Country Banks and the Panic of 1825

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Abstract

The Panic of 1825 was one of the world's first international financial crises. In this paper, I document how this crisis spread from London banks to England's real economy. England's correspondent banking network propagated trouble in sovereign debt markets to small banks outside of London and ultimately to non-financial firms. Using exogenous variation in town-level exposure to the crisis, I show that bank failures led to a substantial number of bankruptcies among non-financial firms, particularly in non-tradable sectors. These findings highlight the costs of a disruption to the payment system: country bank notes were the primary means of payment during the first industrial revolution.

1 Introduction

The Panic of 1825 was a British financial panic that followed a credit and speculative boom from 1821-25. The crisis involved the first cases of sovereign default on government bonds in international capital markets and has been called the first emerging-market induced financial crisis (Dawson (1990); Bordo (1998); Morgan & Narron (2015)). Following a series of bad news shocks in the fall of 1825, the London money market seized suddenly in mid-December and runs occurred on many London banks, causing several major banks to temporarily stop payment and others to fold entirely. Through the correspondent banking network of relationships between London banks and small, so-called "country" banks in English towns outside of London, the crisis exerted significant financial stress on the country banks.

More than 10% of England's country banks went bankrupt during the Panic and real activity declined dramatically. Among Britain's banking crises over the past 200 years, Turner (2014) puts only the Panic of 1825 on par with the Great Recession of 2007-8 in terms of financial distress and output costs. Construction activity, measured by brick production, fell by 30% from 1825 to 1826 (Shannon

(1934)). The value of exported cotton manufactures fell 20% and the quantity of raw wool imports fell by more than half over the same period (Gayer et al. (1975)). Bankruptcies more than doubled from 1,141 in 1825 to 2,590 in 1826 (Marriner (1980)). In this paper I provide the first causal evidence that bank failures during the crisis contributed to the decline in real activity. The main channel appears to be through a disruption to the payment system rather than a credit supply shock, which stands in contrast to much of the literature on the real effects of financial crises.

Like many modern financial crises, including the global financial crisis of 2008, the Panic of 1825 occurred after a large number of new securities appeared in financial markets. Surprising news about the low quality of these assets caused runs on the unregulated financial institutions that were exposed to them. Credit and financial intermediation both within and outside of the financial center (London) contracted. However, several features distinguish the Panic of 1825 from more recent crises. First, towns outside of London used bank notes issued by local country banks as currency so that bank failures directly affected household cash balances through a sharp devaluation of bank notes held by households. Second, the banking network was not diversified: most country banks relied on a single correspondent London bank.

In this paper I explore the impact of country bank failures during the crisis on local economic activity. Economic historians have debated the role of country banks in supporting industrialization and economic growth during the first industrial revolution but lack of data and identification have both been major barriers to answering this question. To address these challenges, I use new, hand-collected data on the universe of English country banks from 1820-1830 and data on local bankruptcies to compare the number of non-financial firm bankruptcies in towns with different numbers of bank failures. I instrument for bank failures using town-level exposure to the sovereign debt crisis through the correspondent banking network. I show that transmission of financial stress occurred geographically and through the banking network.

I find that towns with country banks that failed due to the crisis experienced a higher number of non-financial firm bankruptcies than comparable towns that were not exposed. The direct, partial equilibrium effect of bank failures can explain about 27% of the increase in bankruptcies during the crisis. I discuss two possible ways financial stress on the country banks was transmitted to local economic conditions: (i) a drop in aggregate demand due to lost household wealth; (ii) a negative credit supply shock, particularly to working capital lending.

The paper contributes to two principal strands of literature. First, the paper is related to the literature measuring the cost of financial crises for non-financial firms. Chodorow-Reich (2014) and Fernando et al. (2012) use a similar identification strategy to study the effects of particular institutions' collapse on the availability of credit during the Great Recession. Amiti & Weinstein (2018) and Mian & Sufi (2008) use matched firm-lender data in Japan and Pakistan, respectively, to identify bank shocks in a more reduced form way, using firm and bank fixed effects to identify loan supply shocks from individual banks. A concern in many of these studies is the extent to which firms can switch banks to avoid loan supply shocks. The highly localized nature of English lending and rigid bank-firm relationships during this period provide an ideal setting to isolate the effects of financial stress when switching is not possible.

The focus of much of this literature has been on identifying the effects of a credit supply shock. Yet financial crises that disrupt the payment system or otherwise negatively household wealth may also feature reductions in aggregate demand. One study that focuses on the local demand effects of banking crises is Huber (2018), though the demand effects he documents for Germany are essentially second-round effects of the credit supply shock due to employment losses. I instead highlight the role of country banks in the payment system and study the first-order effects of payment disruptions for local aggregate demand. This channel bears a resemblance to the recent demonetization episode in India, where Chodorow-Reich et al. (2018) show that districts experiencing more severe cash shortages suffered greater reductions in economic activity in the short run, and is also consistent with

the Friedman & Schwartz (1963) hypothesis that the money supply has first-order effects on output.

Several papers have examined the impact of bank distress on firm outcomes in a historical context. In Britain, Kenny et al. (2017) use data on various banking crises in Britain in a VAR framework to identify industrial production contractions of about 8% from these crises. For the U.S, Frydman et al. (2015) identify a large causal effect of runs on shadow banks on aggregate investment in the Panic of 1907 using exposure to a financial scandal. Calomiris & Mason (2003) show that counties and states with more financially distressed lenders saw greater slowdowns in construction activity during the Great Depression. Hansen & Ziebarth (2017) use geographic variation in financial distress within Mississippi to show that financial distress caused firm exit but not bankruptcy during the Great Depression. I provide further evidence that financial crises feature large effects on non-financial firms, including during one of the earliest modern financial crises, the Panic of 1825, and focus on how historical banking crises disrupted the functioning of the payment system in the absence of a single national currency.

The source of exogenous variation in financial stress in this setting merits special attention. Several recent papers have documented the effects of foreign financial crises on the credit supply decisions of domestic lenders (Bottero et al. (2017), Ongena et al. (2015), and Huber (2018)). To the best of the author's knowledge, only in one other study (Acharya et al. (2018)) is the case where *foreign* sovereign debt devaluation was the driving force behind deterioration of the domestic banking system's balance sheet considered, focusing on the recent European debt crisis. The authors show that banks in EU countries contracted lending due to the balance sheet effects of sovereign debt devaluation (see Bocola (2016) for a model of this channel) but the effects were concentrated in banks from the five countries (Greece, Ireland, Italy, Portugal, Spain) most affected by the sovereign debt crisis. The present analysis provides further evidence of this particular cost of sovereign default: contraction of financial intermediation in the investing country, even by domestic banks. The existence of this channel in early 19th century capital markets is a

novel finding.

Second, the role of finance, and of country banks in particular, during England's first industrial revolution is hotly contested. Contemporaries pointed to the high failure rate of country banks as evidence that these banks harmed the towns they served and excessive note issuance by country banks was blamed for credit boom and bust cycles in the early 19th century. Some historians have argued that restrictions on the maximum number of partners and the Usury Law restricting the maximum interest rate banks could charge caused the industrial revolution to be "financed out of the pockets of tinkerers and manufacturers, not through bank lending" (Calomiris & Haber (2014)). Others argue that public finance of the Napoleonic wars largely crowded out private finance (Murphy (2014); Temin & Voth (2013)). Crouzet (1972) summarizes the conventional view of the relationship between banks and industry during the industrial revolution: "they lived in two separate worlds and that the contribution of the banking system to the industrial revolution was therefore quite insignificant."

Those arguing for the importance of private finance include Crouzet (1972), Mathias (1973), and Pollard (1964), who point out that banks' provision of short term credit freed up internal profits for reinvestment in longer term capital. Indeed, these so-called plough-backs were the primary source of fixed capital formation during this period, and would not have been possible had firms been obliged to meet their short-term needs with profits.[1] Heblich & Trew (2019) find that employment in the financial sector in 1817 was associated with structural transformation and industrialization by 1881. This paper complements those findings by focusing on the short term consequences of a loss of financial services and by highlighting the role of country banks in particular.

The rest of the paper is organized as follows: Section 2 describes the history of country banks, their role in the towns they served, and the structure of the English

[1]Brunt (2006) suggests country banks also played a role in industrialization by funding fixed capital investment but evidence on this point is sparse. Policy changes after the Panic (described in detail at the end of section 2.2) make it difficult to study the longer-term causal effects of bank failures on town-level outcomes.

financial system during the period of study, as well as providing background on the Panic of 1825. Section 3 describes the two new datasets I collected. Section 4 presents the main estimation results of the paper and discusses the validity of the instrumental variable approach, then discusses possible transmission mechanisms from bank failures to firm bankruptcies. Section 5 considers robustness checks.

