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Evidence from the United Kingdom, 1750-1938

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The Macroeconomic Effects of Banking Crises: Evidence from the United Kingdom, 1750-1938*

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Abstract

This paper investigates the macroeconomic effects of UK banking crises over the period 1750 to 1938. We construct a new annual banking crisis series using bank failure rate data, which suggests that the incidence of banking crises was every 32 years. Using our new series and a narrative approach to identify exogenous banking crises, we find that industrial production contracts by 8.2 per cent in the year following a crisis. This finding is robust to a battery of checks, including different VAR specifications, different thresholds for the crisis indicator, and the use of a capital-weighted bank failure rate.

JEL: E32, E44, G21, N13, N14, N23, N24.

Keywords: Banking crisis, bank failures, narrative approach, macroeconomy, United Kingdom

* For help and comments, we thank Marco Molteni and Robin Adams.

1. Introduction

The distant memory of banking crises and the Great Moderation meant that from the 1980s the economics profession became less concerned about banking crises and economic downturns. This temporary amnesia dissipated when the 2008 Global Financial Crisis reignited the interest of the profession in the banking crises of the past and their economic consequences. This paper attempts to further this interest by assessing the macroeconomic effects of banking crises in the UK over the period 1750 to 1938.

However, there are at least two difficulties researchers face if they want to investigate the effects of past banking crises on the economy (Jalil, 2015). First, banking crises are very difficult events to define, identify and measure. As a result, there is little correspondence between existing indices of banking crises for the UK. As an illustrative example, over the period 1870 to 1914, Schularick and Taylor (2012) identify a banking crisis in 1873 and 1890, Reinhart and Rogoff (2009) classify crises in 1878, 1890 and 1914, Turner (2014) identifies a nonmajor crisis in 1878, and Grossman (2010) identifies crises in 1878, 1890 and 1914. According to Bordo and Meissner (2016), this "classification uncertainty" results in a potentially wide range of estimates of output losses. Thus, this classification uncertainty not only influences our understanding of the incidence of banking crises, but it introduces measurement error into estimates of the effect of banking crises on the macroeconomy. A major motivation of this paper, therefore, is to chronicle carefully the incidence of British banking crises using a new quantitative approach which uses bank failure data.

The second difficulty which researchers must overcome is to disentangle the causal effect to determine whether banking crises affect the macroeconomy or vice versa. We utilize a narrative methodology to distinguish between banking crises which contemporaries attributed to output shocks and those which were identified as being caused by other factors. This narrative approach has been used by Jalil (2015) in the case of US banking panics and by Cloyne (2013), Ramey (2011), Ramey and Zubairy (2017), and Romer and Romer (2004, 2010) in studies of fiscal and monetary policy.

A study of the macroeconomic effects of UK banking crises is interesting for several reasons. Firstly, unlike the US banking system with its episodic panics, the UK system is renowned for its stability. Secondly, unlike the United States, the UK has had a central bank which acted as a lender of resort for a large part of its banking history (Capie, 2014). It will therefore be interesting to see if the effect of banking crises on the macroeconomy is moderated by this institutional difference. Thirdly, during the period we study, the UK banking system changed from one dominated by small unit banks to one dominated by large branch banks (Turner, 2014). Again, it will be interesting to observe the effect of this structural change upon the frequency of banking crises.

The first thing we do is construct, for each year from 1750 to 1938, the population of banks in the UK and ascertain which banks exited the bank population because of liquidation, suspension, or failure. We then define a banking crisis as the failure of 3 per cent of the banking population. Using this definition gives us banking crises in 1772, 1815-6, 1825-6, 1841, 1866, and 1929-30. We then take this new banking crisis series for the UK and use a VAR methodology to see if banking crises led to declines in industrial production.

In our baseline model, we find that industrial production declines by 8.1 per cent in the year following a banking crisis, but there is no effect beyond a year. We also find that banking crises have a lesser effect on the service sector, but little effect on the agricultural sector. In sum, our baseline model reveals that in the year after a banking crisis, real GDP contracts by 3.3 per cent.

The next step we take in the paper is to use a narrative approach to identify exogenous and endogenous banking crises. We use newspapers to help us understand the perceptions of

contemporaries as regards the nature of each of the six crises. Our evidence suggests that the crises of 1772, 1825-6 and 1866 were exogenous, whilst those of 1815-6, 1841 and 1929-30 were endogenous. Using this identification strategy, we find that the causal effect of banking crises upon industrial production is -8.2 per cent, which is similar to our baseline estimate.

The final step we take in the paper is to subject our findings to a battery of robustness checks. To begin with, we ensure that our results are not being driven by how we define and construct our new indicator of banking crises. First, we test if our results are robust to using a lower (2 per cent) and higher (4 per cent) threshold of bank failures to define a crisis. The response of industrial output to banking crises is reduced (increased) when the lower (higher) threshold is used. Second, we exclude London-based banks which operated in the UK's colonies. This results in 1866 dropping out of our banking crisis series. As a result, the effect of banking crises on industrial output is slightly higher than our baseline estimate. Third, because bank size differed so much across British banks, we construct a capital-weighted indicator. This sees 1772, 1841 and 1929-30 drop out of the crisis series, but the results from our baseline model are unaffected. We also ensure that our results are robust to different VAR specifications and the inclusion of control variables.

This paper augments the extant literature on the frequency and measurement of financial crises (Bordo et al., 2001, 2003; Campbell et al., 2016; Reinhart and Rogoff, 2009; Schularick and Taylor, 2012; Taylor, 2012; Turner, 2014). It does so by developing a new indicator of banking crises based on bank failure rates for the UK. Our findings suggest that the extant literature overestimates the incidence of UK financial crises, but appears to overlook some important episodes, such as 1841.

We also augment the literature on the effects of banking crises on the real economy (Bernanke, 1983; da Rocha and Solomou, 2015; Dell'Ariccia et al., 2008; Demirgüç-Kunt et al., 2006; Friedman and Schwartz, 1963; Hoggarth et al., 2002; Jalil, 2015; Laeven, 2011; Laeven and Valencia, 2010). Our contribution is to go back much further than any previous study to examine the effect of banking crises on the real economy. In addition, as well as analyzing the effects on industrial output, we explore the effects of crises on the agricultural and service sectors. The study which our paper is most closely related to is Jalil's (2015) study of the United States. Although our study extends over a longer period of time, we find a much lower incidence of banking crises. However, the effect of UK crises on industrial output is surprisingly similar to what Jalil (2015) finds for the United States.

Our paper is structured as follows. Section 2 develops and discusses our new UK banking crisis series. Section 3 takes this new series and examines the effect of UK banking crises on the real economy. Section 4 subjects our baseline results to a battery of robustness checks. Section 5 contains a brief conclusion.

2. The New UK Banking Crisis Series

A. Definition

Defining banking crises is problematic. The standard way in the literature of assessing whether a banking crisis has occurred is to use a qualitative approach and read the secondary literature relating to the historical development of the banking system concerned. Scholars have a definition in mind when they read the secondary literature looking for crises. For example, Reinhart and Rogoff (2009, p.10) define a banking crisis as being made manifest by one of two events: (1) banks runs that lead to closure, merging or government takeover of one or more financial institutions or (2) the closure, merging, takeover, or government assistance of an important financial institution or group of institutions.

This approach is problematic because the definition used by Reinhart and Rogoff (2009) has two flaws. First, their definition implies that a bank failure in and of itself constitutes a

banking crisis. However, the failure of one bank or a small number of banks may not have been perceived as a crisis by contemporaries and may actually make the banking system more stable by removing imprudent banks (Calomiris and Kahn, 1991). Indeed, such may have been the case in the UK system in the nineteenth century (Baker and Collins, 1999). In addition, including institutions which are not commercial banks (e.g., investment banks) in the definition of banking crises is unhelpful in an historical context, because they were not involved in either the money supply (via deposits) or credit intermediation (Turner, 2014). Different scholars use different definitions depending on the focus of their study and can therefore end up with different chronologies depending on their definitions.

The qualitative approach can also be problematic if the breadth of the secondary literature is not carefully read and processed. Schularick and Taylor (2012), for example, is based, among others, on Reinhart and Rogoff (2009), which itself is based on Conant (1915). Written over a century ago, this book is a broad history of banks of issue, spanning thousands of years in time and dozens of countries in space, from Babylon to Britain. In light of this, there is much scope to revisit the history of British banking crises.

One example of a new approach to identifying banking crises is that of Turner (2014), who uses bank share prices as an indicator of UK banking crises. Although this overcomes the drawbacks with the qualitative approach to defining banking crises, it is only of use after 1826, when there are banks listed on stock exchanges. In addition, this indicator ignores non-listed partnership banks, who were in the majority until the 1850s and who were still playing an important role until the early twentieth century.

Another example of a new approach in identifying banking crises is Jalil (2015), which defines a banking crisis as a cluster of 3 bank runs and suspensions. Similar to Jalil (2015), we focus on banks and ignore stock market and currency crises. However, we focus solely on bank failures and suspensions. We do so because with bank failures and suspensions there is a disruption of the payments system and a reduction in production because viable projects are liquidated (Diamond and Dybvig, 1983). In addition, bank failures will increase the asymmetry of information faced by banks, with the result that the cost of credit will increase and credit rationing occurs (Bernanke, 1983; Mishkin, 1991). We define a banking crisis as a cluster of bank failures and suspensions representing 3 *per cent of the population*. Normalizing by the population is important as the number of banks in the UK fluctuated widely during the two centuries in our sample (Bond, 2016). 3 per cent corresponds to 1.65 standard deviations above the mean failure rate (rounded to the nearest per cent), which is the 5 per cent one-tailed significance level. In section 4, where we conduct a battery of robustness checks, we show that our results are robust to increasing or decreasing this threshold level.

B. Construction

The two primary data objectives were (1) to determine the total population of banks that existed in the UK each year over the period 1750 to 1938 and (2) to identify those exits from the population which were the direct result of failure or suspension.

A number of sources were drawn upon to construct the new series. Following the work of Bond (2016), whose study focused on the British banking population between 1790 and 1982, the *Banking Almanac* was the principal reference which formed the basis of our series. The *Banking Almanac*, first published in 1845, was described in its first edition as a "Digest of Banking and Commercial Law." Released as an annual volume, it provided contemporary bankers with relevant articles on finance, while also including extensive information on bank developments across the United Kingdom. In a format that varied from year to year, the *Banking Directory* section listed all joint-stock banks and private banks resident in the UK, including an alphabetical list of every location in the UK where there was a bank operating.

This data was later collated in *Almanac Registers*, which included them amongst all registered international banks, ordering them alphabetically. It was therefore first necessary to separate all individual UK banks from the global list provided in the *Almanac Register* (2009). This source was examined for all banks which were listed as having resided in the "UK," "Ireland" and "Northern Ireland" over the entire period. Though listings were also reported for both the Channel Islands and the Isle of Man, they are excluded on the grounds that they are crown dependencies and never formed part of the United Kingdom. Every bank which existed in Ireland during the period 1800-1921 is included in the population, while the Northern Irish banks remain in the sample from 1922.

