



BANK OF ENGLAND

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Georgina Green

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Georgina Green⁽¹⁾

Abstract

This paper investigates whether movements in the Bank of England's interest rate hindered the development of the United States by transmitting or amplifying crises during the first age of financial globalisation. Evidence that US monetary and financial developments entered into the Bank's reaction function implies that a Bank Rate series must include some endogenous rate changes. In order to clean Bank Rate of such movements the narrative approach is applied to a previously unexploited source in the Bank's archives, 'The Record of Outstanding Events'. The Bank also followed a known rule of adjusting Bank Rate to preserve its reserves to liabilities ratio. Bank Rate is also cleaned of the contemporaneous impact of this ratio in order to control for any reflex policy movements that could have been anticipated. This ensures that only true monetary policy shocks to the United States are identified. Estimates derived from this new measure indicate that although the Bank was able, via abrupt rate rises, to attract gold to the United Kingdom and replenish its reserves ratio, it was not responsible for causing or aggravating US crises. This result runs counter to conventional wisdom in the literature and contradicts the hypothesis that many US financial crises extended directly back to Threadneedle Street.

Key words: Bank of England, monetary policy, business cycles, financial crises, international economic history, central banking.

JEL classification: E52, E58, F44, G01, G20, N2, N10.

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1 Introduction

In the first age of financial globalisation many countries tied their currencies to the mast of gold. This created a neat near-mechanical link between members' money supplies, thus providing a unique laboratory in which to test spillovers of monetary policy. Britain and the US were two of the principal gold standard members, accounting for 40% of the world's income by 1913, and the Bank of England was the putative hegemon (Keynes, 1930:306–307). There was an old saying in the City that the Bank of England could, through movements in Bank Rate, “draw gold from the moon” (Leaf, 1927:34). Contemporary observers, such as Sprague (1910), associated episodes of “monetary tightness” in the US with restrictive monetary policy in Britain. Monetary shocks have consequently been identified as the key source of cyclical fluctuations over the classical gold standard period and such shocks have often been attributed to the Bank of England's rate (Huffman and Lothian, 1984:475). There is a consensus that “when the Bank of England raised its discount rate, this led to a short-term capital outflow from the United States, and a gold outflow that reduced the reserves of the commercial banks” (Bordo, Rappoport and Schwartz, 1991:9). If the external drain was accompanied by a seasonally-induced internal one, the situation was, according to the existing literature, aggravated even further, often developing into a financial crisis (c.f. Sprague, 1910; Bordo et al., 1991; Canova, 1991). Two institutional features have been used to defend this view: the absence of a *de jure* US central bank to stem capital outflows, and the classical gold standard, a regime in which numerous national currencies were convertible into a fixed weight of gold (Bordo and Rockoff, 1996:389). The empirical evidence presented in this paper challenges the view that the Bank caused or amplified US crises via Bank Rate.

This paper analyses the impact of UK policy shocks on the US economy during the height of the monetary regime (1884–1913). Evidence will be presented that demonstrates that the Bank, while capable of attracting gold from abroad through movements in the Bank Rate, was not responsible for disturbances in the US, suggesting that criticism of the Bank during the National Banking period may have been somewhat unwarranted. Several factors motivated an investigation of this type. First, although a number of monetarist studies have estimated the effects of gold shocks in the US over this period, demonstrating how they affected the real economy through changes on the

liability side of the national banking system's balance sheet, few empirical investigations have examined the determinants of such shocks.

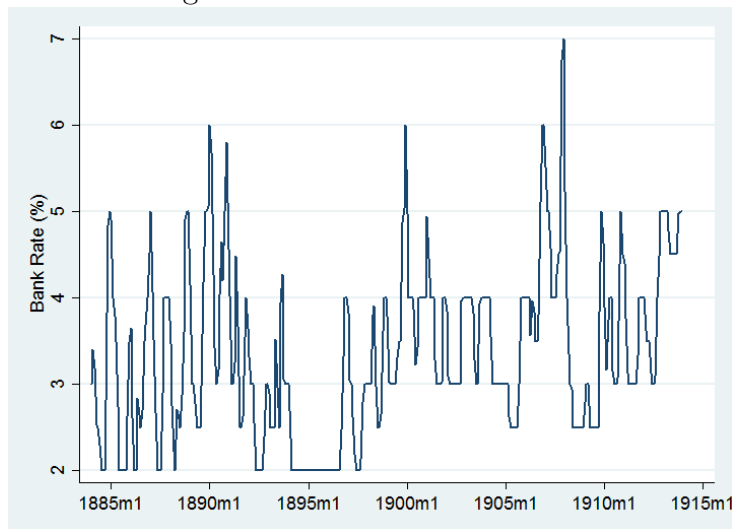
Tallman and Moen's (1998) paper on the National Banking period found that shocks to the American gold supply had a strong effect on US monetary, financial and real variables but did not confirm whether foreign monetary policy was ultimately responsible. Canova (1991) included the exchange rate of New York on London in his VAR to capture shocks from external sources, but he did not focus specifically on the role of the Bank of England or more specifically, Bank Rate. The market could have been acting outside of the Bank's control or another policy tool might have been used to manipulate the relative attractiveness of New York on London and so further investigation is required.

By focusing explicitly on the role of Bank Rate, I am able to improve upon previous investigations into the sources of US monetary disturbances and, in doing so, also estimate the extent of monetary policy spillovers between the supposed hegemon and the largest emerging economy during the last age of globalisation.

There has been a reactivated interest in international spillovers of central bank policies since the latest global financial crisis. Following the crisis, the Federal Reserve's policies were accused of inflating interest rate differentials in emerging economies vis-à-vis the US, leading to large capital inflows, and fuelling inflation (c.f. Neely, 2010; Chen et al., 2011). Although the Federal Reserve's status as today's hegemonic central bank is not exactly analogous to the Bank of England's during the pre-war era, a result refuting that the Bank's policy induced a negative externality on a major developing country in the previous great era of globalisation, may provide lessons for policy-makers today as the scale of financial globalisation and the role of global banks means that even countries with floating exchange rates are not necessarily isolated from policy spillovers (Rey, 2015). Therefore, an investigation into the relationship between the monetary policy of a major central bank and its disruptive impact on capital flows elsewhere is extremely relevant.

In order to identify true monetary policy shocks, I applied the narrative approach of Romer and Romer (2004). To my knowledge, there is only one other application of this methodology to the pre-war era (Lennard, 2017). Much of the empirical research on monetary policy has focused on inter-war and post-war US, and there are far fewer results for British monetary policy,

Figure 1: Bank Rate 1884–1913



Source: NBER series 13013

an exception being Cloyne and Hürtgen (2014). My paper fills this gap, exploiting a rich new source of information for British monetary policy in the pre-war period, which I hope will provide exciting possibilities for future research.

This previously unexploited source suggests that the period 1884 to 1913 was characterised by frequent and severe shocks, contrary to what Gallarotti (1995) argued. Financial crises, wars, and political uprisings continuously threatened to undermine the stability of the classical gold standard regime, which suggests that the survival of the system may instead be attributed to good policy. That the Bank was highly responsive to potential monetary disturbances is illustrated by the variation in Bank Rate in Figure 1. A recent paper by Ritschl, Sarferaz and Uebele (2016) finds increased volatility in the US before 1913. So it is natural to wonder whether the Bank's policy was partly responsible.

This paper will therefore relate to the theoretical literature on the monetary policy transmission mechanism, the National Banking era in the US, and the Bank of England's monetary policy during the heyday of the classical gold standard (c.f. Sprague, 1910; Friedman and Schwartz, 1963; Huffman and Lothian, 1984; Bordo et al., 1991; Canova, 1991; Tallman and Moen,

1998). It also relates to papers that have applied the narrative approach to investigate the effect of policy shocks on the real economy (c.f. Romer and Romer, 1989, 2004; Ramey, 2011; Crafts and Mills, 2013; Ramey and Zubairy, 2014; Cloyne and Hürtgen, 2014; Lennard, 2017).

Crucially, while previous studies have argued that periods of contractionary monetary policy in Britain spurred crises and downturns in the US, I will argue that alterations in the Bank’s main policy instrument were not responsible. My main contribution to the field is finding, via the structural VAR method, that ‘innovations’ in Bank Rate influenced the dynamics of the variables in the US system in a manner inconsistent with contemporary and modern accounts. In particular, I discovered that surprise rate hikes did not have a statistically significant negative effect on US gold or real variables and only a small transitory impact on financial ones. If further investigations confirm this result, then the Bank should be cast in a much more positive light in future accounts of the National Banking Era. It also serves as a reminder that the existence of an active policy maker, especially one following a known rule, hampers the identification of monetary shocks, and that the narrative approach is a useful way to overcome this particular empirical difficulty.

This paper will continue with a summary of the previous literature relating to this field of research. Section 3 then outlines the empirical approach I used to identify monetary policy shocks. Section 4 discusses my data. Section 5 presents my results and robustness checks and finally, Section 6 examines their implications, and suggests possible directions for future study.

2 Background literature

From 1879, when the resumption of gold payments brought the greenback period to an end, until the creation of the Federal Reserve at the end of 1913, the largest component of the monetary base in the US was gold, which was “ultimately a dependent factor controlled primarily by external influences” (Friedman and Schwartz, 1963:89; Miron, 1994:19). Given this feature of the US monetary base during those years of the National Banking Era, and the absence of a *de jure* US central bank, foreign central bank policy may have had a significant effect on the US money supply, in turn affecting the US

financial system and real economy.

This is posited by contemporary observers, such as Sprague (1910), who associated episodes of “monetary tightness” in the US with restrictive monetary policy in Britain, and also by subsequent descriptive accounts. For example, Huffman and Lothian (1984) argued that the Bank’s Rate increases between April 1881 and January 1882 were responsible for large outflows of gold from the US, and these were, according to Friedman and Schwartz (1963), one of the factors which precipitated a short-lived financial panic in New York in May 1884 (Huffman and Lothian, 1984:473–474). Tallman and Moen (1998) argued that European central bank policy in 1893 initiated gold outflows, estimated by Sprague (1910) to have constituted 10% of the total US gold stock over the first five months of that year, which in turn affected financial markets and culminated in the Panic of 1893, causing a drop in industrial production of nearly 40% in less than a year (Tallman and Moen, 1998:385). Sprague (1910), Friedman and Schwartz (1963), and Huffman and Lothian (1984) also argued that the Bank’s actions in 1906 and 1907, led to the panic of October 1907.

There is a diametrically opposed view in the classical gold standard literature. The monetary theorists argue that the system was a self-equilibrating balance-of-payments adjustment mechanism, in which there was little room for discretionary policy making (McCloskey and Zecher, 1976). Although Calomiris and Hubbard’s (1987) VAR analysis found that the US and UK markets were well integrated, claims of perfect gold elasticity are not borne out by the data (c.f. Bordo et al., 1991; Canova, 1991; Jeanne, 1995; Tallman and Moen, 1998). The monetarist view cannot easily account for evidence of discretionary open-market operations and discount policies of central banks, of reserve swaps and international support operations, and of exchange-rate revaluations and devaluations (Eichengreen, 1987:6). Although the characterisation of the Bank as the world’s orchestra conductor would seem questionable when Britain’s size relative to the world economy is considered, the Bank’s unparalleled capacity to attract gold via Bank Rate rises can be accounted for by sterling’s reserve currency role (Eichengreen, 1987).