2 Historical Context

2.1 Country Banks in England

The banking system in England during this period was a three-tiered structure comprised of the Bank of England, London banks, and country banks. Country banks began to appear in England in the mid-18th century, around the time the first industrial revolution began. By 1815 it was estimated that there was a country bank within 15 miles of anywhere in England, according to Pressnell (1956), a comprehensive text on country banks during this period.

Legal restrictions capped the number of partners in a bank at six, so country banks were small and served a very limited geographic area (usually they were unit banks but were not legally prohibited from branch banking). These wealthy partners provided the initial capital for the bank. Country banks also took deposits, but these tended to only be from wealthy individuals and large firms. The main employments for bankers' resources, other than cash reserves, were local loans and purchases of "London assets": British government securities and interest-bearing balances with London bankers. Country bankers tended to match their assets to their liabilities. Private country bank note issues were backed by liquid cash reserves and government securities in London; deposits were used to discount local or London bills of exchange, and longer term loans came from bankers' capital (Pressnell (1956)).

Each country bank maintained an account with a bank in London, referred to as its London agent. While most of the country banks had at most one or two

branches so that they appeared quite isolated, the London agent system served to connect banks across the country with one another. The London agent performed important functions for country banks, transferring excess capital from one part of the country to another, particularly from agricultural areas to industrial areas (Pressnell (1956)). London agents also settled transactions among different country banks. For these services, country banks compensated their agents by promising to leave a large permanent deposit at their London bank (Pressnell (1956)). This scheme meant that if a country bank's London agent failed, as many did during the Panic of 1825, the country bank could face the substantial capital loss of their London balance. In line with recent findings for the U.S.'s correspondent banking network of the 1920s and 1930s (see Calomiris et al. (2019)), I will show that this network was an important source of propagation of financial shocks.

2.2 Panic of 1825

The key to my identification strategy will be that the Panic of 1825 crisis originated outside the small town economies I study. In this section I first discuss the causes of the crisis, then provide a timeline of events during the crisis, and finally discuss the conduct of the Bank of England and other policy responses.

The Panic of 1825-26 has been called the first Latin American debt crisis (Dawson (1990)). The success of Barings' French bond offerings in 1820, combined with the prospect to invest in metal-rich newly independent Latin American governments, and the low return on British government consols, created a huge demand for Latin American securities in the early 1820s (Neal (1998)). As John Horsley Palmer, the Governor of the Bank of England in 1832, put it: "the excitement of that period was further promoted by the acknowledgement of the South American republics by this country, and the inducements held out for engaging in mining operations, and loans to those governments" (Great Britain (1832)). According to Gayer et al. (1975), these Latin American issuances constituted the "largest single category of new investment" in the lead up to the crisis.

Information on the quality of these assets emerged in London only slowly over the years following the first issuances in 1822. Because little was known about each individual government, all Latin American bonds were priced at a heavy discount, and prices for all countries tended to move together before 1825 (see Figure 1). So little information was available about Latin America at the time that Scottish explorer Gregor McGregor was able to issue bonds for the fictional Central American government of Poyais on similar terms as bonds issued for Chile (Morgan & Narron (2015)). Latin yields surged during the fall of 1825 as the Poyais and other schemes were revealed.[2] A November 20, 1825 article in The Examiner (1825b) questioned Buenos Aires' ability to meet its next coupon payment. A December 8 report (The Morning Chronicle (1825)) noted that "every description of Foreign Security continues under a cloud–but more especially South America." By January 1826 it was clear that most, if not all, Latin American borrowers were insolvent (Dawson (1990)), though it was not until April 1826 that the first country, Peru, formally defaulted (that is, completely stopped making interest payments).

London banks could assume two possible roles in sovereign debt issuances during this period. First, banks could underwrite foreign government debt, assuming liability in case of default. Second, banks could assume a "payee" role, responsible for collecting the payments of loan subscribers and then acting as a "window" on behalf of the issuing country and paying out coupon payments. Flandreau & Flores (2009) make the distinction between underwriting and being the window/payee on sovereign debt in the 1820s. They argue that "the risks and revenues of the last two operations were much smaller than those from the first, but leads and lags could cause trouble." For example, Dawson (1990) describes a case as early as 1823 when the London bank Everett & Co., the payee for Peru, temporarily froze payments it had collected from loan subscribers to Peru because of uncertainty about regime stability in Peru. The Peruvian government in turn needed these payments to make coupon payments back to bondholders as it had no other gold or Bank of England

[2]The Hereford Journal (1825) reported MacGregor's arrest on December 8th, 1825, just before the first London bank failed on December 12th.

notes on hand, and ended up suing Everett & Co. to release the money. Early incidents like these undermined confidence in both Peru's and Everett's ability to meet their obligations and also suggest that payee banks were sometimes expected to supply the coupon payments when the country could not come up with the money itself.

Rumors of impending defaults put immense pressure on the London banks involved in debt issuances of these countries. The failures of sovereign borrowers associated with a bank could have devastating reputational consequences for the bank, according to Flandreau & Flores (2009) and Indarte (2016). Often the only information published about sovereign debt issuances in the 1820s were the amount of debt, the interest rate, the underwriter, and which bank would make the coupon payments.

Three of the six largest London agents (by number of country bank correspondents) that failed during the crisis had been the party responsible for paying interest on Latin American debt issuances, according to Dawson (1990). Perring & Co. paid interest on Poyais, Everett & Co. on Peru, and Fry and Chapman on Mexico and on a portion of the Peruvian debt. These three London agents accounted for nearly half of the country banks exposed to the failure of their London agent during the crisis.

Other London banks that had no country bank correspondents but were also involved in underwriting and issuing South American securities also failed during the panic: Goldschmidt failed in February 1826 and Barclay, Herring, Richardson & Co. in April 1826. Flandreau & Flores (2009) cite evidence that underwriting banks, particularly the market leaders Barings and Rothchilds, would intervene to support securities' prices by buying them up during selloff periods. No surviving evidence proves that other banks involved in issuing these securities also did this, but it is certainly possible. Holding these assets on one's balance sheet would be extremely costly: Peruvian bonds earned a negative return of 15 percent during this period, for example (Flandreau & Flores (2009)).

Other causes of the Panic of 1825 have been suggested. Like the lemons in the

sovereign debt markets, Neal (1998) identifies 624 companies floated in England from 1824 to 1825, only 127 of which survived to 1827. Many of these were international companies, particularly mining companies in South America. The Bank of England had also created highly accommodative monetary conditions since 1819 that may have created a credit boom ready to burst by 1825. The Bank lowered its discount rate from 5 percent to 3 percent during this period. Pressnell (1956) argues that a fall in the rate of interest on their London balances encouraged country banks to search for higher yield by increasing their own note issues from December 1823 to December 1825, but also explains that these increases were matched by increases in the demand for credit due to good harvests and increased foreign trade. All three of these causes, the sovereign debt crisis, the decline in foreign private stock prices, and accommodative monetary policy, were more or less external to real economic activity in the interior of England.

A concrete timeline of the crisis helps to clarify my identification strategy. Against the backdrop of increasing tightness in the London money market caused by the sovereign debt crisis, the panic began on December 12, 1825 when the London bank Pole, Thornton & Co. stopped payment.[3] News of the crisis spread rapidly, even to the countryside, and runs began the next day on country banks known to be Pole's correspondents. Runs also occurred on other London banks suspected to be in trouble. By the end of that week four major London banks with a total of 65 country correspondents had failed. By the end of December, 30 country banks had been declared bankrupt and 41 more would follow suit from January to May of 1826 (see Figure 2).

How did the Bank of England respond to the panic in the money market? James (2012) called the Bank of England's response to panics from 1790 until 1825 "limited, episodic and inconsistent", but noted the more active role the Bank played in addressing the 1825 crisis through liberal discounting (p. 299). However, at the

[3]On the causes of Pole, Thorton & Co.'s failure, The Examiner (1825a) writes "The decline of this house is generally attributed to the anxiety felt by the partners at the time when the rate of interest was low, to make a profitable use of their capital, and hence they were led to employ it on securities capable of being realized only at a distant period, or of an inferior degree of credit."

same time, the Bank increased the discount rate from 4% to 5% on December 14, 1825 at the height of the crisis, likely due concerns that its bullion reserves were getting too low (the Bank had resumed convertibility of its notes into gold in 1821).

The Bank of England also began to issue one pound notes for a brief period during the crisis as an emergency measure (all small notes had been removed from circulation in 1821). Parliament set up special boards to make advances to economically distressed country towns. In a previous financial crisis during 1810, the Bank of England had issued Exchequer bills specifically to support "Manufacturers, in different parts of Great Britain, who, having in great degree suspended their works, were enabled to resume, and to afford employment to a number of workmen who must otherwise have been thrown on the Public for support" (Pressnell (1956) p. 468). Similar concerns were at work in 1825.

