Suffrage Reform and Financial Volatility: Reconsidering the Great Reform Act

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ABSTRACT

We argue that Consol price movements during England's reform era reflected speculative activity spurred by continental revolutions and government instability, rather than market perceptions of a significant risk to the British regime's survival. We first show that, controlling for cross-market linkages, Consol variability during the reform era was no different than it was in normal times. Next, we show that Consol risks could be diversified using a portfolio of securities whose value depended on the unreformed regime's survival — something that should not have been possible if regime survival was in serious doubt. Finally, we use daily data to examine the relationship between major events and Consol prices. We find that investors did not view threats to the reform bill's passage as if they entailed risks of default. Instead, "ordinary" political risk (i.e., a potential change in the partisan control of the government) explains much of the variability in Consol prices.

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Introduction

As Przeworski (2009, p. 292) notes, prominent theorists have argued that "...extensions of [suffrage] rights are a response of the incumbent holders of rights to revolutionary threats by the excluded..." Acemoglu and Robinson (2000, 2006) and Boix (2003) have been particularly influential exponents of this view, in which the franchise is granted only *in extremis*. Britain's Great Reform Act of 1832 is often cited as a case illustrating the importance of revolutionary threats. This choice seems natural given the wave of revolutions in Continental Europe at the time; the surge of social unrest on the domestic front; and Prime Minister Grey's famous declaration in the House of Lords that "...The principle of my reform is, to prevent the necessity for revolution..."[1] The immediate effect of the new system of representation was to increase the total electorate in Britain. Nonetheless, while some observers hail the reform as a significant step in the march of liberal democracy, others view its impact as quite modest. Likewise, little agreement exists regarding the reasons for the Reform Act's passage. Some observers, taking Lord Grey's statement at face value, argue that parliamentary reform was a response to a revolutionary threat. Others, however, are skeptical about this view. Recent studies provide inconclusive evidence on this subject.[2]

We investigate how investors, rather than politicians, reacted during the reform era. On the one hand, financial economists conclude that the Reform Bill had little effect on securities markets (Campbell *et al.*, 2018; Mitchell *et al.*, 2002). In their view, uncertainty over which party would control government and financial spillovers from tumults on the continent had substantially larger effects. On the other hand, Dasgupta and Ziblatt (2015) examine the behavior of British Consols, a fixed-interest perpetual government bond. They find that its yield increased significantly in the run-up to the reform, falling back immediately after passage. Therefore, they interpret the fluctuations in Consols prices as being consistent with a revolutionary threat account of the act's passage.[3] Most studies that use data from the financial markets to assess political shocks, however, look at single securities in isolation (cf. Dasgupta

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[1]https://hansard.parliament.uk/lords/1830-11-22.

[2]For example, Aidt and Franck (2015) document that exposure to local riots led voters to elect more pro-reform candidates in the 1831 elections. They interpret this finding as evidence in favor of the *threat of revolution* theory of democratic change. On the other hand, the analyses in Aidt and Franck (2019) suggest that support for parliamentary reform in the critical roll call vote that took place on March 23, 1831 did not stem from fears of revolution, but rather from peaceful agitation and public expressions of support.

[3]According to them, two types of events led investors to believe that the British government may be unwilling or unable to fulfill its sovereign debt obligations during this era: "...incidents of social unrest, for example, the 1831 Swing Riots, as well as elite political deadlock, including the failure of reform bills in the legislature..." (Dasgupta and Ziblatt, 2015, p. 3).

and Ziblatt, 2015; Mitchell *et al.*, 2002; Seghezza and Morelli, 2019). This approach can establish whether prices exhibited unusual behavior during the reform crisis. But, it does not reveal the mechanism of any discovered effect. Our contribution, relative to this existing work, is to investigate how a range of securities — not just Consols — reacted during the reform crisis. This alternative approach allows us to parse out the relative influence of revolutionary threats, financial spillovers, and government instability.

Financial economists routinely seek to control for financial spillovers (Rigobón, 2019). Yet, it has not become standard practice in historical studies to control for these potential confounders when assessing how revolutionary threats affect securities markets. We show that, once one controls for financial spillovers using standard methods (cf. Dungey *et al.*, 2005; Rigobón, 2019), there is no evidence of unusual price movements or comovements in the Consols market during the period when previous studies have argued that the British regime experienced a heightened revolutionary threat. In contrast, the same tests show abnormal behavior in the French bond market (prices fell 26% in 1830) — which was affected by an actual revolution. From a methodological standpoint, these results suggest that controlling for financial spillovers may be important in other studies of suffrage reform. Substantively, our findings indicate that investors saw no *significant* revolutionary threat to the British regime.[4]

Next, we examine whether Consol risk could be diversified. If investors perceived a revolutionary threat to the British regime, then the vast tracts of land held by the old elite, as well as all securities connected to the government's politico-economic apparatus, should have impounded that risk. However, our analysis reveals that land *appreciated* in value during most of the crisis, while a portfolio of regime-dependent securities was less risky than a portfolio of all Consols between July 1830 and March 1832. These results suggest that examining the full range of assets that revolutions would imperil may be important in other studies of suffrage reform. They also indicate again that investors did not think that Britain's unreformed regime faced a significant risk of overthrow.

Finally, we use daily data to examine the relationship between major events and Consol prices. The empirical findings reveal that political uncertainty both at home and abroad played a significant role in the propagation of shocks to the Consol market during the reform period. They also indicate that investors did not view the reform process as a fundamental threat to the stability of property rights. Instead, "ordinary" political risk (i.e., a potential change in the partisan control of the government) explains much of the variability in Consol

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[4]Therefore, our paper contributes to the literature focusing on the reaction of British securities to military and political crises in the nineteenth century (e.g., Brown Jr *et al.*, 2006; Campbell *et al.*, 2018; Ferguson, 2006; Mitchell *et al.*, 2002; Yoon, 2011).

prices.[5] Taken together, these findings support the view that Consol price movements reflected speculative activity spurred by government instability, rather than the existence of fundamental changes in investors' views regarding the stability of property rights.

The remainder of the paper is organized as follows. In the next section, we provide some background on the parliamentary reform process, the Swing Riots, and Britain's capital markets. In the section "Financial Volatility in the Reform Era", we examine how cross-market linkages affected the Consols market in the early 1830s. Next, we use a returns-based analysis to estimate the effect of social unrest and political deadlock on Consol risk. In the section "What Moved Consol Prices?", we analyze how Consol prices responded to various types of non-commercial (i.e., political) risks. The final section concludes.

Background

The Act to Amend the Representation of the People, also known as the Great Reform Act of 1832, introduced important changes in the parliamentary representation of England. First, it reapportioned seats in the House of Commons from smaller boroughs to growing industrial towns and county constituencies. Second, it changed the franchise. In the borough constituencies, all male householders occupying property worth £10 a year were given the vote. In the county constituencies, copyholders of land and various groups of tenant farmers gained the vote. The onset of the reform movement appears to have been sparked by a combination of fortuitous circumstances that took place in 1830. These included: the fragmentation of the old Tory party after the passage of the Catholic Emancipation Act;[6] the death of George IV on June 26; the July Revolution in France; the 1830 general election; the agricultural revolts in the English countryside; and the fall of the Wellington Ministry and the establishment of the Whig administration of Lord Grey in November.