Most importantly for this work, the *Almanac Register* (2009) provides the name of each bank, its date of establishment and closure, as well as the type of closure. In theory, such a source alone should prove sufficient to construct the required population and failure series, provided a reliable closing stock existed which would represent those banks that did not experience an event (and therefore would never appear in the source). However, it became apparent that the source needed to be complemented with additional information to construct a complete series.[1]

One shortcoming of the *Almanac Register* was that a number of listings contained no entries for start or end dates. We overcome these omissions by employing additional sources to fill in the blanks. For the case of England and Wales, these supplementary sources were Dawes and Ward-Perkins (2001), Gilbart (1860) and Price (1890). In the case of Ireland, Barrow (1975), Hall (1949) and O'Kelly (1959) were used and for Scotland, we used Checkland (1975) and Gilbart (1860). Not only were these additional sources used to correct for omissions, they were also employed to crosscheck all existing entries from the *Almanac Register*.

The crosschecking process was crucial in eliminating another recurring problem with the principal source; namely that of significant duplication. The issue manifested itself in the *Almanac Register* primarily through the erroneous recording as separate banks of (1) the same bank with multiple variations on the name and (2) partnership changes where new names appeared on the same banking business. However, perhaps the most common form of duplication represented those entries where banks that had changed the name of partnership on more than one occasion maintained the original date of the first partnership as their date of establishment. In such an instance, every new name change would erroneously represent a newly-added bank with a date of establishment recorded at the earliest point in time of the original partnership's existence. These forms of duplication were eliminated through an additional process of reconciliation and crosschecking, using the above supplementary sources.

After the data was treated in the manner described, the next step was to identify failures from the new population. The Almanac Register provides an array of events from "failed", "suspended payment" and "bankrupt" to "name changed", "acquired" and "merged". In order to separate failures from other types of event, we classify a failure as an event that reduces banking capacity. While other events, such as mergers, reduce the number of banks, the capacity of the banking system is unchanged. Where evidence exists in the supplementary sources that a difficulty had preceded a takeover or merger, a failure is deemed to have occurred.

The closing stock of our bank population in 1938 is taken from the *Banking Almanac* volume of 1939. This was a necessary crosscheck as those banks in existence which had not experienced an event would otherwise not appear in the bank population.

[1] In our treatment of the data, we closely mirror the methods employed by Bond (2016).

The new series which results from all of the above procedures are based upon the collection of the lifespans of almost 2,500 banks which existed in the UK between 1750 and 1938.

C. The New Series

The new chronology of banking crises is shown in Table 1 and Figure 1. Between 1750 and 1938, there were six periods which meet our banking crisis criteria: 1772, 1815-6, 1825-6, 1841, 1866 and 1929-30. Appendix 1 provides a detailed description of each of these crises. Table 1 also lists the dates from the leading chronologies of Reinhart and Rogoff (2009), Schularick and Taylor (2012) and Turner (2014). It shows that while some of the crises identified in the new series are well-established, such as those that began in 1815, 1825 and 1866, there also some surprises that offer fresh insights into the history of banking crises in the United Kingdom.

<<INSERT TABLE 1 AND FIGURE 1 HERE>>

Firstly, there has been debate as to whether there was a banking crisis in the UK during the Great Depression, with the majority opinion being that one did not occur (Billings and Capie, 2011; Grossman, 1994). Neither Reinhart and Rogoff (2009), Schularick and Taylor (2012), nor Turner (2014) identify a crisis in this period. Bernanke and James (1991), in their study of international crises in the interwar period, classify the UK as having a banking crisis in 1931. Our new series, however, suggests that there was a banking crisis in the interwar period, but that it occurred in 1929 and 1930. The reason why most previous scholars have overlooked this is that the "Big 5" major commercial banks were largely unaffected by the stresses of the Great Depression era. Our series, however, suggests that more than 3 per cent of the population of banks failed in both 1929 and 1930. Secondly, our series highlights 1841 as having a banking crisis. Although previous studies have not identified 1841 as having a banking crisis, they have highlighted the difficulties experienced by the banking system in 1837-9 (Reinhart and Rogoff, 2009; Turner, 2014). Notably, Bordo et al. (2003) in their index of UK financial conditions classify 1841 as having severe distress.

Thirdly, there are a number of episodes that have been extensively covered in the extant literature, but were not associated with a critical mass of bank failures, e.g., 1810, 1837, 1847, 1857, 1873, 1878, 1890, and 1914. On average, only 1 per cent of banks failed in these crises. Notably, Turner (2014) does not classify two of these as crises (1810 and 1890) and the other four he classifies as nonmajor crises. In the next section, we show that resolving these inconsistencies is crucial to measuring the macroeconomic effects of banking crises.

Fourthly, the new series suggests that crises occurred less often than has been previously understood. Between 1750 and 1938, banking crises occurred at a rate of 1 every 32 years. It is possible to analyze the frequency by sub-sample so that it is comparable to existing chronologies. For the period 1800 to 1938, the frequency was 28 years, which is about half as frequent as the corresponding figure from Reinhart and Rogoff (2009) of 14 years and is slightly higher than Turner's (2014) figure of 23 years. Notably, for the period 1825 to 1914, the frequency was 30 years, which is much less frequent than the corresponding figure for the United States of 13 years (Jalil, 2015). Thus, crises in Britain were more sporadic relative to both the existing literature and to the United States prior to the founding of the Federal Reserve. By the time Walter Bagehot had published *Lombard Street* in 1873, it was commonly accepted that the Bank of England would act as a lender of last resort during a crisis. In addition, by this date, the structure of the UK banking system had moved from one dominated by small unit banks to one increasingly dominated by large branched banks (Capie, 2014; Capie and Rodrik-Bali, 1982; Goodhart, 1988; Turner, 2014). It is therefore noteworthy that the incidence of crises is much greater in the period 1750-1866 than afterwards.

3. The Macroeconomic Effects of Banking Crises

A. The Baseline

The next step is to investigate the macroeconomic effects of banking crises based on the new series. It is important to bear in mind that it is possible that not only did banking crises affect the macroeconomy but also that the macroeconomy affected banking crises. If the latter mechanism *was* at play, then simple single equation OLS estimates will be biased. In order to deal with any potential endogeneity, the macroeconomic effects of banking crises are estimated using the following vector autoregression (VAR):

$$\mathbf{x}_t = \mathbf{A}_0 + \sum_{i=1}^{P} \mathbf{A}_i \mathbf{x}_{t-i} + \mathbf{u}_t \tag{1}$$

where $\mathbf{x}_t = (\Delta y_t, PANIC_t)'$. Δy_t is the percentage change in industrial production. Industrial production is the preferred measure of output in order to facilitate comparison with Jalil's (2015) results for the United States. We obtain our UK industrial production data from Thomas and Dimsdale (2017), which is based on Broadberry et al. (2015), Feinstein (1972) and Sefton and Weale (1995). In the next sub-section, we show that the results are robust to using broader measures of output. $PANIC_t$ is our new series of banking crises that takes on the value of 1 in the first year of the crisis, as in Jalil (2015), and zero otherwise.

The number of lags in the model is set to $P = 3$. A Choleski decomposition is used to identify the shocks with the order following that in $\mathbf{x}_t$. This assumes that the macroeconomy has a contemporaneous effect on banking crises, but that banking crises do not have a contemporaneous effect on the macroeconomy. Section 4 shows that the results are robust to these assumptions and a range of other permutations of the model. The sample runs from 1750 to 1938.

The main results of the paper are presented in Figure 2. The upper panel shows the estimated percentage response of output to a unit shock in the panic variable. The shaded area spans the 95 per cent confidence interval, based on asymptotic standard errors. The results suggest that banking crises were significantly contractionary in an economic and statistical sense. In the year following a banking crisis, output fell by 8.1 percentage points (t=-3.7), before returning close to zero thereafter. Furthermore, the p-value for the test of the null hypothesis that crises did not Granger-cause output is 0.00, suggesting that, in this narrow sense, crises had a causal impact on the macroeconomy.

<<INSERT FIGURE 2 HERE>>

The lower panel plots the response of the crisis variable to a unit innovation in itself. As expected, the response is 1 on impact, but then completely dissipates thereafter. The p-value for the test of the null hypothesis that output did not Granger-cause crises is 0.64, which alleviates some of the endogeneity concerns because it suggests that crises were not associated with past fluctuations in output.

The depressive effect of banking crises was not lost on contemporaries. Following the collapse of a bank during the 1815 crisis, for example, the *Hampshire Chronicle* (27 November 1815) noted that "this failure has led principally to a determination to shorten the number of hands employed there, and lower the wages of others. Upwards of 5000 men have been put out of employ; and a disturbed and riotous populace has become insubordinate in consequence." As the crisis entered its second year, the *Morning Chronicle* (19 July 1816) explained:

> We continue to receive the most distressing accounts of the state of business at Sunderland. The failure of Cooke and Co. has paralysed everything. Nearly the whole of

> the ship carpenters have been discharged, and several vessels have come round from Sunderland to Newcastle to load coals, which they cannot now procure at Sunderland. Credit is completely destroyed, for since the failure of the bank not a single bill has been paid. Never, perhaps, in any place before were the ruinous effects of a sudden deprivation of capital so strikingly exemplified. How to avert the total ruination of the town will be a consideration of the greatest difficulty.

Contemporaries had a similarly dim view of the 1825-6 crisis. The *Sussex Advertiser* (20 February 1826) wrote that "the mass of misery caused to the working class by the failure of a bank was incalculable." The *Hull Advertiser and Exchange Gazette* (16 December 1825) added:

> On Saturday and Monday a run of some magnitude was made upon the different banks in that place [Leeds]; and such was the panic for a time, that the most foolish occurrences were asserted to have taken place – cash transactions were deemed injudicious – the wages of a great number of work-people were left unpaid – and the business of shopkeepers was proceeded in with tardiness and doubt.

In the crisis of 1841, the *Hampshire Telegraph* (29 November 1841) noted that since the failure of a local bank, "a general gloom has pervaded the City of Chichester, from the ruin it has inflicted on many." The grave macroeconomic effects of banking crises are therefore supported by both quantitative and qualitative evidence.

B. Comparison to Extant Crises Series

A major motivation of our paper is that existing indicators of banking crises are inaccurate. Not only is this problematic in itself, but it also causes trouble in teasing out the effects of these events on the macroeconomy. This is because binary independent variables subject to measurement error lead to attenuation bias (Aigner, 1973). In other words, the estimates will be biased towards zero. In order to gauge the severity of this issue in existing series, we re-run equation (1) and replace $PANIC_t$ with Reinhart and Rogoff's (2009) series, which is closest to our own in terms of sample period. Unfortunately, it begins 50 years later so that the sample covered below is 1800 to 1938. However, all other factors have been held constant.

Panel A of Figure 3 plots the results for the baseline model for this truncated sample. While the dynamics are unchanged, the response is slightly larger, peaking at 8.6 percentage points (t=-3.4). Panel B shows the corresponding estimates for Reinhart and Rogoff's (2009) series. The results show that there is indeed a bias towards zero. In the year following a banking crisis, output declined by 3.3 percentage points (t=-1.8), but the effect is not statistically significant from zero at any horizon. This implies that there is a material degree of measurement error in the Reinhart and Rogoff (2009) chronology. The picture is the same if the Schularick and Taylor (2012) and Turner (2014) series are used. These results, therefore, justify the construction of a new indicator for the United Kingdom.