The growth of the discount market in London may have threatened the Bank’s capacity to control the money market. Withers et al. (1910) noted the extent to which the English banking community worked independently of the Bank, but, according to Sayers (1936), a Bankers’ Committee was set up

in the 1890s to support the Bank's efforts to maintain rates, and this, along with a succession of other changes, gave the Bank greater influence over the London market (Withers et al., 1910:117). Therefore, I assume that, while there was some scope for the market rate to move independently of Bank Rate, there was a pull (Sayers, 1936).

An alternative view promoted by Kindleberger (1981) suggests that the Bank was interested in maintaining stability in the international monetary system, which draining gold from the US might threaten. The fast growth of the US meant that, by Kindleberger's (1981:243) definitions, British "dominance" was quickly giving way to "leadership", implying that British policy-makers increasingly took on an undue share of the burdens of the system. This involved providing public goods, such as maintaining a flow of investment capital and discounting its paper in adversity (Kindleberger, 1973:28). Indeed, there are numerous accounts of Britain acting as a benevolent hegemon in the pre-war monetary system, shielding smaller powers from the effects of monetary disturbances by changing the direction of her capital exports (c.f. Beyen, 1949; Saul, 1960; Ford, 1962). Bergsten (1975) called Britain "the major manager of the pre-1914 monetary history" and Skidelsky (1976) wrote "not only did Britain 'manage' the pre-war economic system, but it is unimaginable that such a system could have developed in the nineteenth century without such management" (Bergsten, 1975:34; Skidelsky, 1976:162). Beyen (1949) noted that, "while it would be naïve to assume that in that period everything was perfect, the disturbances that arose were never of such scope that the machinery of the London market could not handle them. It was always able to absorb the shocks, and the structure of international credit was never impaired" (Beyen, 1949:12).

However, it is extremely unlikely that any finding that the Bank did not drain gold from the US was a sign of benevolence. The Bank's primary objective was to provide for the convertibility of the pound into gold, and its secondary objective was to avoid disturbing domestic trade (Sayers, 1936:116–118). It also had a commercial duty to provide return for stockholders (Pippinger, 1984).

3 Empirical strategy

The VAR approach is a useful way to summarise the behaviour of a system of economic variables. I constructed an eight variable vector autoregression (VAR) and looked for a parsimonious model producing well-behaved residuals by using Akaike's and Schwarz's Bayesian information criteria, which recommended 2 lags. Calomiris and Hubbard (1987), Bordo et al. (1991) and Jeanne (1995) are empirical papers in monetary history which use the same methodology. This method hinges, among other things, on the validity of the measure of monetary policy shocks. In particular, the measure must be free from endogenous and anticipatory movements. Use of an inappropriate measure can either obscure a hidden relationship, or create the appearance of a relationship where there is no true causal link (Romer and Romer, 2004:1055). The absence of a *de jure* US central bank aids the identification of monetary policy shocks, but if the US entered into the Bank's reaction function i.e. it on occasion acted as a *de facto* US central bank, a British rate series would include some endogenous movements, which would lead to biased estimates in a VAR (Romer and Romer, 2004). Indeed, UK rates show seasonality despite experiencing no large domestic loan demand shocks, suggesting they were influenced by seasonal agricultural needs in the US (Calomiris and Hubbard, 1996:197).

In order to identify true shocks and discern whether the Bank's policy ever played an independent causal role, I follow the lead of Romer and Romer (1989, 2004) and apply non-statistical procedures. Friedman and Schwartz (1963) were the first to apply this method to identify disturbances throughout US monetary history, and this approach has come to be known as the 'narrative approach'.

I apply the narrative approach to a previously undiscovered historical source from the Bank's archives to identify in which periods the US entered into the Bank's policy reaction function. I then create a dummy variable equal to 1 in each instance. Including the US dummy as an exogenous variable in the VAR removes such movements, making it possible to investigate the effect of true policy shocks on the US.

As neither the Bank's Court of Directors minutes, nor the Committee of Treasury minutes, provide any information on the motives behind the Bank's policy during this period, Sayers (1936) argued that we can only guess what

objects were actually in the minds of the Bank's governors. Previous papers have relied on references in contemporary journals, leaving out a large part of the Bank's policy making. Lennard (2017) looked at data in the Bank's Daily accounts such as bullion flows, foreign central bank rates and exchange rates to gain a deeper insight into the reasons behind rate changes. I use a new Bank of England source, the Bank Cashier Department's 'Record of Outstanding Events', which includes references to political and economic events of both national and international significance between 1844 and 1924. As the Cashier's department was the principal operational department of the Bank, headed by the Chief Cashier, "who has charge of the issue and payment of notes and all banking business, such as drawing accounts loans, discounts, and all other matters involving dealings in cash", this is an extremely credible source (US National Monetary Commission, 1910).

The record includes instructions that "entries in this column should be confined to matters which may have a definite influence on Finance in the broadest acceptance of the term" and many entries are explicitly identified as causative of rate changes. For example, just before the outbreak of war in South Africa in October 1899, the Cashier Department recorded the "extraordinary circumstances of two advances in Bank Rate in one week . . . due to threatened war with Transvaal and consequent stoppage of gold supplies"; and, for October 1909, "monetary position on Continent leads to higher rates in London" (Record of Outstanding Events, 1899; 1909). When no explicit reason for the rate change was given, the high frequency of remarks on international events mean that events that are recorded in the same month as a Bank rate change can, due to their inclusion in the record and proximity to the Bank Rate decision, be assumed to have had some bearing on decision making. For instance, on the 5th May 1886, the statement "socialist riots in Chicago, about 50 police killed and wounded by bombs, many rioters shot" immediately precedes an entry on the 6th May of a rate rise to 3% (Record of Outstanding Events, 1886).

The Record of Outstanding Events confirms that the prospects of the US monetary position entered into the Bank's monetary policy reaction function. This is unsurprising given the scale of the US economy, and the large trade balance between the two countries, which meant that any unanticipated changes in the US could have interfered with the Bank's objectives.

There are numerous accounts of the Bank reacting to events in the US econ-

omy between January 1884 and December 1913. For example, on the 2nd August 1893 the Bank raised its rate by 50bps to 3%, in reaction to a commercial panic in New York that broke out that day (Record of Outstanding Events, 1893). On the 10th August the Bank hiked the Bank Rate by a further 100bps, due to the large withdrawals of gold for the US, where “banking industrial failures were very numerous (Record of Outstanding Events, 1893). The Bank’s rate rise on the 9th May 1906 to 4% was motivated by the earthquake and fire in San Francisco at the end of April, estimated by Odell and Weidenmier (2004:1003) to have cost the US somewhere between 1.3% and 1.8% of nominal GNP, and caused significant losses for British insurance companies. On the 21st August 1907, the Bank Rate was raised from 4% to 4.5% following a heavy fall in American railway companies on the stock exchange (Record of Outstanding Events, 1907). The following month, on the 18th, there was “anxiety felt about the railway position and danger about a strike”, which came to fruition on the 25th, when the railway dispute began in earnest. Although rates stayed at 4.5% throughout September, the outbreak of panic in New York, after runs on many of the major Trust companies at the end of October and the practical suspension of bank payments, caused the Bank to increase its rate twice in the first week of November, to 6% on the 4th and to 7% on the 7th, an “extraordinary occurrence” (Record of Outstanding Events, 1907). A decision to hike Bank Rate by 100bps in October 1912 coincided with an attempt to assassinate President Roosevelt. For a full list of Bank Rate changes which I identified to be endogenous see table A.1 of the appendix.

As the preceding examples illustrate, it is important to control for endogenous Bank Rate movements. To do so I applied a systematic approach, creating a dummy equal to 1 in all months in which a reference to the US in the record coincides with a Bank Rate change (see Figure 2). This risks removing too many instances. For instance I could instead only select entries which I judge to be related to real and financial variables and, for example, exclude events such as the attempted assassination of President Roosevelt. But this may allow for an element of bias to creep in. The dummy is equal to 1 in 38 instances. This leaves 93 instances, in which Bank Rate was changed in response to a non-US event (see table A.2 of the appendix for a full list). Therefore, being overcautious does not cost much in terms of reducing the power of the test. Including the dummy, as an exogenous variable, ensures that the monetary policy shock variable (Bank Rate) remains continuous.

Figure 2: Bank Rate and US dummy 1884–1913

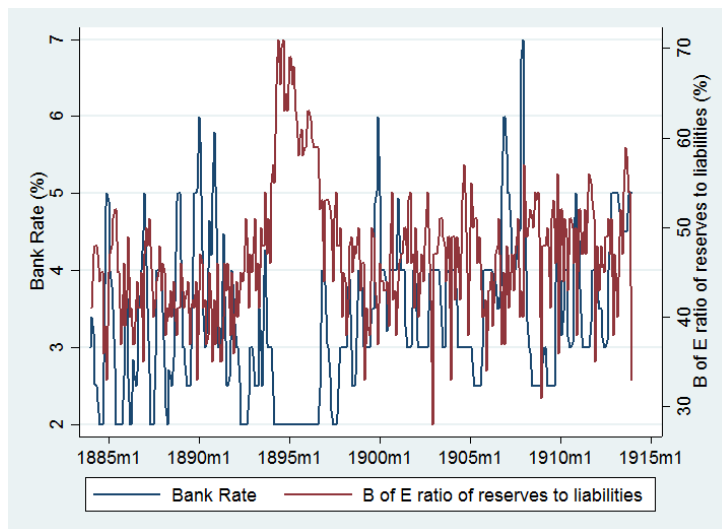


Source: NBER series 13013 and author's own calculations

This allows the magnitude of the policy change to have an impact on the results.

If a rate change was anticipated it would not be expected to have had a significant effect in the same or subsequent periods. Therefore, any rate changes that followed known rules must also be controlled for. The Bank's primary objective was convertibility of the pound and it followed a known rule of adjusting Bank Rate in order to maintain an adequate reserves to liabilities ratio. Including the ratio, which was published regularly in the Bankers magazine, and ordering it before Bank Rate in the VAR, cleans systematic responses to the reserve position from the Bank Rate series. Such rules were contingent, being broken in exceptional circumstances such as wars and financial crises. Any concern that this does not leave enough variation in Bank Rate for a time-series analysis is eased by Figure 3, which reveals that the Bank frequently activated this escape clause between 1884 and 1913, allowing the reserves ratio to fall to below 40% in crisis periods. A shock in the reserves ratio accounts for over 25% of the variation in the forecast value of the Bank of England's rate at 12 months. But a limit to this method is that it does not control for major events that might have been anticipated as influencing the Bank's policy, even before any change in the reserves ratio.

Figure 3: Bank Rate and Bank of England reserves to liabilities ratio 1884–1913



Source: NBER series 13013 and 14087

Ramey (2011) overcame a similar issue but for fiscal policy by constructing a series gauging the public’s expectations of government spending given news. I could attempt to construct something similar for monetary policy but there is more limited information on expectations of monetary policy during this period and as monetary policy tends to react to news much more quickly than fiscal policy, the risk of bias is more limited in an investigation of this type.

Now that the method of isolating monetary policy shocks has been discussed, I shall explain the rest of the ordering amongst variables in the system.