When the Reform Bill was introduced in the House of Commons on March 1, 1831, popular opinion was strongly in favor of the measure. Nonetheless, the reform process quickly ran into a roadblock in March, when the bill passed by a single-vote margin on its second reading in the House of Commons. A month later, Lord Grey asked King William IV to dissolve Parliament and called for a general election. Held under the unreformed system, the election gave the government an overwhelming majority in favor of reform. The reintroduced reform bill was steered through the Commons during the summer of 1831, but

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[5]Our results are thus consistent with those showing that the partisanship of electoral victors affects stock market returns (e.g., Bialkowski *et al.*, 2008; Sattler, 2013).

[6]The Roman Catholic Relief Act of 1829, also known as the Catholic Emancipation Act, permitted members of the Roman Catholic Church to sit in the parliament at Westminster.

it was rejected by the Tory majority in the Lords on October 8. A slightly altered Reform Bill began a third journey through Parliament in December. The measure was defeated again in the House of Lords on May 7, 1832. Two days later, Lord Grey handed in his resignation. He was replaced by the Duke of Wellington, a staunch opponent of parliamentary reform. These events precipitated a period of social unrest known as the Days of May. The crisis was defused on May 16 with the reinstatement of Grey's government, and the king's reluctant agreement to pack the House of Lords with enough supporters to ensure the bill's passage. Facing this threat, the Lords backed down, and passed the Great Reform Act on June 4. It received royal assent three days later.

The Swing Riots

The tortuous reform process summarized above took place against a backdrop of social agitation. Most notably, the wave of rural unrest known as the *Swing Riots* took place between August 1830 and the spring of 1831. The riots began in Kent, with the destruction of threshing machines, then quickly spread through southern England and East Anglia (Aidt *et al.*, 2021; Hobsbawm and Rude, 1973; Tilly, 1995). Holland (2005) documents some 2,818 distinct violent incidents, involving arson, machine breaking, animal maiming, and assault.[7]

The Duke of Wellington's ministry did not take any decisive action against the rioters until November 11, over two months after the first incident. Lord Grey's ministry, which took power a few days later, took more resolute action — offering hefty rewards to apprehend and prosecute offenders and appointing special commissions to try Swing-related offences. According to Hobsbawm and Rude (1973, Appendix II), 1,976 individuals were brought to trial in connection to the Swing Riots; 252 were sentenced to death (although only 19 were actually hanged); 644 were imprisoned; and 481 were transported to penal colonies in Australia. No violence took place in response to the convictions, and Swing-related disturbances entered into an inexorable decline.

Most historians seem to agree that the Swing rioters were not revolutionaries (Brock, 1973; Hobsbawm and Rude, 1973; Holland, 2005; Tilly, 1995). In their responses to the *Rural Queries of the Poor Law Commission*, local parish officials attributed the agricultural unrest mostly to unemployment, low wages, and inadequate poor relief. Moreover, the rioters had little knowledge about the July revolution in France and no convincing evidence of a strong link between urban radicalism and Swing disturbances exists. That said, it remains possible that elites perceived the Swing riots as harbingers of future revolutionary

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[7]The name *Swing Riots* was derived from "Captain Swing", the fictitious name often signed to the threatening letters sent to farmers, magistrates, parsons, and others (Holland, 2005, p. 5).

threats, and supported parliamentary reform as a way to mitigate that risk (Aidt and Franck, 2015). Here, we focus on how the Swing Riots affected investors.

Capital Markets in Britain

British wealth-holders in the post-Napoleonic era had several investment opportunities, including rent charges, mortgages, bank deposits, state lottery tickets, and trade credits. The three major categories, though, were government long-term debt, equity shares in listed companies, and landed property. Each asset class, in turn, had its own market.

The main government security was Consols, a fixed-interest perpetual bond introduced in the early 1750s, with a nominal return of 3%. This asset formed the deepest and most liquid market during the reform era. Their trading volume was large, they were long-lived, were almost infinitely divisible, and were continuously traded on the London Stock Exchange with low transaction costs (Odlyzko, 2017). Trading in equity shares of listed companies grew in importance after 1825, with the liberalization of incorporation law. As a result of directorial oversight of share transfers, the share's large denominations (with £100 shares being the mode), and the relatively small size of some of the listed companies, the market for corporate securities was not as liquid as the Consols market during the reform period. Finally, as Thompson (1907) notes, the amount of land changing hands by buying and selling was not sufficiently large for a highly developed land market to emerge. Small quantities of land were occasionally traded; but whole estates only came onto the market infrequently. In addition, most existing holdings were encumbered by restrictions, making land a highly illiquid asset (Turner *et al.*, 1997).

Each of these markets' attributes attracted different types of investors. The historical evidence indicates that few investors owned land on a large scale and that their landed assets comprised a small share of their total wealth (Nicholas, 1999; Rubinstein, 1981). Land was not only difficult and expensive to sell, but it was also very costly to manage (Offer, 1991). Therefore, as an investment vehicle, it was not well suited for short-term speculators, who would buy and sell assets to obtain capital gains. Equity investors consisted mostly of wealthy individuals. High share denominations ensured that ownership resided with "respectable" people, rather than "butlers, ladies' maids, and all sorts of persons."[8] While some of these shareholders sought to obtain returns on capital, the majority of them were mostly interested in obtaining dividend payments (Rutterford, 2004). Therefore, the extent of speculative investment

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[8]cf. Evidence of General Austin and John Hardin. Secret Committee on Joint-Stock Banks, BPP (1836) IX, pp. 130 and 135. Cited in Freeman *et al.* (2012, p. 68).

as a gamble on the rise of share values was quite limited during the reform era (Freeman *et al.*, 2012).[9]

The market for Consols was distinctive, as it attracted a large number of both: (1) long-term investors, who adopted a "buy-and-hold" strategy, as well as (2) jobbers, or short-term speculators. The first group included both *institutional* investors (such as the National Debt Commissioners, the Court of Chancery, the Ecclesiastical Commissioners, and Cambridge and Oxford universities) as well as so-called "capitalists" or "annuitants", individual investors whose primary aim was to live off the steady rents provided by coupon payments.[10] Constancy of income, rather than capital gain, was the number one priority of these long-term investors. In contrast, short-term investors would exploit the liquidity of the Consols market for speculative purposes. Their simplest strategy would be to lock-in profits in the form of capital gains on their investments. But other, more sophisticated strategies were also prevalent. Trading in Consols could be conducted for regular transfer (i.e., ready money) or based on their price the ensuing account, or settling day (i.e., time bargains). The latter entailed a form of forward trading (Michie, 1999; Morgan and Thomas, 1962; Odlyzko, 2017). So, selling Consols for cash and buying them back for the account was another way in which short-term speculators would use the Consols market to try to make a profit.

Market Reactions in the Reform Era

A convenient way to examine investors' reactions during the reform era is to compare the performance of the different asset classes. Table 1 shows annualized price changes as well as yields for land, equity shares, and Consols for a 50-year period (1816–1865). The evidence indicates that, once we include capital gains, land yielded a rate of return equivalent to Consols.[11] The variability of capital gains, however, was higher in the case of Consols relative to landholding. For example, Consols increased by roughly 32% between 1816 and 1817, as a consequence of the end of the Napoleonic Wars. On the other hand, their biggest price drop (14%) occurred during the financial crisis of 1825. In contrast, large fluctuations in land prices were more rare throughout this 50-year period, and responded mostly to climatic, rather than financial conditions. Table 1 also reveals that average stock returns were much higher than average returns to both land and government bonds. Nonetheless in

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[9]Short-term speculation was also curtailed by requiring company directors to own shares in the companies on whose boards they sat.