<<INSERT FIGURE 3 HERE>>

Figure 4 contextualizes the new results for the United Kingdom by comparing them to Jalil's (2015) results for the United States. All aspects of the two models are the same, except of course the underlying data. In order to facilitate comparison, the sample spans 1826 to 1915. As before, the solid line marks the baseline impulse response for the United Kingdom. The dashed line is the impulse response for the United States. The similarity is striking, with the biggest decline hitting after a year, which was -8.7 percentage points (t=-3.6) in the United Kingdom and -10.5 percentage points (t=-3.9) in the United States. In both cases, the impact of crises was not statistically significant from zero at horizons beyond a year. The results are

also in line with da Rocha and Solomou's (2015) study for a panel of 24 economies in the interwar period. The local projections estimates show that industrial production declined by up to -10.4 percentage points following banking crises. The evidence therefore suggests that banking crises, irrespective of time or space, have been associated with roughly double-digit output losses.

<<INSERT FIGURE 4 HERE>>

C. Output and the Transmission Mechanism

Our results show that banking crises have large contractionary effects on industrial production. An obvious extension is to investigate the response of agricultural and services output, as well the overall impact on real GDP. Using data on national output by sector, we therefore re-estimate equation (1), where $\mathbf{x}_t = (\Delta y_t^i, PANIC_t)'$ and Δy_t^i is the output of sector i.[2] As the sectoral data has gaps during the First World War, the sample only spans 1750 to 1913.

Figure 5 plots the results from this variant of the model. Panel A shows that banking crises had no discernible impact on the output of the agricultural sector as the estimated effect is not statistically different from zero at any horizon. Panel B shows, as we have already seen, that banking crises lead to great contractions in industrial production with a peak impact of -8.5 percentage points (t=-4.1). Panel C suggests that banking crises affected the service sector to a greater degree than agriculture, but to a lesser extent than industry, declining by a maximum of 3.5 percentage points (t=-3.0). The results indicate that the response of output to banking crises varied by sector.

<<INSERT FIGURE 5 HERE>>

Unsurprisingly, the impact on general economy activity is a composite of these sectoral effects. Figure 6 shows the impulse response of real GDP to banking crises where Δy_t is the percentage change in constant-border real GDP at factor cost.[3] In the wake of a crisis, real GDP declined by 3.3 percentage points (t=-2.5) after a year. Thus, banking crises were transmitted to the macroeconomy via the industrial sector and, to a lesser extent, the services sector.

<<INSERT FIGURE 6 HERE>>

D. Identification

While the results so far suggest that crises had a Granger causal impact on the macroeconomy, the next step is to tackle the identification issue more directly. An interesting solution in the context of time series has been the narrative approach, which has recently been applied to tax multipliers (Cloyne, 2013; Romer and Romer, 2010), government spending multipliers (Ramey, 2011; Ramey and Zubairy, 2017) and monetary policy (Cloyne and Hürtgen, 2016; Lennard, 2017; Romer and Romer, 2004), but can be traced back to the seminal contribution of Friedman and Schwartz (1963).

In this spirit, we apply the narrative approach, which was pioneered in the case of historical banking crises in the United States by Jalil (2015). The intuition is to use contemporary newspapers to disentangle exogenous crises, i.e., those that were not related to output shocks, from endogenous crises, i.e., those that were related to such shocks. This approach assumes that informed contemporaries could accurately identify the cause of a crisis.

[2] Sectoral data from Thomas and Dimsdale (2017) based on Broadberry et al. (2015) and Feinstein (1972) in Mitchell (1988).

[3] From Thomas and Dimsdale (2017) based on Andersson and Lennard (2017), Broadberry et al. (2015), Feinstein (1972) in Mitchell (1988), Geary and Stark (2004, 2015), Sefton and Weale (1995) and Solomou and Weale (1991).

In order to make the discussion more concrete, consider the following model:

$$\Delta y_t = \beta_0 + \beta_1 PANIC_t + \varepsilon_t \quad (2)$$

To consistently estimate β_1 it is necessary that $E(\varepsilon_t | PANIC_t) = 0$. However, this is unlikely to be the case as banking crises are not only a function of idiosyncratic shocks (x_t), but also the shocks that make up ε_t:

$$PANIC_t = x_t + f(\varepsilon_t) \quad (3)$$

Simply using $PANIC_t$ in its present state will clearly lead to inconsistent estimates of β_1 as equation (3) shows that $E(\varepsilon_t | PANIC_t) \neq 0$. However, isolating those crises in $PANIC_t$ that are determined by exogenous factors will lead to consistent estimates of β_1.

Exogenous crises are those that are not correlated with output shocks. This type of crisis might unfold for a number of reasons. First, a number of historical crises have been associated with bubbles (Reinhart and Rogoff, 2009, pp. 158-62), where asset prices appear to have been detached from fundamentals (Garber, 2000; Kindleberger and Aliber, 2011). Second, certain changes in bank regulation might trigger a crisis, yet would not affect the macroeconomy other than through the crisis itself. Third, the failure of a particular institution for idiosyncratic reasons such as fraud might lead to a systemic crisis, but would not be a function of the state of the economy.

To construct an exogenous series, the starting point is to identify the cause of each crisis from contemporary newspapers. The crises are then grouped, according to the cause, into endogenous and exogenous bins, from which $PANIC_t^N$ and $PANIC_t^X$ are constructed respectively. A variety of newspapers are included in the sample. This is because no publication is sufficient alone in terms of topic or period covered. For the sake of robustness, the reports of contemporaries are cross-referenced with subsequent Parliamentary enquiries and the historiography of UK banking. Appendix 1 details the sources and evidence used to construct the exogenous series.

The results show that half of the six crises were exogenous: 1772, 1825-6 and 1866, while the other half were endogenous: 1815-6, 1841 and 1929-30. The exogenous crises mainly stemmed from poor risk management, while the endogenous crises were largely due to depressions. The fact that half of the crises prior to the Second World War were exogenous challenges Aldcroft and Fearon's (1972, p. 95) argument that "the great financial crises of this era occur, almost without exception, after the downturn of the cycle."

Armed with the new exogenous series, we re-run equation (1), where $\mathbf{x}_t = (PANIC_t^X, \Delta y_t)'$. Note that the panic indicator is now ordered first due to the fact that, by construction, these crises were not contemporaneously affected by output growth. However, all other factors are the same as in the baseline specification. We continue with a VAR model, as opposed to local projections (Jordà, 2005), because of greater efficiency (Barnichon and Brownlees, 2016). Figure 7 shows the *causal* impact of banking crises on the macroeconomy. The results are virtually identical to the baseline estimates, peaking at -8.2 percentage points (*t*=-2.6) after one year.

<<INSERT FIGURE 7 HERE>>

4. Robustness

In this section, we put the baseline model through the mill, assessing the sensitivity of the results to variations of the crisis indicator, alternative VAR specifications and the addition of control variables.

A. The Crisis Indicator

There are, of course, alternative ways to construct the crisis indicator. One is an alternative threshold. The estimated impact of crises will not be invariant to this. A higher threshold is likely to raise the effect as only the most severe crises are retained, while a lower threshold is likely to reduce the impact as more mild episodes are included. Nonetheless, it is useful to gauge just how sensitive the response of output is to this choice. Figure 8 shows the results from indicators with a 2 per cent and 4 per cent failure threshold. The baseline results and associated confidence intervals are also plotted for reference. As expected, the response of output is reduced slightly when the threshold is 2 per cent, declining by 5.4 percentage points (t=-2.9) after a year. This is because the relatively minor episodes of 1812, 1820-1 and 1914 are included. Equally, the output response is magnified when the threshold is 4 per cent, dropping by up to 8.6 percentage points (t=-2.3). This is because only the most severe crises are included, those of 1815-6 and 1825-6. Nevertheless, irrespective of the threshold, the peak response of output following a banking crises remains economically and statistically significant.

<<INSERT FIGURE 8 HERE>>

A second alternative is an indicator that excludes foreign and colonial banks. These institutions, which flourished in the nineteenth century, were registered as companies in the United Kingdom, but conducted most of their business elsewhere (Turner, 2014, pp. 51-2). If there are crises in the sample which are driven by these institutions, the results are likely to be biased downwards as these episodes are unlikely to impact the domestic macroeconomy. In order to identify foreign and colonial banks in the sample, we refer to the annual editions of the *Bankers' Almanac* and the Banking Supplement of *The Economist*, which listed these institutions separately. The exclusion of foreign and colonial banks means that 1866 is no longer a crisis. It is not that this episode was driven solely by foreign and colonial banks, but that the failure of a few of these institutions was necessary to nudge the failure ratio over the 3 per cent threshold. Figure 9 plots the response of output to crises based on this alternative indicator. As expected, it shows that the impact is slightly larger, peaking at -8.2 percentage points (t=-3.4).

<<INSERT FIGURE 9 HERE>>

A third and final alternative is an indicator that is weighted to reflect the relative size of banks that fail. As a result, we weight banks by paid-up capital, which involves the collection of a great deal of data from primary and secondary sources. These sources are discussed in Appendix 2. For private banks, an average was calculated for the eighteenth, nineteenth and twentieth centuries based on a sample of balance sheets. These averages were centered, so that the observation for the eighteenth century was centered on 1750, the observation for the nineteenth century was centered on 1850, and so on, with the gaps being linearly interpolated. For joint-stock banks, these were identified using Gilbart (1860), Capie and Webber (1985) and the annual editions of the *Bankers' Almanac* and the Banking Supplement of *The Economist.* The paid-up capital for these banks was obtained from the editions of the *Bankers' Almanac* every fifth year and linearly interpolated between. Because banks changed their paid-up capital infrequently, there was ultimately little need for interpolation. In cases where the earliest observation for paid-up capital in the *Bankers' Almanac* was after the date of establishment, we collect capital at the date of establishment from other sources. If this was not possible, the earliest recorded growth rate for that bank is cast backwards. The same applies where the last observation was before the date that the bank exited the population. In the rare event that banks had no recorded capital, they take on the average of the other joint stock banks for that year. The end product is almost 100,000 non-zero bank-year observations.

Figure 10 shows the failure ratio weighted by paid-up capital, which identifies crises in 1815-6, 1825-6 and 1866, but not in 1772, 1841 or 1929-30. While the unweighted series suggests that the latter crises involved many banks, the weighted series implies that the institutions involved were relatively minor. In addition, as can be seen from Figure 10, the only year, which has not already been classified as crisis, that comes close to the 3 per cent threshold is 1857, but even it falls short. Figure 11 plots the response of output to crises based on the weighted indicator. The results show that the peak response is unchanged at 8.1 percentage points (t=-2.6).

<<INSERT FIGURE 10 AND 11 HERE>>

B. The VAR Specification

The results may be sensitive to the specification of the VAR. One possibility is the number of lags included in the model. In the baseline specification, 3 lags were included, which was in line with Jalil (2015). However, information criteria point to a shorter length (P=1). Figure 12, therefore, plots the impulse response of output growth to a banking crisis from a model with a single lag. The peak response is, in fact, larger at -8.5 percentage points (t=-3.9). For completeness, the results based on a model with 5 lags are also reported. Again, the results are not materially sensitive to the lag length, with a peak impact of -8.2 percentage points (t=-3.7).

