ΔDep. × σ(ΔPrices)			0.278		−0.545
			(2.659)		(2.562)
ΔDep. × σ(Output)			−1.060		−0.816
			(0.918)		(0.818)
ΔWage				0.147***	0.146***
				(0.043)	(0.043)
ΔMaterials price				−0.290***	−0.297***
				(0.048)	(0.048)
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	0.250	0.252	0.250	0.261	0.265

Table 5: Finance dependence and employment

Panel regressions of employment growth on deposit growth interacted with finance dependence:

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

Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Deposit growth is the growth rate of core deposits (checking, savings, and small time deposits). Energy intensity is energy costs as a fraction of shipments (both deflated by their respective deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level. The sample is from 1965 to 1982.

	ΔEmployment				
	(1)	(2)	(3)	(4)	(5)
ΔDep. × Fin. dep.	0.463***	0.416***	0.496***	0.467***	0.448***
	(0.117)	(0.117)	(0.121)	(0.117)	(0.119)
ΔDep. × Energy intensity		−0.021**			−0.020**
		(0.008)			(0.008)
ΔDep. × TFP		−0.187**			−0.192**
		(0.093)			(0.090)
ΔDep. × $\sigma(\Delta\text{Prices})$			−0.370		0.054
			(1.620)		(1.605)
ΔDep. × $\sigma(\text{Output})$			−0.747		−0.826
			(0.542)		(0.526)
ΔWage				−0.216***	−0.217***
				(0.042)	(0.042)
ΔMaterials price				0.036	0.034
				(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	0.236	0.238	0.237	0.245	0.247

Table 6: Finance dependence and inventory

Panel regressions of real inventory growth on deposit growth interacted with finance dependence:

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

Real inventory growth is the growth of inventories minus the growth of the shipments deflator. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Deposit growth is the growth rate of core deposits (checking, savings, and small time deposits). Energy intensity is energy costs as a fraction of shipments (both deflated by their respective deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level. The sample is from 1965 to 1982.

	ΔInventory				
	(1)	(2)	(3)	(4)	(5)
ΔDep. × Fin. dep.	1.189***	1.125***	1.064***	1.177***	0.997***
	(0.199)	(0.204)	(0.190)	(0.193)	(0.188)
ΔDep. × Energy intensity		−0.029			−0.034*
		(0.022)			(0.020)
ΔDep. × TFP		−0.315			−0.447**
		(0.191)			(0.195)
ΔDep. × $\sigma(\Delta\text{Prices})$			8.987**		7.823*
			(4.325)		(4.264)
ΔDep. × $\sigma(\text{Output})$			−1.686		−1.504
			(1.253)		(1.218)
ΔWage				0.006	0.009
				(0.058)	(0.057)
ΔMaterials price				−0.335***	−0.326***
				(0.072)	(0.071)
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	0.106	0.106	0.107	0.110	0.112

Table 7: Finance dependence and investment

Panel regressions of real investment growth on deposit growth interacted with finance dependence:

$$\Delta\text{Investment}_{i,t+1} = \alpha_t + \gamma_i + \beta\Delta\text{Deposits}_t \times \text{FinDep}_i + \delta X_{i,t} + \epsilon_{i,t}.$$

Real investment growth is the growth of investment minus the growth of the investment deflator. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Deposit growth is the growth rate of core deposits (checking, savings, and small time deposits). Energy intensity is energy costs as a fraction of shipments (both deflated by their respective deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level. The sample is from 1965 to 1982.

	ΔInvestment				
	(1)	(2)	(3)	(4)	(5)
ΔDep. × Fin. dep.	1.346***	1.241***	1.573***	1.344***	1.435***
	(0.408)	(0.419)	(0.428)	(0.407)	(0.444)
ΔDep. × Energy intensity		−0.052*			−0.049
		(0.031)			(0.030)
ΔDep. × TFP		−0.793**			−0.774**
		(0.398)			(0.393)
ΔDep. × $\sigma(\Delta\text{Prices})$			−9.597		−7.390
			(7.368)		(7.227)
ΔDep. × $\sigma(\text{Output})$			−0.999		−1.193
			(2.161)		(2.199)
ΔWage				0.231	0.228
				(0.141)	(0.141)
ΔMaterials price				0.016	−0.004
				(0.131)	(0.129)
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	0.089	0.089	0.089	0.089	0.090

Table 8: Reg Q share and prices

Panel regressions of price growth on the deposit spread interacted with the Reg Q share:

$$\Delta \text{Prices}_{i,t} = \alpha_t + \gamma_i + \beta \text{DepositSpread}_t \times \text{Reg}Q\text{Share}_{i,t-1} + \delta X_{i,t} + \epsilon_{i,t}.$$

Price growth is the percentage change in an industry's shipments deflator. The Reg Q share is the share of deposits subject to Reg Q. It is aggregated to the industry level by weighting across counties by industry employment. The deposit spread is the Fed funds rate minus the savings deposit rate (the Reg Q ceiling rate until MMDAs are introduced and the MMDA rate thereafter). Energy intensity is energy costs over shipments (both deflated by their deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER-CES database and bank and S&L call reports. The sample is from 1965 to 1982.

