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Credit Conditions and Recoveries from Recessions Associated with Financial Crises

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Research Department

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Abstract

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Recoveries from recessions associated with a financial crisis tend to be sluggish. In this paper, we present evidence that stressed credit conditions are an important factor constraining the pace of recovery. In particular, using industry-level data, we find that industries relying more on external finance grow more slowly than other industries during recoveries from recessions associated with financial crises. Additional tests, based on establishment size, on alternative definitions of financial crises, and on corporate-government interest rate spreads, support the findings. Moreover, for subsets of industries where financial frictions are more severe, we find much stronger differential growth effects.

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I. INTRODUCTION

Recoveries from recessions associated with financial crises in advanced economies tend to be sluggish affairs. On average, it takes about five and a half quarters for output to return to the level of its previous peak. The equivalent duration for all other recoveries is about three quarters. Likewise, growth in the first year of a recovery following a recession associated with a financial crisis is 2.2 percent, on average, while growth in the first year of all other recoveries is 4.3 percent.[1]

What accounts for the slow recovery from these crises? Viewed from the perspective of Friedman (1993)'s "plucking" model of business cycles, this pattern appears to be puzzling. Based on this model, recessions are largely due to cyclical contractions, which tend to dissipate more quickly the larger the size of the contraction. Indeed, Sichel (1994) and Wynne and Balke (1992) find evidence of this "bounce-back" hypothesis—the deeper the recession, the stronger the recovery. As recessions associated with financial crises tend to be long and deep, the subsequent slow recovery runs against this hypothesis.

In this paper, we examine the extent to which stressed credit conditions—situations where the cost of credit is unusually high, or the availability is unusually restricted—dampen recovery in the aftermath of a financial crisis. A striking feature of recoveries from recessions associated with financial crises is the near absence of growth in domestic credit extended by the banking system (see Figure 1).[2] Credit remains flat up to two years after the end of the recession—a pattern that is significantly different from all other recovery episodes. Although the demand for credit is generally lower following a financial crisis, as households and firms reduce their debts, the stress experienced by the banking sector during these episodes suggests that restrictions on the supply side are also important.

Measuring these effects is not, however, straightforward. Data on outstanding bank credit, such as those presented in Figure 1, conflate supply and demand factors, making identification challenging. Data on bank capital or the net worth of firms—two balance sheet indicators that capture the ability and willingness of banks to lend—or results from surveys of bank loan officers, would more directly reflect credit conditions, but such data are hard to obtain on a systematic basis for a significant cross-section of countries and over a lengthy time period. This paper therefore takes an indirect approach. If credit conditions are important, industries that are more reliant on external finance, or more subject to financial frictions, should recover relatively slowly following a recession associated with financial crises. Furthermore, as the severity of frictions increases, so should the impact of the dependence on external finance on growth during recovery.

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[1] The classification of episodes and the construction of these statistics are described in Kannan, Scott and Terrones (2009).

[2] Details underlying the construction of Figure 1, namely the dating of recessions and the association of recessions with financial crisis episodes, are described in Section 2.2
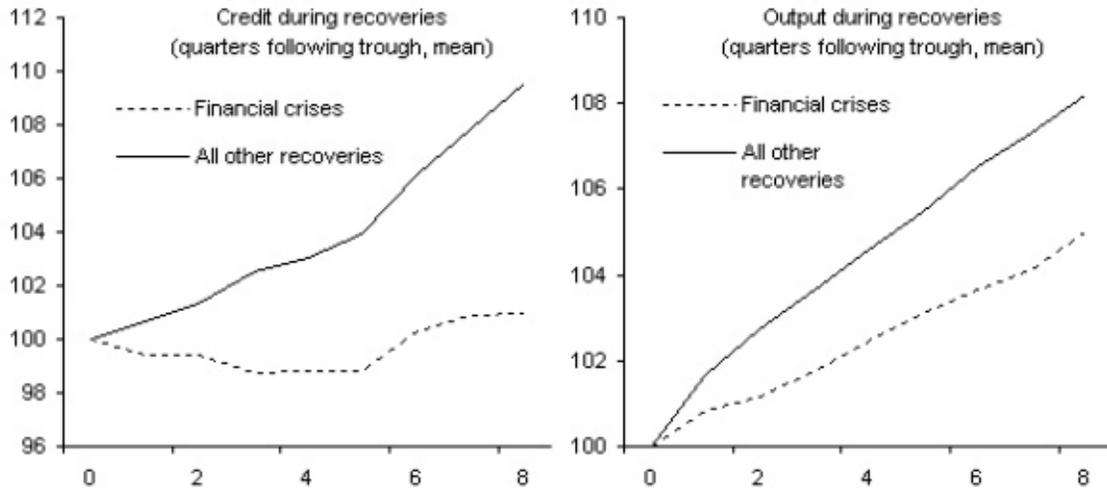
Figure 1: Behavior of Credit and Output during Recoveries (the x-axis is measured in quarters where 0 marks the trough of the recession)

The tests applied in this paper involve three steps. The first is to identify business cycle phases: recessions, recoveries and expansions. The second step involves selecting those recessions with episodes of financial crises, as identified by Reinhart and Rogoff (2008). If the start of a financial crisis occurs just before or during the early part of a recession, we say that such a recession is associated with a financial crisis.[3] The paper also explores alternative definitions of financial crisis, based on stock market crashes and widened interest rate risk spreads. In the third step, we examine the variation in output growth across industries during recovery, controlling for country, time and industry effects.

Our findings suggest that credit conditions play an important role in constraining recovery from recessions associated with financial crises. Industries that rely more on external finance, or that have less assets eligible as loan collateral, or that are populated by smaller firms, grow relatively slowly during recoveries from these episodes. We infer that credit conditions remain stressed well after the trough of the recession. The negative effects are strongest during the first year of the recovery phase, and become insignificant only after three years.

Further evidence on the importance of credit conditions is obtained by sorting industries into two sub-samples based on the average degree of asset tangibility and the share of output that is traded internationally. Industries characterized by a higher degree of tangible assets are in a better position to pledge these assets as collateral and thus reduce the cost of external finance, while industries that produce goods that are more tradable have an easier time accessing credit from external sources either through trade credits or by pledging export receivables. We find that variation along these two dimensions matters during the recovery phase. Industries that rely

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[3] The association of a recession with a financial crisis in this manner follows from Kannan, Scott and Terrones (2009).

more on external finance perform even worse during recovery from a financial crisis when they also have less tangible assets, or produce goods that are relatively less tradable.