<<INSERT FIGURE 12 HERE>>

Another possibility is that the results are sensitive to the timing assumption. Although our narrative analysis suggests than not all crises are contemporaneously exogenous, it is nonetheless standard practice in the literature to assume that they are. Indeed, Romer and Romer (2017) find that the response of output to crises is contingent on this impact effect. As a result, we re-estimate our baseline model where $\mathbf{x}_t = (PANIC_t, \Delta y_t)'$, which assumes that banking crises affect, but are not affected by, output contemporaneously. Figure 11 shows that output growth is positive on impact, before declining to the familiar territory of -8.4 percentage points (t=-3.9) after a year.

C. Control Variables

There are a number of factors that could have been correlated with banking crises and output growth. If this was the case, then omitting these factors will lead to inconsistent impulse response functions (Stock and Watson, 2001). While the original specification was intended to be simple, we now extend the model to include a range of control variables. In order to do so, we rotate in a control variable of interest, z_t, in a sequence of models so that $\mathbf{x}_t = (\Delta y_t, PANIC_t, z_t)'$. The data for the control variables was collected from Thomas and Dimsdale (2017).

The first set of control variables relate to stabilization policy. Monetary and fiscal policy are good candidates to be both correlated with banking crises and output growth. According to Dimsdale and Hotson (2014, p. 32), the Bank of England and HM Treasury were to blame for the crisis of 1825-6, while policy, even in the nineteenth century, had familiar macroeconomic effects (Lennard, 2017). The measure of monetary policy is Bank Rate, the rate at which the Bank of England lent to the banking system. Fiscal policy is captured by government revenue as a percentage of GDP, which can be thought of as an average tax rate, and government spending as a percentage of GDP.

Table 2 shows the estimated peak response of output growth to banking crises along with the associated t-statistic for a range of models. The first row shows the peak effect for the baseline specification for reference, while subsequent rows list the corresponding numbers for the various z_ts. Controlling for policy has mixed results. Including Bank Rate or government

spending marginally reduces the peak effect, while controlling for government revenue slightly raises it. Nonetheless, the effect of banking crises on output remains large and highly statistically significant.

<<INSERT TABLE 2 HERE>>

The next set of controls are general macroeconomic variables: CPI inflation and share price returns. It is reasonable to assume that these variables might be important. A banking crisis might well follow an asset price boom, for example, while a rise in asset prices might stimulate output growth through wealth effects. Nevertheless, controlling for these variables has little impact on the results, reducing the peak effect by just 0.1-0.2 percentage points relative to the baseline specification.

In order to gauge the robustness of the results, 12 additional variants of the model were estimated. The estimated peak impact ranged from -5.4 percentage points to -8.6 percentage points. The median, 8.2 percentage points, was slightly larger than the baseline of 8.1 percentage points. Therefore, irrespective of the specification, the aftermath of banking crises in the UK were associated with economically and statistically significant declines in output.

5. Conclusions

The contribution in this paper is twofold. First, we develop a new banking crisis series for the UK covering the period 1750-1939, using bank failure rates. We identify six crises – 1772, 1815-6, 1825-6, 1841, 1866 and 1929-30. For the sake of robustness, we also construct a capital-weighted failure rate series, which identifies 1815-6, 1825-6, and 1866 as crises. Both our series suggest a different chronology than that offered in the extant literature.

Second, we use our banking crisis series to understand the effect of banking crises on the real economy. In our baseline model, we find that in the year following a banking crisis, industrial production contracts by 8.1 per cent. Using a narrative methodology to identify exogenous and endogenous crises, we find that the effect of exogenous crises on industrial output is almost identical to the baseline model. Our findings are robust to using a capital-weighted bank failure series, exclusion of foreign and colonial banks, alternative failure thresholds, different VAR specifications, and the inclusion of control variables.

The principal lesson of our findings for policy-makers is that banking crises have substantial effects on the macroeconomy. The banking crisis of 2008 was the same as many of its predecessors in having an effect on the real economy. However, unlike its predecessors, the effect on the macroeconomy has been long-lasting; our results suggest that banking crises between 1750 and 1938 had no effect beyond the year after the crisis. This raises the interesting question as to why this is the case. In 2008, for the very first time, there was a wholesale bailout of the UK banking system, followed by contractionary fiscal policy. The unprecedented scale of the crisis and rescue effort meant that unlike its historical antecedents, 2008 had a long-lasting deleterious effect on the real economy.

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Table 1. *Comparison of Chronologies, 1750-1938*

New Series	*Reinhart and Rogoff (2009)*	*Schularick and Taylor (2012)*	*Turner (2014)*
1772			
	1810		
1815-6	1815-7		
1825-6	1825-6		1825-6
	1837-9		1836-7
1841			
	1847-8		1847
	1857		1857-8
1866	1866		1866
		1873	
	1878		1878-9
	1890	1890	
	1914		
1929-30			

Notes: Reinhart and Rogoff (2009) and Turner (2014) start in 1800. Schularick and Taylor (2012) start in 1870. Turner (2014) categorizes 1825-6 as a major crisis and all of the others as nonmajor or minor crises.

Table 2. Robustness to Adding Control Variables (percentage points)

Control Variable	*Peak Effect*
None	-8.1 (*t*=-3.7)
Bank Rate	-7.3 (*t*=-3.3)
Government revenue as a percentage of GDP	-8.5 (*t*=-4.0)
Government spending as a percentage of GDP	-8.0 (*t*=-3.7)
CPI inflation	-8.0 (*t*=-3.8)
Share price inflation	-7.9 (*t*=-4.0)

Source: Thomas and Dimsdale (2017).

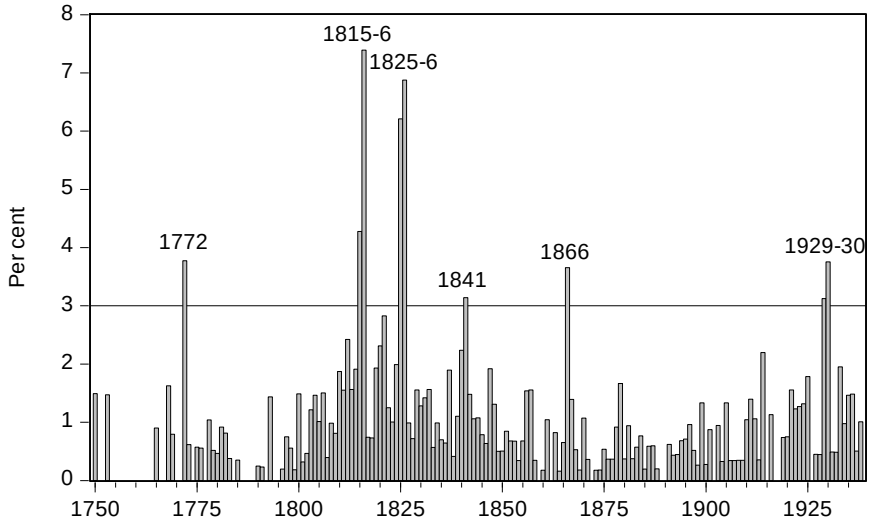

Figure 1. *Failure Ratio, 1750-1938*

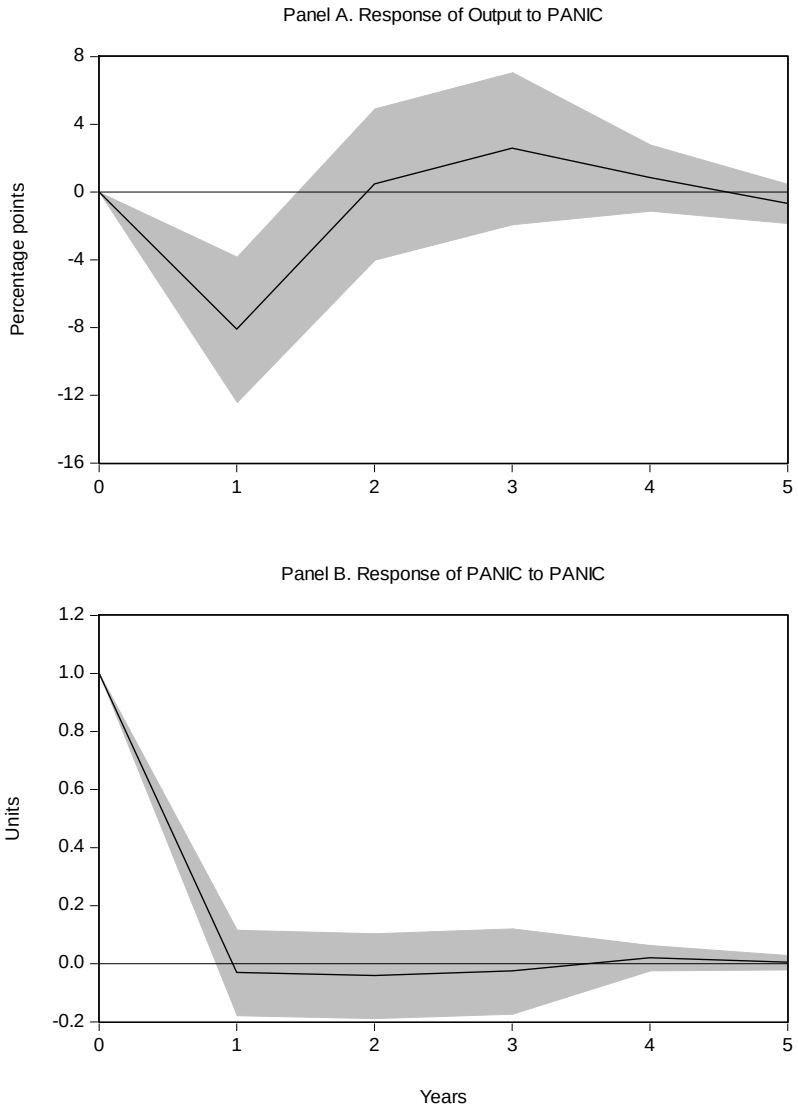

Figure 2. *Response of Output and PANIC to PANIC*
Notes: The sample period is 1750 to 1938.

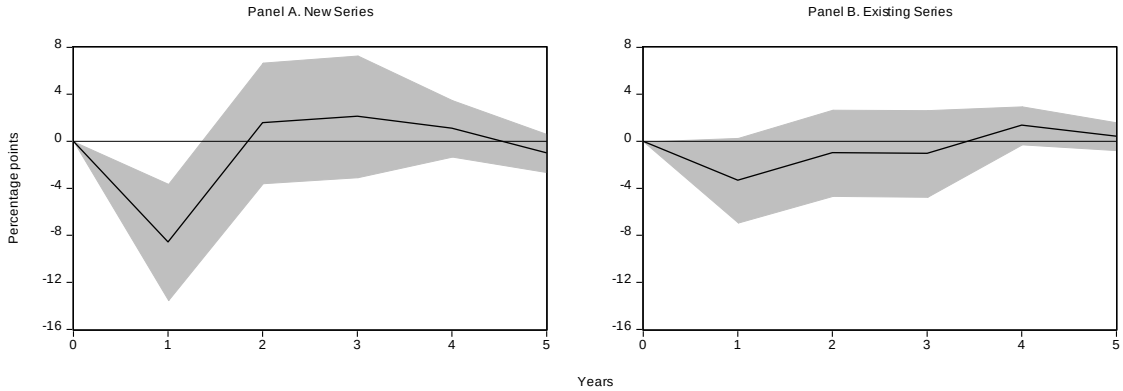

Figure 3. *Comparison of Response of Output to PANIC based on New and Existing Series*
Note: The sample period is 1800 to 1938.