My preferred interpretation of the dynamics is consistent with the following ordering: Bank reserves ratio, Bank Rate, UK gold stock, US prices, US output, US gold stock and finally US financial variables. The reasoning behind this ordering of the US variables is that output is unlikely to be influenced by any other variables within the month, except for sticky prices, while financial variables are highly sensitive. The Bank Rate is ordered after the reserves ratio because, as has been argued above, it was sensitive to the reserves ratio and was adjusted within the month, sometimes even twice a week (Withers et al., 1910).

The model that I estimate is shown in (1). Having defined the empirical strategy the next section will discuss the data.

$$\begin{bmatrix} \text{reserves ratio}_t^{\text{UK}} \\ \text{bankrate}_t^{\text{UK}} \\ \text{gold}_t^{\text{UK}} \\ \text{prices}_t^{\text{U.S.}} \\ \text{output}_t^{\text{U.S.}} \\ \text{gold}_t^{\text{U.S.}} \\ \text{stockprices}_t^{\text{U.S.}} \\ \text{commpaper}_t^{\text{US}} \end{bmatrix} = \alpha + \beta_1 \begin{bmatrix} \text{reserves ratio}_{t-1}^{\text{UK}} \\ \text{bankrate}_{t-1}^{\text{UK}} \\ \text{gold}_{t-1}^{\text{UK}} \\ \text{prices}_{t-1}^{\text{US}} \\ \text{output}_{t-1}^{\text{US}} \\ \text{gold}_{t-1}^{\text{US}} \\ \text{stockprices}_{t-1}^{\text{US}} \\ \text{commpaper}_{t-1}^{\text{US}} \end{bmatrix} + \dots + \beta_2 \begin{bmatrix} \text{reserves ratio}_{t-p}^{\text{UK}} \\ \text{bankrate}_{t-p}^{\text{UK}} \\ \text{gold}_{t-p}^{\text{UK}} \\ \text{prices}_{t-p}^{\text{US}} \\ \text{output}_{t-p}^{\text{US}} \\ \text{gold}_{t-p}^{\text{US}} \\ \text{stockprices}_{t-p}^{\text{US}} \\ \text{commpaper}_{t-p}^{\text{US}} \end{bmatrix} + u_t \quad (1)$$

4 Data

I used monthly, seasonally unadjusted data from January 1884 until December 1913 for all variables. For the UK, I included the Bank of England reserves ratio, weighted Bank of England minimum rate of discount (NBER series 14087 and 13013) and a UK gold stock variable. The gold stock was computed by integrating a net gold (in) flow series, taking a base level of 0 in January 1884. The Bank’s daily data was reported by *The Economist* as weekly totals, so I extended the net gold flow series in Goodhart (1986, Appendix VA, Column 7) back to 1884, by following his method of aggregating the weekly totals given annually in *The Economist Commercial History and Review*. The Bank series differs to the net monthly gold flow provided by the Board of Trade. I chose to use the Bank series because economists who checked the accuracy of the Board of Trade figures became convinced of their unreliability (Goodhart, 1986:83).

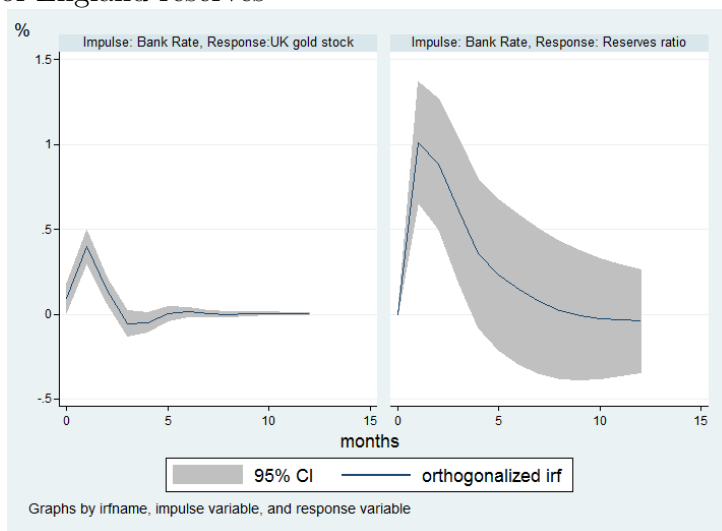
For the US, I included the US gold stock, in millions of dollars, which includes gold inside and outside of the treasury. This series was estimated from monthly series in Reports of the Treasurer until July 1907, and then taken from the US Treasury Department “Circulation Statement of Money” (NBER series 14076). The US general price level index, 1913 = 100 was included as the other money variable (NBER series 04051). I chose to use the prime 60–90 day double name commercial paper rate to represent the

short-term US interest rate (NBER series 13002). I also included a US index of stock prices, 1935–1939 = 100 (NBER series 11025).

Finally, because of the absence of a reliable US output measure, I experimented with three different proxies for the real economy. The first is Miron and Romer’s industrial production index (Miron and Romer, 1990:322). Tallman and Moen (1998) used this index in their investigation into the effect of gold shocks on the real economy during the National Banking era. It was produced to overcome the quality problems in the pre-1919 output data, before the Federal Reserve Board began to produce a comprehensive index of industrial production for the US. The index includes data on manufacturing firms, mines, and a fairly wide range of industrial commodities, and is not contaminated by other measures of economic activity, such as bank clearings, prices, or the volume of foreign trade. As an index of weighted individual series, any bias in weightings may skew the result. Therefore, I also checked the result by substituting in Macaulay’s pig-iron production series, in thousands of gross tons, also used by Calomiris and Hubbard (1987) and Canova (1991) (NBER series 01130), and the US cotton supply, in thousands of running bales from the Commercial and Financial Chronicle (NBER series 05003b,c and d). The agricultural sector was the largest sector of the US economy and probably the most affected by credit. A 1907 survey by the Economist found the domestic effects of Bank Rate were almost completely confined to markets in raw materials, e.g. jute, grain, sugar, metals and cotton. Results from using the three proxies should provide enough evidence to reach some conclusions.

Many of the variables exhibit a strong positive time trend from 1896 coinciding with the “super growth” of gold caused by gold discoveries in South Africa and Alaska and the perfection of the cyanide process for extracting gold (Friedman and Schwartz, 1963:8). Stationising the data is therefore essential. When IRFs were graphed using logged values for all variables, other than the reserves ratio and rates, which were in levels, many of the responses displayed spurious persistence, suggesting another method was required. I therefore employ a VAR with a constant, with all first-differenced data, other than the reserves ratio and rates which were in levels. 11 seasonal dummies wash out seasonality. As the use of the difference filter might bias against finding policy effects I also repeated the investigation with all data logged, except for the reserves ratio and rates, which are in levels, and apply the Hodrick–Prescott (H-P) filter, to remove the cyclical component, with the

Figure 4: IRFs where impulse is Bank Rate, responses are UK gold stock and Bank of England reserves



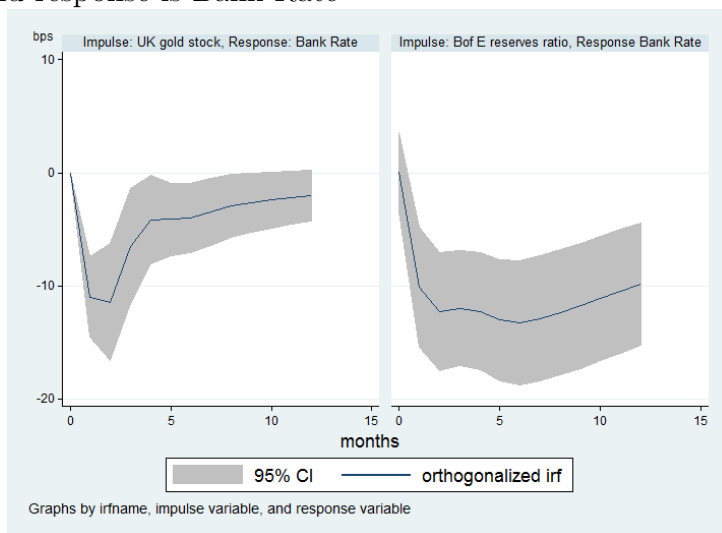
parameter set equal to 129600 as suggested for data at a monthly frequency by Ravn and Uhlig (2002). Due to the issues with the HP filter raised by Hamilton (2017) the first is my preferred method.

Having described the data sources and methods of removing unit roots I shall now discuss the results and their robustness.

5 Results

The discussion of the empirical results will begin by focusing on the impulse response functions (IRFs) for my preferred recursive ordering and method of stationising (UK Bank of England reserves ratio, Bank Rate, first-differenced UK gold stock, first-differenced US price index, first-differenced US industrial production, first-differenced US gold stock, first-differenced US stock prices and finally US commercial paper rate, with the US dummy as an exogenous variable to control for endogenous movements in Bank Rate and 11 exogenous seasonal dummies to control for seasonality). As explained above, the ordering of the recursive structure is that imposed in the Cholesky decomposition, which is that in which the endogenous variables appear in the

Figure 5: IRFs where impulses are UK gold stock and Bank of England reserves and response is Bank Rate

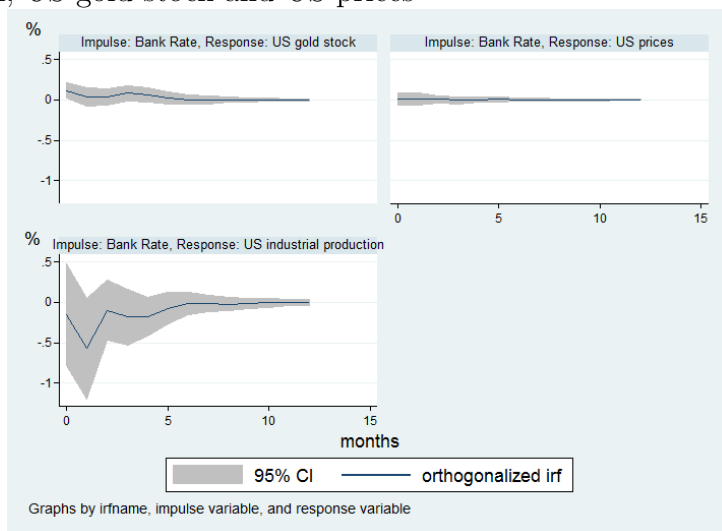


VAR estimation. Including the UK Bank of England reserves to liabilities ratio in the VAR controls for movements in Bank Rate that could have been anticipated based on published figures.

Selected IRFs are shown and discussed below. Each graph shows the dynamic response of a variable in the estimated system, when subjected to a one unit orthogonal innovation associated with a particular variable. The IRFs are plotted within generated 95% confidence levels.