Our findings are reinforced through three alternative specifications. First, instead of looking at the variation across industries based on their dependence on external finance, we use a measure of average establishment size that is industry, country specific. Gertler and Gilchrist (1994) and Oliner and Rudebusch (1995), amongst others, show that smaller firms tend to embody the types of informational frictions that add to the cost of external finance. Accordingly, and in line with our earlier results, we find that industries that on average are populated by smaller firms tend to grow more slowly during recoveries from recessions associated with financial crises relative to a typical recovery. Second, we alter our methodology used to identify recessions associated with financial crises. Instead of relying on the crisis dates of Reinhart and Rogoff (2008), we look at recessions that featured large drops in equity prices. Such episodes may be associated with large falls in the net worth of firms, thus raising the cost of external finance. Just as in our baseline definition of a recession associated with a financial crisis, we find that industries that rely more on external finance grow more slowly during recoveries from recession episodes that featured large equity price drops. The magnitude of the differential, however, is much smaller; suggesting that the impact of banking crises on credit conditions tends to be stronger relative to the case of recessions associated with equity price collapses. Finally, we attempt to directly measure credit conditions during the recovery phase by looking at corporate-government interest rate spreads. As expected, we find the differential growth pattern that we observed across industries depending on their degree of external finance dependence is also present during recovery periods where interest rate spreads were particularly high.

This paper is related to the literature on finance and economic growth (see King and Levine, 1993, and Claessens and Laeven, 2003, for example), as well as the microeconomic literature on financial frictions and firm behavior (see Fazzari, Hubbard and Petersen, 1988, for an early example).[4] The three most closely-related previous papers are Braun and Larrain (2005), Krozner, Klingebiel and Laeven (2007) and Dell'Ariccia, Detragiache and Rajan (2008), all of which build on the seminal work of Rajan and Zingales (1998).

This paper differs from these papers in three ways. First, this paper looks at the interaction between financial crises and recessions, rather than analyzing the two separately. This interaction is important to capture the effect on credit conditions arising from financial sector stress, as distinct from the balance sheet deterioration that always accompanies recessions. Second, the current paper's focus on recoveries is complementary to their analysis of growth during recessions, financial crises, and banking crises respectively. Recoveries are of intrinsic interest, as stressed credit conditions tend to persist well after the initial crisis has passed (see Bernanke, 1993). Identifying constraints on recovery also has direct implications for policy. Finally, the current paper focuses solely on advanced economies. While this has some

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[4] The importance of financial frictions in the propagation of business cycles has also recently received much attention (see Christiano, Motto and Rostagno, 2007, and Jermann and Quadrini, 2009).

advantages as will be described later, it comes with the cost of limiting the number of episodes that we can study.[5]

The paper is organized as follows: Section 2 outlines the baseline specification used. Details related to the methodology employed, the data used and the construction of indicators are contained here. Section 3 then presents the main results. In Section 4, we present results related to alternative specifications. Finally, section 5 concludes. An Appendix contains details related to the data sources and the dating of recessions.

II. BASELINE SPECIFICATION

A. Methodology

The underlying question addressed in this paper is whether or not stressed credit conditions affect the pace of recoveries from recessions associated with a financial crisis. In an environment of stressed credit conditions, firms in industries that rely more on external financing will be disproportionately affected by the higher cost of credit relative to firms that rely more on internal funds due to the presence of capital market imperfections.

Two distinct factors contribute to tight credit conditions during recessions associated with financial crises. First, episodes of financial crises are characterized by banking sector difficulties, which include loss of confidence in some banks and widespread depletion of bank capital. These serve to reduce the effectiveness of normal financial intermediation activities.[6] Second, the balance sheets of debtors—both households and firms—deteriorate significantly either through bankruptcies, falling asset prices or failed investments.[7] In the absence of financial frictions, or information problems, firms would substitute other forms of credit for bank credit, with little effect on investment and output decisions. The presence of market imperfections, however, implies substantially higher borrowing costs, and reduced availability of credit, for firms and industries that are more bank dependent. Furthermore, any deterioration in the balance sheets of firms also leads to an increase in the cost of external finance (see Bernanke and Gertler, 1989, and Kiyotaki and Moore, 1997).

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[5] Recoveries from episodes of systemic, sudden stops (SSS) in the case of emerging markets are featured in Calvo, Izquierdo and Talvi (2006). Unlike the evidence for advanced economies, recoveries in these episodes were found to be rapid. Huntley (2008) and Abiad et. al. (2009) cast doubt on these findings and find that the recovery patterns from SSS episodes tend to be bimodal.

[6] Bernanke and Lown (1991) provide evidence which shows that bank capital is a significant determinant of loan growth. Kashyap and Stein (1995), amongst others, demonstrate that banks are uniquely capable of solving certain information problems. This implies that other forms of credit, if available at all, are not perfect substitutes for bank credit. Any stress experienced by the banking sector, is therefore likely to increase the cost of credit for bank-dependent borrowers, or even to shut off their access to credit.

[7] In addition, debt deflation mechanisms, as described in Fisher (1933), could also be present. See Bernanke (1983) for an exposition on how these two factors were important in the propagation of the Great Depression.

The difference in growth rates during recoveries between industries that are highly dependent on external finance and those that are less dependent should therefore be a gauge of the importance of credit conditions. Observed differences in industry growth rates, however, cannot necessarily be attributed to credit conditions. Other factors may also give rise to these differences. For example, dependence on external finance could be correlated with industry-level growth opportunities that also result in similar differential growth rates, regardless of the importance of credit conditions (see Fisman and Love, 2004, 2007). Such factors could influence growth rates across industries during the course of the business cycle, such that industries less dependent on external finance grow faster during all recoveries, not just from those that follow a financial crisis.