The Panic of 1825 eventually caused significant reforms to the English banking system. In 1826 Parliament lifted the prohibition on joint-stock banking outside London that had been in place since 1708 (Black (1995)). These larger banks slowly absorbed or out-competed the country banks. At the same time, the Bank of England sought to expand its sphere beyond London by opening branches in seven major English cities. Because small note issues were blamed for the crisis, in March 1826 Parliament declared that all private notes below five pounds had to be withdrawn by 1829 (Black (1995)). These additional changes to the banking system after 1826 make it difficult to study the longer term effects of the crisis, so I focus my analysis on quite a narrow period, as described in further detail in the next section.

3 Data

To undertake this study I created two novel datasets.[4] One database records the universe of country banks in the United Kingdom, matching each country bank to a London agent. The other dataset includes all bankruptcy records in England for

[4]I supplement these two databases with parish/town-level population data from Census of Great Britain (1821).

the period December 1, 1824 to June 30, 1826. This section describes the datasets. Additional details are provided in Appendix A.

3.1 Banking Network

I construct the banking network characterizing the English financial system from 1820-1830 using five years of data from the Post-Office London Directory: 1820, 1823, 1825, 1827[5], and 1830. For the main results of the paper I identify country bank branch failures on the basis of their disappearance from the 1827 London Directory relative to 1825. This introduces some measurement error since I am not able to learn when a branch's existence was recorded for publication in the Post-Office Directory, and some may be mistakenly omitted in 1827, resulting in a misidentified failure.

Table 1 describes some of the features of the data. Consistent with narrative evidence about the banking system at the time, the number of country bank branches in England peaked in 1825, and began to decline afterwards. The greatest number of failures per year came between 1825 and 1827, my window of study. However, a large number of disappearances occurred between 1827 and 1830, likely driven by other changes like the prohibition of small note issues, the introduction of joint stock banking, and competition from the branches of the Bank of England that opened during this period.

3.2 Firm Bankruptcies

The second set of data I collect is individual bankruptcy statistics from the Edinburgh Gazette.[6] The records include the date of the announcement of

[5]I thank a researcher at Reed College for providing access to the 1827 volume.

[6]Bankruptcy notices for all of Britain had to be printed in the London, Dublin, and Edinburgh editions of the Gazette. For English bankruptcies the Edinburgh Gazette prints the information most readably. However, using Edinburgh Gazette entries means I don't capture bankruptcies in Scotland and Ireland well, so despite having information on the London agents of many Scottish and Irish banks, I exclude these countries from the subsequent analysis. Appendix A.2.2 includes a further discussion of the decision to focus on England.

the bankruptcy proceedings to the general public, the bankrupt individual's name, location of residence, and occupation. To my knowledge, this is the first time these records have been collected at the town level rather than at the national level.

Bankruptcy commissions could seize an individual's assets, determine which creditors would be paid, and how much each creditor would receive. To be eligible for bankruptcy, an individual's total debt had to exceed 100 pounds, a large sum at the time, and the individual had be classified as a trader rather than a farmer or a professional (Duffy (1973)). These criteria remained fixed over the period of study. This means that the data I collect omits gentlemen, farmers, professionals like attorneys and doctors, and merchants owing amounts under one hundred pounds. Private businesses were not entitled to limited liability during this period because of the Bubble Act of 1720, so I treat individual and firm bankruptcies as equivalent and refer to bankruptcies as firm failures throughout the paper.

The sample I collect covers December 1, 1824 to June 30, 1826 and includes 1,440 bankruptcies in 488 towns, 208 of which had country bank branches. Bankruptcies increased substantially across all occupation classes (see Table 2). Note that I discover just 42 bankruptcy notices for bankers during the crisis, compared to the 99 branch failures I identify using the Post-Office directories. In some cases bankers were also merchants or industrialists so I exclude from the bankruptcy database of non-financial firms any individual with the same last name as a named partner in a failed bank. Another reason why bankruptcy notices understate bank failures is that each bankruptcy notice lists a single location, where the individual actually lived. In many cases multi-branch banks failed corresponding to just one individual named in bankruptcy proceedings.

A final concern with the bankruptcy statistics is that many troubled

debtors may not appear in the statistics at all due to the inefficacy of bankruptcy commissions during this period.[7] Hearings on bankruptcy laws conducted in 1818 suggested that in cases of debts less than £1000 the costs of bankruptcy commissions usually exceeded the amount recovered from bankrupts' estates (Duffy (1973)) and were rarely initiated as a result, so I am likely measuring truly large firms. Because of concerns like these, Silberling (1919) and others have used bankruptcies as a barometer of economic activity rather than a measure of activity in itself. Gayer et al. (1975) show that bankruptcies strongly comove with many other cyclical indicators like trade volumes, indices of goods production, inflation, and the money supply at the national level.

3.3 Summary Statistics

Summary statistics for the variables used in the town-level regressions in the rest of the paper are shown in Table 3. Combining all towns with country banks with all towns with at least one bankruptcy over the study period, there are 616 total towns in the sample. Just over half the towns in the sample had at least one country bank before the crisis,[8] and the maximum number of country banks in any town before the crisis was 10 (in Bristol). The number of banks per town whose London agent failed ("Exposed banks") and the number of bank failures per town both range from 0 to 3. Because there is little variation in the number of bank failures I will use a Poisson count model to model bank failures in the IV setup (described in more detail in section 4.3). There is more variation in the outcome variable, number of bankruptcies per town during the crisis, where the number ranges from 0 to 73 (in Manchester).

[7] Duffy (1973) argues that "faulty laws and administration encouraged dishonesty and prevented speedy collection of estates" and that bankruptcy laws were unpopular as a result (p. 153).

[8] In section 5 I show that the IV results are roughly the same in the subsample of 328 towns with at least one bank before the crisis.

4 Results

In this section I first present ordinary least squares results for regressions of individual (firm) bankruptcies on bank failures for 616 English towns. Next, to control for the possibility that bank failures are endogenous to local economic conditions, or that bank failures are mismeasured, I use town exposure to failed London agents as an instrument for town-level bank failures. Before presenting the IV results I discuss the validity of the instrument. Then I use my preferred instrumental variable specification and the bankruptcy occupation data to isolate one possible channel: a negative aggregate demand shock from lost household wealth. Using the historical record, I discuss an additional channel: a credit supply shock to the availability of working capital loans.

4.1 Ordinary Least Squares Results

First, to visually compare the difference in firm bankruptcies between towns with and without bank failures, Figure 3 compares towns with at least one bank failure to towns with banks but no bank failures and shows that these two groups had similar patterns of firm bankruptcies until the Panic of 1825, when towns with bank failures began to experience much higher bankruptcy rates.

Table 4 shows ordinary least squares (OLS) regressions of firm bankruptcies on bank failures. Letting f_i denote the number of firm failures in town i, bf_i the number of bank failures, and X_i a set of town-level controls (town's population, number of pre-period bankruptcies, and an indicator for whether the town had at least one bank before the crisis), the OLS model is:

$$f_i = \beta_0 + \beta_1 bf_i + X_i'\theta + \varepsilon_i$$

The relationship, measured by β_1, is positive as expected, but not statistically significant after controlling for pre-period bankruptcies. Ex ante, my main concern with the OLS results was the possible omitted variable bias inherent in regressing firm bankruptcies on bank failures, as many unobserved local economic shocks could push these variables in the same direction, biasing the estimates of the effects upwards. However, since the OLS results suggest that bank failures had little to no effect on local bankruptcies, the IV strategy can also be used to correct for measurement error in the bank failure variable that may have attenuated the OLS coefficient on bank failures toward zero. This correction (partially) addresses measurement error as long as the country bank's London agent is uncorrelated with the chance it is mis-reported in the London Directories.

4.2 Instrumental Variable Validity

Using country towns' exposure to the financial crisis of 1825 through their banks' connection with London agents that failed during the crisis as an instrument relies on several assumptions. This section discusses each condition that must be satisfied for the identification strategy to be valid and provides evidence in favor of the identification strategy. I find that interbank relationships were conduits of financial stress from large London banking houses to smaller country banks.[9]

4.2.1 Agent Failures Affected Country Banks

The first condition is that the failure of a country bank's London agent had a material effect on the chance that the country bank itself would fail, that

[9]Empirical studies of propagation are rare, as data on interbank exposures have been difficult to obtain, according to Iyer & Peydro (2015). While I also lack data on balance sheet exposures, the environment of 1825 is well-suited to studying propagation in a network with few connections since 98% of country banks had just one London agent.

is, the relevance of the instrument. Evidence from the banking network data shows that bank-agent relationships in the English banking system during the 1820s were sticky: even 10 years later, 76% of country banks that survived until 1830 had the same London agent in 1830 as they did in 1820. This suggests that switching London agents likely involved some cost that country banks were unwilling to pay, and that problems at the London bank would therefore be transmitted to the country bank.