The significant positive response of the UK gold stock and Bank of England reserves to Bank Rate in Figure 4, confirms that the Bank was able to make its rate effective and encourage a decrease in UK commercial activity and imports of gold. There is a possibility Bank Rate was guided by the Market Rate, rather than *vice versa*. However, the Baring crisis, in the autumn of 1890 secured the Bank of England’s leadership of the joint-stock banks and other financial houses. For example, in May 1891 the larger joint-stock banks made an effort to support the Bank of England to maintain market rates (Sayers, 1936:12). The Bank also made several steps to bring itself into closer touch with the market via sale (or purchase) of securities; selling Consols spot and buying back for the account; borrowing “in the market”; borrowing from the clearing banks; borrowing from its own depositors; and

Figure 6: IRFs where impulse is Bank Rate and responses are US industrial production, US gold stock and US prices

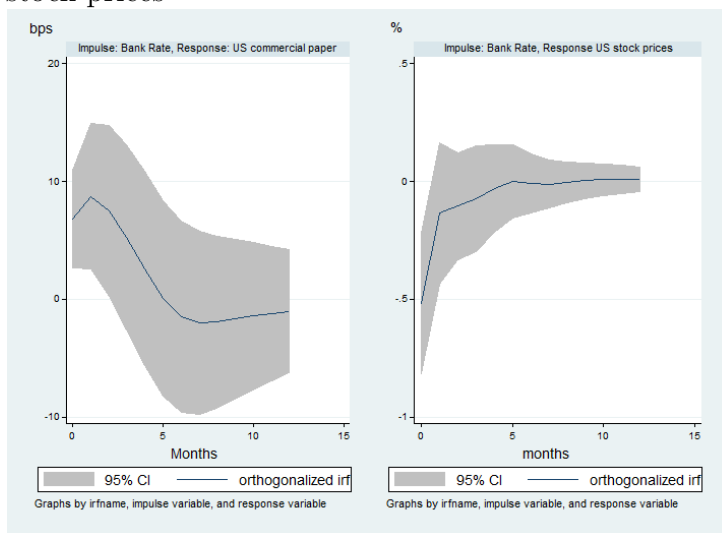


finally moral suasion (Sayers, 1936:25–26).

The significant negative response of Bank Rate to UK gold and Bank of England reserves shows that the Bank subscribed to the contingent “rules of the game” and increased rates when gold flowed out and vice versa (see Figure 5).

Having established that Bank Rate was effective I now examine the responses of US variables to a positive shock in Bank Rate. If the Bank’s policy had a negative spillover impact on the US economy, the US gold stock, industrial production, prices and stock prices would be expected to fall and commercial paper rates rise. The response of the US gold stock to Bank Rate, shown in Figure 6, is very slightly significant but in the wrong direction. During an international crisis, New York banks may not have regarded the deposits of foreign banks as perfect substitutes for gold deposits in New York, as if there was a run on their bank, deposit holders would require gold and so this might explain the positive response. The responses of US prices and industrial production to a policy shock, also shown below, are both insignificant. While positive innovations in Bank Rate did have a significant negative impact on stock prices and a positive impact on US commercial paper as expected, this was not persistent and disappears after just 2 months (Figure 7). This result

Figure 7: IRFs where impulse is Bank Rate and responses are US commercial paper and stock prices



suggests that Bank Rate shocks did not have an important impact on the US financial system or real economy. Moreover, an exogenous shock that motivated a Bank Rate hike might at the same time heighten tensions in US financial markets, so the Bank's policy may not have been responsible for any impact on the US financial market.

Insignificant results from innovations in Bank Rate may be caused by lack of power of statistical procedures that result in wide confidence bands, or by not having enough identifying variation in the data. However, the large number of instances in which the Bank changed its Rate, even when cleaned of US driven rate changes, suggest that the latter is not of much concern, and although lags in the VARs do reduce the power of the test, they are necessary to remove serial correlation, and a long enough time-period was used to ensure that there is not much of a trade-off between the two, suggesting that lack of power is not concealing a positive result.

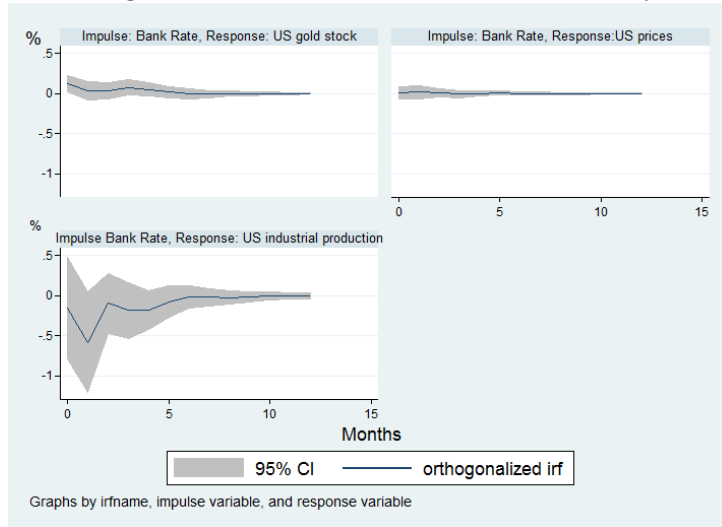
Furthermore, if the gold variable was gold outside of the US Treasury it would be reasonable to argue that the Treasury counteracted any shock gold outflows by injecting gold into the domestic economy. Champ (2007) argues that the US Treasury performed some functions of a domestic central bank, for example, in September 1873 it remedied pressure caused by more severe

withdrawals in the crop-moving season by selling gold and buying bonds. Calomiris and Hubbard (1996) also argue that the Treasury acted to offset outflows of funds from banks by depositing Treasury reserves in the banking system. But I use a total gold stock variable, including gold both inside and outside of the Treasury. As the Bank Rate had no significant impact on the total gold stock in the US this implies that there was no outflow that the Treasury was required to offset.

This implies that, when the Bank raised its rate in reaction to an international crisis, the negative spillover to the US was small. There are two potential explanations for this counterintuitive result. First, as shown in the IRF above, US rates rose immediately in response to a surprise Bank Rate hike, which would have partly reduced any change in incentive to redirect investments from the US to the UK. Second, in reality exchange rates were not completely fixed and transaction costs existed which created a band around exchange rates and these would have been wider around the sterling dollar exchange rate than between sterling and European members. For example, investors faced a higher cost than their European counterparts when moving funds from their US bank account to British bank accounts in the form of a brokerage fee, the cost of shipping gold abroad (transport, insurance fees and tariffs) and the risk that the British rate could fall once gold was in transit. So movements in Bank Rate that were sufficient to overcome such costs in Europe may not have been sufficient in the US. This might explain why the UK gold stock grew but there was no impact on the US.

This does not necessarily contradict Canova's (1991) finding that during international crises, markets stopped providing the liquidity that the US system needed to operate appropriately. The Bank sometimes avoided extreme movements in Bank Rate by acting directly on the gold market; placing obstacles in the way of gold exports, facilitating gold imports and charging a premium on gold (Sayers, 1936:71). For instance, the Bank discriminated against American bills in September 1906 and this was referred to by Sprague (1910) as the most potent factor in the US financial situation (Record of Outstanding Events, 1906). It is likely that such restrictions would have represented monetary shocks for the US and might have had severe repercussions on financial markets and output.

Figure 8: IRFs with modified US dummy

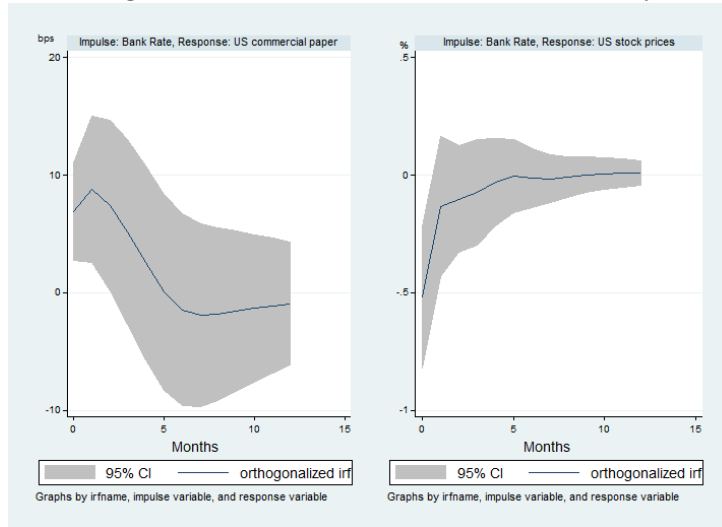


Robustness

Constructing a dummy equal to 1 only in months in which a reference to the US in the record coincides with a Bank Rate change may lead me to incorrectly interpret certain Bank Rate changes as exogenous when in fact they were part of a gradual response to developments in the US. For instance, the rate hike in September 1906 is considered endogenous but the following month is identified as exogenous when it is highly likely that the latter was also a reaction to the “heavy withdrawals of gold for America” mentioned in the Record the previous month. Similarly the rate cut in January 1908 and June 1908 are considered exogenous but it is likely that they were both a “return to normal” following the stabilisation of the financial situation in the US in the wake of the 1907 crisis. I created another US dummy equal to 1 in 5 additional months when it appeared highly likely from evidence in the record that rate changes were part of a gradual reaction to events in the US. As Figures 8 and 9 illustrate, my results are robust to this change in methodology.

As another robustness test I repeated the exercise with two other proxies for output. Figures 10 and 11 refer to the same specifications but using pig iron as a proxy for output and Figures 12 and 13, cotton as a proxy.

Figure 9: IRFs with modified US dummy



That I generated almost identical results to those derived from the initial specification is taken to be supporting evidence that contractionary surprises in Bank Rate had a transient effect on financial markets in the US but did not drain gold from across the Atlantic or have a significant impact on the real economy.

As a further robustness test I repeated the investigation with hp-filtered data. The graphs of IRFs in Figures A.1 and A.2 of the Appendix illustrate that there were no notable changes to the IRFs, which further strengthens my earlier findings.

Next I examined the robustness of these results to an alternative ordering. The alternative ordering is similar to the preferred ordering in Tallman and Moen (1998), with money variables followed by financial, and real variables. By making money and financial variables more exogenous in the VAR this increases the likelihood of finding a significant result. As shown in Figures 14 and 15, I generated almost identical results as all of the other specifications.

Now that I have demonstrated that my initial result, that surprise movements in Bank Rate did not transmit non-US crises to the US is robust, I investigate whether the Bank amplified US crises.

Figure 10: IRFs with US pig-iron production as a proxy for output

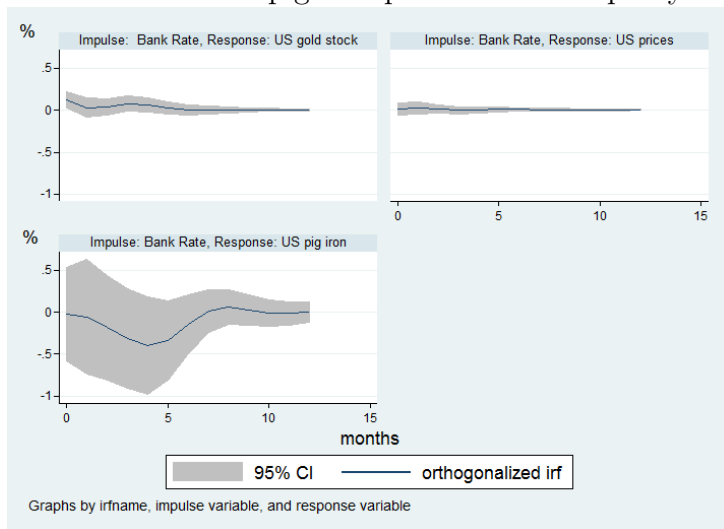
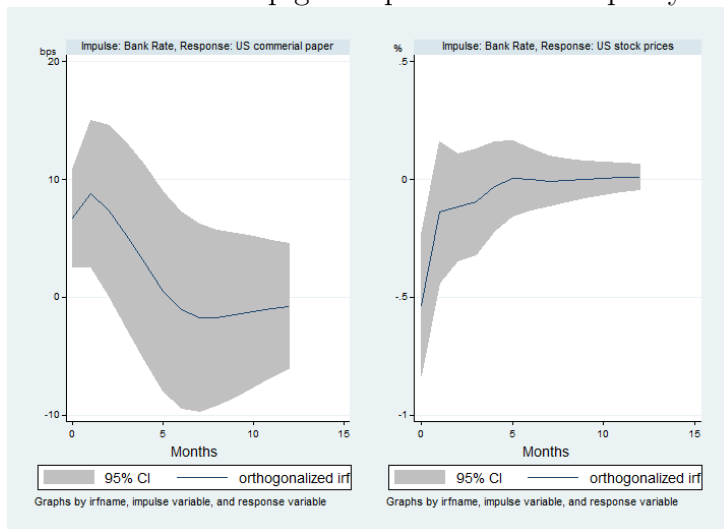