This motivates us to adopt a difference-in-difference approach. The test is to see if the difference in growth rates between industries that are more reliant on external finance is larger in the aftermath of a financial crisis *relative to* the difference in growth rates during all other recoveries. Since recessions associated with financial crises feature a higher degree of stressed credit conditions, this test will allow us to identify the effects of credit conditions separately from all other factors that could result in the same cyclical variation in growth rates across industries.[8]

The specific empirical specification is as follows:

$$
\begin{aligned}
Growth_{i,c,t} \quad = \quad & \beta_1 \cdot Lagged\ Share_{i,c,t\text{-}1} + \beta_2 \cdot Recovery_{c,t} \\
& + \beta_3 \cdot Recovery_{c,t} \times Financial\ Crisis_{c,t} \\
& + \beta_4 \cdot Recovery_{c,t} \times External\ Finance_i \\
& + \beta_5 \cdot Recovery_{c,t} \times Financial\ Crisis_{c,t} \times External\ Finance_i \\
& + \textbf{vector of dummy variables}
\end{aligned}
$$

The definitions of the variables in equation (1) are as follows: $Growth_{i,c,t}$ is the growth rate of value added for industry i, in country c at time t; $Lagged\ Share_{i,c,t\text{-}1}$ is the (lagged) value-added for a particular industry expressed as a share of total value added across all industries in that country; $Recovery_{c,t}$ is an indicator variable that takes on the value of 1 when the economy is in a recovery phase; $Financial\ Crisis_{c,t}$ is an indicator variable that takes on the value of 1 when the particular recession that preceded the recovery is associated with a financial crisis; $External\ Finance_i$ is a measure of an industry's dependence on external finance; and, finally, the vector of dummy variables span the country, time, industry, industry-country and industry-time dimensions.

The behavior of growth in value added in an industry during recoveries is captured by the coefficients β_2 through β_5. The lagged share of value-added output is included in the

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[8] The underlying identification assumption is that the return to investments for industries does not vary systematically based on their dependence on external finance.

specification to control for growth effects related to the size of the industry that could be due to, amongst other things, convergence effects. The coefficient on the interaction between the indicator variable for a recovery and the measure of dependence on external finance, β_4, captures the difference in growth rates across industries with different degrees of dependence on external finance during a recovery that is not associated with a financial crisis. If $\beta_4 < 0$, growth rates are lower during normal recoveries the more dependent the industry is on external finance. The main coefficient of interest, however, is β_5. A negative value for this coefficient implies that an industry's degree of external finance dependence has a larger impact on its growth during a recovery from a financial crisis relative to a typical recovery.

B. Data

The specification above requires the use of both data at the aggregate level—to identify business cycles—and at the disaggregate level—to study the behavior across industries. Quarterly data on real gross domestic product for 21 industrialized economies spanning the period 1970:Q1 to 2004:Q4 are obtained from the *OECD Analytical Database*.[9] Disaggregate data on industries, meanwhile, were obtained from the 2006 edition of the *IndStat3* database produced by the United Nations Industrial Development Organization (UNIDO). The database contains annual data for 28 manufacturing sectors, classified at the 3-digit ISIC level. The data generally range from 1970 to 2003, with some omissions and gaps, which we will discuss at relevant points in the paper. To compute growth in value-added output for these sectors, we deflate the local currency series on value-added using the consumer price index (CPI) for that country, where the CPI data are from the IMF's *International Financial Statistics*.

The sample of countries used in this paper is limited to a set of advanced economies. This was done for three main reasons. First, these economies are all in similar stages of development, and as such, have similar industrial compositions. This is important since we use the degree of external financing for industries in the U.S. as a proxy for the other countries in our sample. This is a widely used approach; the justification is that the measures for the U.S. would to a large extent reflect intrinsic industry needs that have much in common across the advanced economies. Second, advanced economies tend to have longer data series, and more regular business cycle fluctuations, which allow us to distinguish cyclical patterns more easily. Aguiar and Gopinath (2007) find that business cycles in emerging markets are driven more by shocks to trend growth rather than cyclical factors, which characterize more developed economies. Third, the use of variation in growth across industries as an indicator of the importance of credit conditions is only valid if industries largely obtain their funds from domestic sources, which is not the case in most emerging markets.

We draw three classifications from our sample. The first relates to the dating of recessions and recoveries. The second set separates recessions associated with financial crises from those that are not. For this purpose, we draw on the existing literature, which dates events from

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[9] The list of countries included in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and the United States.

quantitative indicators and narrative evidence. The third classification groups industries according to dependence on external finance. We take up each of these components in turn. In Section 4, we will study the robustness of our results across different definitions of financial crises, and alternative industry-level characteristics.

Identifying recessions associated with financial crises

The focus on recoveries from a recession necessitates the implementation of a dating procedure for the various phases of the business cycle. In the tradition of Burns and Mitchell (1946), we date cycles based on turning points in the level of output, rather than deviations from a trend. The procedure—based on Harding and Pagan (2002) who, in turn, build on work done by Bry and Boschan (1971)—consists of a set of statistical criteria. These concern: the window over which an observation is classified as a local peak or trough; the minimum duration of a complete cycle; and the minimum duration of a phase of a business cycle. In this paper, we set the observation window at 2 quarters long; the minimum duration at 5 quarters; and the minimum phase at 2 quarters. While the criteria on the minimum duration of a cycle and a phase are occasionally binding, the procedure generally dates the start of a recession as the quarter where output is higher than the two quarters preceding it and following it.[10] Likewise, the end of a recession is generally marked as the quarter where output is lower than the two quarters before and after it. These criteria establish local peaks and troughs, and hence recessionary and expansionary phases of the business cycle. This procedure is identical to that carried out in Claessens, Kose and Terrones (2009).[11]

A key issue is the mismatch between the frequencies of the data on output at the aggregate level and the sector-level data. While the procedure described above can be applied to annual national accounts data as well, it tends to miss out on a large number of recessions. Indeed, the procedure using annual data only identifies 47 recessions in the sample of 21 countries, whereas the use of quarterly data identifies 83.[12] As there are obvious benefits to using higher frequency output data to identify business cycles, we implement the dating algorithm at the quarterly frequency and then map these quarterly observations into an annual frequency. We do this in a simple manner: if two or more quarters in a year are identified as recessionary, then the whole year is marked as a recession year. Tables A1 and A2 in the Appendix show the recession dates using both data at the annual frequency and the quarterly data mapped into annual dates. The results of estimating equation (1) using annual data to date recessions are presented in Table A2.

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[10] This implies that two quarters of negative growth is a sufficient, but not necessary, condition for a recession.

[11] Dating cycles only based on the level of output is a much narrower concept of business cycles than that employed by the National Bureau of Economic Research (NBER), which dates business cycles in the United States. In addition to output, the NBER also considers measures of employment, real income, industrial production, and sales. The weight on each variable, however, differs from cycle to cycle, and is, therefore, difficult to replicate. The procedure described above has the benefit of being easy to replicate across different countries. Furthermore, relative to approaches that utilize two-sided filters, such as the Hodrick-Prescott filter, the dating of recessions and recoveries using the procedure described above does not change with the addition of future observations.