Even if such relationships were sticky, it is still not clear a priori that an agent failure would put financial stress on their country bank clients; it could be that London balances and transactions were an unimportant part of a country bank's balance sheet, in which case the instrument would be weak. Pressnell (1956) uses surviving bank balance sheet data to argue that the London account was the best-managed and most important part of a typical country bank's balance sheet and the first resource in times of liquidity crisis.

Moreover, narrative evidence about the Panic suggests a second channel was at play during this crisis that did not exist in other financial crises studied in this literature. Following the failure of the first London bank on December 12, 1825, "That Monday saw runs upon banks known to be correspondents of Pole's, upon other banks in the same towns, and upon banks in nearby towns." (Pressnell (1956) p. 486). Thus, the failure of a London agent could affect its correspondents through a news channel even if the financial impact of its failure on its correspondents was small. As Duffy (1973) writes, "the failure of a London bank could, by arousing panic in provincial areas, cause the stoppage one after the other of banks which were completely solvent" (p. 249). Even if country banks could costlessly switch to another London agent, financial contagion spread on rumor and relationships as much as actual solvency concerns.

To demonstrate that agent failures during the Panic of 1825 had material

effects on their country bank clients Table 5 shows bank branch-level probit models for bank failures for 561 English bank branches (includes only banks in towns where population data is available).[10][11] Across all specifications, agent bankruptcy has the expected positive association with bank bankruptcy. It seems that banks with multiple branches were more likely to fail than unit banks, which is somewhat surprising given that these banks were better positioned to insure themselves across space. Banks that had been founded more recently were much more likely to fail than older banks.

Column 4 provides evidence that the financial crisis was propagated not just through agent failures but through two additional channels. First, there is the within-town contagion effect: banks in towns where other banks failed were more likely to fail themselves, though this effect disappears once I control for county fixed effects, perhaps suggesting that contagion occurred at the county level rather than at the town level.[12] There is also evidence of the within-agent contagion effect: failures of other country banks' connected to a bank's London agent increased that bank's probability of failure, conditional on whether the agent itself failed or not. See Calomiris et al. (2019) for a similar study of propagation in correspondent banking networks in the U.S.

The magnitude of the effect of an agent failure is large. Using the model in column 3 of Table 5 at the mean of the other covariates, branches whose London agent did not fail had a 19% chance of failing during the crisis while banks whose agent failed had a 31% chance. Given this, plus the finding that there was a within-town contagion effect, the first stage regression of town bank failures on town exposure to London agent failures, reported in Section 4.3, is expected to be a strong instrument.

[10] I treat 13 bank branches with 2 London agents as separate branches in the regressions.

[11] Linear probability models that avoid the incidental parameter problem for the regressions including county fixed effects show qualitatively similar results and are available upon request.

[12] Certain counties experienced no bank failures, so including county fixed effects omits banks in those counties, thus decreasing the number of observations.

4.2.2 No Selection on London Agents

A second assumption necessary for instrumental variable validity is that banks with London agents that failed were not systematically different from other banks. Irresponsible, insolvent country bankers who were more likely to fail ex ante may have chosen irresponsible London agents who were also more likely to fail, creating an upward endogeneity bias in the previous results. Not much is known about how agents were chosen. Pressnell argues that the choice of a particular London banker was affected largely by the nature of the business of the country banker and of his clients, but family ties also played a role. The fact that relationships were so sticky, as already demonstrated, makes it unlikely that more savvy banks were able to foresee and avert risks related to which London agent they used.[13]

Table 6 compares banks with London agents who failed during the crisis to those whose agent survived and shows few differences. Banks in these two groups were equally likely to have more than one London agent, be founded in the last five years, had roughly the same number of competitors in their town, and their towns had roughly the same number of firm bankruptcies in the pre-crisis period. The only statistically significant differences between the two groups are in the number of bank branches, with exposed banks having fewer bank branches on average, and exposed banks tending to be in towns with lower populations. In the regression analysis I control for town size to account for this difference.

Historical evidence also supports the fact that the exposed banks were no more risky than other banks ex ante. Many country bank failures during the 1825 panic were caused by illiquidity rather than insolvency. By 1828 23 out of 63 banks that declared bankruptcy during the crisis had resumed

[13]I also show in a placebo test in Section 5 that having a London agent that failed in 1825 did not predict bank failure in 1823-1825.

payment, and records from the same year show that an additional 31 of these 63 were still attempting to resume operation (Pressnell (1956) p. 491).[14] Still, payment stoppages that were successfully resolved several years later could have large consequences in the short run, as discussed later in this section.

4.2.3 Exclusion Restriction

The final requirement for the instrument to be valid is the exclusion restriction that failures of the London agents serving a town's country banks did not affect local economic conditions, especially firm bankruptcies, in any way other than through financial stress on the town's country banks. London agents did occasionally lend to and take deposits from firms outside London, and may have been more likely to lend to firms in towns where they had a country bank client. Few balance sheets have survived to shed light on this concern. On the liability side, Duffy (1973) reproduces the claims of major claimants against Brickwood & Co., a London agent that failed in an earlier banking crisis in 1810. For this particular bank, with liabilities of £621,117, only 6% of those were owed to traders outside of London, and just three individuals made up these claims (p. 381). The country bank with the largest balance at Brickwood, Bowles Bank, accounted for about 20% of all outstanding claims on Brickwood and folded a few months later.

It turns out that the reduced form estimates of the town exposure instrument on the firm bankruptcies at the town level show a *negative* correlation between town exposure to agent failures and firm bankruptcies during the crisis after controlling for firm bankruptcies in the pre-period which is the strongest predictor of firm failures during the crisis (see Table 7). This suggests that the exclusion restriction is valid and the true channel is through country bank failures.

[14]Surviving bankruptcy records from three of these banks show that two were solvent and the third was short only £6,000 on a debt of £71,000 (Pressnell (1956)).

4.3 Instrumental Variable Results

Because the endogenous bank failure variable is a count variable ranging from zero to three, the appropriate first stage is a count model. To account for this, I follow the three stage IV method for non-linear first stages described by Wooldridge (2002) (p. 623) which I summarize below. Doing so avoids using the "forbidden regression" with an endogenous count variable and a linear second stage. In section 5 I show the results carry through in a garden-variety two stage least squares (2SLS) setup. The drawback of that approach is significantly worse model fit and less explanatory power of the exposed banks instrument when trying to fit a linear model to count data for bank failures.

Under Wooldridge's approach, the usual 2SLS standard errors and test statistics are asymptotically valid if the standard IV assumptions hold. If the first stage is correctly specified (that bank failures follow a Poisson distribution in my case[15]) and the errors are homoskedastic (a strong assumption), the estimator is asymptotically efficient in the class of IV estimators.

The estimation procedure is as follows:

Step one, count model for bank failures at the town level:

$$bf_i = \exp(\delta_0 + \delta_1 eb_i + X_i'\boldsymbol{\delta} + \ln(tb_i + 1) + \eta_i) \tag{1}$$

where eb_i is exposed banks (number of country banks in town whose London agents failed during the crisis), tb_i is total banks, and X_i is a vector of town controls. η_i is a random error term. Note that I control for a town's exposure to the possibility of bank failures using the total number of banks in the town. Since many towns had no banks but did have firm failures, I use total banks plus one as the control.

[15]I also estimated a negative binomial model but the estimated over-dispersion parameter α was very close to 0, suggesting Poisson is an appropriate fit. Estimating a zero-inflated Poisson model to account for the fact that many towns in this sample will have no bank failures because they had no banks to begin with also doesn't change the results much. For more on these models see Long & Freese (2014).

I report first stage results with different sets of controls in Appendix D. Here I discuss the results with no controls (column 1 in Table 14). The relationship between the number of exposed banks and the number of bank failures is positive and significant at the 1% level. Interestingly, the incidence rate ratio $e^{\delta_1} = e^{0.393} \approx 1.481$, meaning that having an additional exposed bank increases the rate of bank failures by more than a factor of one. This may capture the contagion effect of runs not just on clients of failed London agents but on other banks in town. Another way to interpret the results is using predicted counts. "Exposed banks" ranges from 0 to 3, and the mean predicted bank failures (conditional on total banks) for each value of exposed banks is 0.15, 0.37, 0.66, and 2.1, respectively.

Step two, first-stage IV regression using predicted bank failures $\widehat{bf}_i$ from the previous step as an instrument for actual failures:

$$bf_i^{IV} = \gamma_0 + \gamma_1 \widehat{bf}_i + X_i'\boldsymbol{\gamma} + \nu_i \tag{2}$$

Obtain predicted bank failures from this regression, denoted $\widehat{\widehat{bf}}_i$.