Figure 11: IRFs with US pig-iron production as a proxy for output



The VAR includes the same 8 variables but the ordering is different to reflect that US variables affect Bank Rate contemporaneously. A dummy is included as an exogenous variable, which is the inverse of the US dummy in the previous VARs. The ordering is as follows: first-differenced US price index, first-differenced US industrial production index, first-differenced US gold stock,

Figure 12: IRFs with US cotton production as a proxy for output

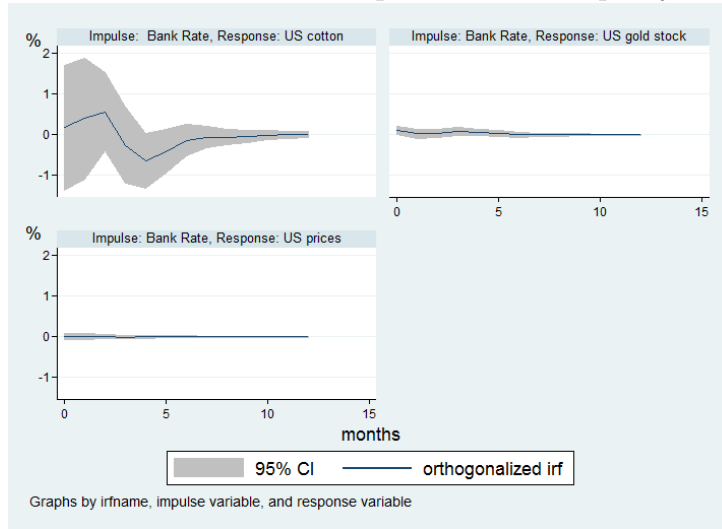
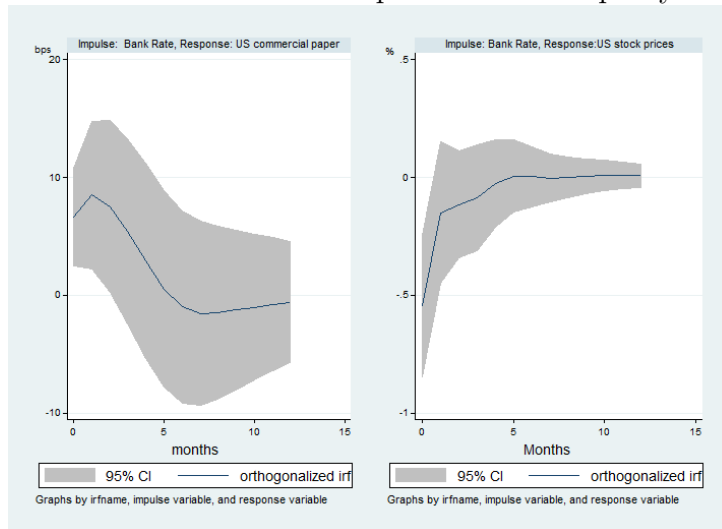


Figure 13: IRFs with US cotton production as a proxy for output



first-differenced US stock prices, US commercial paper, first-differenced UK gold stock, Bank of England reserves and finally Bank Rate.

It is reassuring that innovations in many of the US variables in the system had a statistically significant impact on Bank Rate, as it confirms that the

Figure 14: IRFs where impulse is Bank Rate and responses are US gold, and real variables

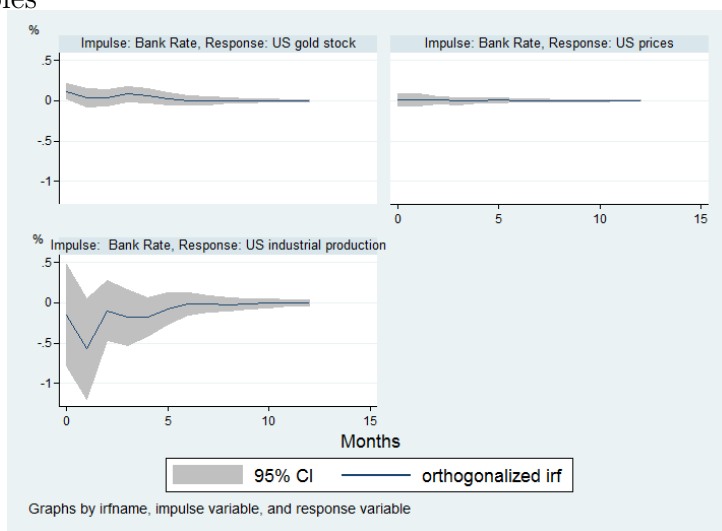
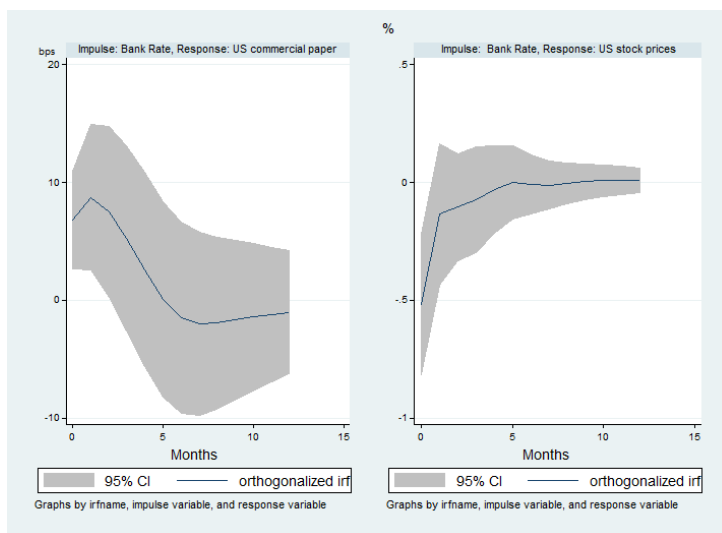


Figure 15: IRFs where impulse is Bank Rate and responses are US financial variables



US entered into the Bank’s monetary policy reaction function. For example, in Figures 16 and 17, a positive innovation in the US gold stock has a positive effect on the Bank rate, as do innovations in the US commercial paper rate.

Figure 16: IRFs where impulses are US gold and real variables and response is Bank Rate (motivated by US events)

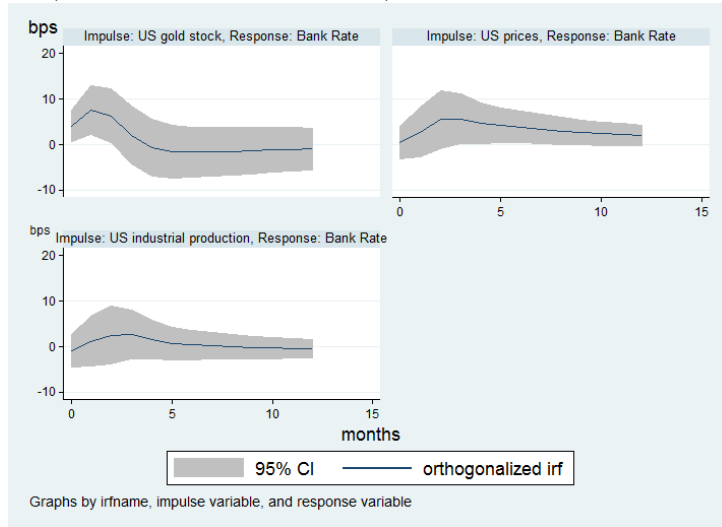
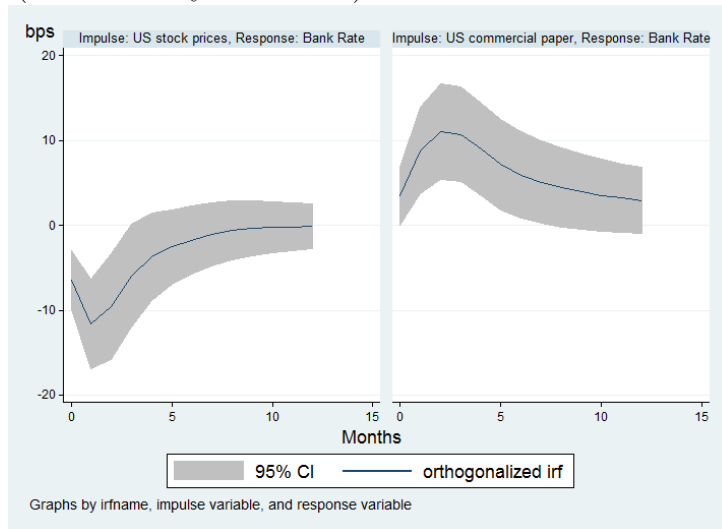


Figure 17: IRFs where impulses are US financial variables and response is Bank Rate (motivated by US events)



It is initially surprising that a fall in stock prices has a positive impact on Bank Rate, but this may be explained by the fact that stock prices fell during times of crises, when the Bank characteristically increased its rate.

Figure 18: IRFs where impulse is Bank Rate (motivated by US events) and responses are US gold and real variables

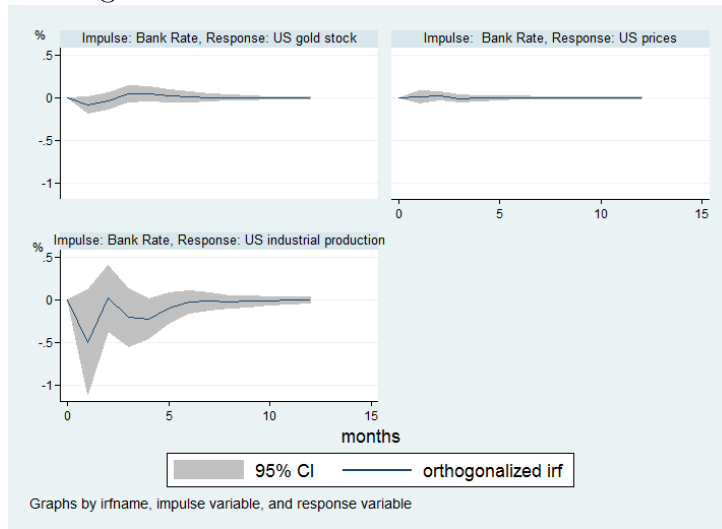
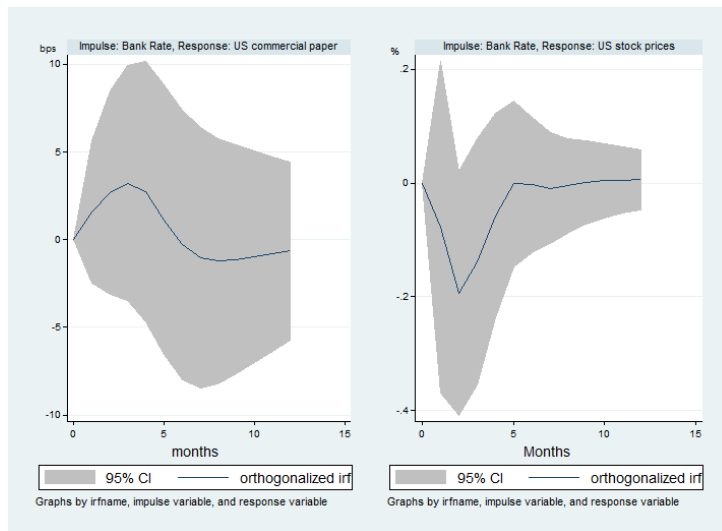
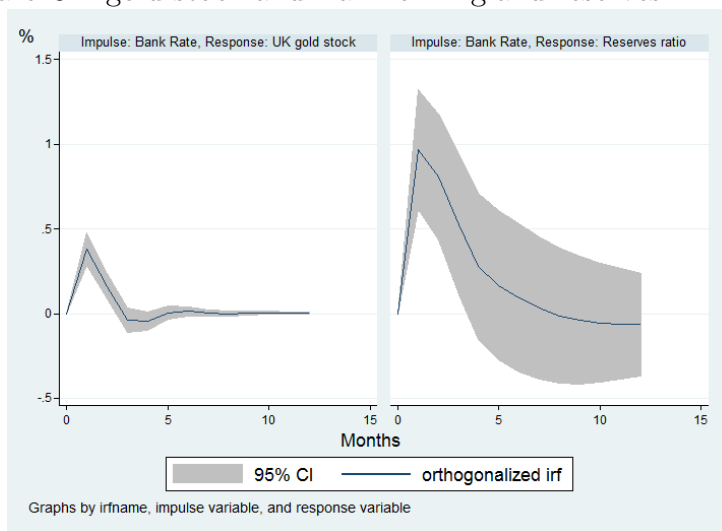