[12] The algorithm was run using 1-year as the criterion for the window, minimum cycle and minimum phase.

The results show that industries that rely more on external finance grow more slowly during recoveries from recessions associated with financial crises. However, this slower relative growth is not significantly different from what is experienced during a normal recovery.

The next step is for us to associate particular recessions with financial crises. To do this, we use the set of crisis dates for advanced economies identified by Reinhart and Rogoff (2008), which builds upon earlier work by Kaminsky and Reinhart (1999), Caprio and Klingebiel (2003) and Bordo, et al. (2001).[13] The financial crisis episodes identified in these papers are essentially banking crises. The criteria used to identify these episodes include whether or not there were systemic bank runs, or large-scale government interventions in major financial institutions. In Section 4, we will take a relatively broader view of financial crisis as a test of the robustness of our results. Using these dates of financial crisis, a recession is said to be associated with a financial crisis if the recession episode starts at the same time or within a year after the beginning of the financial crisis. For the majority of episodes, this simple procedure has plausible results: the recessions so identified tend to occur in the same year as a financial crisis, or in the following year. But, there are some notable exceptions. The dating of the start of the Savings & Loan crisis in the U.S. (1984), and the banking crisis in Germany (1977) are not followed closely by a recession. We, therefore, do not associate any recession to these two episodes of financial crises.[14] Data restrictions also limit the number of financial crisis episodes we can examine. For example, the financial crisis in Greece in the early 1990s is excluded because the data for a substantial number of sectors stop at 1991.

We now turn to the issue of dating recoveries. There is no agreed definition of recovery in the literature. Some define it as the period during which the economy returns to its pre-recession peak. Others measure it by the cumulative growth achieved after a certain time period, say a year, following the trough. Our baseline specification is the first two years after the end of a recession, conditional on the economy not falling back into recession during these two years. For robustness, we also look at the behavior across industries in the first and third year following the end of a recession.

External finance measure

Our baseline measure of external finance follows Rajan and Zingales (1998). External finance is defined as the share of capital expenditure financed outside of retained earnings. The ratio is computed for U.S. firms, averaged over the 1970s and 1980s. We use the U.S. ratios as proxies for the external financing ratio in all other countries, assuming that the averaged ratios for the U.S. represent the intrinsic external financing needs of the industry due to the nature of their

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[13] The dates in Reinhart and Rogoff (2008) overlap substantially with the database in Laeven and Valencia (2008). One episode—Japan (1997)—is identified in Laeven and Valencia (2008), but not in Reinhart and Rogoff (2008). We include this episode in our analysis as it occurs just before the recession of 1997-98 in Japan. Our results are robust to the exclusion of this episode.

[14] In the case of Germany, it turns out not to matter as data at the industry level only start after unification.

product cycle, scale, and cash harvest period. The specific measures that we use are those listed in Braun and Larrain (2005) who map the data to the 3-digit ISIC level.[15]

C. Stylized facts

Table 1 presents some summary statistics on recessions identified using the procedure described above along with the average behavior across industries during these periods. In total, we identify 83 recessions across 21 countries, which implies an average of about 4 recessions per country over the thirty-three years covered.[16] Of these 83, we associate 13 with financial crises (see the Appendix for the list of specific episodes). The mean duration of recessions is 1.3 years. Given that the minimum length of a recession using our procedure is one year, it is not surprising that the mean is greater than one year. The full distribution of durations in this case is more informative and, as such, is also presented in the table. About 28 percent of recessions identified are longer than one year. The two three-year long recessions—the longest in the sample—are the ones experienced in Finland (1990-1992) and Sweden (1990-1992), both of which are associated with financial crises.

Some interesting patterns emerge for different sectors and different types of recession. Value-added across all manufacturing sectors experiences a larger contraction during recessions associated with financial crises. The decline in total value added is 3.4 percent per year during these episodes—almost twice that during recessions not associated with financial crises. The average growth across all manufacturing sectors in the first two years after the end of the recession is also more sluggish in the case of financial crises.

III. RESULTS

A. Baseline result

Table 2 shows the results from estimating equation (1) across recoveries from different classifications of recessions. Across all recoveries, we find evidence that industries that rely more on external finance grow more slowly relative to industries that rely less on it (column 2). A useful statistic to gauge the economic significance of the estimated coefficient is the percentage-point difference in growth between the industry at the top quartile, in terms of reliance on external finance, and the industry that is at the bottom quartile. This difference turns out to be 0.4 percentage points. To put this number in perspective, it is equivalent to about 18 percent of the average growth rate across all industries during the first two years of recovery.

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[15] We use the average measure over 1970 and 1980 in all our specifications.

[16] Note that this is not the total number of recessions identified, but only those for which we have adequate data at the industry-level for the corresponding periods. Note also that not all recessions have recoveries associated with them. For 6 of the 83 identified recessions, the economies in question fall back again into recession the subsequent year.

When we split the sample into recoveries from recessions associated with financial crises and those that are not (columns 2 and 3), we find strong evidence that the differential growth patterns across industries is much more pronounced in the aftermath of a financial crisis than it is for other recessions. The estimated coefficient of -0.032 in column (3) implies a difference in growth rate of 0.8 percentage points between the industries at the top quartile of dependence on external finance and the bottom quartile. This is equivalent to about 44 percent of the average growth rate across all industries in a recovery from a financial crisis. In contrast, when we look at recoveries from recessions that were not associated with financial crises (column 2), we do not find a significant differential in growth rates for industries that rely more on external finance.

The results from columns (2) and (3) in Table 2 indicate that there is no significant relationship between growth in an industry, its dependence on external finance, and the recovery from a recession not associated with a financial crisis.[17] However, industries which rely more on external finance experience slower growth in the aftermath of a financial crisis. This provides indirect evidence that credit conditions continue to remain stressed even after the end of the recession, constraining economic recovery.

It still remains to be shown that the differential growth effect that we find across industries during recoveries from recessions associated with financial crises differs significantly (in a standard statistical sense) from the effect during all other recessions. The result shown in column (4) confirms this. The coefficient on the interactive term—β_5 in equation (1)—captures the difference-in-difference effect we are interested in. The negative and statistically significant coefficient obtained is evidence that recoveries from recessions associated with financial crises feature a more pronounced difference in the growth rates between industries with varying degrees of external finance dependence as compared to recoveries from all other recessions.