Step three, second-stage IV regression for firm failures at the town level:

$$f_i = \beta_0 + \beta_1 \widehat{\widehat{bf}}_i + X_i'\boldsymbol{\beta} + \varepsilon_i \tag{3}$$

as in the OLS model I expect β_1 to be positive, measuring the cost of a contraction in financial intermediation for firm survival.

The main results are shown in Table 8.[16] I find that in my preferred specification controlling for local economic conditions using firm bankruptcies in the pre-period and town size using population data, each bank failure causes about 2.3 additional firm failures (column 2 of Table 8). This effect is large:

[16]The first-stage Poisson regressions with each set of controls can be found in Appendix D. The F-statistic reported in Table 8 is the F-statistic for the regression of actual bank failures on the predicted failures and controls. That is, from equation (2).

about half a sample standard deviation (5.2) in the town bankruptcy variable, and about one and a half times the sample mean (1.6).

Controlling for pre-crisis bankruptcies seems important given potential omitted variable bias: poor local economic conditions before the crisis could be correlated both with pre-crisis bankruptcies and with bank failures. Or, for local institutional reasons, firm bankruptcies may have been more likely at all times in some towns than in others regardless of size and pre-crisis bankruptcies can capture this difference across towns. The inclusion of pre-period bankruptcies reduces the estimated number of firm bankruptcies due to a bank failure from about 7 to 2.3 and I prefer this more conservative estimate due to the concerns above. Between the second two models, I prefer the model without county fixed effects. The average number of towns per county in my sample is just 15 so there probably is not enough power to identify the effects using variation within counties.

The number of firm failures caused by each bank failure might appear modest, but the discussion in Section 3 about using bankruptcies as a barometer of economic activity overall suggests that towns with bank failures were likely to be suffering greater output losses than towns without failures. Moreover, I find that having a local bank played a mitigating role in the crisis overall: holding the number of bank failures fixed, towns with at least one bank had fewer firm failures than towns without a bank (coefficient on "Has bank" is negative). This could suggest that banks made better quality loans to firms in their own towns, since monitoring was easier, or that surviving banks provided liquidity in the form of country bank notes that helped their towns weather the crisis better than towns without easy access to a local means of payment.

To understand the aggregate implications of bank failures during the crisis, I perform a simple counterfactual analysis using the results in Table 8. Taking the estimated coefficients from equation 3, I instead assume a world with no

bank failures, setting the value of the bank failures variable to zero for all towns. Comparing this predicted value to the model-predicted value with actual bank failures, firm failures rise by 27% less when bank failures are zero.

4.4 Discussion

The above results show a causal relationship between bank failures and firm failures in the short run, suggesting a role for banks in promoting economic activity in the towns they served. In this section I describe two possible ways for bank failures to cause firm failures.

4.4.1 Aggregate Demand

Towns outside London did not usually use Bank of England notes until after 1826, and instead relied on country bank notes.[17] Day laborers' wages were usually paid with country bank notes and these notes subsequently circulated through purchases of local goods and services. Failures of the banks backing these notes could wipe out the household wealth of noteholders as well as wealthier depositors. For example, the failure of the bank Turner, Turner, & Morris, was said to have caused "much alarm and difficulty among the middling and lower orders, as the circulation of their notes was very great" (The Examiner (1825a)).

Whether the value of bank notes issued by bankrupt bankers was wiped out entirely or whether they continued to circulate at a fraction of their face value is unclear and seems to have varied. There were some cases where a particular local merchant would accept bank notes of a defunct bank in exchange for goods at a fraction of their face value, hoping to recover some

[17]Testimony given to Parliament by the Governor of the Bank of England in 1832 suggested that the public had preferred private notes issued by a banker they knew and trusted to notes issued by the Bank of England that were subject to forgery to a greater degree than country notes (Great Britain (1832)).

of the value in bankruptcy proceedings according to parliamentary testimony given by (Pease (1848)).[18] At other times, small noteholders themselves were forced to participate in bankruptcy proceedings to recover the value. Banks that failed in 1825 eventually paid an average of 85% on their obligations (a figure of 17 shillings on the pound, worth 20 shillings, was cited by Pease (1848).) However, this dividend on the bankrupt's estate was paid out several years after payment was stopped (Duffy (1973)). Whether the noteholder received a large fraction of the value in some years' time, a smaller fraction immediately, or nothing at all, all three constitute a drop in household money balances in the short run.

Recent work by Chodorow-Reich et al. (2018) studies the effect of India's demonetization on economic activity at the local level and finds that local cash scarcity generated substantial output losses. In their model this happens because of a cash-in-advance constraint on a portion of household consumption. Because of this constraint, a negative shock to money balances directly translates to a negative local demand shock as households are forced to cut consumption and the market-clearing level of output drops.[19] Such a constraint likely held for English households in 1825 as well considering the many credit market imperfections (lack of effective enforcement and legal protection for creditors, costly monitoring, information asymmetries) that existed at the time. In a similar setting to the one examined here, recent work by Kenny & Turner (2019) uses narrative evidence to argue that money supply shocks from bank failures in Ireland's banking panic of 1820 resulted in similar contractions in economic activity.

[18] A notice posted in the Northampton Mercury (1826) asserted that anyone who purchased or accepted bank notes of already bankrupt banks had no legal claim to recover the value in bankruptcy proceedings, though the legality of this behavior one way or the other is unclear.

[19] The size of differences in output losses between locations in their model depends both on the size of local money balance shocks and on the size of the non-tradable sector. With a larger non-tradable sector there is less opportunity to smooth idiosyncratic money balance shocks across space. Moreover, in this model, cumulating the estimated local effects like I do in the previous section to obtain the 27% figure is a lower bound on the true aggregate effect because of trade between locations.

Chodorow-Reich et al. (2018)'s model of demonetization and other models of local aggregate demand shocks (for example Mian & Sufi (2014)) predict that firms producing non-tradables will be differentially more affected by local aggregate demand shocks than firms producing tradable goods. This is because tradable goods may be exported to areas that are less affected and thus the prices of these goods will fall by less than the prices of non-tradable goods and services.

I use the preferred IV model to investigate whether non-tradable firms did indeed experience higher bankruptcy rates than tradables firms during the Panic of 1825.[20] As expected, I find no statistically significant effect of bank failures on tradable firm failures in Table 9, while non-tradable industries were significantly affected. Each bank failure results in 3.5 non-tradable firm bankruptcies. The results are suggestive that a drop in local aggregate demand was an important channel and the magnitude of the difference in the effects on the two sectors is very large, but the results are not conclusive since the coefficients are statistically indistinguishable.

4.4.2 Credit Supply Shock

The devaluation of existing bank notes held by households was just part of a larger drop in the availability of country bank notes that were the primary means of payment in British towns. Banks supplied their bank notes to firms as a form of working capital in exchange for longer term promissory notes. Pressnell writes that "the bankrupted banks represented a reduction of the means of payment and an immobilization of much capital. The survivors contracted their lending... contraction enforced by caution was reinforced by reduced confidence in the ordinary banks" (p. 491). Thus, much like the recent financial crisis, the Panic of 1825 was characterized by a contraction in

[20]The first stage results are the same as column 2 of Table 14 in Appendix D.

bank lending to firms. James et al. (2013), studying similar disruptions to the payment system in correspondent banking networks in the U.S., argue that these stoppages act as severe adverse supply shocks, mainly by preventing firms from being able to make payroll. They find that payment stoppages by New York banks (analogous to London banks) from 1866-1914 were associated with declines in real activity of 10-20%.

Figure 4 approximates the contraction in short term lending by showing the volume of *new* bank notes issued, differentiating small and large denominated bills. Small denominated bills were commonly used to pay workers' wages.[21] The Bank of England responded to the credit crunch by issuing its own notes[22], but not enough to completely offset the contraction in private notes. The fact that small private bank note issues never recovered was due to the 1826 banking reform requiring that notes under £5 had to be withdrawn by 1829. Unfortunately, no data on note issues at the local level is available so it's not possible to identify the causal effect of credit contractions on firm failures during this period.

The above discussion provides support for the arguments of Crouzet (1972), Pollard (1964), and Mathias (1973) that country banks did indeed contribute, at least modestly, to industrialization, but largely not through long-term lending for fixed capital formation, as Brunt (2006) argued more recently. The above reexamination of the historical evidence suggests that country banks provided liquidity to provincial economies and greased the wheels of nascent factory systems by supplying a means of payment through working capital loans.[23] This is why I can detect effects of country bank failures in the very

[21]The cash in advance model of Sargent & Velde (2002) provides an example of how the composition of the money supply can play a role in determining output. Smaller denominations provide greater liquidity services in the model.

[22]The Examiner (1825a) quotes a local Birmingham paper: "the failure of the house of Smith and Gibbins created a good deal of local inconvenience from the quantity of their paper which was in circulation...It appears that the issue of £1 Bank of England notes in Birmingham, has been very considerable, and by no means unwelcome."