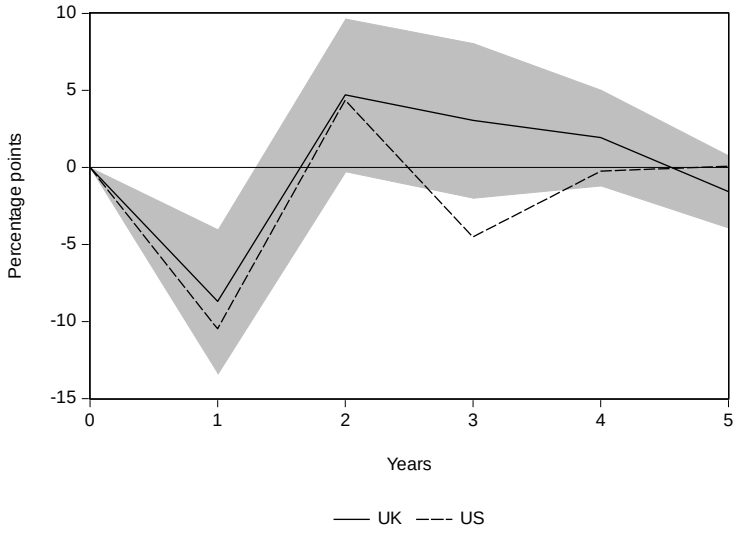

Figure 4. *Comparison of Response of Output to PANIC in UK and US*
Note: The sample period is 1826 to 1915.
Source: US data from Jalil (2015).

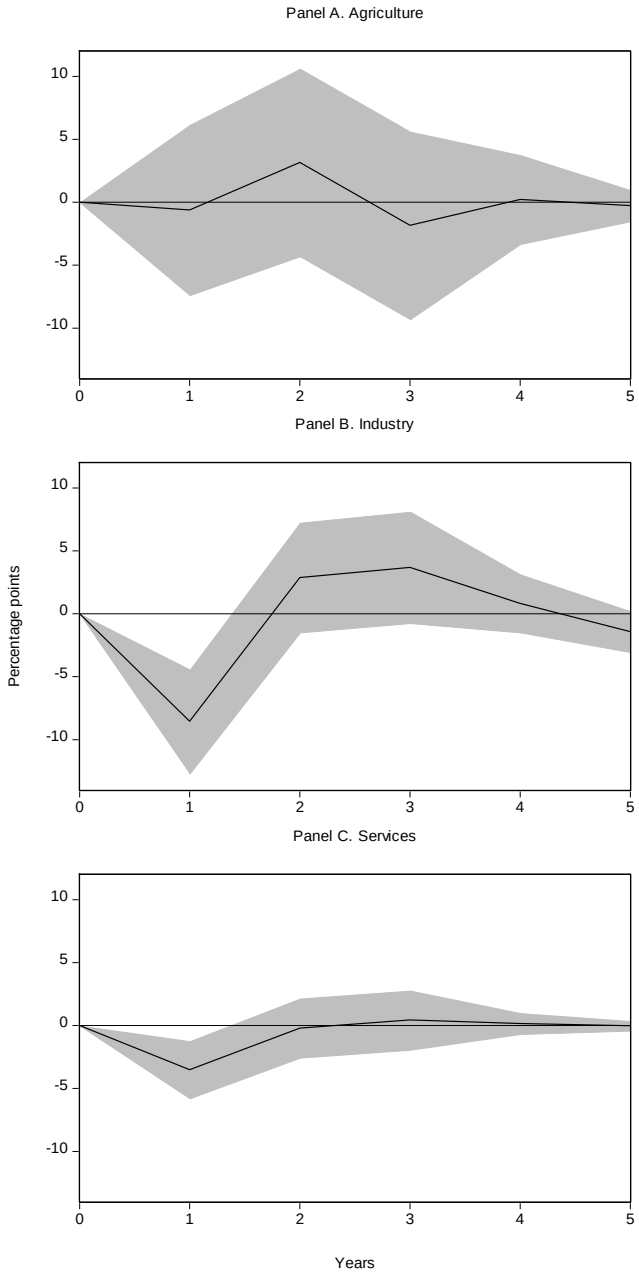

Figure 5. *Response of Sectoral Output to PANIC*
Note: The sample period is 1750 to 1913.

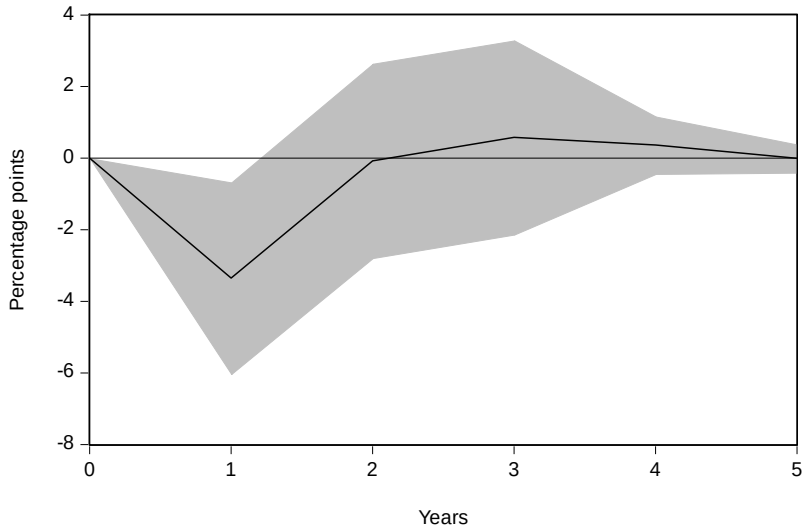

Figure 6. *Response of Real GDP to PANIC*
Note: The sample period is 1750 to 1938.

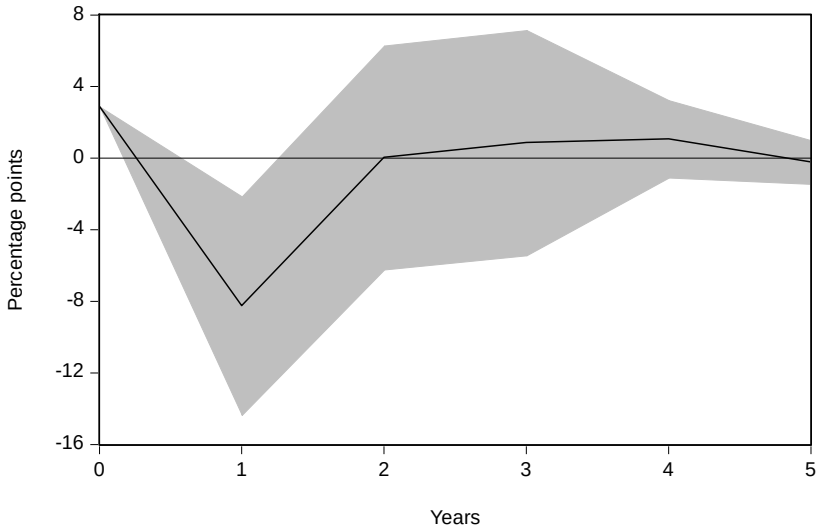

Figure 7. *Causal Response of Output to PANIC*
Note: The sample period is 1750 to 1938.

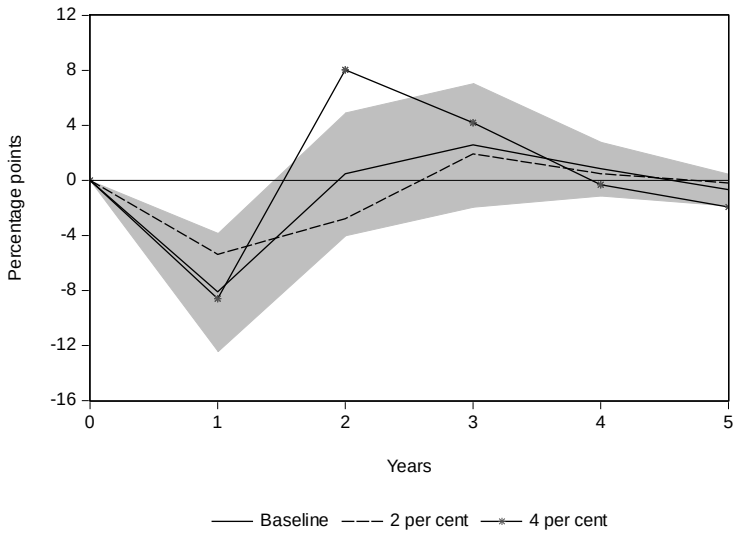

Figure 8. *Robustness to Alternative Thresholds*

Note: The sample period is 1750 to 1938.

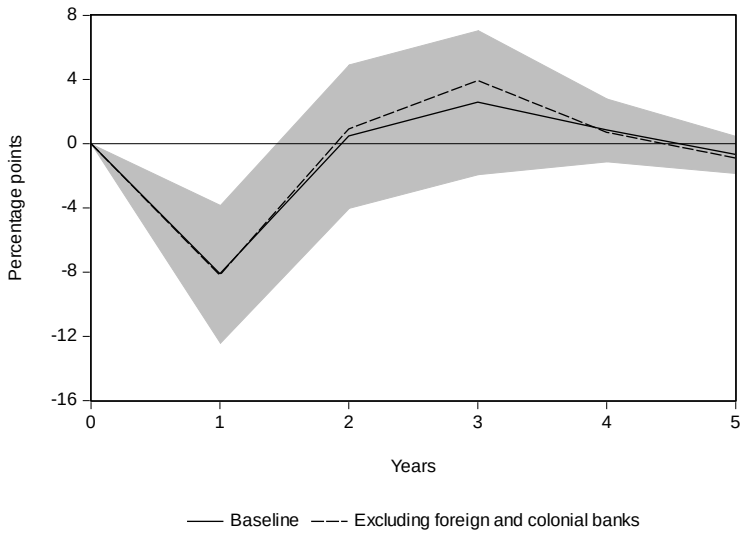

Figure 9. *Robustness to Excluding Foreign and Colonial Banks*
Note: The sample period is 1750 to 1938.