[10]According to Morgan and Thomas (1962), the number of individual investors who held Consols in 1830 were believed to number nearly 275,000 and it was estimated that 250,000 of them received less than £200 a year in dividends.

[11]This pattern is consistent with the findings in Offer (1991) and Clark (1998).

Table 1: Performance of different asset classes, 1816–1865.

	Land		Equity shares		Consols	
	Price change (%)	Yield (%)	Price change (%)	Yield (%)	Price change (%)	Yield (%)
1816		3.21			3.07	4.72
1817	4.17	3.35			32.34	3.85
1818	3.11	3.45			−6.15	3.82
1819	−3.02	3.35			−13.58	4.45
1820	−0.44	3.33			2.59	4.32
1821	−2.23	3.26			11.71	3.89
1822	−5.94	3.07			4.68	3.74
1823	1.94	3.13			3.85	3.64
1824	3.81	3.24			13.35	3.16
1825	1.83	3.30	−7.18	2.29	−14.40	3.51
1826	−7.21	3.07	−7.33	4.05	3.21	3.67
1827	0.49	3.08	2.25	4.34	0.30	3.55
1828	6.28	3.27	0.10	4.16	2.36	3.48
1829	−2.73	3.18	1.92	4.33	8.23	3.30
1830	2.80	3.27	−5.61	3.83	−11.87	3.44
1831	1.82	3.33	−4.95	4.48	1.06	3.58
1832	−1.79	3.27	6.49	5.11	−0.60	3.55
1833	0.45	3.29	7.34	4.70	6.63	3.38
1834	−0.45	3.27	2.90	4.30	2.97	3.27
1835	0.91	3.30	7.30	4.39	0.27	3.29
1836	0.90	3.33	11.13	4.05	−3.97	3.35
1837	−0.89	3.30	5.59	3.98	6.27	3.26
1838	−0.45	3.29	12.24	3.89	0.00	3.18
1839	0.00	3.29	−1.29	3.79	−2.68	3.26
1840	3.62	3.41	8.73	3.96	−0.41	3.29
1841	3.49	3.53	−2.16	3.90	−1.52	3.35
1842	0.42	3.54	5.25	5.09	6.32	3.20
1843	1.26	3.59	16.08	5.34	2.11	3.14
1844	1.24	3.63	13.57	4.51	4.40	2.99
1845	0.82	3.66	19.94	4.19	−4.09	3.06
1846	1.22	3.71	2.58	3.75	−1.42	3.13
1847	−1.20	3.66	−15.70	3.87	−10.62	3.45
1848	2.85	3.76	−2.61	6.01	2.64	3.50
1849	−3.95	3.62	−1.65	6.54	9.43	3.21
1850	1.23	3.66			1.17	3.10
1851	−3.25	3.54	7.28	4.65	1.94	3.05
1852	2.10	3.62	29.14	5.12	2.53	2.97
1853	−0.82	3.59	−7.46	3.54	−6.30	3.08
1854	1.24	3.63	0.83	4.68	−3.29	3.29

<div align="right">(Continued)</div>

Table 1: (*Continued*)

	Land		Equity shares		Consols	
	Price change (%)	Yield (%)	Price change (%)	Yield (%)	Price change (%)	Yield (%)
1855	2.46	3.72	4.17	5.04	−2.72	3.30
1856	4.80	3.90	14.01	5.42	4.48	3.20
1857	4.96	4.09	−3.32	4.87	−2.28	3.25
1858	1.45	4.15	12.31	5.19	6.31	3.10
1859	−0.72	4.12	5.53	4.88	−0.52	3.19
1860	−0.36	4.11	6.65	5.19	−2.85	3.19
1861	1.81	4.18	−2.32	4.80	−1.13	3.25
1862	−0.36	4.17	9.31	4.91	1.15	3.22
1863	0.71	4.20	9.39	4.99	−1.34	3.23
1864	−0.71	4.17	9.29	5.42	−1.89	3.29
1865	−0.71	4.14	3.22	5.71	−1.52	3.32
1816–1865	0.55	3.55	4.32	4.58	1.00	3.40

Note: We calculated the yield on land with the rent index in Thomson (1907, p. 613) using the average years' purchase value during this period (28 years). The series starts in 1816, so the price change of that year relative to the previous one cannot be calculated. Stock market data including capital appreciation, and dividend yields come from Acheson *et al.*'s market capitalization-weighted index (2009, p. 1124). The sample starts in 1825, and excludes companies that were part of the government's politico-economic apparatus. The data for 1850 are missing. The Consol quotations are for the account. We used the prices corresponding to the end of the month preceding the transfer of the half-yearly dividends (May and November) to calculate Consols' yields and the year-to-year price changes.

terms of dividends as well as capital gains, buying equity shares rather than land or Consols was a significantly riskier investment in this 50-year time period.

With respect to the reform period (marked in grey), the evidence reveals that Consol prices decreased substantially in 1830, were mostly flat in 1831 and 1832, and then experienced a significant recovery in 1833. One might interpret this pattern as showing that frightened elites reduced their demand for Consols — likely to become worthless if the regime were overthrown — thereby reducing their prices (Dasgupta and Ziblatt, 2015). The other evidence in Table 1, however, casts doubt on this *revolutionary threat* account. First, this fluctuation in Consol prices was no different from the pattern in 1825–1827 — a period of purely financial, rather than political, distress. Second, revolutionary-threat theorists typically identify land as the most vulnerable asset in the face of a revolutionary threat. Yet, the land market underwent a price increase in 1830 and 1831, and a downturn in 1832. Moreover, land was

not riskier than Consols during the reform crisis. Taking capital losses into account, the return on Consols turned negative (−0.28%) in the years 1830–1832, while the average annualized return on land was 3.32%.[12] Unlike purely financial assets, land's rental values may have reacted differently depending on their geographical proximity to the Swing Riots. If that was the case, then the yields presented in Table 1 (based on rental values) would be masking such variation. In the Online Appendix (Table A1), we show that neither the Swing Riots nor the share of Whig representation in the unreformed Parliament in 1832 affected agricultural rents during the reform period.[13]

Turning to the stock market, the evidence in Table 1 shows that equity shares did not decline as much as Consols did in 1830; but the reverse was true in 1831. In 1832, the prices of corporate securities rallied significantly, anticipating the 1833 recovery in Consol prices. An examination of dividend yields reveals that investors were usually compensated for buying equity shares rather than Consols. Yields of corporate securities were consistently higher than Consols' throughout the 1826–1836 period. This equity risk premium indicates that holding government debt was perceived as being safer than investing in private-sector firms, even during the reform era. So, if there was a revolutionary threat, it was not large enough to make private investments look good relative to sovereign debt.