Figure 19: IRFs where impulse is Bank Rate (motivated by US events) and responses are US financial variables



Figures 18 and 19 demonstrate that even when the Bank increased its rate in response to US crises it did not aggravate the US situation. In fact, when the Bank increased its rate in response to a US event this did not have a

Figure 20: IRFs where impulse is Bank Rate (motivated by US events) and responses are UK gold stock and Bank of England reserves



significant effect on any US variables.

As Figure 20 shows, endogenous Bank Rate hikes did attract gold to the UK and increase the Bank of England reserves, but such gold inflows must have been from outside of the US.

Again this might be explained by the wider band-widths of transaction cost that existed between the UK and US than between the UK and other members of the gold standard. But if rate hikes on either side of the Atlantic were powerless to alter investors' incentives, then it is difficult to understand why the Bank carefully monitored and reacted to events in the US.

Some US rate movements must have had the capacity to impact transatlantic gold flows. The absence of a *de jure* central bank in the US and continuous flirtations with bimetallism meant that any shock in the US caused a large spike in rates as the commitment of the US to the gold standard was questioned. Such rapid movements in the sterling dollar exchange rate would have had an impact on gold flows, speeding up gold outflows from the UK to the US. This required the Bank to respond quickly to prevent its external position rapidly deteriorating. Foreign central banks waited to follow the Bank's lead and, in the interim, their demand for sterling assets, as an inter-

national reserves currency, increased (Eichengreen, 1987). As a result gold flowed in to the UK and stabilised the Bank's reserves position. Transaction costs might explain why the change in the Bank's policy only incentivised investment to the UK from some countries and not from the US. When this natural mechanism failed and the Bank's capacity to maintain the convertibility of the pound to gold actually came under pressure, other core central banks stepped in and lent gold to the Bank. For instance, in November 1890 when there were large withdrawals for America, the Bank received loans from France and St Petersburg and in November 1907, it was also assisted by the Bank of France (Record of Outstanding Events, 1890 and 1907). This reflects previous research which found that there was overt, conscious co-operation among central banks and governments of gold standard countries (Eichengreen, 2003).

If the Bank was not able to incentivise gold inflows from the continent, it might have intervened directly in the gold market to encourage gold inflows without further increases in Bank Rate. But if the Bank was able to maintain the convertibility of the pound by attracting gold from outside of the US, any further operations would have been unnecessary.

6 Concluding comments

This paper set out to investigate whether British monetary policy shocks induced negative spillover effects on the US during the first age of financial globalisation. The convertibility of currencies into gold and the absence of a US central bank to stem gold outflows led to a consensus in the literature that the Bank was, at least partly, responsible for US crises. I controlled for a possible endogeneity bias by applying the narrative approach to a rich new source in the Bank's archives and used this to create a new variable that cleaned the Bank Rate of endogenous movements. I also tried to control for anticipated movements by including a Bank reserves ratio variable in the VAR, ordered before Bank Rate. Estimates derived from this new measure of monetary policy shocks, suggest that any spillover to the US was small and transitory and did not have important real effects. However, these methodological controls do not appear to have had a strong impact on my results, since even endogenous changes in Bank Rate did not have a

significant impact on US variables. The main reason my findings differ from previous papers is that I focused on Bank Rate decisions as the source of external shocks. The Bank may still have influenced the development of the US through other means, for example by implementing quantitative restrictions, as in 1906.

These results were robust to numerous checks, including a modification to the US dummy, two adjustments to my proxy for output, a change in the method of washing out seasonality, and a change in ordering, all of which supports my conclusion that there were no large spillover effects on the US from Bank Rate shocks.

This counterintuitive result that the Bank was able, via abrupt rate rises, to attract gold to the UK and replenish its reserves ratio, but was not responsible for causing or aggravating US crises might be explained by a few factors. In reality exchange rates were not completely fixed due to transaction costs. Movements in Bank Rate, which were sufficient to overcome such costs in neighbouring European countries, may have been insufficient to change incentive behaviours related to the US. Continental support of the Bank might have been important in preventing extreme rises in Bank Rate. Finally, unconventional monetary policy such as manipulating gold prices and restricting gold exports may have been more important in the US than movements in Bank Rate. Future research into the spillover effects on neighbouring European countries would be required to determine whether distance and cooperation really did have an effect on gold flows and into the impact of unconventional policy on US gold flows.

These findings highlight the variety and complexity of interlinkages in fixed exchange rate regimes, even in the first age of financial globalisation. These days capital flows across borders at the click of a finger, creating even greater potential for policy spillovers (Rey, 2015). This makes understanding the cross-border transmission mechanism of monetary policy even more essential and the classical gold standard period can serve as a useful laboratory.

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Archival evidence

Record of Outstanding Events, 31st August 1844 – 25th June 1924, The Bank of England Archives (C13), The Bank of England, London, UK

Data

NBER series: 14087, 13013, 04051, 13002, 11025, 01130. Retrieved 01/03/16 from <http://www.nber.org/databases/macroeconomy/contents/>

Appendix

Table A.1: List of *endogenous* monetary policy decisions

Year	Month	Record of Outstanding Events	Details
1884	March	Heavy shipments of gold from New York	Cut
1884	April	Large shipments of gold from New York during the month, chiefly taken by the continent	Cut
1884	October	Issue of \$10,000,000 6% Bonds ordinary stock of the Louisville and Nashville Railroad	Hike
1886	May	Socialist riots in Chicago about 50 police killed or wounded by bombs and many rioters shot	Cut
1886	December	War Rumours – Markets very flat. £380,000 taken for New York	Hike
1887	August	Withdrawal of gold for America	Hike
1887	September	Failures in wheat trade at Chicago	Hike
1890	June	A silver bill passes the US congress but encounters difficulties in the Senate	Hike
1890	August	US treasury achieves great stringency in the New York money market by freely purchasing government bonds	Cut
1890	December	Argentine Committee issue a report. Withdrawals of gold to America	Cut
1891	January	Free coinage of silver bill rushed through the US senate then shelved	Cut
1891	December	Large exports of wheat from US	Hike
1892	January	Differences between United States and Chili	Cut
1892	April	President of US invites European powers to silver conference. Gold exported from US	Cut
1893	June	Renewed exports of gold from the US, reserve considerably below usual limit.	Cut

Table A.1: – continued

Year	Month	Record of Outstanding Events	Details
1893	August	Commercial panic in New York withdrawals of gold from the Bank for America. Continued large withdrawals of gold for the US where banking and industrial failures were very numerous.	Hike
1893	September	Reported negotiations of a US loan in Paris. Failure of US loan negotiations on the continent	Cut
1893	October	Further diminution of US treasury balance of gold and renewal of uneasiness. Silver repeal bill voted by US senate.	Cut
1894	February	Appointment of a commission by Sherman to consider the silver question	Cut
1897	January	Arbitration Treaty between Great Britain and the United States signed	Cut
1897	September	Withdrawals of gold for United States	Hike
1898	April	United States President's message to Congress delivered threatening intervention in Cuba. Fall in prices on the stock exchange owing to expectation of war. American congress determines on war with Spain.	Hike
1898	May	Recovery on the stock exchange in consequences of an American victory at Mansia. Bank rate reduced. Proposals for an Anglo-American alliance discussed	Cut
1898	September	Bank Rate advanced from 2.5% to 3% owing to withdrawals of gold for the United States.	Hike
1902	October	Bank rate raised to 4% as a precautionary measure against the strained monetary position of the United States of America. End of American coal strike after lasting 5 months.	Hike
1905	March	Japanese loan issued in England and United States, a great success.	Cut
1906	May	Earthquake and fire at San Francisco involving serious losses to English insurance companies	Hike

Table A.1: – continued

Year	Month	Record of Outstanding Events	Details
1906	June	Chicago meat packing revelations	Cut
1906	September	Bulk of gold arrivals in London purchased for America. Heavy withdrawal of gold for America. Bank discriminates against American bills	Hike
1907	January	Difficulties between Japan and United States become pronounced. Earthquake on Jamaica Kingston practically destroyed with numerous loss of life. Violent liquidations in New York.	Cut
1907	November	American panic continues. Bank Rate raised twice in one week 6% on 4th and 7% on 7th. Railway disputes settled. Bank received £30,000 in gold from Paris	Hike
1908	March	Set back in American Market.	Cut
1910	March	Unfavourable trade balance in US	Hike
1910	June	Quantity of American Finance Bills and short term notes on offer	Cut
1911	February	Business depressed in America	Cut
1911	March	Unusual trade demand caused by prosperity at House Hui India balanced by continued depression in US. Unusual ease of money in Wales by export of gold from Brazil to London and from Austria to India. Employment of considerable American balances a feature of the money market.	Cut
1912	August	Panama canal Bill signed. Bill provides that American shipping engaged in coastline trade of limited states should be released from payment of tolls for use of canal.	Hike
1912	October	Attempt to assassinate Mr Roosevelt.	Hike