[23]According to Crouzet (1972) "short-term credit to finance increases in inventories was quantitatively

short run, six month period during and after the crisis. If long term lending were the main driver, so many failures of large firms would likely not have occurred so rapidly.

5 Robustness

This section explores various robustness checks for the results already presented. I check that the firm bankruptcy results hold in the subsample of towns with at least one bank. I test an alternative instrument that uses only exposure to London agents directly connected to the Latin American debt crisis. I use a placebo test to show that the instrument only predicts country bank failures during the crisis period. Finally, I show that the results hold up to assuming a linear model rather than a Poisson model in the first stage.

One concern with the main IV results is that I pool towns with and without banks together. While these towns experienced bankruptcies (hence their inclusion in the dataset), recording zero bank failures for these towns is misleading in the sense that they had no bank to begin with. Other unobserved differences between towns with and without banks, such as financial integration with London or level and type of of economic activity, may correlate with bankruptcies and bias the results in one way or another. So, in this first robustness check, I consider the subsample of towns with at least one bank at the beginning of the crisis, leaving 328 towns total. The results in Table 10 suggest that the main IV results broadly carry through to the subsample of towns with banks, though the effect of bank failures is estimated to be smaller than in the main results. Precision is a concern here since the sample size has been reduced substantially. Since the results are mainly driven by non-tradables, I check the effect of bank failures on non-tradables only in the

by far the largest need of industry" during the industrial revolution.

bank town subsample in columns 4-6. Here I find similar results to the full sample.

As already mentioned, only three of the London banks that failed during the crisis were directly connected with the Latin American debt crisis through their payee role, though it is likely that the others that failed were exposed through holding these securities on their balance sheet. Using the failure of the other banks ignores reverse causality concerns that country bank failures may have caused their London agent to fail, overstating the strength of the instrument and potentially violating the exclusion restriction. One can see in Table 11 that the F-statistics are still quite large and only slightly smaller than the baseline F-statistics. The main IV results are not at all sensitive to using this alternative instrument.

Next, to further check the validity of the instrument and ensure that there were no systematic differences between London agents that did and did not survive the 1825 Panic, I use a placebo test. The probit models reported in Table 12 show that agent failure during the 1825 crisis did not predict earlier county bank failures between 1823 and 1825, after controlling for agent characteristics like the total number of clients the agent had and the agent's total number of correspondent failures over the same period. Interestingly, in normal times (1823-1825), the failure of one of the bank's local competitors reduced the probability it would fail, presumably because this expanded its business prospects. However, during the crisis the within-town contagion effect dominated and reversed the sign on "CB bankruptcies in same city." This is a novel finding relative to the analysis of Calomiris et al. (2019) who find a consistently negative effect of the failure of other banks in town during the Great Depression in the U.S., perhaps because their analysis covers a protracted period with elevated bank run risk, whereas my sample covers both the boom and bust parts of the credit cycle.

Finally, some may be skeptical of the non-standard three-step procedure I employ for the main IV results and prefer a standard two-stage linear IV approach. The main problem with this approach is that a count model fits the bank failure data much better, as discussed in Section 4.3. Using the town's number of exposed banks as an instrument in a linear first stage is weak, whereas it is a strong and statistically significant instrument when using the count model. Nevertheless, the main results are largely unchanged by using the standard two-stage linear setup (Table 13).

6 Conclusion

This paper contributes to two strands of literature. The first is on the output costs of banking crises. Recent studies have generally focused on firms directly connected with financially stressed banks and have not attempted to identify spillovers to local demand. I instead focus on the role of banks in the payment system and show that payment suspensions and bank failures affected local aggregate demand directly during the Panic of 1825.

In general, the effects I find demonstrate that the first modern financial crisis in Britain looked somewhat like financial crises in the twenty-first century, but with important institutional caveats. In particular I argue that the destruction of household wealth when private bank notes lost value was likely the most important channel of transmission from financial shocks to the real economy, but classical features like a contraction in bank lending and a loss of market liquidity for previously safe assets may have also been important.

These findings update arguments in the second strand of literature on the importance of finance in the industrial revolution in England. The rapid spread of bank failures to bankruptcies of non-financial firms suggests that banking services, particularly the means of payment they provided to households

and firms, were important for the normal functioning of local economies at a short-term frequency. This point may be useful for understanding the potential consequences of rapid demonetizations like India's in 2016 as well as the potential costs of disruptions to cryptocurrency payment systems as these currencies become more widely used.

Finally, I have found that integration in the form of the correspondent banking network played a critical role in transmitting financial stress induced by the Latin American debt crisis in 1825 to provincial economies. This finding is consistent with models of failures in networks of interdependent financial organizations (see Elliott et al. (2014), for example). These models predict non-monotonic effects of financial integration: integration initially allows contagion to travel farther, but eventually reduces individual organizations' exposure to their own idiosyncratic shocks. For example Scotland, with its more mature and well-integrated banking system, experienced much milder effects of the Panic of 1825 compared to England.[24] Geographic integration via correspondent banking may well have had positive effects in normal times; for example I find that towns with banks but no bank failures weathered the Panic with fewer non-financial firm failures than towns without banks. Policy reforms in England in response to the Panic allowed banks to grow larger and expanded branch banking significantly, eventually enabling banks to more effectively smooth idiosyncratic local shocks.

[24]Calomiris & Haber (2014) provide a comparison of the two countries' banking systems during this period. Scotland allowed joint-stock banking and Scottish banks were much larger than English country banks.

A Data Appendix

A.1 Banking Network

As described in Section 3, the banking network data comes from the Post Office London Directories for five years: 1820, 1823, 1825, 1827, 1830. Historical records suggest these directories were published annually, but I was only able to locate and access these five years. The directories were published under the patronage of the postmaster general, and were meant to provide the names and addresses of government officials, merchants, and public companies. The relevant section in each year is called "A List of Country Bankers", which contains the name (almost always the partner names), town, and London agent of all country bank branches that drew on a London bank.

I transcribed these records by hand since the number of entries was manageable, around 600 country bank branches per year. After transcribing each year separately I matched bank branches over time using their name and location. Country banks were limited to six partners, and partnerships changed somewhat frequently over time according to Pressnell (1956), so I chose to consider two branch-year pairs a match as long as the location and at least one partner name was the same. Within each year I also tried to match country banks branches across different locations to identify branches of the same banks. Here I used partner names and London agent, assuming that different branches would have the same London agent. Around 2% of country bank branches had two London agents rather than one and I recorded each of these connections separately.

A.1.1 Identifying Agent and Bank Failures

As discussed in Section 3, my identification of branch failures is based on branches that disappeared from the Post-Office Directories between 1825 and

1827 rather than on direct evidence. London agent failures identified using the same method match narrative evidence from James (2012) and Dawson (1990) closely (both sources list examples of London agents that failed during the crisis). I further use Price (1890)'s Handbook of London Bankers, which attempts to provide a comprehensive guide to all London banks in the 19th century, to verify when agents failed. In any case, agent failures are less likely to be mismeasured by my strategy since each agent shows up in the Directories as many times each year as they have clients, which is nine on average. Country bank branches, which only appear once, are much more likely to be mismeasured.

A.2 Firm Bankruptcy Data

The bankruptcy data comes from the Edinburgh Gazette. There is a gap in the Edinburgh Gazette publications available online from July to December of 1826, so I end the analysis with June 30, 1826. The crisis period is thus December 1, 1825-June 30, 1826. To have a comparable sample and to help control for seasonal variation in bankruptcies, I begin collecting data December 1, 1824. Excluding bankruptcies in the urban areas of London and Middlesex, I am left with 1,440 individual bankruptcies over the study period (excluding bankruptcies from July 1, 1825 to November 30, 1825). I exclude that period because of uncertainty about whether it falls into the pre- or post-crisis period.

When an individual declared bankruptcy or was sued for bankruptcy by a creditor, a notice was required to be posted in the London, Edinburgh, and Dublin Gazettes so other creditors were aware of the proceedings. Marriner (1980), an authority on bankruptcy statistics from this period, argues that Gazette records provide an accurate picture of bankruptcy statistics because the government-appointed Commission of Bankrupt had to certify that creditors

had a legitimate claim before notices were posted in the Gazettes. Duffy (1973) analyzed 50 bankruptcies from 1810-1811 and found that for 41 out of 50 cases of payment stoppage, bankruptcy proceedings began within one month, so the dating is fairly accurate.

By searching all banker names in the Post-Office Directories that I identify in those databases as bankrupt, I find that some bankers' occupations are not listed as banker in their bankruptcy notices in the Gazette. This misclassification could introduce bias by understating banker failures and counting them as non-financial firms, so I drop bankruptcies of individuals with the same name as the bankers who failed, but I may miss some since not all partner names are listed in the London Directories. For banks with two or more partners listed, however, I actually find few cases where more than one partner went bankrupt.