Financial Volatility in the Reform Era

The distinctive movement of the Consols market raises the question of why Consol prices were so volatile during Britain's reform era. Scholarly opinions differ. While Dasgupta and Ziblatt (2015) argue that parliamentary reform had a large impact on Consol prices, Mitchell *et al.* (2002) conclude that the event had little importance for market participants. Instead, they argue that the fall of Wellington's government and uncertainty in Europe had much more significant impacts on Consol prices.[14] In this section, we offer an

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[12]For the land market, we consider the calendar years 1831 and 1832 as the ones corresponding to the Reform era. Except for those that were settled on Old Michaelmas (September 29), year-long contracts between landowners and tenant farmers in nineteenth-century England would begin/end on Old Lady Day (March 25). Therefore, most of the rental values for 1830 correspond to agreements that were made before the initial onset of Swing rioting.

[13]Our results indicate that the rent per acre in the average constituency without a proximate riot exposure amounts to £1.12 (with a standard deviation of £0.14), while a three-standard deviation increase in the number of riots is associated with a negligible rise in the average rent per acre: £1.15 (with a standard deviation of £0.08).

[14]Campbell *et al.* (2018) reach a similar conclusion with regard to stock price movements on the London market between 1823 and 1870 — finding that the vast majority of large movements can be attributed to European wars. For the post-1850 period, see Yoon (2011).

account — closer to Mitchell *et al.*'s (2002) — according to which financial spillovers from the continent drove Consol fluctuations.

Threat of Revolution in Europe

In his seminal book, *The Age of Revolution*, Hobsbawm highlighted the unique correlation between British and Continental politics during Reform Bill era. As he noted, the period was "…probably the only one in modern history when political events in Britain ran parallel with those on the continent…" (1962: p. 110). The revolutionary wave of 1830–1834 — ignited by the overthrow of the Bourbons in France (1830) — affected many parts of Europe. Belgium (1830) won independence from Holland, Poland (1830–1831) was suppressed only after military operations, and parts of Italy and Germany also rebelled. As noted above, various domestic events might have increased elites' fears of revolution in Britain. These included the initial onset of Swing rioting (August 1830); the peak of Swing rioting (November 1830); and the aforementioned days of May (in 1832).

Britain's synchronicity with Continental Europe during the early 1830s suggests that volatility in Consols may have been driven by market reactions to foreign, rather than domestic, risks. Bolstering this idea, strong cross-market linkages already existed between Britain and Continental Europe. Dutch and French investment capital flowed in and out of Britain throughout the reform era (Michie, 1999); and investors could purchase a wide range of foreign securities in the London Stock Exchange.[15] Trading in foreign securities, as Michie (1999) notes, was much more prone to manipulation and rumor than market for Consols, creating risks for the whole market. The main issue was how price-sensitive information was disseminated. However, this account, published on July 30, 1830 (two days after the French revolution of July 26–28) in the *Money Market and City Intelligence* section of the *The Times*, illustrates how quickly the London market reacted to continental events:

> The English funds are maintained with tolerable firmness, though the alarm at the events in France is spreading over a pretty considerable class of stockholders. The closing price of Consols is $\frac{3}{4}$ per cent. below that of yesterday…; while the fall of the French funds on the second day after the publication of the ordinances has been 3 per cent, and in the whole 7 or 8 per cent. Generally speaking, there is a disposition among the English capitalists to get rid of this latter stock as an investment, but there are also a

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[15]For example, in the 1820s, the investment portfolio of Samuel Greg (a cotton mill owner) included Consols as well as Prussian Bonds, French Funds, and Peruvian Bonds (Rose, 1979).

few who have [bet on] the ultimate maintenance of public credit
in France.

Inter-market connections

Both Consols and French *Rentes* commanded an active market in London
as well as in Paris.[16] Therefore, it was not uncommon for arbitrageurs to
buy/sell British Consols against French *Rentes*. For example, Michie (1999)
reports that David Ricardo amassed a fortune of around £0.5 m. from buying
and selling *Rentes* through the Paris market during the Napoleonic wars.[17]
So, consider some mechanisms by which the French revolution might have
put downward pressure on Consol prices, even if investors saw no threat
of regime overthrow in Britain. First, the revolution in France caused the
price of *Rentes* to fall, inducing some investors to speculate on a restora-
tion of order (as noted in the quote above). Because the market for pri-
vate loans was highly imperfect, speculators typically had to sell portions
of their own portfolios to raise the funds they needed. Consols were the
preferred vehicle by which speculators sought to preserve their liquidity (Mor-
gan and Thomas, 1962). Thus, most speculators would have sold Consols
in order to buy *Rentes*. Since the drop in *Rentes* prices was significant and
the French bond market was large, speculators should have exerted a sig-
nificant downward pressure on Consol prices. Second, a good number of
long-term investors with exposure to French government debt likely needed
to extract cash from their portfolios — to the extent that the French revolu-
tion shrank economic activity.[18] If they held Consols, these investors would
have sold them, as Consols were among the most liquid and stable assets
at the time. Thus, long-term investors who had *Rentes* in their portfolios

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[16]*Rentes* (also called *rentes sur l'état*) is the name commonly given to the negotiable
perpetual annuities issued by the French government.

[17]See also Grant (1837, pp. 64–74) for a contemporary, and very candid, account of how
Stock Exchange speculators' fortunes were gained and lost as a result of the vicissitudes of
the Napoleonic Wars. Following Napoleon's defeat at Waterloo, and fearing that France
would be unable to afford the reparations it owed under the Second Treaty of Paris, the
Duke of Wellington brokered a major loan, underwritten by the British house Baring and
the Dutch firm Hope & C0., that furnished Louis XVIII with the needed resources. The
first installment of the loan was almost sold out in April 1817. Its successful flotation not
only had a positive impact on the price of the French *Rentes*, but it also strengthened
cross-market linkages, as approximately 29% of the loan was sold in London, and 13% in
Amsterdam (Oosterlinck *et al.*, 2014; White, 2001).

[18]These include both retail investors as well as firms (such as Baring, Rothschild, Hope,
Laffitte, Baguenault) who held a significant amount of *Rentes* in their portfolios, regardless
of their nationality and/or place of residence.

should have been another substantial source of downward pressure on Consol prices.[19]

Our financial propagation account has two important empirical implications. First, it entails that observed bond prices are endogenous, and/or that omitted variables are present. Second, if financial contagion is associated with significant increases in volatility, then the bond prices data will likely suffer from heteroskedasticity (Rigobón, 2019). Suppose, however, that the cross-market spillovers just illustrated were important factors driving Consol prices. In this case, we should be able to predict Consol prices well using lagged prices of Consols, *Rentes*, and other commonly traded assets. Moreover, we should be able to do just as good a job in crisis and noncrisis periods. On the other hand, if investors became significantly more worried about regime collapse during the reform crisis, then this should appear as an omitted variable in a simple regression of Consol prices on lagged asset prices. To pursue this line of analysis, we follow the standard practice in the empirical modeling of contagion literature (cf. Dungey *et al.*, 2005; Rigobón, 2019) — using vector autoregression to establish the baseline predictions and comparing the fit of the regressions in noncrisis and crisis periods.

Was it Just Continental Spillovers?

Let $\mathbf{R}_t = (r_{1t}, r_{2t}, \ldots, r_{kt})'$ denote a $(k \times 1)$-vector corresponding to k different assets' returns. A k-dimensional *vector autoregressive model* of order p, or VAR(p), has the form:

$$\mathbf{R}_t = \mathbf{c} + \mathbf{\Phi}_1 \mathbf{R}_{t-1} + \cdots + \mathbf{\Phi}_p \mathbf{R}_{t-p} + \boldsymbol{\varepsilon}_t, \quad t = 1, \ldots, T$$

where $\mathbf{\Phi}_i$ are $k \times k$ coefficient matrices, and $\boldsymbol{\varepsilon}_t$ is a $(k \times 1)$ zero mean white noise vector process with covariance matrix Σ.