Table A.2: List of *exogenous* central bank monetary policy decisions

Year	Month	Record of Outstanding Events	Details
1884	February	News of disastrous defeat of the Egyptians outside Suakin, 2600 men massacred. Notice given in both Houses of Parliament of a vote of Censure on the British Government. Fall of Sankat and massacre of the garrison by the rebel Arabs. Issue of Federal 350,000M French 3% Redeemable Rates. Liverpool 3 1/2% loan £2000M allotted. Arrival of General Gordon at Khartoum and proclamation of the Mahdi of Sudan. Defeat of the vote of censure by 311 to 262. Fenian dynamite explosion at Victoria station followed by discoveries of 3 others London terminals.	Hike
1884	June	Conflict between Serbia and Bulgaria. Bank of Bombay 10%. 12% Bank of Bengal 6%. Bank of Bombay 7%. Bank of Bengal 7%. 19th Bank of Bengal 6%. Bank of Bombay 7%. Death of Prince of Orange at the Hague	Cut
1884	November	Death of the Postmaster General. Bank Rate 5%. Bank of Bengal 3%. Outbreak of cholera in Paris. Notes of £1000M for the Egyptian and £725M for the Bechuanaland expeditions agreed to by the Commons. Bank of Italy 5%. 18th Compromise offered by government with regard to the Franchise Question: a redistribution Bill to be submitted for approval and to be passed after the adoption of the Franchise Bill in the Lords, the passing thereof to be made a vital question for the Ministry. A temporary addition of 1d to the Income tax decided upon by the Commons.	Hike
1885	January	Bank of Bengal 6%. Important victory at Battle of Abu Klea – serious loss of the enemy .Dynamite explosions at the Houses of parliament and at the Tower. Bank of Bombay 5%	Cut
1885	March	News of further Russian Advance. Egyptian Financial agreement signed. Commission of Sevens Loan 1000M	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1885	May	Acceptance of Arbitration on the Panjdeh. Question of Russia. Queensland Loan 4% £2500,000. Metropolitan Board of Works Loan.	Cut
1885	August	1545m in sovereigns to Egypt	Cut
1885	November	Declaration of War between England and Burma. Declaration of war between Serbia and Bulgaria. Decisive Bulgarian victory after several days fighting. Death of King of Spain. Entry of Bulgarians into Serbia. Armistice between Serbia and Bulgaria at the insistence of Austria. Surrender of the Burmese army, without fighting. End of Burmese War.	Hike
1886	January	Failure of Jersey Banking company. European note to Greece ordering disarmament. British Mediterranean squadron ordered to Crete. Defeat and resignation of Lord Salisbury's Ministry. Mr Gladstone takes office	Cut
1886	February	Issue of Turkish trade recognising the union of Romania and Bulgaria under Prince Alexander. Riots in London. Failure of the Commercial Bank of South Australia	Cut
1886	June	Mr Gladstone's Irish Home Rule Bill rejected by a majority of 30 in the House of Commons. Leopold II King of Bavaria committed suicide. Dissolution of Parliament.	Cut
1886	Augugust	Revolution in Bulgaria. Prince Alexander kidnapped by Russian agents. Counter Revolution in Bulgaria in favour of the return of Prince Alexander as Ruler. Return of Prince Alexander to Bulgaria	Hike
1886	October	Alteration of the hour for closing London Clearing Banks on Saturdays from 3 to 2	Hike
1887	February	Continued war rumours. Panic on the Stock Exchange	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1887	April	Bank Dividend for 1/2 year 5%. Mr M Collett Governor. Mr Lidderdale Deputy Governor	Cut
1888	January	Failure of Mr Kattenback in speculation in copper on Paris bourse	Cut
1888	February	Failure of large French Iron company. Great strike at Rio Tinto Mint. Resignation of Viceroyalty of India by Lord Dufferin and appointment of Lord Lansdowne in succession. Uruguay financial agency acquired in London by Barings	Cut
1888	March	Death of German emperor. Mr Goschen introduced his scheme for conversion of the National Debt. Mr Goschen introduces his budget. Income tax reduced.	Cut
1888	May		Hike
1888	June	Discussion in parliament as to extension of colonial government securities for trust investments. Panama canal lottery loan offered for subscription in Paris	Cut
1888	August	Victorian Budget shows surplus of £838,000. 1st-16th further shipments of gold to Buenos Ayres. Leading financial firms in London protest against Quebec conversion scheme	Hike
1888	September	Withdrawal of £600,000 Notes by Barings for export to Russia. £390,000 sovereigns taken for Buenos Aires. Bank Dividend declared 5%. £500,000 sovereigns taken for Russia by Barings. £361,000 sovereigns taken for Buenos Aires by Barings	Hike
1888	October	Great strike in England – coal trade threatened. Issue of new shares by Bank of New Zealand	Hike
1889	January	Rise during the week of 7 1/2 % in Bank stock	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1889	April	Mr Lidderdale Esq Governor, David Powell Esq Deputy Governor. Bank dividend 5 1/4%. Considerable rise in Stock Exchange prices generally. Coupons of Egyptian debt paid by Bank for first time. Introduction of the Budget question of sight gold to be dealt with. Redemption of old 3% began	Cut
1889	August	Disturbances in Crete. Great Strike at the Docks. Withdrawal of the Tithe Bill. Visit of Austrian Emperor to Berlin. At the request of the Chancellor of the Exchequer the Bank limits the issue of half sovereigns as much as possible. Meeting of Monetary Conference in Paris.	Hike
1889	September	Termination of the Dock strike on the mediation of the Lord Mayor and Cardinal Manning. Bank Dividend 5%. General Election in France. Return of Republican candidates and general defeat of the followers of General Boulanger.	Hike
1889	December	Great fall in Brazilian stocks, strike of gas stokers in South London, Bank rate 6 per cent	Hike
1890	February	Discovery of plot against Prince Ferdinand of Bulgaria, arrest of Major Praitgya. Arrest of Duke d'Orleans. Increase of issue of Bank of England notes by £250,000. Fall in Brewery Ordinary Stock owing to decrease since 1889 in the dividend	Cut
1890	March	Bill for the division of ordinary stocks referred by the House of Commons to a Hybrid Committee. Resignation of Prince Bismarck of the Imperial Chancellorship in Germany. Bank dividend 5 1/4%	Cut
1890	April	Dangers of trouble in East Africa between England and Germany. Mr Goschen introduces his Budget. Resignation of Argentine ministry	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1890	July	Financial crisis in Uruguay. National Bank of Uruguay unable to make payment. Run on Argentine Banks. Revolt in Buenos Aires with 3 or 4 days fighting, resulting in a victory for the government	Hike
1890	September	Visit of Emperor of Germany to Russia. Bank to undertake investment in consols. Failures of some South African Banks. Export of gold to Portugal. Commencement of Great Scotch iron strike	Hike
1890	November	Bank imports 2 million in bar gold as a loan for 6 months from Bank of France. 1 1/2 million from St Petersburg. Fall of Barings announced. Guarantee scheme of assistance. Money market paralysed. Bank lends freely. Argentine inquiry Committee formed. Official proclamation that the Victorian gold coin will be de monetised after 28th Feb 1891	Hike
1891	April	Death of Mr Barings MP. Chairman of Baring Brothers Limited (new company). Successful conversion of Ottoman Defence Loan. Argentine State Banks defer payment. Bank Stock Dividend 5 3/4	Cut
1891	May	Sudden postponement of the issue of the Russian loan. Presentation of Freedom of the City to Mr Lidderdale, Governor of Bank, in connection with his services during the Baring crisis. Decree issued by Portuguese government suspending payments for 60 days.	Hike
1891	June	Buenos Aires gold premium. London omnibus strike commences. Shipments of gold to Russia. Bank publishes statement of Baring Liquidation account. Argentine government proposes a 6 month moratorium, afterwards reduced to 3 months.	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1891	July	Emperor William of Germany in England. Disquieting rumours in St Petersburg. Gold withdrawn from Bank for Russia. French Senate refuses to assist Panama Canal scheme. Failure of English Bank of Tee River Plate. Russian order of 750,000 suddenly commanded and gold returned to Bank. Crisis in Portugal. Leading banks first issue monthly statements	Cut
1891	September	Uruguay National Debt burden reduced. Gold to Germany. Scare on the reported occupation of Sigri by British troops. German Chancellor declares that “there is not a cloud in the political sky”. General Boulanger shot himself.	Hike
1891	October	Deficit in Greek Budget Statement. Rt Hon W. H. Smith 1st Lord of the Treasury died. Charles Stewart Parmace died. Heavy selling of securities in Paris. Severe gale. Telegraph interrupted. Hungarian budget good. Political crisis in Argentina. Oaman (New Zealand) in default. More Australian land companies fail. Reported aid to Bank of Spain. Bank borrowed in the market.	Hike
1892	October	Diplomatic relations between Greece and Romania. Dissolution of Italian parliament. English and French delegates to Greece to examine into the finances of that country. Successful attempt to issue a Persian loan. Disclosure of the Liberator Society Frauds. Large sums of money misappropriated.	Hike

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1893	January	Prince Ferdinand of Romania married to Princess Marie of Edinburgh. Revelations of corruption at trial of Panama Directors. Suspension of note issue by Bank of France. The Khedive causes uneasiness in Egypt by appointing his ministers against advice of British Representative whose protest is eventually accepted. Civil war in Argentina	Cut
1893	May	Further suspensions of Australian banks. Large sums of gold shipped to Australia. Increased difficulties in Australia. Great fall in colonial stocks Shales. Numerous failures at the stock exchange settlement. Resignation of Greek cabinet. Heavy fall in Greek securities. Four additional banks in Australia stopped payment. Panic in trustees executors securities Shales.	Hike
1896	September	Bank rate raised to 2.5%. Bank Rate raised to 3%. The Iron gates canal on the Danube opened (between Serbia and Romania).	Hike
1896	October	Lord Rosebery resigned the leadership of Liberal party. Great activity in iron and steel and ship building trades. Bank rate raised to 4%. Chinese indemnity.	Cut
1897	February	Satisfactory dividends announced by the Railway companies. Greek war ships dispatched to Crete. Transvaal claim for indemnity on the Jameson Raid submitted to Parliament. Fall in foreign stocks on account of Cretan crisis. Strike on North Eastern Railway	Cut
1897	April		Cut
1897	May	Outbreak of war between Turkey and Greece. Turks gained decisive victories. Bank Rate reduced to 2%. Instalment of £2900000 of Chinese indemnity to Japan flows into the Bank. Terms of Peace between Turkey and Greece discussed.	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1897	October	Spread of the lockout in the engineering trade. Board of Trade intervenes in engineering dispute	Hike
1898	June	Further reductions in Bank Rate. Proposal for a moratorium in Brazil. Fresh attempt made to raise capital for great northern city railway. Bankruptcy of Mr E T Hooley. Ministerial crisis in France and Italy. Moratorium on Brazilian loans for three years. Sale of Dd'ira estates by Egyptian government. Arrangement arrived at between South Eastern London Dover companies. Failure of Great Northern and City issues	Cut
1898	October	Considerable friction between England and France respecting the Nice question. Military and Naval preparations commenced. Bank borrows money from the Market in order to sustain rates. Semi panic on the Stock exchange on apprehensions of war with France	Hike
1899	January	Bank rate lowered from 4 to 3.5%. Paris Bank robbed of bank notes to the amount of £60,610	Cut
1899	February	Bank Rate lowered from 3.5 to 3%. Death of Prince Alfred, Grandson of Queen Victoria	Cut
1899	July	Sharp rise in discount rate owing to absorption of gold by home circulation. Negotiations with Transvaal in an unsatisfactory condition. Troops and war material being dispatched to the Cape. Report of Indian currency commission published, with recommendation for establishing gold standard in India. Bank rate advanced from 3 to 3.5%. Gold received from Holland and Germany alleviates necessity for further advances in Bank Rate.	Hike