B. Looking at subsamples

The results so far show that the differential growth rates between industries that have a high reliance on external finance and those with less reliance are worse in the aftermath of a recession associated with a financial crisis as compared to a regular recession. We have claimed that this differential growth pattern is indicative of lingering stressed credit conditions that arose during financial crises, and that persist even after the end of the recession, dampening the recovery. This claim is based on the notion that there are financial frictions that make different forms of credit—bank versus debt finance, for example—not perfectly substitutable. Financial frictions that arise in the presence of asymmetric information also result in a reduction in the amount of credit that a firm can obtain should its net worth decline. If these mechanisms are indeed present, then situations where financial frictions are reduced should result in less

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[17] This finding accords with the finding in Braun and Larrain (2005), which shows that growth rates are not statistically different across industries with varying degrees of external finance dependence for countries that have high accounting quality or high effective creditor rights—countries that typically belong to the advanced economies sample.

differentiated growth patterns between industries that rely more on external finance and those that do not.

To provide evidence along these lines, we look at two partitions of the sample where these frictions are potentially alleviated. The first derives from a measure of asset tangibility. Industries characterized by a higher degree of tangible assets are in a better position to pledge these assets as collateral, thereby reducing the impact of shocks on the cost of obtaining external finance. The second uses a measure of product tradability. Industries that produce goods that are more tradable could potentially have easier access to credit from external sources either through trade credits or by pledging export receivables (see, for example, Tornell and Westerman, 2002, and Desai, Foley and Forbes, 2008).

Data on asset tangibility and tradability for the 28 manufacturing sectors were obtained from Braun and Larrain (2005). Asset tangibility is measured by the average ratio of plant and production equipment to total assets in a given industry. The degree of tradability, on the other hand, is computed as the proportion of an industry's product that is exported or imported (as a ratio of gross output) using data from the Bureau of Economic Analysis' Make and Use tables. Both these measures are estimated for U.S. industries, and subsequently applied across all countries.[18] Industries are then sorted into two subsamples across both the asset tangibility and tradability dimensions. Industries that lie above the median measure of each characteristic are labeled "high" while those that are below the median are labeled "low". We estimate equation (1) for these two subsamples, over the recovery periods from recessions associated with financial crises.

The results in Table 3 provide evidence that financial frictions are indeed a driving force behind the differential growth pattern between industries with varying dependence on external finance. During the recovery from a financial crisis, industries that rely more on external finance perform worse when they have less tangible assets, or produce goods that are relatively less tradable. The strength of recoveries in industries that have a high degree of asset tangibility are not significantly affected by the extent of dependence on external funding (Table 3, column 1). However, firms in industries that have relatively fewer tangible assets, and that rely more on external finance, grow much more slowly in the recovery from a financial crisis (Table 3, columns 2 and 3). In industries with a low degree of asset tangibility, the difference in the growth rates between the top and bottom quartiles of external finance dependence is around 2.5 percentage points. This pattern is also present when we look at industries sorted along the tradability dimension. Industries that produce goods that are relatively less tradable grow more slowly in the aftermath of a financial crisis the more they rely on external finance. The comparable differential in growth rates across industries in this case is 2.1 percentage points. For industries that produce highly tradable goods, on the other hand, there is no statistically

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[18] This is the approach followed by Braun and Larrain (2005). Unlike the measure of external finance, however, it seems less likely that the measures of tangibility or tradability estimated for the U.S. represent intrinsic features of the industry and can therefore be applied to all other countries. Lack of comparable cross-country data, however, prevent us from computing similar measures for all the countries in our sample. Having said that, the fact that we look only at industrialized economies somewhat mitigates this problem as these economies have more similar industrial composition and are at similar stages of development.

significant difference in growth rates across industries with varying degrees of external finance dependence. We should note, however, that this differential effect for the subsample of industries with low tradability is not statistically different from the differential effect for industries that have a high degree of tradability.

C. How long do the effects last?

The results presented up to this point have been based on a recovery phase defined as the first two years after the end of a recession. How do these results change as we vary the length of the recovery phase? Tables 4 and 5 redo the estimations in Table 1, but for recovery horizons of 1 year and 3 years, respectively. The results show a pattern of declining differential effects, with the strongest effects at the 1-year horizon. The difference in growth rates during the first year after the end of a recession associated with a financial crisis between industries at the top and bottom quartile based on external finance dependence is 1.1 percentage points. The differential growth behavior across industries during the recovery phase continues to remain negative when we look at the first three years after the end of the recession, but the coefficients are not statistically significant at any reasonable significance level.

IV. ALTERNATIVE SPECIFICATIONS

In this section, we examine the robustness of our results by varying three aspects of our analysis. First, we sort industries by firm size, instead of dependence on external finance. Second, we look at an alternative definition of a financial crisis. Rather than focusing on banking crises, we sort recessions into those that featured large drops in equity prices and those that did not. Third, we use interest rate risk spreads to gauge recovery phases where credit conditions remained unusually tight: this allows a more direct test of the hypothesis that stressed credit conditions are responsible for the relatively slow recovery of industries reliant on external finance. The next three sections take up each of these robustness tests in turn.

A. Using an indicator of firm size

The estimation strategy up to this point has used the variation across industries based on their degree of reliance on external finance, within a particular country, as a means to identify the effect of stressed credit conditions during the recovery from recessions associated with financial crises. Our measure of dependence on external financing, however, has two shortcomings. First, it does not discriminate between bank financing and other forms of external finance. If only the banking sector was experiencing stress during the episodes that we consider, firms in industries that are more reliant on debt markets may be less affected. Secondly, due to the lack of comparable data for all countries, the ranking based on the measure for U.S. industries is applied across all the other countries. This approach is defensible on the grounds that the measure for the U.S. reflects an intrinsic requirement for external finance that applies to a particular industry regardless of its location. Nonetheless, it is still desirable to have a measure that allows country rankings to be different.

A measure of firm size provides a different perspective on financing requirements. A large body of literature, beginning with Fazzari, Hubbard and Petersen (1988), has documented the fact that

small firms tend to embody the types of informational frictions that add to the cost of external finance: they tend to be young, have more volatile sales, and are not well collateralized (see Gertler and Gilchrist, 1994, and Oliner and Rudebusch, 1995). For these reasons, small firms tend to be more dependent on banks than large firms, which have easier access to capital markets. In an environment of stressed credit conditions, therefore, growth in smaller firms should be relatively more affected than larger firms.