In terms of model selection, we adopt the specification that maximizes the overall goodness-of-fit of the full VARs, as well as of the Consol equation. To evaluate the different models, we allow for different lag structures; we consider

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[19]We are not aware on any historical systematic, quantitative, evidence about British investors covering losses after the July revolution in France. Anecdotal evidence, however, indicates that the reaction of British speculators to the events that took place in Paris followed the logic suggested above. For example, the Commercial and Money-Market Report of the September 1830 issue of the *New Monthly Magazine* stated that: "...Since our last report of the state of the Money Market, the speculators for the fall in the funds have met with such an opportunity as rarely falls to the lot of stockjobbers in these peaceable times. Although there was evidently nothing in the events in France which might have justified any reasonable apprehensions respecting this country, they were easily converted into an effectual means of depression ... The tendency to a decline continued all the time during which disorder was known to prevail in Paris ... Some speculators are said to have earned immense profits, while others have been considerable losers..." (p. 407).

samples with different time spans; and, we include two additional (indirect) channels of interdependence. We present these different models, as well as the relevant test statistics in the Online Appendix (Tables C1 and C2). Based on these analyses, we fit a k-dimensional VAR with 6 lags (i.e. $p = 6$).[20]

Our time series $\mathbf{R}_t$ consist of monthly returns for seven "endogenous" assets, as well as two "exogenous" ones for the period between January 1826 and December 1835.[21] The assets include Pound Sterling, British Consols, and Bank of England stock, as well as equity return indices for the British railroad and banking industries calculated by Acheson *et al.* (2009). To account for the behavior of returns outside Britain, we consider French *Rentes* and Dutch Bonds.[22] As our exogenous variables, we consider gold, as well as an index of U.S. stock returns compiled by Schwert (1990).[23]

For each endogenous asset k, we are mainly interested in ε_{kt}, the residual from regressing that asset's returns on its lagged (past) values, along with the lagged return values of the other assets in the model. These residuals have a straightforward interpretation: they represent unexpected changes in an asset's performance, given all the prior available information. Therefore, one can use the estimated residuals to determine the presence of unexpected shocks, as well as the contemporaneous correlation between those shocks.

Figure 1 presents two Q–Q (quantile–quantile) plots of the residuals from two different assets, British Consols and French *Rentes*. For each of these two assets, we compare the quantiles of the residuals corresponding to the crisis period (June 1830/July 1832) with the quantiles of the noncrisis period residuals (May 1826/May 1830, and August 1832/December 1835). The graph's left (right) panel shows the Q–Q plot for Consols (*Rentes*). For ease of interpretation, and following Dungey *et al.* (2005), the residuals are scaled by their standard deviation from the noncrisis period.

Compared to tranquil times, asset prices should be more unpredictable during a crisis. Therefore, if investors perceived a threat to the stability of the regime whose bonds they traded, we should see larger forecast errors (i.e., outliers) during the crisis period as opposed to the noncrisis period. Consider

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[20] The most parsimonious VAR model produces qualitatively similar results. See the Online Appendix, Figures E1 and E2.

[21] There are 45 coefficients per equation, giving a total of 315 coefficients to be calculated. We estimate these parameters using the ordinary least-squares (OLS) method.

[22] According to Michie (1999), Nathan Rothschild as well as many Amsterdam Jews (including the Raphael brothers) used their Dutch connections to trade in government securities between London, Paris, Amsterdam, and Antwerp.

[23] To make sure the data are stationary, we calculate each asset's cumulative returns as: $r_{kt} = ln\left(\frac{v_t^k}{v_{t-1}^k}\right)$, where ln is the natural logarithm operator, and v^k represents the total return from holding asset k between the periods t and $t-1$ (which correspond, in this case, to two consecutive months). Both the Consol and French *Rentes* series are stationary. See the Online Appendix for a battery of statistical tests on unit roots, stationarity, and fractional integration (Tables B1–B5).
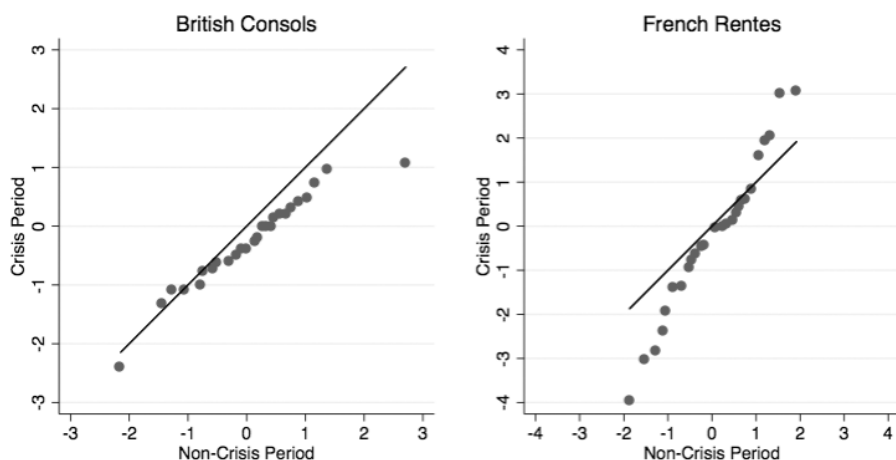
Figure 1: Q–Q plots.

the behavior of French *Rentes* first. The right panel of Figure 1 shows a significant difference between crisis and noncrisis periods in France. The estimated slope coefficient of a regression of quantiles corresponding to the crisis period on the ones for the noncrisis period is 1.87 (z-score $= 25.32$). Moreover, the lowest quantiles of the crisis distribution show much larger losses than the corresponding quantiles in the noncrisis distribution. Moreover, the largest negative "outliers" (i.e., unexpected price drops) during the crisis period corresponded to the outbreak of the revolution (July 1830), the purge of the *Legitimists* (September 1830), Lafitte's downfall (February 1831), and Perier's appointment as President of the Council of Ministers (March 1831). The decline in *Rentes* prices is also striking if one compares France with Britain: they fell 37% in value from the beginning of the crisis to the nadir, which is much bigger than for Consols. Table D1 in the Online Appendix shows the annualized returns for French 3% *Rentes*, as well as monthly price changes vis-a-vis Consols for the period between 1826 and 1836 (Figure D1). It seems that market participants dealt with French *Rentes* as if they perceived a substantial new threat to that investment, one that corresponded well to a conventional history of the revolution.

In contrast, there is no evidence that market participants viewed Consols as subject to a similar threat. As the left panel shows, the crisis and noncrisis distributions for Consols are quite similar (i.e., the points in the Q–Q plot lie approximately on the reference line). The estimated slope parameter when the quantiles corresponding to the crisis period are regressed on the noncrisis

period ones is statistically indistinguishable from one at conventional levels (p-value = 0.164).