A.2.1 Occupation Classifications

Occupation titles vary widely, so after transcribing the data I classify each occupation into eight broad categories: bankers, other financial occupations, trade, manufacturing, retail, food, clothing, and construction. In cases where multiple occupations are listed I make the classification based only on the first occupation listed. I also separately classify occupations according to the four categories (tradables, non-tradables, construction, and other) used in Mian & Sufi (2014), matching occupation titles in the Gazette to the 4-digit NAICS industries listed in the appendix of that paper as closely as possible, with the exception of food- and beverage-related occupations all of which I classify as non-tradable. I also collapse construction occupations into non-tradables unlike Mian & Sufi (2014) because the exogenous shock in 1825 was unrelated to house prices.

A.2.2 Focus on England

As discussed in Section 3, I focus exclusively on English bankruptcies rather than Irish or Scottish bankruptcies. This is acceptable because both countries differed from England in important ways. In Scotland, for example, joint-stock banks were not prohibited, banks had limited liability, and most banks had many branches,[25] more closely resembling modern day financial systems and allowing Scottish banks to better weather crises like the 1825 panic.[26] Both Scotland and Ireland had their own (proto-)central banks, adding an additional layer to the institutional differences between these national contexts. It is not clear how and where Welsh bankruptcies were reported, but I find very few Welsh bankruptcies reported in the Edinburgh Gazette despite Wales having a large number of country banks, so I also exclude Wales.

[25]Black (1995) provides a useful description of how the Scottish system differed from the English system.

[26]The *Edinburgh Courant*, quoted in the December 25th, 1825 edition of The Examiner (1825a), wrote "The consideration of these circumstances forces upon our notice the superior security which our Scottish banking establishments afford...the alarm of the money-market in London has scarcely been at all felt."

B Tables

Table 1: Post-Office London Directories, English Banks Only

	1820	1823	1825	1827	1830
Number of towns	340	347	358	318	302
Number of country banks	465	465	470	418	370
Number of country bank branches	555	569	593	505	489
Number of London agents	61	57	56	50	48
Average bank (branch) failures per year	21	26	64	58	

Source: Post-Office London Directories, 1820, 1823, 1825, 1827, 1830. Average bank (branch) failures denotes the average number of failures per year in the years between the given year and the next year in which data is available.

Table 2: Bankruptcies in England from Edinburgh Gazette

	Pre-Crisis	Crisis	Total
Bankers	1	42	43
Other financial	11	37	48
Trade	74	202	276
Manufacturing	32	255	287
Retail	28	78	106
Food	71	237	308
Clothing	67	187	254
Construction	34	88	122
Total	318	1122	1440

Source: Edinburgh Gazette. Pre-crisis: Dec. 1, 1824-June 30, 1825. Crisis: Dec 1, 1825-June 30, 1826.

Table 3: Summary Statistics for Main Variables

	Source	Mean	Std. dev.	Min.	Max.
Bank failures, 1825-1827	Post-Office Directories	0.19	0.48	0	3
Exposed banks, 1825	Post-Office Directories	0.17	0.43	0	3
Total banks, 1825	Post-Office Directories	0.91	1.17	0	10
Has bank, 1825	Post-Office Directories	0.53	0.50	0	1
Population, 1821, thousands	1821 Census	6.60	12.10	0.07	119
Firm bankruptcies, pre-period	Edinburgh Gazette	0.47	1.76	0	27
Firm bankruptcies, crisis	Edinburgh Gazette	1.64	5.19	0	73
Number of towns: 616					

Pre-crisis: Dec. 1, 1824-June 30, 1825. Crisis: Dec 1, 1825-June 30, 1826.

Table 4: Ordinary Least Squares Estimates for Firm Bankruptcies Dec. 1, 1825-Jun. 30, 1826

	(1)	(2)	(3)	(4)
Bank failures	1.806^{+}	0.820	0.265	0.255
	[0.948]	[0.584]	[0.351]	[0.346]
Has bank	0.079	-0.669*	-0.349	-0.489*
	[0.412]	[0.295]	[0.212]	[0.224]
Population, 1821, thousands		0.320**	0.116**	0.129**
		[0.065]	[0.032]	[0.029]
Firm bankruptcies, pre-period			1.977**	1.942**
			[0.293]	[0.324]
County FE				Yes
Observations	616	616	616	616
R^2	0.029	0.568	0.786	0.813

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 5: Probit Models for Bank Failure

	(1)	(2)	(3)	(4)
Bankruptcy				
Agent bankruptcy	0.181	0.234	0.383*	0.389*
	[0.150]	[0.151]	[0.158]	[0.178]
Number of other branches		0.075*	0.059^{+}	0.039
		[0.032]	[0.032]	[0.041]
Founded 1821-1825		0.333*	0.290*	0.481**
		[0.135]	[0.137]	[0.153]
CB bankruptcies in same city			0.161^{+}	-0.208
			[0.091]	[0.128]
Agent's number of clients			-0.003	0.002
			[0.009]	[0.009]
CB bankruptcies of same agent			0.032^{+}	0.020
			[0.019]	[0.020]
County FE				Yes
Observations	561	561	561	506

Source: Post-Office London Directories, 1820-1830. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 6: Comparison of Exposed vs. Not Exposed Banks, 1825

	Exposed	Not Exposed	Difference	
	Mean	Mean	Diff.	t-stat
Number of bank branches	1.49	2.00	-0.51**	-3.85
Has more than one agent	0.04	0.05	-0.01	-0.40
Founded 1821-1825	0.21	0.25	-0.04	-0.94
Number of banks in town	2.19	2.45	-0.27	-1.42
Population, 1821, thousands	9.25	14.10	-4.85**	-2.65
Firm bankruptcies in town, pre-period	1.18	1.49	-0.32	-0.77
Observations	102	459	561	

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 7: Reduced Form Estimates for Firm Bankruptcies Dec. 1 1825-Jun. 30, 1826

	(1)	(2)	(3)	(4)
Exposed banks	0.978	0.620	-0.366	-0.327
	[1.123]	[0.656]	[0.296]	[0.289]
Has bank	0.424	-0.576^{+}	-0.144	-0.138
	[0.466]	[0.337]	[0.222]	[0.217]
Population, 1821, thousands		0.323**	0.115**	0.114**
		[0.064]	[0.032]	[0.031]
Firm bankruptcies, pre-period			2.005**	2.000**
			[0.294]	[0.289]
County type FE				Yes
Observations	616	616	616	616
R^2	0.010	0.566	0.787	0.792

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 8: Instrumental Variable Estimates for Firm Bankruptcies Dec. 1 1825-Jun. 30, 1826

	(1)	(2)	(3)
Bank failures	6.939**	2.291*	0.981+
	[1.645]	[1.091]	[0.510]
Has bank	-2.781**	-1.053**	-0.749**
	[0.495]	[0.337]	[0.199]
Population, 1821, thousands	0.294**	0.115**	0.128**
	[0.067]	[0.031]	[0.028]
Firm bankruptcies, pre-period		1.904**	1.935**
		[0.321]	[0.316]
1st Stage F-Stat	59.75	46.12	111.54
County FE			Yes
Observations	616	616	616

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 9: IV Estimates for Bankruptcies, Tradables vs. Non-tradables Dec. 1, 1825-Jun. 30, 1826

	T	NT	Other
Bank failures	-1.266	3.546*	0.011
	[1.635]	[1.562]	[0.305]
Has bank	0.223	-1.246*	-0.030
	[0.528]	[0.507]	[0.106]
Population, 1821, thousands	0.091**	-0.004	0.028+
	[0.026]	[0.014]	[0.015]
Firm bankruptcies, pre-period	0.787**	1.041**	0.076
	[0.289]	[0.118]	[0.088]
1st Stage F-Stat	46.12	46.12	46.12
Observations	616	616	616

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 10: IV Estimates for Firm Bankruptcies in Bank Towns Only

	All bankruptcies			Non-tradables only		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank failures	4.254*	0.699	0.371	5.282*	3.028*	0.402
	[1.661]	[0.908]	[0.509]	[2.399]	[1.466]	[0.369]
Population, 1821, thousands	0.399**	0.179**	0.178**	0.122**	-0.021	0.002
	[0.074]	[0.039]	[0.039]	[0.033]	[0.023]	[0.019]
Firm bankruptcies, pre-period		1.901**	1.965**		1.231**	1.097**
		[0.335]	[0.367]		[0.175]	[0.147]
1st Stage F-Stat	52.21	42.73	51.14	52.21	42.73	51.14
County FE			Yes			Yes
Observations	328	328	328	328	328	328

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 11: IV Estimates With LA Agents Only