We construct a measure of size by computing the average value-added (in US dollars) per establishment in an industry. A low value of this ratio implies that, on average, the industry is populated by smaller firms relative to another industry with the same level of value-added, but with fewer firms. We averaged the ratio over the period 1970-2003, and then scale it to create an index with a maximum value of one (the value for the industry most dominated by large firms). The availability of cross-industry size measures at the country level allows some variation in the ranking of industries across countries, which was not possible when using the external finance measure.[19]

To estimate the impact of differences in size across industries during recoveries, we again estimate equation (1), with the size index replacing the external finance ratio. A key difference is that size is now industry-country specific rather than just industry specific, as in the case of the external finance measure.

$$
\begin{aligned}
Growth_{i,c,t} \quad = \quad & \beta_1 \cdot Lagged\ Share_{i,c,t\text{-}1} + \beta_2 \cdot Recovery_{c,t} \\
& + \beta_3 \cdot Recovery_{c,t} \times Financial\ Crisis_{c,t} \\
& + \beta_4 \cdot Recovery_{c,t} \times Size_{i,c} \\
& + \beta_5 \cdot Recovery_{c,t} \times Financial\ Crisis_{c,t} \times Size_{i,c} \\
& + \textbf{vector of dummy variables}
\end{aligned}
$$

The empirical strategy remains the same as before. Specifically, we are interested in determining whether or not the difference in growth rates across industries of different sizes is significantly different following a recession associated with a financial crisis, as compared to recoveries from all other recessions.

Table 6 shows the results based on the constructed measure of size. The results show that smaller firms grow more slowly during recoveries from recessions associated with financial crises than during other recoveries (column 4). These effects continue to remain significant even after accounting for any cyclical patterns across industries related to their size. If smaller firms are indeed more vulnerable to stressed credit conditions, especially those related to bank credit, then these results support the hypothesis that stressed credit conditions experienced during a

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[19] The concept of size as used here, however, is different from that used in the literature, which is typically based on gross nominal assets.

recession associated with a financial crisis tend to linger on well after the end of the recession, impeding recovery.

B. An alternative classification of recessions associated with financial crises

The second robustness test that we employ is to use an alternative means of associating a recession with a financial crisis. The dating procedure that we have used thus far only captures banking crises. To get a broader, more objective, way of identifying episodes of financial crises, we look at recessions that featured large drops in equity prices. Large drops in equity prices tend to accompany a broad array of financial difficulties.[20] In models where the ability of a firm to borrow funds is a function of its net worth, such as Bernanke and Gertler (1989), the drops in net worth implied by large falls in equity prices translate to higher costs of credit.

To classify recessions in this manner, we compute increases in real equity prices (deflated by CPI) for all the recessions identified in our sample.[21] Episodes where the cumulative price change during the recession is in the bottom quartile of the distribution across all recessions are labeled as recessions associated with financial crises. This procedure identifies 19 recessions that were associated with large falls in equity prices, 6 of which overlap with the baseline classification. The specific episodes are listed in the Appendix.

Table 7 shows the results obtained when we re-estimate equation (1) for recoveries from recessions associated with sharp equity collapses. The first column reproduces the results in Table 1, as it shows the behavior of industries across all recoveries. Column (3) shows that during recoveries from recessions associated with equity collapses, industries that rely more on external finance tend to grow more slowly, just as in the baseline specification. The magnitude of the differential, however, is much smaller. The differential growth rate, between the industry that is at the top quartile from that at the bottom quartile, is only 0.4 percentage points, compared to 0.8 in the case of banking crises. Furthermore, while the differential impact is statistically significant, it is not significantly different from the differential pattern observed across other recovery periods. The results therefore suggest that banking crises have a more forceful lingering effect on credit conditions, and growth, than equity price collapses.

C. Interest rate spreads as an indicator of credit conditions

Up to this point, we have been using indirect means to infer whether credit conditions remain stressed during recoveries from financial crises. This was done as direct measures of credit conditions are difficult to come by. As mentioned in the introduction, data on bank capital, lending standards, or the net worth of firms might more closely reflect credit conditions, but these are hard to obtain on a systematic basis for a significant cross-section of countries over a lengthy time period.

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[20] Kannan and Kohler-Geib (2009) use large drops in equity prices as a way of identifying financial crises for a broad sample of countries.

[21] Equity prices were obtained from the IMF's *International Financial Statistics.*

In this section, we use a proxy for stressed credit conditions—the spread between the commercial paper rate and the short-term interest rate on government-issued bills. This spread embodies a confluence of risk premia, including default risk, market risk, liquidity risk and prepayment risk (see Duca, 1999). Variations in all such components, however, indicate a change of some kind in credit conditions.[22] Corporate paper rates for our sample of countries along with short-term rates on government bills were obtained via Haver Analytics. The sample of countries, however, drops to 17 as historical data for Greece, Ireland, New Zealand and Portugal were not available.

In order to determine which recoveries were associated with periods of stressed credit conditions, we first compute the average spread across all identified recoveries. Those that feature spreads greater than the median across the whole sample (regardless of the state of the business cycle) are labeled as featuring stressed credit conditions. Of the 77 recoveries that we identify in our sample, 23 are associated with stressed credit conditions as measured by the spread between the corporate bond rate and the short-term government rate. Of these 23, 5 overlap with recoveries from recessions associated with financial crises using our baseline measure.[23]

Equation (1) is then re-estimated over the periods of wide interest rate spreads; Table 8 shows the results. We again find that industries that rely more on external finance grow more slowly during recoveries where credit conditions are stressed. The difference in growth rates between the industry at the top quartile in terms of dependence on external finance with the industry at the bottom quartile is 1.0 percent. This difference is greater than that found for recoveries from recessions associated with financial crisis. Insofar as the spread is a good gauge of credit conditions, the results confirm the claim that industries that rely more on external finance grow less during periods of stressed credit conditions compared to other recoveries.

V. CONCLUSIONS

Recessions associated with financial crises are extremely costly events. Empirical evidence indicates that output losses are as high as 10-15 percent of a single year's output, with losses in advanced, industrialized economies equally high, if not higher, than emerging markets (see Hoggarth, Reis and Saporta, 2002). A crucial component of this cost is the relatively slow pace of recovery that typically follows such events. The slow pace of recovery is related to a variety

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[22] Studies that have constructed composite financial stress indices typically include some measure of the spread between corporate bonds and the risk-free rate as one of their components (see, for example, Illing and Liu, 2006 and Cardarelli, Elekdag and Lall, 2009).