In the case of England, as Aidt and Franck (2015) note, the process that culminated in the Great Reform Act could have failed at a number of hurdles. It is, thus, possible to conceive alternative "windows" corresponding to the crisis period. We consider four different subperiods that overlap with the reform era as well as the revolutionary events in France (March 1829/July 1832; June 1830/August 1831; October 1830/June 1831; September 1831/April 1832). These dates include moments before any reform had been introduced, as well as moments at which the bill's fate was in doubt.[24] For each of these subperiods, the estimated slope parameter when the crisis quantiles are regressed on the noncrisis ones is statistically indistinguishable from one at conventional levels (see the Online Appendix, Table E1). In sum, once cross-market spillovers are taken into account, the variability in Consol prices during the reform era was no different than that of normal times. These results are robust under all the different VAR model specifications discussed above (see the Online Appendix, Figure E1).

We should also consider the contemporaneous propagation of shocks between Consols and French *Rentes*. If the French revolution *directly* increased perceptions of a revolutionary threat to the British regime, then one should expect to see a heightened correlation between these two assets during the crisis period — as both would have lost value in the event of revolution. In contrast, if the comovements between these assets did not intensify during the Reform era, then one should conclude that fluctuation in Consol prices reflected ordinary cross-market spillovers. An examination of the relationship between these assets' residuals obtained from our VAR model indicates that Consols and French *Rentes* tended to move in tandem; yet, their comovement did not increase during the reform crisis (see the Online Appendix, Figures E2 and E3).

Taken together, the results presented in this section show that purely financial spillover or contagion, co-produced by imperfections in the financial system and investors' efforts to cover their losses after the French revolution, can explain overtime trends in Consol prices. Indeed, whereas market participants treated French *Rentes* as if the French revolution posed a serious threat to the regime's ability to repay its debts, they did not treat Consols as if they perceived a similar threat to the credibility of British debt. Using a simple battery of lagged asset prices, Consols continued to be just as predictable during the reform crisis, as before or after that crisis (Figure 1). Moreover, there was no significantly increased comovement of Consols and French *Rentes*

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[24]For example, the period between March 1829 and July 1832 also includes the political uncertainty related to the Catholic Emancipation question.

during the crisis. None of these results is consistent with a revolutionary threat perspective.

Political Risk and Consol Prices

The evidence of foreign contagion highlights the importance of distinguishing between Consol price fluctuations that were the result of different sources of risk. Idiosyncratic risk (also known as diversifiable or residual risk) should affect a specific security (in this case Consols). In contrast, systematic risk denotes vulnerability to events which affect aggregate outcomes, rather than just a particular security or asset class. We examine how a particular factor — the risk of regime instability — affected Consol returns during the reform era.[25]

Risk Exposure

A risk of revolutionary overthrow should have affected any security whose worth hinged on the unreformed regime's stability, including sovereign debt (such as Consols and Reduced Annuities), currency (Pound Sterling), and stocks connected to the government's politico-economic apparatus, such as the Bank of England and the East India Company (Acheson *et al.*, 2009). Therefore, we can use these regime-dependent securities to construct a portfolio with an explicit factor exposure.

If investors thought that the unreformed regime faced an existential threat, then an all-Consols investment strategy should have been as risky, but not riskier than, one based on a portfolio of regime-dependent securities. On the other hand, Consol risk premia in excess of the *Regime* portfolio's returns would indicate that price movements in the Consols market did not respond exclusively to the risk of regime downfall. Instead, the finding that Consols exhibited more risk than the *Regime* portfolio would suggest that other factors might be confounding one's ability to interpret Consol price variability as stemming from increased threat perceptions.

Risk Decomposition

Risk decomposition allows one to explicitly examine the impact of individual factors on the return variation of risky assets. Following the capital asset pricing model (CAPM), the expected return from an all-Consol investment

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[25]Classical investment theory assumed that there was a single type of systematic risk, called market risk. Over time, however, other risk factors in the returns on stocks and bonds were identified. From this perspective, a factor is any common (systematic) driver of securities' returns.

strategy during period t is

$$E(R_{ct}) = R_f + \beta_c[E(R_{it}) - R_f]$$

where R_f is the return from a risk-free asset, $E(R_{it})$ is the expected return from the factor index, and β_c is $cov\ (R_c, R_i)/\sigma^2(R_i)$. Thus, β_c provides a measurement of the volatility of an all-Consol investment strategy relative to the *Regime* portfolio.

The parameter β can be estimated using an OLS regression of the form:

$$R_{ct} = \alpha_c + \beta_c R_{it} + \varepsilon_{ct},$$

where $\alpha_c = R_f(1 - \beta_c)$, and ε_{ct} is an error term. If the estimated β_c is equal to 1, it means that the all-Consols investment strategy was as volatile as the *Regime* portfolio. If the estimated β_c is greater than 1, it means that an all-Consols investment strategy was more volatile than the one based on a portfolio of regime-dependent securities. Specifically, $\beta_c > 1$ would indicate that when the *Regime* portfolio returns went up, then the returns to the all-Consols investment strategy went up more; and when the *Regime* portfolio returns went down, the returns to the all-Consols investment strategy went down by a larger amount.

To allow for the possibility that the β_c parameter varied over time, we estimate rolling regressions using 12-month periods, incrementing the starting month in quarterly intervals. So, our first estimate corresponds to the period between January 1826 and December 1826, the second to the period between April 1826 and March 1827, and so on. For each estimation window, we also calculate β_c's standard error, so that we can obtain 95% confidence intervals.

Consol Risk

We empirically estimate the time-varying β_c coefficients using the sample of monthly Consol prices between January 1826 and December 1835. The factor index is an equally weighted portfolio composed of Consols, 3% Reduced Annuities, Pound Sterling (cash), the Bank of England, and the East India Company.[26] Figure 2 displays our results. The solid black line shows the β_c coefficients. The dashed lines represent 95% confidence intervals around these estimates. The situation where the all-Consols investment strategy carried the same risk as the *Regime* portfolio (i.e., $\beta_c = 1$) is represented by the black dotted line.

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[26]In both cases, we focus on total returns; namely, we consider not only the capital appreciation on the two alternative strategies, but also on the income received on these investments. The income consists of interest in the case of bonds as well as dividends in the case of the Bank of England and the East India Company.
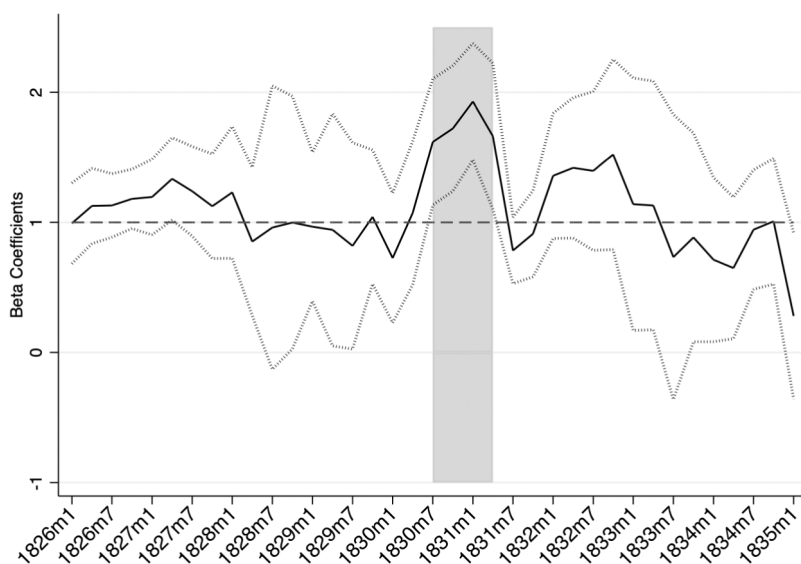
Figure 2: Consol excess risk (1826–1835).