	ΔPrices				
	(1)	(2)	(3)	(4)	(5)
Dep. spread × Reg Q share	1.823**	1.801**	1.823**	1.803**	1.782**
	(0.864)	(0.849)	(0.877)	(0.866)	(0.864)
Reg Q share	0.108	0.108	0.111	0.108	0.111
	(0.070)	(0.071)	(0.073)	(0.071)	(0.075)
Dep. spread × Energy intensity		−0.000			0.000
		(0.009)			(0.010)
Dep. spread × TFP		0.077			0.082
		(0.113)			(0.114)
Dep. spread × $\sigma(\Delta\text{Prices})$			0.829		0.684
			(2.325)		(2.310)
Dep. spread × $\sigma(\text{Output})$			0.397		0.427
			(0.500)		(0.516)
ΔWage				0.023	0.023
				(0.018)	(0.018)
ΔMaterials price	0.849***	0.849***	0.849***	0.849***	0.849***
	(0.078)	(0.078)	(0.078)	(0.078)	(0.078)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,354	6,354	6,354	6,354	6,354
R^2	0.578	0.578	0.578	0.578	0.578

Table 9: Reg Q share and output

Panel regressions of output growth on the deposit spread interacted with the Reg Q share:

$$\Delta\text{Output}_{i,t} = \alpha_t + \gamma_i + \beta\text{DepositSpread}_t \times \text{Reg}Q\text{Share}_{i,t-1} + \delta X_{i,t} + \epsilon_{i,t}.$$

Output is shipments plus the change in inventories over the shipments deflator. The Reg Q share is the share of deposits subject to Reg Q. It is aggregated to the industry level by weighting across counties by industry employment. The deposit spread is the Fed funds rate minus the savings deposit rate (the Reg Q ceiling rate until MMDAs are introduced and the MMDA rate thereafter). Energy intensity is energy costs over shipments (both deflated by their deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER-CES database and bank and S&L call reports. The sample is from 1965 to 1982.

	ΔOutput				
	(1)	(2)	(3)	(4)	(5)
Dep. spread × Reg Q share	−5.235**	−5.570**	−5.324**	−5.282**	−5.727**
	(2.375)	(2.321)	(2.433)	(2.318)	(2.285)
Reg Q share	0.279*	0.301*	0.302*	0.297*	0.346**
	(0.166)	(0.168)	(0.172)	(0.163)	(0.166)
Dep. spread × Energy intensity		0.033*			0.042**
		(0.019)			(0.018)
Dep. spread × TFP		0.668***			0.638***
		(0.241)			(0.240)
Dep. spread × $\sigma(\Delta\text{Prices})$			2.783		2.572
			(4.001)		(4.026)
Dep. spread × $\sigma(\text{Output})$			−2.593**		−2.475**
			(1.287)		(1.249)
ΔWage				0.136***	0.137***
				(0.049)	(0.050)
ΔMaterials price				−0.256***	−0.263***
				(0.051)	(0.051)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,354	6,354	6,354	6,354	6,354
R^2	0.227	0.229	0.228	0.237	0.239

Table 10: Reg Q share and employment

Panel regressions of employment growth on the deposit spread interacted with the Reg Q share:

$$\Delta\text{Employment}_{i,t+1} = \alpha_t + \gamma_i + \beta\text{DepositSpread}_t \times \text{Reg}Q\text{Share}_{i,t-1} + \delta X_{i,t} + \epsilon_{i,t}.$$

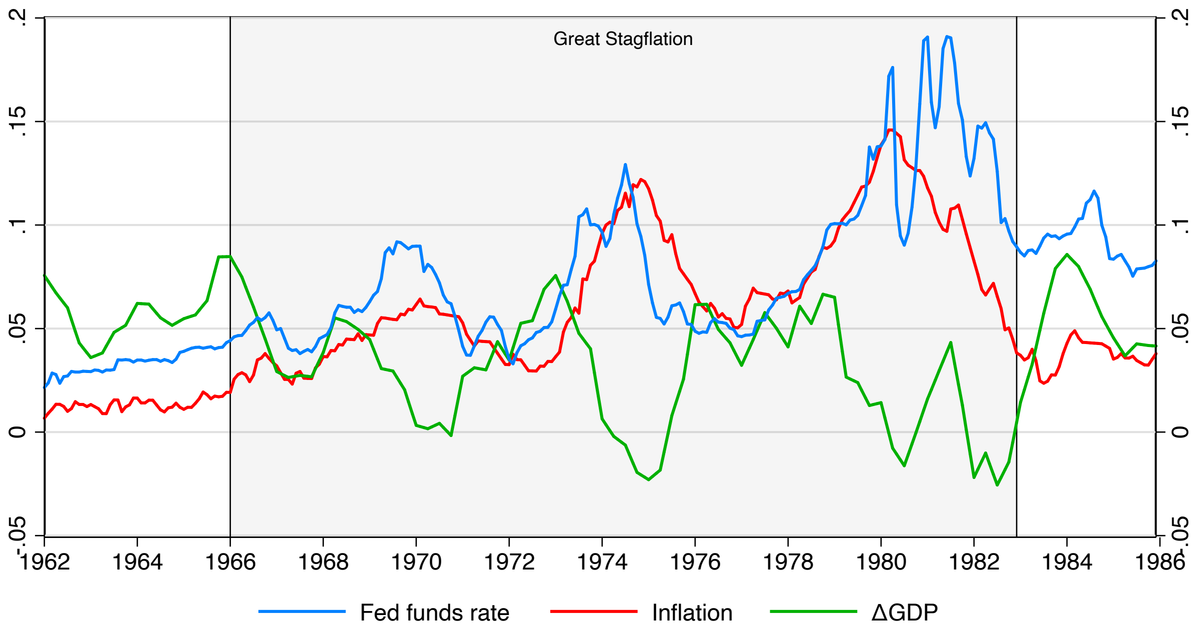
The Reg Q share is the share of deposits subject to Reg Q. It is aggregated to the industry level by weighting across counties by industry employment. The deposit spread is the Fed funds rate minus the savings deposit rate (the Reg Q ceiling rate until MMDAs are introduced and the MMDA rate thereafter). Energy intensity is energy costs over shipments (both deflated by their deflators). TFP is five-factor total factor productivity in 1965. The standard deviations of price growth and real output growth are measured from 1958 to 1965. Wage growth is the growth of hourly production wages (production wages divided by hours worked). The price of materials is the industry's deflator for cost of materials. Standard errors are clustered at the industry level. The data are from the NBER-CES database and bank and S&L call reports. The sample is from 1965 to 1982.