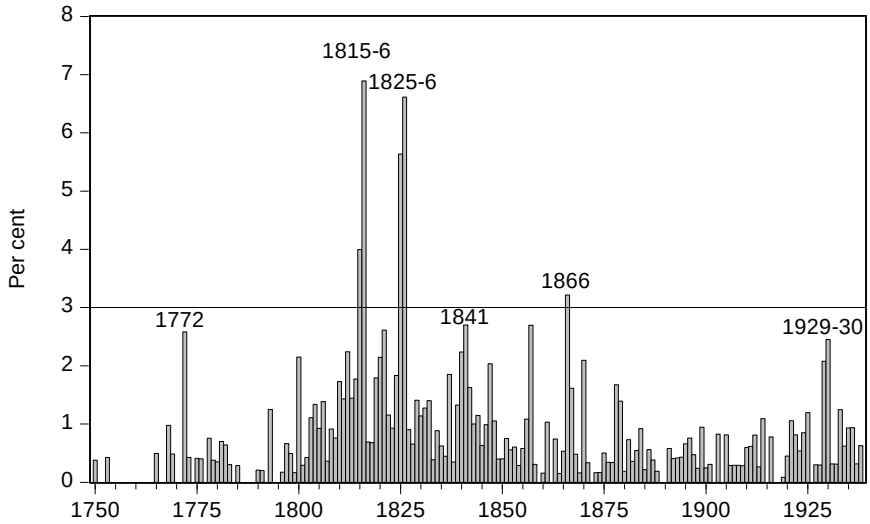

Figure 10. *Failure Ratio Weighted by Paid-up Capital, 1750-1938*

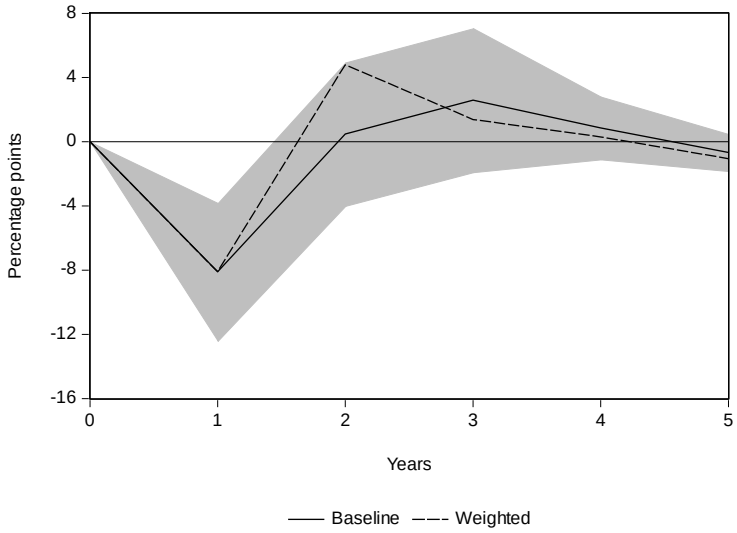

Figure 11. *Robustness to Weighting by Paid-up Capital*
Note: The sample period is 1750 to 1938.

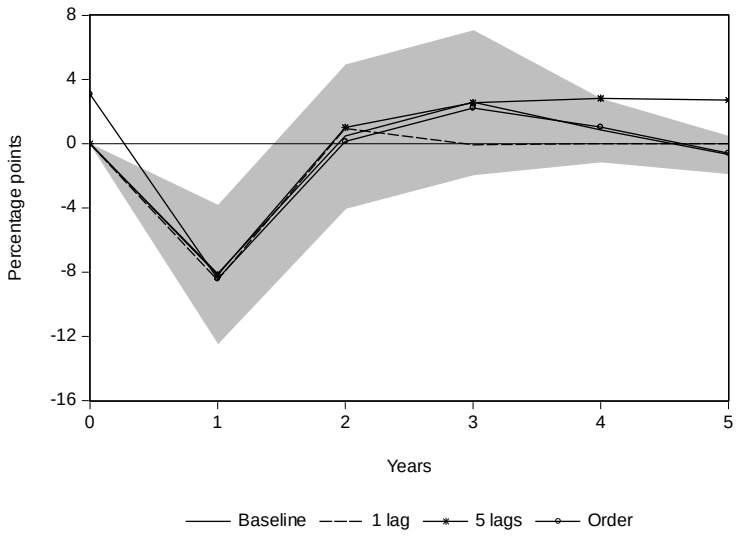

Figure 12. *Robustness to Alternative VAR Specifications*
Note: The sample period is 1750 to 1938.

Appendix 1. A Narrative Account of Banking Crises in the United Kingdom, 1750-1938

This Appendix discusses the classification approach we have adopted to identify whether a banking crisis was exogenous or endogenous in nature.

To be clear, an *exogenous banking crisis (X)* constitutes an event which occurs that is unrelated to wider macroeconomic activity. Examples include bank failures which were *preceded* by incidences of individual or widespread fraud in the banking sector, dubious lending/borrowing practices, abnormal bank leverage and poor reserve management. The eventual collapse of a portion of the banking system then may *cause* a downturn in macroeconomic activity, though this is not specifically assumed. With *endogenous banking crises (N)* on the other hand, causality lies in the opposite direction. Typically, this category of banking crisis occurs following a depression, a fall in the price level or the failure of a local non-bank firm(s) against which a bank is heavily exposed. For example, banks' customers may find it impossible to repay loans in the event of a sudden decline in demand and suffer a reduction in selling prices, which in turn *causes* their banks to fail.

We restrict ourselves to two subcategories of each classification which encapsulate all of the above descriptions and more which are outlined in Table A1. Where crises display more than one subcategory, they are coded as such.

Table A1. The Classification of Banking Crises

Group	*Sub Category*	*Explanations and Examples*
Endogenous (N)	*Depression (D)*	*Macroeconomic Conditions* Local (national) firm failures (or struggling sectors) may lead to unpaid bank loans which in turn could trigger a run on local (national) bank(s). A reduction in domestic/international demand leads to struggling firms. Banks (or the banking system) which have lent to these firms may suffer a loss of confidence and a run. If lower selling prices are necessary as a result of subdued demand, costs are cut leading to higher unemployment. This in turn might cause unrest and a run on the banks and the further falls in prices will make it increasingly difficult for firms to repay loans at original nominal value. Deflation is usually observable during such depressions as the combined outcome of sellers attempting to attract buyers and a contraction in currency.

	Government Policy (P)	*Government policy that leads to a deterioration of macroeconomic conditions and/or deflation-* The process is initiated by the authorities (the Treasury and/or the Bank of England) who directly affect macroeconomic conditions in order to bring about a policy objective. Examples may include higher taxes and lower spending by the government, which will under certain conditions lead to a fall in the price level and activity. Increases in bank rate to adjust, for example, for a balance of payments deficit will tend to depress the price level. The effects of these actions on firms, activity and prices result in the same pressure on banks as outlined in D.
Exogenous (X)	*Fraud (F)*	*Fraudulent Activity by Bank(s)* Expropriation of funds by directors of bank(s) Misleading customers in types/concentration of investments. This may include investing deposits in the stock market while claiming that they were invested in assets which are perceived as safer such as government stock. Forged documents, audits and accounts. When fraud becomes public knowledge, a panic can be triggered which can be limited to that institution or can spread to the wider banking system.
	Risk Management (R)	*Poor Risk Management by Bank(s)* Extreme leverage (asset to capital ratios) where aggressive investment and lending practices are pursued without sufficient capital to absorb even a minor downturn. Poor liquidity management also exposes a bank to failure in the event of a run, if insufficient reserves are maintained against liabilities such as deposits or notes. Risk shifting an ever greater portion of bank assets into riskier investments which offer a potentially better return. Excessive concentration in one sector. Increases in proportions of non-core liabilities (borrowing) with shorter term maturities to fund longer term investments, exceeding maturity mismatch safety thresholds.

		Insufficient due diligence on the quality/safety of new investments and the portions thereof on balance sheets.

Similar to Jalil (2015), we use a variety of newspaper publications which were active during each of the six crises (1772, 1815-6, 1825-6, 1841, 1866, 1929-30) to categorize events based upon contemporary reporting in accordance with the classification provided in Table A1. Though classification of each case appeared relatively clear-cut from these primary sources from an early stage in the identification process, we rely on additional primary sources and subsequent economic historians and economists as a cross check of our conclusions in each instance.

In the following section, each crisis is documented in chronological order and is presented in the same standard format: (1) a brief context, (2) the narrative newspaper evidence is presented to determine our classification, (3) we use additional primary and secondary sources as a final cross check on the robustness of our classifications.

The Crisis of 1772

Classification: Exogenous (X)
Causes: Risk Management (R)

Context
The crisis of 1772 is often referred to as the 'Ayr Bank Crisis,' the collapse of which, was its most famous casualty. A speculator by the name of Alexander Fordyce had mismanaged a large trade which he had financed by a loan from his own bank, which in turn was heavily indebted to the Ayr Bank. An adverse market movement bankrupted Fordyce who promptly fled to France in June 1772. The failure of the Ayr Bank resulted from their exposure to Fordyce's, combined with an inability to meet its demands. This triggered the subsequent panic which spread to the wider banking system, leading to the failure of 4 per cent of all UK banks.

Narrative Evidence
The Scots Magazine, a contemporary Scottish newspaper, provided detailed accounts of contemporary perceptions. Its account of the trigger of the crisis described a "melancholy scene [which] began with a rumour, of one of the greatest bankers having stopped, which afterwards proved true" (01/06/1772). The suddenness of the panic was described as the newspaper expressed indignation at the "alley transactions" of Fordyce leading to the outcome that "everybody for some days appeared to be struck with amazement and terror from the dread and uncertainty with regard to those that might be affected by this accident" (01/06/1772). The incident, referred to as "an accident," brought about "such distrust and such jealousy was never known" (01/06/1772), led to a panic, which manifested principally on Scottish banks in the UK which were suspected of dealing with the Ayr extensively. "But as the failure of these two houses [Ayr and Fordyce's] was supposed to be connected with many others of that country [Scotland], the gentlemen of this city were disposed to consider this a prelude to the universal bankruptcy of every safe house of that part of the kingdom" (01/06/1772). However, most banks separated from the event, *The Scots Magazine* observed, "went on with their usual tranquility, to answer their engagements" (01/06/1772). That the panic was limited to banks is supported by the fact that the major complaint of this contemporary broadsheet was that

Scottish banking "cannot upon the present plan keep pace with" the "improvements of this country [Scotland] in agriculture, in foreign and domestic trade" (07/07/1772). Therefore, on the basis that the public was primarily concerned with who would be "affected by this accident" and due to reporting of general "improvements" in macroeconomic conditions, we classify this crisis as an *exogenous* one caused by poor *risk management (X, R).*

Additional Evidence

Our conclusions are supported by other research which has reviewed this event. The Ayr Bank was associated with overtrading in an era of increased speculative activity and an "extravagant creation of credit", which undermined confidence in both Edinburgh and London (Hamilton, 1956). Additionally, instead of raising the full amount of its capital, the bank lent to its investors which increased its leverage beyond what its books revealed (Rockoff, 2009). Kindleberger and Aliber (2011, p. 58) viewed the episode as a crisis which was precipitated by speculation and highlighted that the bank had been in the practice of borrowing on London when its acceptances came due in Scotland and it had replenished its reserves in a similar manner (Rockoff, 2009). The above observations on the bank could be summarized as poor risk management behavior. Such "foreign" capital provided by English banks typically made up the shortfall in savings which existed in Scotland but such lending was sensitive to a downturn in sentiment (Hamilton, 1956). While it has been suggested that the cause of the failure was a determination to ignore rules of prudent banking (Rockoff, 2009), recent research has suggested that restrictive banking legislation introduced prior to the event had undermined the flexibility and resilience previously exhibited by Scottish finance (Goodspeed, 2016, p. 8).

The Crisis of 1815-6

Classification: Endogenous (N)
Causes: Depression (D), Government Policy (P)

Context

During the suspension era (1797-1821), poorly regulated and insufficiently capitalized small private banks proliferated in the UK. These banks often issued inconvertible notes against securities of a questionable character. In this period of war-time inflation, such banks were particularly sensitive to downturns given these structural weaknesses. The major banking crisis which occurred in the aftermath of the Napoleonic wars led to the failure of 4 per cent of all UK banks in 1815 and 7 per cent in 1816.