The graph shows that investing exclusively in Consols usually carried the same risk as investing in the portfolio of regime-related assets.[27] The β_c coefficient, however, is significantly different from unity at the 95% confidence level for the period starting in July 1830 and ending in March 1832 (marked in grey in Figure 2). More specifically, the β_c coefficient for this subperiod is 1.43 (z-score 8.06), implying that the all-Consol investment strategy was 43% more volatile than investing in the *Regime* portfolio.

Why were Consol returns more volatile than the *Regime* portfolio? Was sovereign debt significantly more likely to be repudiated by a new postrevolutionary regime than other regime-dependent securities? If this were true, then another common form of British sovereign debt, 3% Reduced Annuities, should also have been significantly more volatile than the *Regime* portfolio during the crisis period. But, as we show in the Online Appendix, (Figure F1), this was not the case. Moreover, if market participants thought the risk of revolution and debt repudiation was high, then investing in private-sector firms during the reform crisis should have been perceived as being safer than holding government debt. But, as we showed in Table 1, the yields of corporate securities were consistently higher than Consols' in this era.

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[27] A regression for the whole period (January 1826–December 1835) indicates that the β_c coefficient is 1.038 (z-score 13.17), with the riskiness adjusted to that of the minimum variance portfolio.

Our results, however, make sense when investors' speculative activities are considered. As noted in the section "Financial Volatility in the Reform Era", both speculators and investors exposed to French government debt had strong incentives to sell Consols, exerting a downward pressure that did not affect other regime-dependent securities. In addition to events in Continental Europe, the July of 1830–March of 1832 period witnessed, among other things, the aftermath of George IV's death, the Swing Riots, the fall of Wellington's ministry, the cholera morbus outbreak, the activities of the political unions, and the protracted parliamentary reform process. All of these events could have arguably spurred speculative actions in the Consols market. The following account, published on August 25, 1831 in the *The Times*, illustrates how the overpricing of Consols was regarded as a short-term anomaly caused by speculative moves: "There is an advantage, in the present state of the Stock-market, in investments in 3 per cents Reduced, compared with Consols, of about $\frac{1}{4}$ per cent. This ought to be generally known, as the difference is worth something; the rate of interest and the security being of course precisely the same. This would imply, and such, we believe, the fact, that Consols being the stock to which the time bargains are wholly confined, have been raised by speculation above their proportionate value..." (cited in Odlyzko, 2015, p. 32).

What Moved Consol Prices?

Nineteenth-century investors relied on business journalists to procure information on financial and commercial activities. Their preferred source in the 1830s, before such venues as the *Economist* and the *Banker's Magazine* were founded, was *The Times' Money Market and City Intelligence* (MMCI) section (Morgan and Thomas, 1962). We, thus, rely on the coverage provided by the MMCI section of *The Times* to obtain detailed information on noncommercial risks affecting the Consols market during the reform era. We focus on transactions conducted in the London Stock Exchange during the period between January 8, 1830 and December 31, 1832. The exchange operated 6 days a week, excepting a few holidays, and Consols had an official record of trades on almost every trading day that it was open for trading. We obtained data on Consol prices from the daily quotes reported in *The Times*. We use forward prices (i.e., the price of Consols at the ensuing account) to address the issue of measuring the effects of *expectations* about political events.[28] During the period under study, trading in Consols "for money" was suspended ("shut") for about a month preceding the transfer of the half-yearly dividends to allow

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[28]Consol account settlement days were spaced at an average of about 6 weeks apart during this era.

the Bank of England to prepare its accounts for the payouts (Klovland, 1994; Odlyzko, 2017). Therefore, an additional advantage of using Consol prices quoted 'for account,' rather than prices quoted for cash trading, is that we have an uninterrupted record of transactions. Finally, we adjust the daily prices to account for the accrued dividend element in the market price.[29]

News and Consol Volatility

We can use a form of extreme-value analysis to examine the linkage between public information and Consol prices between 1830 and 1831 (cf. Cutler *et al.*, 1989). On some days, the MMCI coverage offers no clear explanation for movements in the money market. But, on some other days, important information connected to noncommercial risks is provided. For example, on March 2, 1831, the MMCI states that:

> . . .contempt abroad, with loss of credit at home, have been inferred as part of the consequences of so sweeping a reform as that now contemplated. At the Stock-Exchange, from the nature of the operations entered into, this . . . feeling would appear to have prevailed to a very considerable extent; for though there have been some purchases for investment, the sales have, altogether, considerably predominated. . .

Table G1 in the Online Appendix lists the 20 largest one-day Consol positive and negative movements during this period, along with the MMCI account of the noncommercial factors that affected the money market. The most commonly cited factors were foreign events (11 instances), the fate of the reform bill (3 instances), and uncertainty about government turnover (3 instances). Nine out of the top-10 one-day losses were contemporaneous with the Swing riots. Yet, with one exception (November 8, 1830), the newspaper did not mention social unrest as a source of market movements.

To probe the relationship between political risk(s) and market valuations in a more systematic way, we rely on the media coverage provided by the MMCI to identify the days in which stories about noncommercial risks affecting the money market were published. Once again, we focus on the period between January 8, 1830 and December 31, 1832. Next, we combine these data with the daily Consol prices quoted 'for account' described above. Finally, we compare the variability of Consol returns between "news" versus "non-news" days. Based

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[29]Dasgupta and Ziblatt (2015) also examine fluctuations in Consol prices using daily data. But, they do not adjust for the accrued dividend element in the market price. By neglecting this factor, as Klovland (1994) notes, one would obtain spurious effects on the calculated yield. They also seem to be unaware that their source provides data on Consol prices quoted for cash trading, rather than prices quoted 'for account', to be settled later (a form of forward trading). This is another important weakness in their analysis.

on the findings in Table G1, we classified the MMCI's account of the factors that affected the money market into five categories: (1) military conflict in Continental Europe; (2) spread of cholera morbus; (3) the Reform Bill's fate; (4) changes in the British government's composition; and (5) other/no discernible event. To construct this classification, we conducted word searches in the MMCI section of *The Times* using the newspaper's built-in digital engine. A similar search for stories about Swing riots in this particular section of the newspaper yielded no results.[30] For overlapping dates, returns were assigned hierarchically to category (3) (Reform Bill) first, then to categories (4), (1), and (2), respectively.[31] A total of 290 stories in categories (1)–(4), and 633 in category (5) were published in the MMCI section during the sample period of the analysis. Of these accounts, 105 belong to the first category (prospects for war/peace in the continent), 71 to the second one (cholera pandemic), 77 to the third one (Reform Bill), and 37 to the fourth one (government changes).[32] The number of stories in (1) confirms that uncertainty in European affairs was considered to be quite important vis-a-vis domestic politics.[33]

We used intraday price changes to compute the Consol volatility in each of our five MMCI categories. Specifically, we took the natural logarithm of the ratio of the closing price at time t to the closing price at time $t-1$. This measure is equivalent to the percentage change of Consol returns relative to the previous day, allowing us to control for differing yields across time periods. Next, we pooled these intraday changes across all days in each of our

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[30]https://www.gale.com/preview/c/the-times-digital-archive. The search term for category (1) was "war OR peace;" for (2) we used the term "cholera OR quarantine;" we searched for "reform" for (3); and the search terms for (4) were "election" and "ministry." After retrieving the results, we conducted a manual check on each story's content to make sure that the events occurred in Continental Europe and/or Great Britain (e.g., we ignored discussions of government changes in Argentina or Brazil).