	ΔEmployment				
	(1)	(2)	(3)	(4)	(5)
Dep. spread × Reg Q share	−4.137***	−4.358***	−4.184***	−3.956***	−4.192***
	(1.159)	(1.117)	(1.192)	(1.172)	(1.149)
Reg Q share	0.344***	0.364***	0.352***	0.335***	0.360***
	(0.119)	(0.120)	(0.122)	(0.118)	(0.120)
Dep. spread × Energy intensity		0.031***			0.028**
		(0.011)			(0.012)
Dep. spread × TFP		0.310*			0.274
		(0.167)			(0.172)
Dep. spread × $\sigma(\Delta\text{Prices})$			0.673		0.386
			(2.594)		(2.595)
Dep. spread × $\sigma(\text{Output})$			−1.727*		−1.474*
			(0.883)		(0.887)
ΔWage				−0.231***	−0.231***
				(0.049)	(0.050)
ΔMaterials price				0.055**	0.051**
				(0.025)	(0.025)
Time FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs.	6,354	6,354	6,354	6,354	6,354
R^2	0.217	0.218	0.218	0.227	0.229

Figure 1: The Great Stagflation

Panel A shows the Fed funds rate, inflation, and real GDP growth. Inflation and real GDP growth are the year-over-year percentage changes in the Consumer Price Index (CPI) and real GDP, respectively. Panel B shows unfilled orders, inflation, and real GDP growth. Unfilled orders are from the Census Bureau's M3 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 measured in billions of 1982–1984 dollars. The data are monthly from 1962 to 1986 (GDP is quarterly).

Panel A:



Panel B:

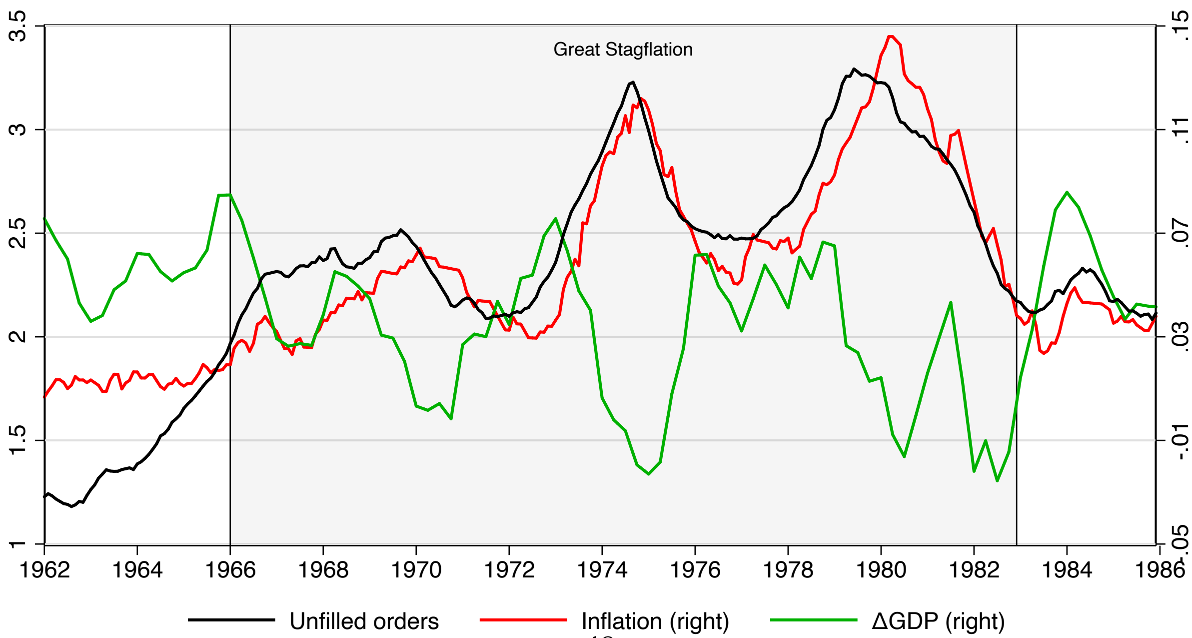
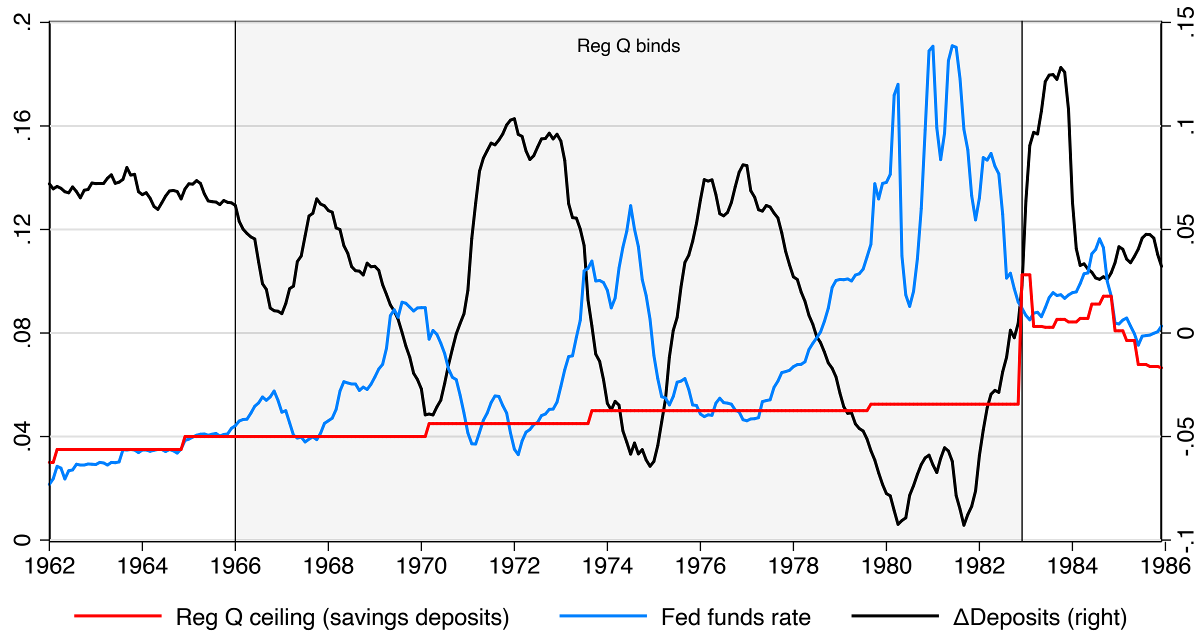


Figure 2: The Reg Q Credit Crunches

Panel A shows the Reg Q ceiling rate on savings deposits, which becomes the MMDA (a type of savings account) rate after 1982. Also shown is (core) deposit growth (checking, savings, and small time deposits). Gray shading covers the period when Reg Q is binding: from January 1966 when the ceiling first binds to December 1982 when MMDAs are introduced. Panel B shows the growth in bank credit (loans and securities) Deposits and bank credit are deflated by the CPI. The data are monthly from 1962 to 1986.

Panel A:



Panel B:

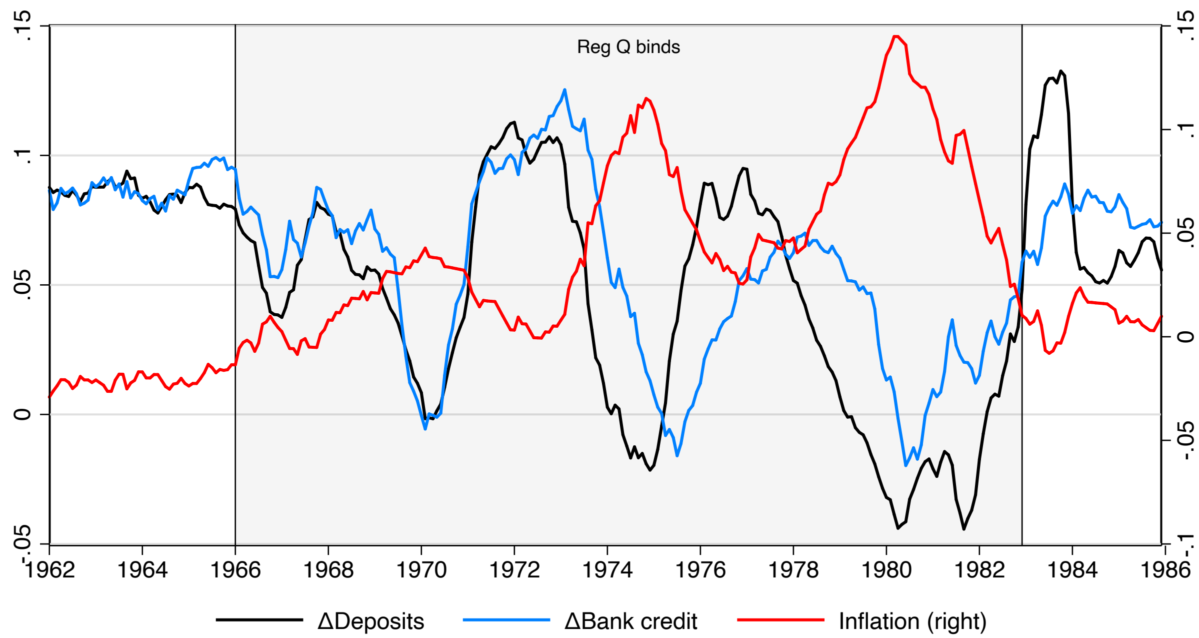
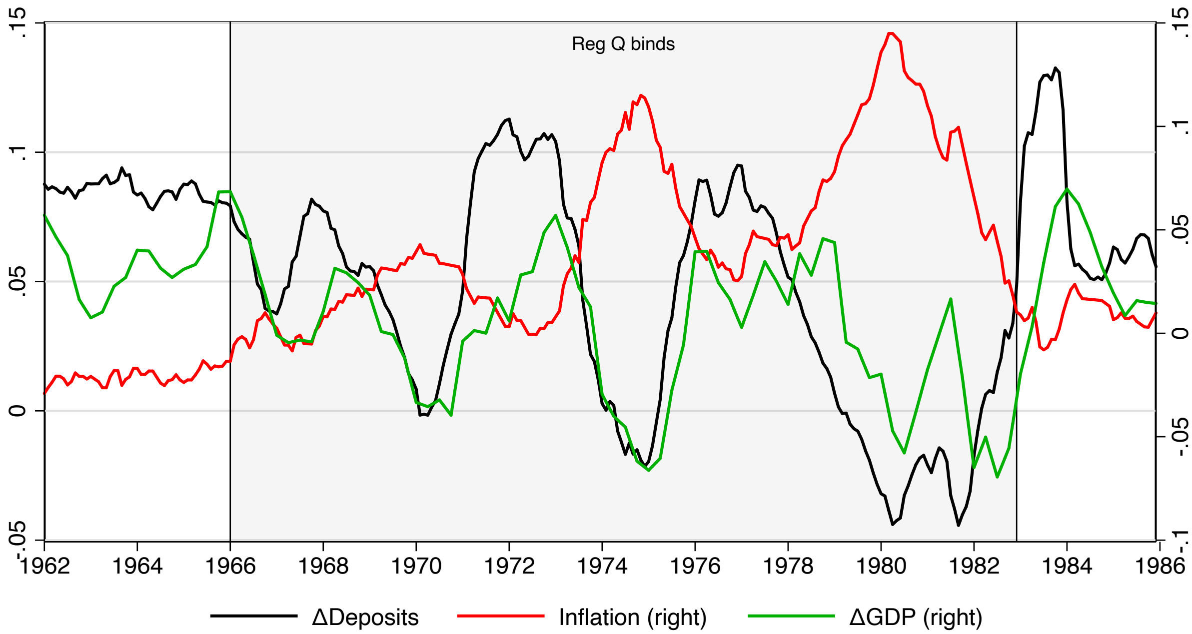


Figure 3: Credit Crunches and the Great Stagflation

Panel A shows (core) deposit growth (checking, savings, and small time deposits), inflation, and real GDP growth. Inflation and real GDP growth are the year-over-year percentage changes in the Consumer Price Index (CPI) and real GDP, respectively. Panel B adds employment growth, measured as the year-over-year percentage change in nonfarm employment. Gray shading covers the period when Reg *Q* is binding: from January 1966 when the ceiling first binds to December 1982 when MMDAs are introduced. Deposits are deflated by the CPI. The data are monthly from 1962 to 1986.

Panel A:



Panel B:

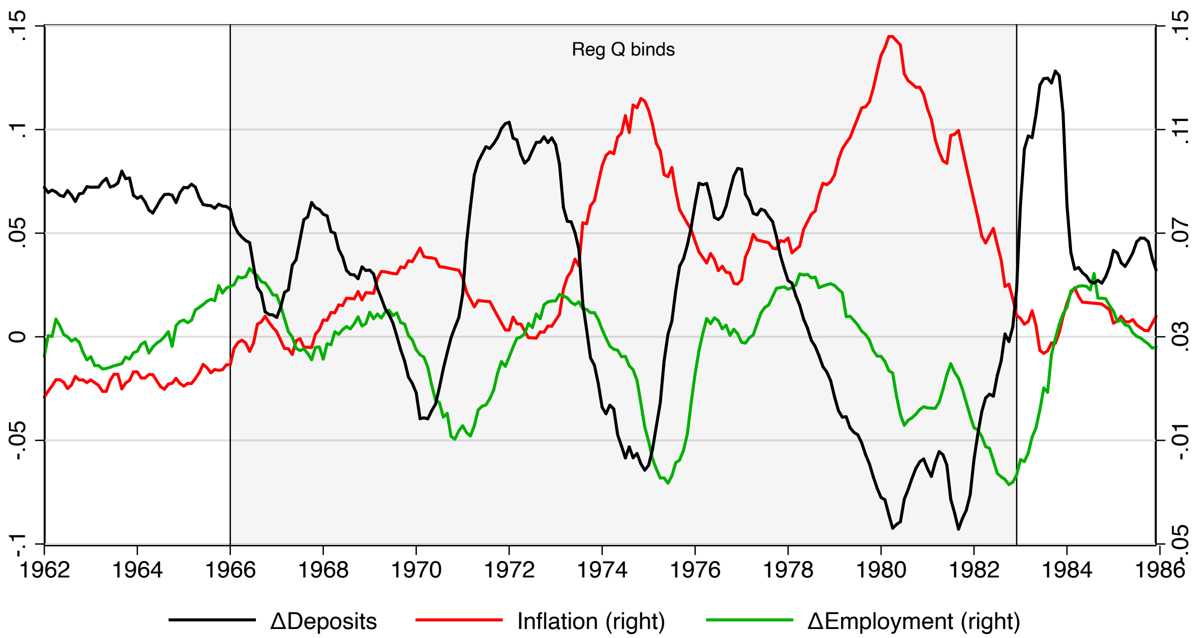


Figure 4: Credit Crunches and Financial Conditions

The figure plots the Chicago Fed Adjusted National Financial Conditions Index. The index measures the tightness of financial conditions in the U.S. across debt, equity, and loan markets. The adjusted index strips out economic conditions. Also shown is (core) deposit growth (checking, savings, and small time deposits), adjusted for inflation. Gray shading covers the period until December 1982 when MMDAs are introduced. The data are monthly from 1971 (the first year of the Chicago Fed National Financial Conditions Index) to 2021.

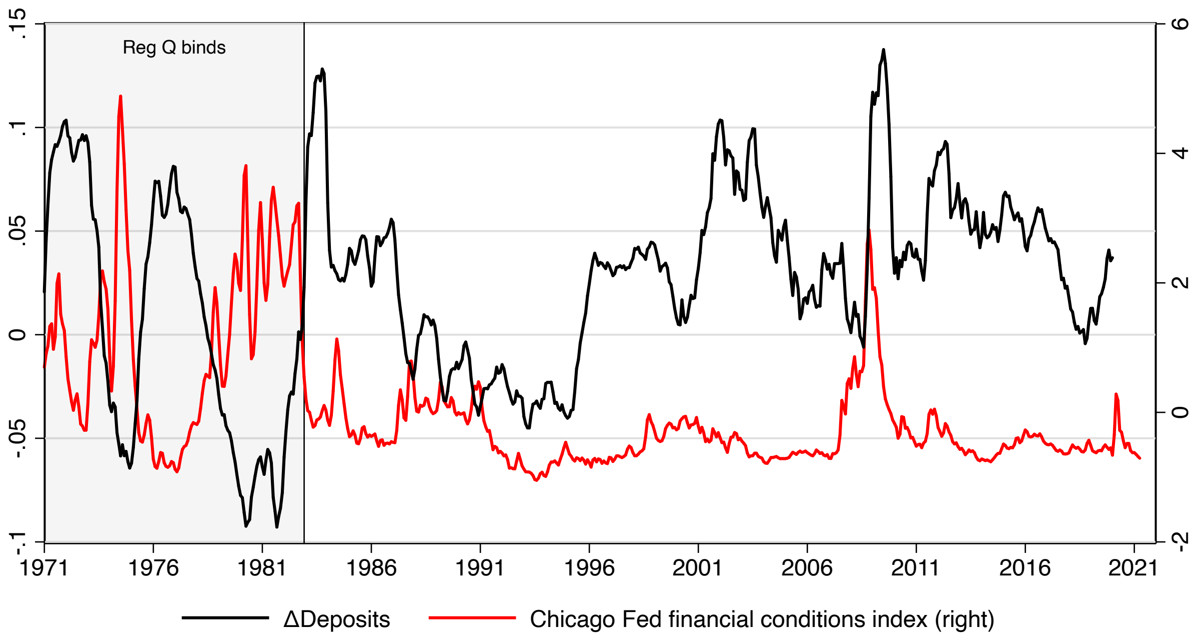


Figure 5: Finance dependence, prices, and output

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

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

Price growth is the yearly growth of an industry's price deflator for shipments. Real output growth is the growth of output (shipments plus the change in inventories) minus the growth of the shipments deflator. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. The regressions control for the growth of the cost of materials deflator. Shading denotes 90% confidence intervals. Also shown are U.S. inflation (short dashes) and real GDP growth (long dashes) on the right axis. The data are from the NBER manufacturing database, which covers 459 manufacturing industries at the four-digit SIC level.