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1899	October	£600000 withdrawn for Cape. Extraordinary circumstances of two advances of Bank Rate in one week. 3 1/2% to 4 1/2% on 3rd October and 4 1/2% to 5% on 5th October. Movement due to threatened war with Transvaal and consequent stoppage of gold supplies. Ultimatum delivered by Transvaal. Outbreak of war in South Africa. 13th–20th £600,000 withdrawn for Cape	Hike
1899	November	28th – £900000 withdrawn for south America. 30th – Bank rate advanced from 5% to 6%	Hike
1900	January	Desperate assault on Ladysmith by Boers repulsed by Sir George White and his garrison after hours of continuous fighting. The British loss was 15 officers and 141 men killed. 26 officers and 238 men wounded. Lord Roberts’s staff arrived at Cape Town. Arrival at Khartoum of first through train from Caro. Bank Rate lowered to 5%. 13th – First detachment of the City of London Imperial Volunteers sailed from Southampton after having the Freedom of the City conferred upon them on the 12th. Bank Rate lowered to 4.5%. Capture of the notorious devilish leader Osman Digna in Tokar. Bank Rate lowered to 4%. Consols highest 102 1/4. lowest 97 1/8	Cut
1900	May	Mr Chamberlain introduced the Commonwealth of Australia Bill in the House of Commons. Relief of Mafeking besieged since 15th Oct 1899. Annexation of the Orange Tree State, as the Orange River Colony, by Lord Roberts	Cut
1900	June	Opening of City South London Railway. Bank Rate lowered to 3%. Destruction of Chinese forts by the allied squadrons	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1900	July	Bank rate raised to 4%. Assassination of King Umberto of Italy at Monza. 30th – Death of the Duke of Saxe-Coburg and Gotha	Hike
1901	January	The commonwealth of Australia was inaugurated at Sydney. Bank Rate raised to 5%. Reserve £16200M. Death of Queen Victoria at Osborne. The Prince of Wales proclaimed King as Edward VII.	Hike
1901	February	The body of Queen Victoria removed from Osborne to Portsmouth in the Royal yacht Alberta, Public holiday on the day of the Queens funeral – the coffin was transported by train to London and hence by road to Paddington Station, the streets were lined by military and great crowds of people – the procession was of a most impressive nature and representatives from every European State took part in it. Bank Rate reduced to 4%	Cut
1901	June	Bank Rate reduced to 3.5%	Cut
1901	October	Fall in shipping freights – withdrawal of bullion. Criticism of appointment of Sir Evelyn to the Command at Aldershot in consequence of which the war office relieved him of it and places him on half pay. Bank Rate raised to 4% owing to withdrawal of gold coin	Hike
1902	January	Reserve £20000000. Steady depreciation of silver throughout the year. Nullifield absorbed by Finest Keen & Co. Bank rate reduced to 3.5% which caused the market rate to fall	Cut
1902	February	Bank rate reduced to 3%. Government scheme for purchase of London water companies published. 14 – Death of Lord Dufferin.	Cut
1903	May	Enormous applications for Transvaal loan. £20,000 lent by the Bank – method of allotment arouses considerable dissatisfaction. Bank Rate reduced to 3.5%	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1903	June	Assasination of King and Queen of Serbia by military officers	Bank Rate Cut
		reduced to 3%	
1903	September	Bank Rate raised to 4% on withdrawal of gold for Germany. Resignation of Lord Chamberlain and Lord Hamilton. Consols reached record	Hike
1904	April	Proposed agreement between England and France published and cordially received. Hitch in Northern Securities affair. Anglo-French agreement concluded. £2000000 Treasury Bills allotted. Budget produced estimated deficit £3820000. Advance of income tax, tea and tobacco duties. Great shipping strike in France. Great Japanese victory on the Yalu	Cut
1905	September	Treasury Bills £2500m, average £1.16.8. Peace concluded between Russia and Japan by withdrawal of Japan's claim for an indemnity. Promulgation of a constitution in Russia. Output of gold for august from the Transvaal of £1820.496 exceeding all previous monthly totals. Terms of separation between Norway and Sweden agreed to.	Hike
1905	October	Announcement that the purchase of Bombay Baroda is to be affected by issue of India stock instead of annuities gives much satisfaction. £2920000 to Egypt during October. Grave internal disorders in Russia.	Hike
1906	April	Sudden settlement of constitutional difficulty in Hungary. Announcement of new scheme for reclassification of Bank staff to take effect as from 1st March.	Cut
1906	October	Heavy gold withdrawal for Egypt on excellent cotton crop selling at enhanced prices. Bank Rate Raised 6% on withdrawal of £1000000 in sovereign for Egypt	Hike
1907	April		Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1907	May	Resignation of Lord Cromer as British agent and Consul-General of Egypt. Railway men in demonstration causes slump in home railway market.	Cut
1908	January	Bank Rate reduced from 7% to 6%. Bank Rate reduced to 5%. Bank Rate reduced to 4%. Parliament opens; Kings speech includes Licensing Bill & old age pensions. Assassination of the King and Crown Prince of Portugal. Weakness in foreign markets.	Cut
1908	June	King visits the Tsar at Reval. Women suffrage demonstration in Hyde Park. Crisis in Persia -Russia and Britain cooperate.	Cut
1909	January	Disastrous earthquake at Messina. Town almost destroyed. Deaths estimated at over 100000. Nearly all the towns' villages in the neighbouring districts devastated. Bank Rate raised to 3% on 14th Jan to attain gold. Russian Loan. Issue of £5855000 in London through Masons Baring. Failure of London and Paris Exchange	Hike
1909	April	Bank Rate reduced to 2.5%. Revenue deficit of £714,000 for year. Expenditure for 1909 leaving probable deficit to be made good. Fall of young Turks in Constantinople and return to old regime.	Cut
1909	October	Bank rate raised to 3%. Monetary position on continent leads to higher rates in London. Bank Rate raised to 4%. Bank borrows £400M from the market. Further considerable exports of gold to Egypt, South America and Turkey. Bank Borrowings increased to £5,220M.	Hike
1909	December	Bank Rate reduced to 4.5%. General Election to take place middle of January. Further gold exports. Bank's borrowings outstanding £3,370m. Bank borrowing from the market on and off. Capital valuations for 1909 £182,356,000. Nearly £2000M in Gold due to Paris	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1910	January	Bank Rate reduced to 4%. Exchequer Balance very low – General Election disturbed business. One or two Banks declare reduced dividends. Bank rate reduced to 3.5%. Government balance rising rapidly.	Cut
1910	February	Damage in Paris caused by floods. French and German demand for gold. Slump in Rubber shares owing to bill account and profit taking. Flood of new issues, principally Rubber. Election results show that passage of budget depends on Irish rate. Money easy owing to non-collection of Income Tax	Cut
1910	September	Continental exchanges moving adversely. Money plentiful owing to repayment of Treasury Bills. £2682M exported to Egypt during Sept. 29th £1120M exported to Turkey. Bank rate raised to 4%.	Hike
1910	October	Revolution in Portugal owing to misrepresentation in Parliament and intolerable pressure of the Church. Flight of King to Gibraltar and eventual residence in England. Republic established in Portugal. Gold comes from Paris. £5877M exported to Egypt during October.	Hike
1910	December	Bank Rate reduced to 4.5%. Constitution of new parliament making a majority of 126 to the government against the Unionists. Murder of 3 police officers by band of supposed anarchists in the East End. Two of the assassins tracked to a house in Sidney Street East which was thereupon surrounded by police who, with the help of some men of the Guards bombarded the place	Cut
1911	January	Improvement in Railway traffics and profits causes a boom in Home Rails, continued for 3 months. Offer of 140 lakhs by India Council: a record	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1911	September	Tripolitania and Lenasia proclaimed to be under the full sovereignty of the Kingdom of Italy. T.W Burgess swam across the English channel in 22 hours 35 minutes. Italy having sent Turkey a 24 hour ultimatum having reference to her grievances in Tripoli declared war on the 29th. The lowers were notified of Italy's annexation of Tripoli. Barclays & Co purchase Stampford Spalding Banking Co. necessity for sale being depreciation of securities. Trouble in Szechuan over the Government Railway Policy. Railway strike in Ireland threatened a complete stoppage of supplies but in spite of the feeble attitude of the Lord Lieutenant and under Secretary, died a natural death. Heavy gold withdrawals for Egypt & South America.	Hike
1912	February	January to March withdrawal of gold for India £3,600,000. £655,000 set aside by Council of India as India Paper Currency Reserve. French-German Treaty ratified. French Protectorate established over Morocco. Death of Count Aehrenthal, the Austrian premier	Cut
1912	May	Baron Marschall von Bieberstein, German ambassador at Constantinople, transferred to London. Second reading of Home Rule Bill. Strike by lights men and Dockers in Port of London. This strike, which was unauthorised, and without either moral or pecuniary support, dragged along until the end of July when it was abandoned.	Cut

Table A.2: – continued

Year	Month	Record of Outstanding Events	Details
1913	April	Only continued political anxiety perverts fall in Bank Rate, money easier after term of the quarter. London overloaded with short term notes. Money plentiful and good prospects of early reduction of Bank rate. Proportion rises to 45. Brazil in need of gold. Trade activity continuing. Strength of Bank returns and condition of international money market justified reduction in Bank Rate, proportion nearly 48. Renewed apprehension of disagreement between Powers. Large collections of excise revenue through clearance of Stocks after the Budget. Anxiety caused by Austria's action against Montenegro.	Cut
1913	October	Withdrawals of 2 million in sovereigns for Egypt. Rate to 5%. Withdrawals of cash and credit with harvest season put an end to existence of ease of short term loan market. Market pessimistic on failure of colonial loans. Balkan embarrassments which affect Paris especially and financial troubles of Brazil prevent improvements and a drop of 1 1/2 million in the Reserve. Weakness of foreign borrowing and London Stock Exchange causes uneasiness. Retention shows improvement, the rise in the Reserve being due to return of notes and coin from circulation. Money market more hopeful. Reserve 1 million higher, three quarters being imports from abroad. Banking failures in India cause heavy fall in price of silver. Market aversions but reduction of Reichsbank rates to 5.5% a welcome change. Bank return satisfactory. Reserve only a trifle lower than last year.	Hike

Figure A.1: IRFs with hp-filtered data and US industrial production as proxy for output

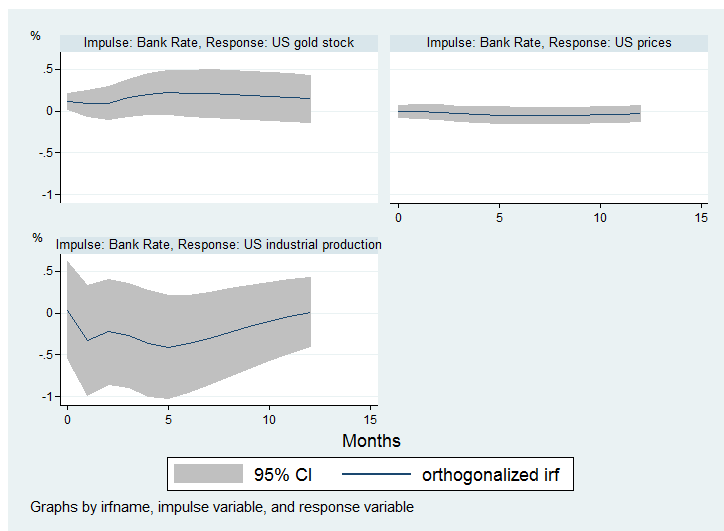


Figure A.2: IRFs with hp-filtered data and US industrial production as proxy for output