Narrative Evidence

The Times attempted to reveal the origins of the crisis in the following manner: "Let them all causes of our distress be enumerated, in order to apply proper remedies. 1st A superabundant harvest; 2nd foreign importation; 3rd tithes; 4th poor and other rates; 5th property and other war taxes; 6th want of credit; 7th decrease in circulating medium" (09/10/1816). The decrease in circulating medium which must cause the "want of credit" was initiated by the Bank of England contracting its note issue in preparation for the restoration of gold. Of the six causes listed, two relate directly to economic issues, three are government policies, while the fall in credit is a direct result of policy. The abundant harvest and the fall in circulation and credit assisted falling prices. Manufacturers and producers of commodities "felt the influence of a depreciation in the value of their respective articles" (02/08/1816) and evidence emerges that "before the peace was concluded…iron works began to fail" (05/08/1816). This *preceded* the dramatic rise in bank failures which peaked in 1816.

The effects of the falling prices and the post-war depression manifested itself in the form of mistrust in the fragile banking system. Of the country banks' mode of operation during the

suspension era, one observer noted that "any sudden reverse, any unforeseen fall in the markets, occasioned at once their own ruin, and often involved that of their creditors" (*Oxford University and City Herald*, 25/05/1816). One commentator derided the "practice" in some papers of "swelling every trivial failure in the mercantile world" as "the bad effects of such exaggerations" spread "through the whole country" (*London Courier and Evening Gazette*, 16/08/1815). This, the writer suggested, was exemplified by a "failure in the City," which though minor, led to an immediate rumor that "one of our first houses in the City had asked assistance from the Bank [of England] to the amount of half a million." Reporting on many bank failures in Sunderland, the *Stamford Mercury* stated that the "stagnation of trade *prior* to this [failure of Cooke and Co.] was great; at the ceasing of hostilities we anticipated a trade with Holland in the export of coals, which we concluded would counteract the superabundant vessels in coasting. Alas! We are miserably mistaken" (12/07/1816). Similarly, economic conditions were blamed for the bank failure of Bruce and Co. whose lending to merchants placed them in a position which was "fearfully ominous of the general conditions of the commercial world" (*Taunton Courier, and Western Adviser*, 11/07/1816). They regretted that the "mercantile portion of the public" appeared to be "unfortunately progressing to a most disastrous crisis," as international trade appeared "paralyzed" with countries which are "in a still worse condition than this" leading them to the conclusion that "there is difficulty in allowing a ray of hope to struggle through" (*Taunton Courier, and Western Adviser*, 11/07/1816) for a return to normal levels of international trade.

Though the newspaper reporting during these earlier crises was not as extensive as it was to subsequently become, complaints of poor economic conditions dominate the reporting *prior* to the bank failures which they brought about. The typical scenes above are repeated in towns across the UK where a local firm experiences bankruptcy, mass unemployment and unrest follows and smaller local banks, which may have concentrated their assets in the local economy collapse. For this reason, we classify this crisis as *endogenous (N)* which was caused by *depression (D)* in post Napoleonic Europe and *government policy (P)*.

Additional Evidence

The account of Presnell (1956) largely supports the newspaper evidence. Following the end of the Napoleonic war, it was expected that the Bank of England would attempt to resume sterling convertibility as early as July 1816 (Presnell, 1956, p. 471). This was pursued through a contraction of its notes (Turner, 2014, p. 67), which, combined with falls in government borrowing and expenditure, "could not but have a deflationary influence" (Presnell, 1956, p. 470). The Governor of the Bank of England, while promoting the policy of a return to convertibility as it would eventually "place this country in a better situation with regard to all foreign countries", was conscious when interviewed that if the contraction was "done suddenly, it might do a great deal of mischief" and agreed that the "effect must be a proportionate fall in the prices of commodities generally" (P.P. 1819, p. 32). He additionally admitted that in the short run, this policy would mean that "the manufacturer would not be disposed to manufacture upon a low price to the same extent" (P.P. 1819, p. 32). In 1815 alone, prices fell by over 14 per cent (Thomas and Dimsdale, 2017) and were depressed further by increases in general supply at the cessation of hostilities. Reinhart and Rogoff (2009, p. 387) also cite the abundant harvest and low prices in addition to a general depression in property prices which affected production industries. It was reported that general business failures were high in Autumn 1815 and early 1816, leading one banking historian to note: "That bank failures were high is not surprising, for to general economic depression there was added the deflationary expectations of the Resumption of Cash Payments" (Presnell, 1956, p. 471).

However, with respect to the 1815-6 crisis, the case for the banking system's role in causing the crisis is not negligible. The rapid expansion of unregulated note-issuing private

banks in the United Kingdom which had occurred in the suspension era has been blamed for increasing inflation and economic instability (Ó Gráda, 1994, p. 52) and the system exhibited "underlying structural weaknesses in the steady trickle of failures" which occurred (Presnell, 1956, p. 447). Nonetheless, the majority of the failures in England occurred in agricultural areas, which suffered even lower prices as a result of a plentiful harvest (Presnell, 1956, p. 471). This was exemplified in Ireland, a primarily agricultural economy, where the clustering of failures was linked to declines in agricultural prices (or assets held by the banking system), which "led to a fall in business confidence and to a flurry of rumour and counter rumour," resulting in bank runs and suspensions (Ó Gráda, 1994, p. 55). On balance, subsequent research supports our conclusion that the post-war deflationary slump exposed a weak banking structure to widespread ruin.

The Crisis of 1825-6

Classification: Exogenous (X)
Causes: Risk Management (R), Fraud (F)

Context

In recent research, the crisis of 1825 has been placed alongside 2008 as the most acute banking crisis of the previous two centuries in terms of financial casualties and output effects (Turner, 2014, pp. 53-4, 62). Indeed, some fifty years later a chairman of the Manchester and Liverpool Bank recalled the event as follows: "when people went to their business that year, they did not inquire what banks were broken, but what banks were standing" (P.P. 1875, p. 340, q. 6610). In 1825 and 1826, 6 and 7 per cent respectively of all UK banks failed, which supports the conclusions of Turner (2014) that this was a uniquely extreme event.

Narrative Evidence

Contemporary accounts provide no material attention to economic considerations, instead saving their criticisms for the behavior of the banking sector. During the early stages of the crisis, there is little evidence of difficulties affecting merchants (*The Times*, 15/12/1825). Instead, we find evidence that merchants provided support to the banking system: "During the late panic, it appears that some of the leading merchants supported those houses [banks] in which they had confidence, in the most liberal manner" (*The Times*, 20/12/1825).

The banking sector was blamed by the *Globe* who wrote that "the country bankers, imitating their example [the Bank of England]…had saturated the provinces with paper" (14/12/1825). The frenzy of the speculative environment is constantly remarked upon by the newspapers of the day. *The Times* for instance commented: "credit, gained by pretence, and given by credulity, and wasted on the projects of cupidity mingled with indiscretion-that sort of credit which is now in its last agonies" (29/11/1825). In moralistic tones, it continued that the crisis is the "natural result of eager and accumulated speculation, carried, through the facility which every adventurer was accommodated by capitalists at a loss to find vent for their money." Further attention was focused on bankers who were "well aware, that the state to which they had brought things, by their over issues and their too ready supplies from scanty capitals, was a state most grievously oppressive and injurious to the nation" (08/12/1825). Comparing the event with the South Sea Bubble of the previous century, *The Times* wondered that considering the current episode exhibited "a much greater mass of fraud and deception in the aggregate: can we, therefore, wonder that the result has been similar?" (13/12/1825).

Due to the initial absence of reporting on any adverse economic conditions in the earlier stages of the crisis and the focus falling almost entirely on the perception of the risky behavior of banks with their "too ready supplies from scanty capitals" (leverage) and "fraud and

deception", we classify this crisis as *exogenous (X)*, caused by a failure in *risk management (R)* and *fraud (F).*

Additional Evidence

The causality of the crisis was later implied by a witness interviewed in a Parliamentary Committee established to review the Bank of England Charter. "The lamentable effects" of bank lending and "overissues" which preceded the crisis "entailed ruin on large classes of respectable traders and manufacturers, and much misery on a vast population" (P.P. 1831-2, p. 338, q. 4398). Writing on the history of the crisis, Dimsdale and Hotson (2014, pp. 32-3) claim that the conditions were ripe for a speculative boom by the initial policy of the authorities who were concerned about reducing yields in government bonds as a result of the high public debt which prevailed in the post Napoleonic war era. This, they claim, pushed investors into riskier assets seeking a better return. These included Latin American Sovereign debt and speculation in real and imaginary projects (Reinhart and Rogoff, 2009, p. 387). Independently, the Bank of England extended credit, purchased securities and increased its note circulation instead of decreasing it, despite lower rates on government debt adding to the speculative environment (Turner, 2014, p. 68). In London alone, between 1824 and 1825, an amount almost equivalent to the entire market value of the equity market was raised in capital (Turner, 2014, p. 70). Many banks which had invested in risky securities began to fail in the autumn and the collapse of the speculative boom was a major factor causing the crisis (Dimsdale and Hotson, 2014, p. 33). One contemporary interviewed six years after the event argued that had "banks been established on sound principles" then "it would have been utterly impossible to have lent to such an enormous extent, without the possession of a large amount of real capital" (P.P. 1831-2, p. 338, q. 4398).

The devastation which visited the banking system provided the impetus for the introduction of joint-stock bank legislation. As already indicated by the above observation, a defining characteristic of the vast majority of failed banks had been that they were poorly capitalized small partnerships (Dimsdale and Hotson, 2014, p. 33; Turner, 2014, pp. 102-39). More than twenty years later, a Member of Parliament recalled that the panic "of 1825 was confined to the Banking Interest" (P.P. 1848, p. 207, q. 1744). All of the above considerations reinforce our categorization of this crisis as exogenous.

The Crisis of 1841

Classification: Endogenous (N)
Causes: Depression (D), Government Policy (P)

Context

The crisis of 1841 occurred in the immediate aftermath of 1836-7, which has received considerably more attention to date. Indeed, had this earlier crisis been included here, it would have been classified as an exogenous crisis (only two major banks failed) as subsequent research has highlighted aggressive risk taking and fraudulent behavior among the principal causes (Turner, 2014, p. 72). However, to reinforce the difficulty in dating events, Reinhart and Rogoff (2009, p. 387) claim that a crisis occurred during the period 1837-9, while Dimsdale and Hotson (2014, p. 27) date a recession which persisted between 1839 and 1842. It is during this economic downturn that our new measure of panics begins to rise considerably, as 3 per cent of UK banks failed in 1841. The previous year had a figure of 2 per cent, suggesting that this episode to date has received insufficient attention as a banking crisis, which is likely due to the emphasis of contemporaries on depressed macroeconomic conditions.