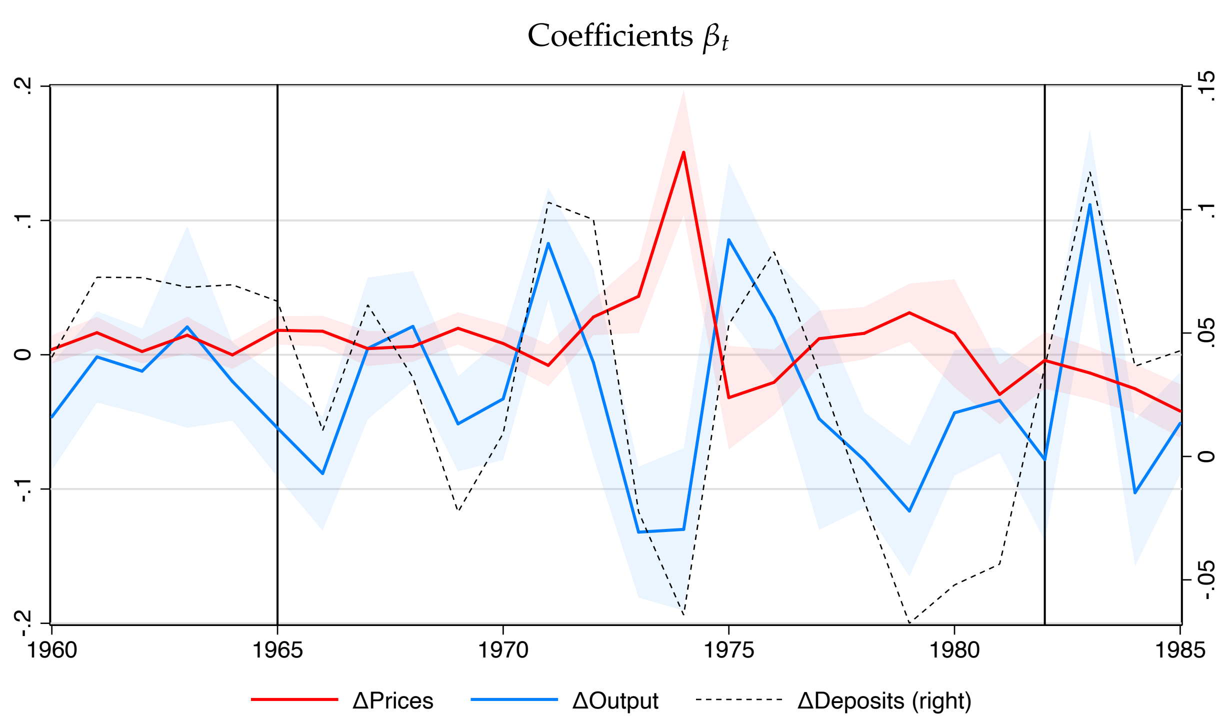


Figure 6: Finance dependence and employment

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

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

Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured at the industry level from 1958 to 1965 and winsorized at the 5% level. Also shown is the analogous set of coefficients fro real output growth (blue). Shading denotes 90% confidence intervals. Aggregate U.S employment is in 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

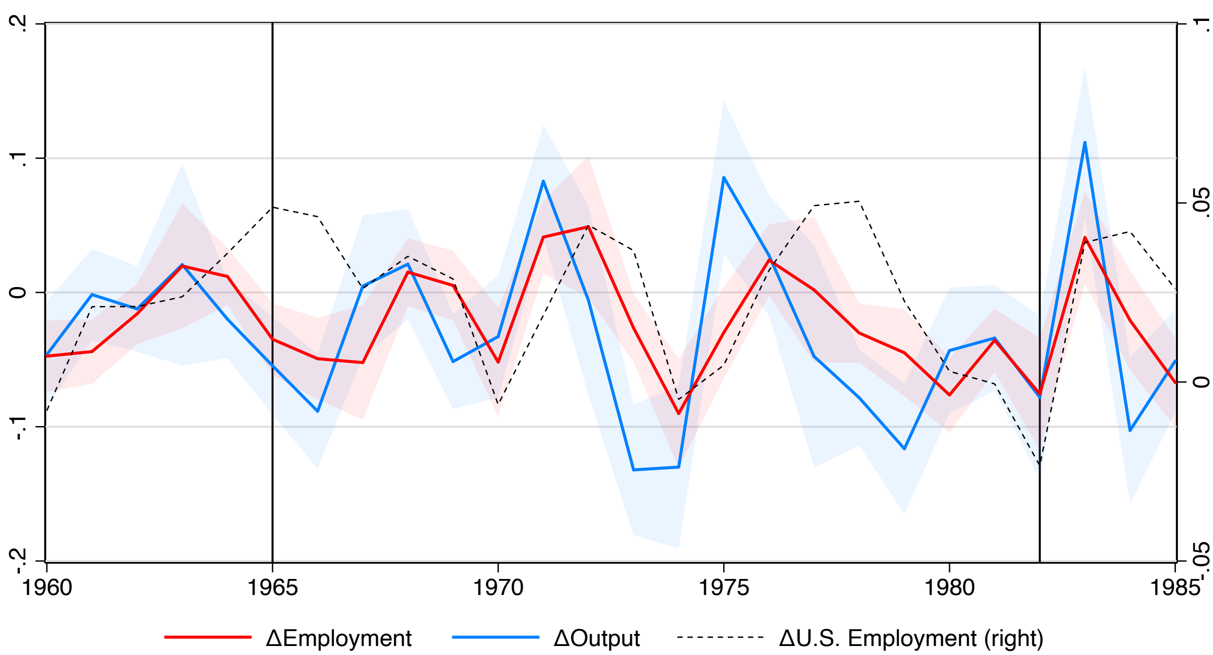


Figure 7: Reg Q share and lending

The figure plots the coefficients β_t from yearly cross-sectional regressions of loan growth (red) and asset growth (blue) on the Reg Q share at the county level:

$$y_{i,t} \;=\; \alpha_t + \beta_t \text{RegQShare}_{c,t} + \epsilon_{i,t},$$

The Reg Q share is the share of deposits that are subject to Regulation Q (excludes large time deposits, MMCs after 1978 and MMDAs after 1982). It is mapped to the industry level by weighting across counties by industry employment employment. Shading denotes 90% confidence intervals. Also shown is the deposit spread for savings deposits (black line), measured as the difference between the Fed funds rate and the ceiling rate on savings deposits. The ceiling rate is replaced by the rate on MMDAs once they are introduced. The regressions are weighted by assets. The data are from bank call reports and S&L financial reports.

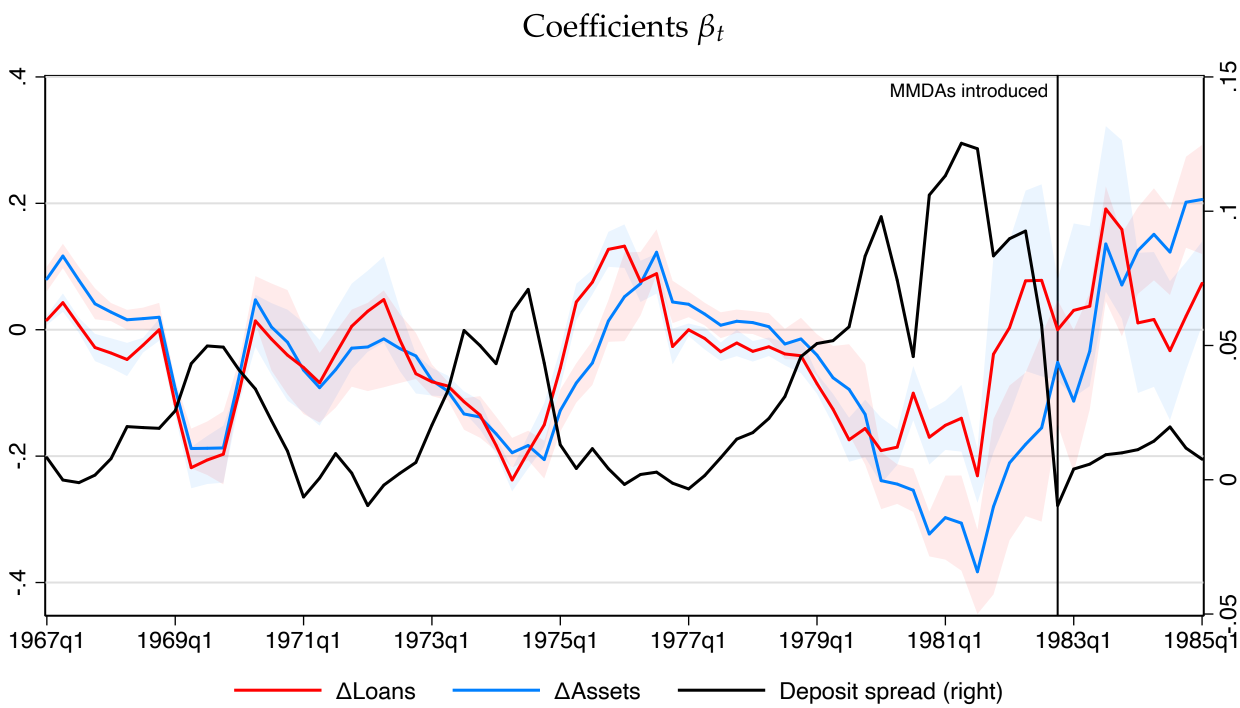


Table A.1: Finance dependence by sector

The table shows finance dependence at the two-digit SIC level. Finance dependence is production costs (materials plus labor) minus gross profit (sales minus production costs) divided by production costs. It is measured from 1958 to 1965 and winsorized at the 5% level. We first calculate finance dependence at the four-digit SIC level then average to the three-digit level and two-digit level. The data are from the NBER-CES manufacturing database.

	SIC2	Fin. Dep.
Apparel & Other Textile Products	23	0.66
Chemical & Allied Products	28	0.31
Electronic & Other Electric Equipment	36	0.37
Fabricated Metal Products	34	0.52
Food & Kindred Products	20	0.59
Furniture & Fixtures	25	0.56
Industrial Machinery & Equipment	35	0.42
Instruments & Related Products	38	0.28
Leather & Leather Products	31	0.63
Lumber & Wood Products	24	0.69
Miscellaneous Manufacturing Industries	39	0.49
Paper & Allied Products	26	0.55
Petroleum & Coal Products	29	0.67
Primary Metal Industries	33	0.61
Printing & Publishing	27	0.26
Rubber & Miscellaneous Plastics Produ	30	0.52
Stone, Clay, & Glass Products	32	0.38
Textile Mill Products	22	0.70
Tobacco Products	21	0.43
Transportation Equipment	37	0.62