[23] The specific recovery periods are listed in the Appendix. Only a few of the recoveries from recessions associated with financial crises overlap with those that feature high corporate bond spreads. The obvious reason for this would be that interest rate spreads only capture a small fraction of the potential sources of stressed credit conditions.

of factors, such as the nature of the crisis, the external environment, and the size of the permanent component of the shock to potential output.[24]

The present paper provides evidence that unusually stressed credit conditions contribute to the sluggishness of these recoveries. We find that industries that rely more on external finance grow more slowly in recoveries from recessions associated with financial crises. Importantly, this difference in growth rates is wider than that during recoveries from other recessions. Similar findings hold through various additional tests, which include alternative measures of financial crises, and the use of corporate-government interest rate spreads to capture tightness of credit. For subsets of industries where the financial frictions are more severe—such as industries populated by small establishments, or have fewer tangible assets, or produce goods that are less tradable—we find the differential growth effects across industries to be much stronger.

Our results underline the importance of policies to strengthen the financial sector during episodes of financial crises. Policies aimed at improving the balance sheets of financial institutions help not just to stabilize financial institutions and markets, but also provide a foothold for a broad recovery of economic activity.

Much like previous papers in the literature, the evidence presented in this paper on the importance of stressed credit conditions in slowing recovery from a financial crisis is indirect. Several recent papers, such as Angelini and Generale (2008) and Meisenzahl (2010), exploit more detailed microeconomic data to directly measure financing constraints faced by firms. Once sufficient data on the 2008-09 financial crisis becomes available, such approaches would yield more definitive evidence on the importance of credit conditions in affecting recoveries from financial crises.

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[24] See Balakrishnan, et al. (2009).

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Table 1. Summary Statistics

	All Recessions (1)	Recessions associated with Financial Crises (2)	All other recessions (3)
Number of recessions	83	13	70
Mean Duration (years)	1.3	1.6	1.2
Distribution of Duration (Number of episodes)			
1 year	60	7	53
2 years	21	4	17
3 years	2	2	0
Average real growth in value added during recession across industries (percent)	-2.3	-3.4	-1.9
Average real growth in value added during first two years of recovery across industries (percent)	2.2	1.8	2.4

Table 2. External Finance and Recoveries from Recessions Associated with Financial Crises

	(1)	(2)	(3)	(4)
Lagged Share	-2.029 ***	-2.029 ***	-2.026 ***	-2.027 ***
	(0.291)	(0.290)	(0.291)	(0.291)
Recovery	0.002			-0.002
	(0.005)			(0.005)
Recovery * External Finance	-0.016 *			-0.011
	(0.009)			(0.009)
Recovery * Non. FC		-0.002		
		(0.005)		
Recovery * Non. FC * External Finance		-0.010		
		(0.008)		
Recovery * FC			0.014	0.016
			(0.019)	(0.204)
Recovery * FC * External Finance			-0.032 ***	-0.022 **
			(0.011)	(0.010)
N	15204	15204	15204	15204
R^2	0.22	0.14	0.14	0.22

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Table 3. External Finance and Recoveries from Recessions Associated with Financial Crises: Looking at Subsamples

	Asset Tangibility			Tradability		
	High	Low	Full Sample	High	Low	Full Sample
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Share	-2.319 ***	-1.734 ***	-2.029 ***	-2.144 ***	-1.948 ***	-2.027 ***
	(0.455)	(0.401)	(0.290)	(0.525)	(0.329)	(0.291)
Recovery from FC	0.012	0.014	0.013	0.003	0.032 *	0.015
	(0.023)	(0.018)	(0.019)	(0.023)	(0.018)	(0.019)
Recovery from FC * Ext. Fin.	-0.003	-0.064 ***	-0.004	-0.006	-0.094 **	-0.022 **
	(0.019)	(0.022)	(0.013)	(0.014)	(0.040)	(0.009)
Recovery from FC * Ext. Fin. * Low Asset Tangibility			-0.060 **			
			(0.029)			
Recovery from FC * Ext. Fin. * Low Tradability						-0.035
						(0.034)
N	8071	7133	15204	8192	7012	15204
R^2	0.16	0.13	0.22	0.12	0.17	0.14

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects.

Table 4. External Finance and Recoveries from Recessions Associated with Financial Crises: 1-year Horizon

	(1)	(2)	(3)	(4)
Lagged Share	-2.038 ***	-2.033 ***	-2.033 ***	-2.039 ***
	(0.290)	(0.290)	(0.290)	(0.290)
Recovery	-0.017 **			-0.018 **
	(0.007)			(0.006)
Recovery * External Finance	-0.021 *			-0.016
	(0.012)			(0.012)
Recovery * Non. FC		-0.017 **		
		(0.006)		
Recovery * Non. FC * External Finance		-0.015		
		(0.012)		
Recovery * FC			-0.015	0.001
			(0.021)	(0.022)
Recovery * FC * External Finance			-0.043 ***	-0.028 *
			(0.015)	(0.014)
N	15204	15204	15204	15204
R^2	0.14	0.14	0.14	0.14

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Table 5. External Finance and Recoveries from Recessions Associated with Financial Crises: 3-year Horizon

	(1)	(2)	(3)	(4)
Lagged Share	-2.032 ***	-2.029 ***	-2.031 ***	-2.033 ***
	(0.289)	(0.288)	(0.292)	(0.291)
Recovery	-0.004			-0.004
	(0.004)			(0.005)
Recovery * External Finance	0.001			0.003
	(0.011)			(0.011)
Recovery * Non. FC		-0.002		
		(0.005)		
Recovery * Non. FC * External Finance		0.005		
		(0.011)		
Recovery * FC			-0.004	-0.001
			(0.014)	(0.018)
Recovery * FC * External Finance			-0.007	-0.009
			(0.014)	(0.016)
N	15204	15204	15204	15204
R^2	0.14	0.14	0.14	0.14

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Table 6. Size and Recoveries from Recessions Associated with Financial Crises

	(1)	(2)	(3)	(4)
Lagged Share	-2.032 ***	-2.031 ***	-2.026 ***	-2.027 ***
	(0.290)	(0.289)	(0.289)	(0.289)
Recovery	-0.003			-0.003
	(0.007)			(0.007)
Recovery * Size	0.022			-0.001
	(0.025)			(0.027)
Recovery * Non. FC		-0.003		
		(0.007)		
Recovery * Non. FC * Size		-0.006		
		(0.027)		
Recovery * FC			-0.003	0.000
			(0.019)	(0.021)
Recovery * FC * Size			0.132 **	0.132 **
			(0.047)	(0.055)
N	15120	15120	15120	15120
R^2	0.22	0.22	0.22	0.22