Narrative Evidence

It is clear from the newspaper reporting during the period that poor economic conditions *preceded* the bank failures of 1840 and 1841. *The Times* reported in the first half of 1839 that "business is more than ordinarily dull" (01/05/1839) and the crisis became associated, among other things, with "failure of corn crops of that and the preceding year" (09/07/1841). As we may expect from the Cunliffe version of the price-specie-flow theory, to rectify the balance of payments deficit which the UK experienced (see below), Bank Rate was raised to bring about a price reduction. While at the end of 1838 it was 4 per cent, by the end of 1839, it had reached 6 per cent, leading to a fall in prices. Such actions were heavily criticized by manufacturers in the press as having led to widespread unemployment or "injuries inflicted upon the laboring classes by the operations of the Bank of England upon the currency" (01/01/1840). The manufacturers also complained that unlike "monied capitalists" who had enjoyed higher prices for their silk imports in 1838 due to "the depreciation of the currency by the Bank of England," the "manufacturing capitalist, at all times a purchaser" now suffered as sales prices fell and it incurred "heavy losses" (*Evening Mail*, 01/01/1840). The *Morning Post* claimed almost two years later that the fall in prices was being "unduly aggravated through the continual supplies furnished by persons largely indebted to their bankers, and who have been compelled, week after week, to bring them to market and dispose of them at any sacrifice in order to keep their manufactories going" (15/11/1841). The banks, in turn, came under pressure from debtors who could no longer repay their loans, selling at ever lower prices. The *Morning Post* heavily criticized the affected banks for "the unreasonable lengths to which some of them have ventured in the advances made to cotton spinners and manufacturers" (15/11/1841). The public was made increasingly aware of the banks' exposure in this manner "by means of the disclosures consequent upon the bankruptcy examinations that are going forward" (15/11/1841). For instance, the failure of Hobhouse and Co. at Bath was "owing to heavy advances to two houses engaged in the woolen manufacture" (Hereford Journal, 22/09/1841).

The above evidence is typical of the newspaper reporting at the time which focuses on the depressed conditions of manufacturing, linking it with falling prices caused by "actions of the Bank of England upon the currency" and failing banks who had extended credit to the affected sectors. We therefore classify this as an *endogenous crisis (N)* which was linked with *government policy (P)* and *depression (D)*.

Additional Evidence

To our knowledge, few researchers to date have focused on this episode as a banking crisis. Bordo et al (2003), however, identify 1841 as an event of "severe distress" in the financial conditions index which they construct. Where it has received attention, it has been recognized as a UK depression which affected both industry and agriculture and it has, in turn, been linked to the depressed state of Anglo-American trade (Ollerenshaw, 1987, pp. 52-6). Dimsdale and Hotson (2014, p. 27) describe the onset of this episode as a "balance of payments crisis" which occurred in 1839, prompting a rise in Bank Rate which was duly forthcoming. During a series of interviews published by a Banking Committee in 1841, this subject was addressed at length. A chairman of the Committee of Private Bankers expressed his view on the trade deficit and the effect it had on the banking system: "when gold is going out of the country there is generally a gloom hanging over the public mind" and "that lowers prices very much" (P.P. 1841, p. 12, q. 94). It was claimed that during the first eight months of 1839, the "foreign drain" was so severe that the Bank of England was nearly reduced to the "necessity of suspending specie payments" and that a reduction in circulation was the only course available to them (P.P. 1841, p. 65, q. 603, 604). In this environment of a rising bank rate, contraction in circulation and falling prices, the archives of one regional bank show as early as February 1839, that there was a great deal of "apprehension" felt by "people congregating" who placed "severe pressure upon

all the banks" (Provincial Bank of Ireland Archive, 12/02/1839). In his *Business Annals,* Thorp (1926, p. 161) described the year 1841 in England in the following manner: "severe depression; many failures; widespread unemployment; foreign trade dull. Money tight." In 1857, it was recalled by a Committee witness that the distress of 1839-41 was "an American Pressure" brought about "in consequence of a drain of bullion" (P.P. 1857-8, p. 160, q. 2364-5). In support of our conclusion that poor economic conditions *caused* this banking crisis, the question has been specifically posed by Ollerenshaw, (1987, p. 56): "what was the banks' *reaction* to this depression?"

The Crisis of 1866

Classification: Exogenous (X)
Causes: Risk Management (R), Fraud (F)

Context

The Crisis of 1866 has often been referred to as the 'Overend Gurney Crisis' as a refusal by the Bank of England to bail out that institution, which "rebutted the principle of 'too big to fail'", triggered a panic in the banking sector (Flandreau and Ugolini, 2014). While it is typically viewed as having occurred in 1866, subsequent research has shown that failures of a number of significant banks continued into 1867 (Turner, 2014, pp. 82-4). A total of 3 per cent of the UK banking population failed in 1866.

Narrative Evidence

Newspaper reporting at the time held the view that this crisis was limited to the newly-formed finance and banking companies and was the result of lax lending safeguards, speculation and fraudulent practices. A letter from the Governor of the Bank of England to the Government was published in *Caledonian Mercury* (14/05/1866) in which the sentiment was expressed that this crisis "differs from those of 1847 and 1857. These periods were periods of mercantile distress, but the vital consideration of banking credit does not appear to have been involved in them, as it is in the present [1866] crisis." During the most acute month of the panic, May 1866, a number of articles appeared in *The Times* which fitted this perception. Its suddenness was remarked upon on 12 May as "nothing had happened since the day before to justify such a fear as was everywhere shown" and the panic was said to have "had no solid foundation." Deriding recent practices of lending long against increasingly shorter borrowing, it reported that "a particular course of unsound business has broken down, but the position of ordinary bankers and merchants remained unaffected." *The Observer* confirmed that the majority of the crowd in the city "composed of men who, judging from their levity or appearance, had not any interest at stake in the great panic" (13/05/1866). Suspicious of the rapidity of the formation of the finance companies and the lack of capital paid up, *The Times* (07/05/1866) doubted the credibility of "the very magnitude of the dividends declared" complaining that "their doings [are] all in the dark" and blamed the depression in those company share prices upon "the liabilities with which they are saddled. People are afraid of 'calls'." Due to the suddenness of the event, the suspicion amongst newspapers that "unsound business" was at play and maturity mismatch had exceeded reasonable thresholds, we therefore classify this crisis as exogenous, caused by poor *risk management (R)* and *fraudulent practices (F).*

Additional Evidence

Turner (2014, p.80) describes the buildup to this crisis, citing a number of recent finance company flotations which had incorporated under limited liability following an Act of 1862, many of which had been of a "dubious nature". In a Committee which examined the flotation of these companies, a Chief Clerk of the Rolls explained that "undoubtedly the facility for

forming joint-stock companies has furnished the means of committing some of the frauds which have been committed", the extent of which was "very great." He continued that "companies are got up [established] simply to procure the promotion money" (P.P. 1867, p. 95, q. 1483-5). Such companies had been lending against low quality securities to limited liability companies at high interest rates. These companies were largely borrowing long term to construct railways throughout the UK. When the railway companies began experiencing difficulties, their finance companies suffered pressure, a number of whose shareholders had not subscribed their full allotment and now began selling shares in panic. Following a share price fall of almost 50 per cent in 4 months, the largest company in difficulty, Overend, Gurney and Co. collapsed on 10 May 1866 with losses of £5 million. On the following day, "Black Friday", a "violent panic" descended on the money market and the Bank Act was suspended and this "psychological palliative" brought the panic to an abrupt end (Turner, 2014, p. 81).

Clapham (1958, p. 266) argued that the crisis was not based upon real or monetary phenomena. However, though Gladstone and Lord John Russell wrote in *The Times* (12/05/1866) of the "intense rapidity" with which the shock had emerged, failures of a number of significant banks continued into 1867 (Turner, 2014, pp. 82-4). In sum, subsequent research and other contemporary reports support our conclusion that this event was not caused by macroeconomic activity, but was caused instead by fraud and poor risk management.

The Crisis of 1929-30

Classification: Endogenous (N)
Causes: Depression (D), Government Policy (P)

Context

The crisis of 1929-30 occurred during the early stages of the international downturn which subsequently became the Great Depression. While the interwar years of the British economy have received considerable attention from economists and economic historians, the perception prevails that while bank failures were synonymous with the depression in the US (Friedman and Schwartz, 1963), the UK banking system did not suffer extensively. Instead the literature has tended to focus on other factors, such as the reduction in hours worked, the exchange rate, the failure of policy and the fall of the old staple industries (Lennard, 2017). However, our new data reveals that the banking system was considerably affected, with bank failure rates of 3 and 4 per cent for 1929 and 1930 respectively.

Narrative Evidence

The narrative evidence from the newspapers paints the bleak picture of economic conditions one would expect from "a period of prolonged industrial depression" (*The Times*, 28/02/1929). As early as New Year's Day in 1929, *The Times* was already reporting of "distress in the mining districts" and that 1928 had been an "exceedingly difficult one for the coal trade" (01/01/1929). These events preceded the rise in bank failures in our series and the depression was geographically dispersed: "acute distress in South Wales" (28/02/1929) and "distress in the North East" (02/03/1929) was reported. Similar to the crisis of 1841, contemporaries recognized that falling prices were related to the downturn. Some criticized the US for a restrictive monetary policy, which led to "depressing the prices of goods by raising the price of gold" and foresaw that if "a moderate rise in the price of produce" was not forthcoming to sellers (exporters), then "the certainty of non-payments and bankruptcies" would materialize (*The Times*, 15/11/1929). The effects upon banks mirrored those of 1841, which had debtors on its books selling in a market of falling prices. For instance, a London bank, J. Horstman & Co. Ltd. had failed as it had been making loan advances on "the security of merchandise on bills of exchange" until it transpired that the merchandise had been "over-valued" (*Derby*

Telegraph, 02/12/1929). The record from one bankruptcy court, as early as January 1929, seemed to predict the difficulties banks would come to face during the following years. The failure of an iron processor who appeared there, "was due to the slump" and "the only debtor, the bank, suffered on account of the securities given by defendants" (*Buckingham Advertiser and Free Press*, 12/01/1929). As international trade continued to decline, the shipping industry predictably suffered, leading one newspaper to suggest that the struggling "big firms which have been financed by the banks must be considered." It suggested that the banks "bring pressure to bear upon their clients to cease unprofitable operations" in the hope that the shipyard owners may accept a sale "value not unreasonably higher than scrap value" for their properties upon which they had been "waging a losing fight for years" (*Yorkshire Post and Leeds Intelligencer*, 24/04/1930). Consequently, it is implicit that the loans which the banks had originally granted would not be repaid.

Due to all of the above observations, we classify this as an *endogenous crisis (N)* brought about by a deep recession *(D)*, which manifested itself first through the real economy and culminated in failures of banks which had lent to particularly depressed industries.

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Appendix 2. The Construction of the Capital-Weighted Indicator of Banking Crises

In this Appendix, we provide a list of the sources used to construct the capital-weighted crisis indicator. We collected data from the archives of the following banks: Bank of Scotland, Barclays Bank, HSBC, Lloyds Bank and Royal Bank of Scotland. While today these banks are single entities, over the centuries they engaged in a large number of takeovers and mergers, which had the result that they now house historical records of a number of extinct institutions. We collected balance sheets of private and joint-stock banks from these archives.

In addition, we also employed the work of contemporaries such as Gilbart (1860), which contained the balance sheets of a number of joint-stock banks in this period. Paid-up capital was also collected from the *Bankers' Almanac,* which published balance sheet information from the mid-nineteenth century until the end of the sample period.

Data Sources

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