	(1)	(2)	(3)
Bank failures	7.357**	2.694*	1.020*
	[1.866]	[1.166]	[0.517]
Has bank	-2.925**	-1.193**	-0.763**
	[0.559]	[0.347]	[0.198]
Population, 1821, thousands	0.292**	0.115**	0.127**
	[0.066]	[0.031]	[0.028]
Firm bankruptcies, pre-period		1.889**	1.934**
		[0.322]	[0.316]
1st Stage F-Stat	45.50	39.44	115.75
County FE			Yes
Observations	616	616	616

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

Table 12: Placebo Probit Models for Bank Failure, 1823-1825

	(1)	(2)	(3)	(4)
Bankruptcy, 1823-1825				
Agent bankruptcy, 1825	0.261	0.331^{+}	0.294	0.220
	[0.179]	[0.185]	[0.188]	[0.208]
Number of other branches		0.007	0.018	0.023
		[0.043]	[0.042]	[0.052]
Founded 1821-1823		0.687**	0.698**	0.750**
		[0.167]	[0.169]	[0.186]
CB bankruptcies in same city, 1823-1825			-0.124	-0.462*
			[0.201]	[0.191]
Agent's number of clients, 1823			-0.002	-0.000
			[0.007]	[0.007]
CB bankruptcies of same agent, 1823-1825			-0.028	-0.032
			[0.045]	[0.050]
County FE				Yes
Observations	578	578	578	409

Source: Post-Office London Directories, 1820-1830. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table 13: IV Estimates: 2SLS

	(1)	(2)	(3)
Bank failures	7.371**	3.219**	3.174**
	[1.945]	[1.159]	[1.105]
Has bank	-2.930**	-1.376**	-1.537**
	[0.577]	[0.329]	[0.349]
Population, 1821, thousands	0.292**	0.115**	0.122**
	[0.065]	[0.030]	[0.027]
Firm bankruptcies, pre-period		1.870**	1.912**
		[0.318]	[0.330]
1st Stage F-Stat	21.69	17.21	15.79
County FE			Yes
Observations	616	616	616

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

C Figures

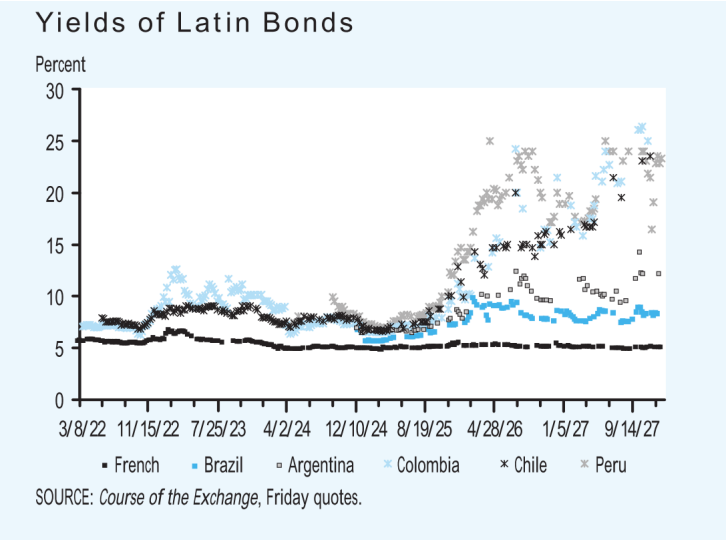

Figure 1: Source: Neal (1998).

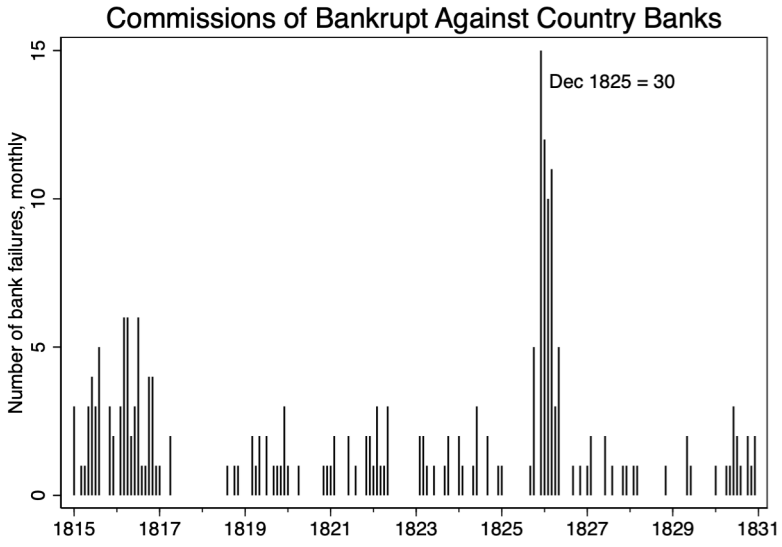

Figure 2: Source: Report from the Committee of Secrecy on the Bank of England Charter, 1832, Appendix No. 101.

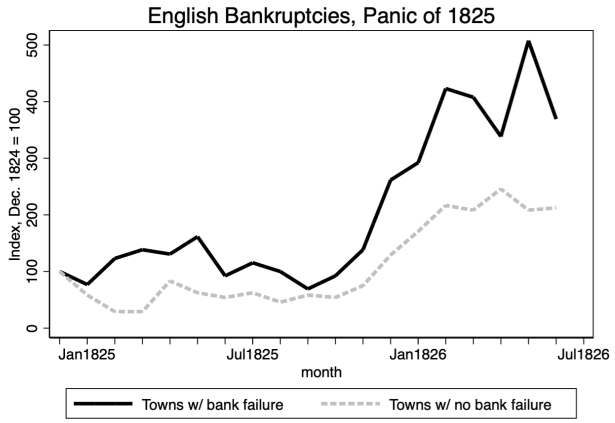

Figure 3: Source: Author's calculations from London Post-Office Directory and Edinburgh Gazette. 133 towns with bank failures and 298 towns without bank failures, indexed to their December 1824 total.

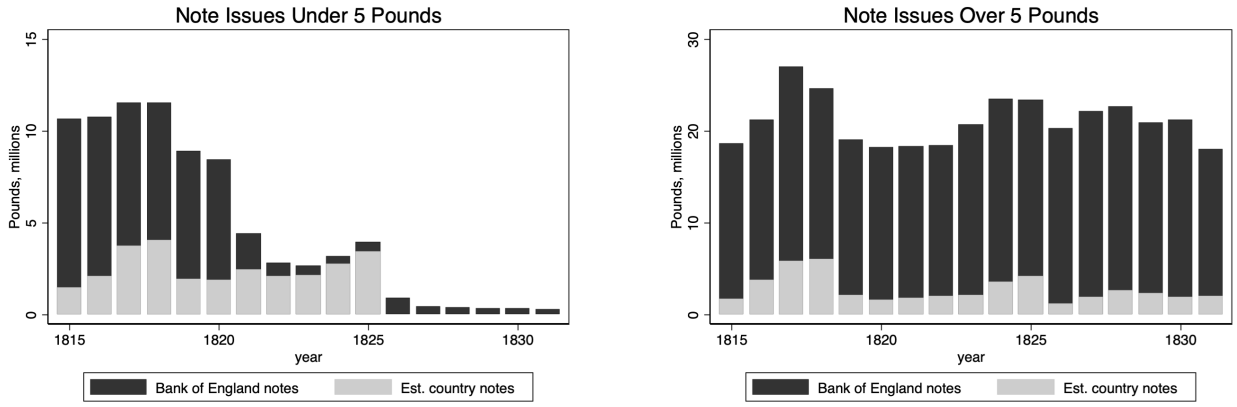

Figure 4: Source: Report from the Committee of Secrecy on the Bank of England Charter, Appendix No. 99 (stamp duties) and Appendix No. 82 (Bank of England notes). I estimate the volume of country bank notes using tax rates and the amount of stamp duties collected.

D First Stage Regressions for Main IV Results

Table 14: First Stages, Including for Main IV Results in Table 8

	(1)	(2)	(3)	(4)
Bank failures				
Exposed banks	0.393**	0.178+	0.173	0.130
	[0.084]	[0.101]	[0.111]	[0.120]
Has bank		16.095**	17.418**	18.604**
		[0.107]	[0.110]	[0.144]
Population, 1821, thousands		-0.001	-0.002	0.007
		[0.003]	[0.008]	[0.007]
Firm bankruptcies, pre-period			0.005	-0.004
			[0.035]	[0.045]
County FE				Yes
Observations	616	616	616	616

Source: Post-Office London Directories, 1820-1830; Edinburgh Gazette; Census of Great Britain (1821). Pre-period for firm bankruptcies is Dec. 1 1824-Jun. 30 1825. Firm bankruptcies exclude banks. Each regression includes a log(total banks+1) control with coefficient constrained to be one. Columns 2-4 correspond to columns 1-3 in Table 8. Reported coefficients are the estimated coefficients in model 1. Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01.

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