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Table 7. External Finance and Recoveries from Recessions Associated with Equity Price Collapses

	(1)	(2)	(3)	(4)
Lagged Share	-2.029 ***	-2.027 ***	-2.030 ***	-2.029 ***
	(0.291)	(0.290)	(0.291)	(0.291)
Recovery	0.002			0.002
	(0.005)			(0.007)
Recovery * External Finance	-0.016 *			-0.014
	(0.009)			(0.010)
Recovery * Non. FC		0.003		
		(0.007)		
Recovery * Non. FC * External Finance		-0.012		
		(0.009)		
Recovery * FC			-0.002	-0.004
			(0.010)	(0.013)
Recovery * FC * External Finance			-0.016 *	-0.006
			(0.008)	(0.010)
N	15204	15204	15204	15204
R^2	0.22	0.22	0.22	0.22

Notes: Dependent variable is growth in real value-added. "EC" stands for equity price collapse episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Table 8. External Finance and Recoveries with Stressed Credit Conditions

	(1)	(2)	(3)	(4)
Lagged Share	-2.029 ***	-2.027 ***	-2.308 ***	-2.307 ***
	(0.291)	(0.291)	(0.428)	(0.429)
Recovery	0.002			0.004
	(0.005)			(0.011)
Recovery * External Finance	-0.016 *			-0.005
	(0.009)			(0.012)
Recovery * Low spread		0.002		
		(0.008)		
Recovery * Low Spread * External Finance		0.000		
		(0.007)		
Recovery * High Spread			0.003	-0.001
			(0.012)	(0.016)
Recovery * High Spread * External Finance			-0.040 **	-0.036 **
			(0.017)	(0.015)
N	15204	15204	10383	10383
R^2	0.22	0.14	0.20	0.20

Notes: Dependent variable is growth in real value-added. "High Spread" stands for episodes that feature corporate spreads that were higher than the median. "Low spread" instead stands for all other episodes

Robust standard errors, clustered at the country level, are reported in parentheses.

***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.

All specifications above include country, industry, time, country-industry and industry-time fixed effects

Appendix

The Appendix for this paper consists of three Tables: A1 through A3. Tables 1 and 2 list out the identified recessions based on quarterly data, as well as using annual data. Identified recessions associated with financial crises, equity price collapses or those that featured recoveries with high corporate spreads are also denoted in these tables. Table A3 presents results based on an estimation of equations (1) and (2) using recessions identified using annual data.

Table A1. Identified Recessions

Australia	1971, 1975, 1977, <u>1982-83*</u>, **1990***
Austria	1975, 1980*, 1982, 1984
Belgium	1975, 1977*, <u>1981,</u> 1982, 2001-02*
Canada	<u>1980, 1981-82,</u> 1990
Denmark	<u>1974-75,</u> 1980-81, **1987***
Finland	1975, <u>1977*,</u> 1981*, **<u>1990-92</u>**, 2001
France	1974, 1980*, **1992-93**, 2003
Germany	2003-04
Greece	1974, 1977, 1980-81, 1982-83, 1990, 1992*
Ireland	1983, 1986
Italy	<u>1975,</u> 1977, <u>1982*,</u> **1992-93**, 1996*, 2001, 2003-04
Japan	**1993, <u>1997-98</u>**, 2001
Netherlands	<u>1973,</u> 1974, 1977, 1980*, 1982*
New Zealand	1973, 1975, <u>1977,</u> 1979-80, 1982, 1985, **<u>1987*</u>**
Norway	1980, **1988**
Portugal	1974-75, 1983-84, 1992-93*, 2002*
Spain	1975, **<u>1978*,</u>** 1981, 1992-93
Sweden	<u>1976,</u> 1980*, **<u>1990-92</u>**
Switzerland	
United Kingdom	**<u>1973,</u>** 1975, <u>1979*,</u> **1990-91***
United States	<u>1974,</u> 1980*, 1982*, 1990, 2001

Notes: Entries denote years where the economy was in recession. Note that the entries do not represent the entire set of identified recessions, but only those for which industry-level data were also available. Distinct recessions in two adjoining years are denoted as separate entries, while recessions that lasted more than one year are denoted with dashes. Years in bold are recessions associated with financial crises. Underlined years are recessions that featured large drops in equity prices. Years with asterisks are recessions that featured recoveries with high corporate bond spreads.

Table A2. Identified Recessions Based on Annual Data

Australia	1982-83, **1990**
Austria	1975, 1978, 1981
Belgium	1981
Canada	1982, 1991
Denmark	1974-75, 1980-81, **1987**
Finland	**1991-92**
France	1975, **1993**
Germany	2003
Greece	1974, 1981-83, 1987
Ireland	1983, 1986
Italy	1975, **1993**
Japan	1974, **1998**
Netherlands	1975, 1981-82
New Zealand	1975, 1977-78, 1991
Norway	**1988**
Portugal	1975, 1983-84, 1993, 2003
Spain	1981, 1993
Sweden	1977, 1981, **1991-92**
Switzerland	
United Kingdom	**1973,** 1975, 1980-81, **1991**
United States	1974-75, 1980, 1982, 1991

Notes: Entries denote years where the economy was in recession. Note that the entries do not represent the entire set of identified recessions, but only those for which industry-level data were also available. Years in bold are recessions associated with financial crises.

Table A3. External Finance and Recoveries from Recessions Associated with Financial Crises: Using Annual GDP Data

	(1)	(2)	(3)	(4)
Lagged Share	-2.024 ***	-2.030 ***	-2.021 ***	-2.022 ***
	(0.291)	(0.290)	(0.292)	(0.291)
Recovery	0.023 **			0.019 **
	(0.009)			(0.009)
Recovery * External Finance	-0.014			0.010
	(0.011)			(0.013)
Recovery * Non. FC		-0.005		
		(0.005)		
Recovery * Non. FC * External Finance		-0.012		
		(0.008)		
Recovery * FC			0.033	0.016
			(0.021)	(0.023)
Recovery * FC * External Finance			-0.028 **	0.019
			(0.012)	(0.017)
N	15204	15204	15204	15204
R^2	0.22	0.22	0.22	0.22

Notes: Dependent variable is growth in real value-added. "FC" stands for financial crisis episodes.

Robust standard errors, clustered at the country level, are reported in parentheses.
***, ** and * refer to significance at the 1, 5, and 10 percent level, respectively.
All specifications above include country, industry, time, country-industry and industry-time fixed effects