[31]As such, every day in our sample is assigned to each of these five mutually exclusive categories. One of our goals is to disentangle the effect of foreign versus domestic factors. Therefore, by placing in the *domestic* catergories (3) and (4) stories that mentioned both foreign and domestic events as the source of Consol price fluctuations, we are erring in the side of caution.

[32]The Asiatic cholera pandemic reached the continent in 1829, spreading widely in Central Europe during 1830–1831. In Great Britain, the first cases occurred in the autumn of 1831, followed by a major epidemic in the summer of 1832 (Underwood, 1947). Throughout Europe, people's lives were affected by quarantine measures, compulsory hospitalizations, and the sealing-off of entire cities by *cordons sanitaires*. In several European capitals, these rigid policing measures raised violent opposition (Evans, 1988). Even though such opposition did not snowball into revolution, it had a distinct impact on the regions' public health, business activity, and trade patterns.

[33]Recall that whenever a story mentioned both war/peace in Continental Europe and politics in Britain as the source of Consol changes, we classified the account using the latter rather than the former account.

Table 2: News and variability of consol prices.

	War/peace in Europe (1)	Cholera (2)	Reform bill (3)	Change in gov. (4)	Other/no news (5)
Standard deviation	0.50	0.28	0.55	0.73	0.35
of returns	(105)	(71)	(77)	(37)	(632)

	Comparison among			F-Statistic	p-value
Levene's test	Cols. (1)–(4) vs. (5)			19.61	0.000
for equal variances	Col. (1) vs. (5)			17.73	0.000
	Col. (2) vs. (5)			1.22	0.268
	Col. (3) vs. (5)			25.36	0.000
	Col. (4) vs. (5)			5.92	0.015
	Col. (3) vs. (4)			0.25	0.616

five categories, and calculated their standard deviation.[34] Table 2 presents a comparison between the variability of Consol returns on dates with news classified in each of the categories described above. The annualized standard deviation for the days in category (5) is almost exactly the same as the one for Consol prices for the whole period between 1826 and 1835 examined above (6.19% versus 6.26%). Therefore, it provides a reliable baseline to evaluate the relative volatility of the days in the other categories.[35] We can easily reject the null hypothesis that the variance of returns is equal for days in categories (1)–(4) and days with "other/no discernible event" news stories.

Volatility is higher during periods associated with stories about war/peace in Europe, as well as the Reform Bill, than during "other/no discernible" news periods. In both cases, however, volatility is lower than during days when stories about the government's survival were published. In the case of the "cholera" category, its volatility is lower than the variability of returns on days in category (5). Most stories were published at the peak of the epidemic in Britain. As a result of the imposition of quarantine/isolation measures, the bond market came to a complete standstill, and Consol prices experienced little movements at that time.

The MMCI, however, did not seem to be overly concerned with the threat of revolution in Britain. First, they never explicitly mentioned such a risk.

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[34]This approach is closely related to Roll (1984), who examines the connection between articles about oranges published in the *Wall Street Journal* and the variability of orange juice futures returns, as well as to Elmendorf *et al.* (1996), who study the effect of news on weekly Consol prices between 1900 and 1920.

[35]To obtain the annualized figure, we simply multiply the daily standard deviation by the square root of 305 (the number of trading days in a year during the period under study).

Second, they never mentioned the on-going Swing riots as a noncommercial factor affecting the market. Third, it does not appear that their mentions of the reform bill were tacit acknowledgments of a revolutionary threat. Otherwise, volatility on days with stories about the reform bill should have been higher than volatility on days with stories about Ministerial instability — but, as the last row in Table 2 indicates, this was not the case.[36]

Political Uncertainty and Consol Prices

In this section, we run a "horse race" regression in which proxies for extraordinary uncertainty (about the unreformed regime's survival) and proxies for uncertainty over partisan control of government are used to predict the first- and second-moment components of the Consol returns distribution over the period between January 8, 1830 and December 31, 1832. Specifically, we adopt the following Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model:

$$r_t = \alpha + X_t\beta + \epsilon_t,$$

$$\epsilon \sim N(0, h_t^2),$$

$$h_t^2 = \exp(\eta + Z_t\lambda) + \gamma_1\epsilon_{t-1}^2 + \gamma_2 h_{t-1}^2$$

where r_t is the percentage change in Consol returns relative to the previous day; X_t is matrix of covariates affecting Consol returns in day t; β is a column vector of parameters to be estimated; ϵ_t is an error term; h_t^2 is the conditional variance of ϵ_t; Z_t is a matrix of covariates affecting Consol volatility in day t; λ is a column vector of parameters to be estimated; and γ_1, and γ_2 are the coefficients of a GARCH(1,1) specification.[37]

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[36]If all 922 days in our sample had experienced the same volatility as the 37 days in which stories about government instability were reported, then the overall variance of returns would have been roughly 93% higher than the variance actually observed. A similar calculation indicates that the observed volatility would have only been 44% higher if the 922 days in our sample had experienced the same price volatility as the 77 days in which stories about the unreformed regime's survival were reported.

[37]To examine the potential existence of long memory, or fractional integration, in the series of daily returns we estimate the parameters of an ARFIMA model with the fractional difference parameter and a constant. Both the Akaike information criterion and the Bayesian information criterion select a specification with one autoregressive term and one moving-average term. The fractional difference parameter, $d = -0.072$ (with a standard deviation of 0.056). Therefore, we cannot reject the null $d = 0$ in the series. See the Online Appendix for additional statistical tests on unit roots, stationarity, and fractional integration (Tables G2 and G3).

We proxy elite perceptions of a revolutionary threat using the data on contentious collective action collected by Horn and Tilly (2000).[38] We consider Swing riots and other contentious gatherings separately. In the case of the former, we use the classification in Horn and Tilly to restrict our attention to gatherings demanding the extension of the franchise.[39] A steady stream of events would have likely made a greater impression on investors than a few isolated incidents. The data are coded on a daily basis; so, for each observation in our sample, we calculate the cumulative number of events that took place within the past 7, 15, and 30 days (see the Online Appendix, Tables H4 and H5). To the extent that these variables are valid proxies, and revolutionary threat perceptions drove the bond market, we should find that Consol prices dropped following spikes in the number of contentious gatherings.

We also account for parliamentary votes on the issue of franchise extension. As Aidt and Franck (2015) note, the Reform Act could have failed at a number of hurdles, including its second reading (March 23, 1831), as well as the Lord's explicit rejection of the Bill (October 8, 1831). We construct a dummy variable that takes a value of 1 in the three days around a key parliamentary vote on Reform Bills between 1831 and 1832, and 0 otherwise.

With regard to government turnover, we consider parliamentary elections (held in 1830, 1831, and 1832). In this era, elections were held over a period of months, not on a single day. Thus, our election dummy takes the value of one for each day between the first (July 29) and last (September 1) day of the 1830 election; between the first (April 28) and last (June 1) day of the 1831 election; and after the first (December 10) day of the 1832 election; and zero otherwise.[40] We also explicitly consider the two periods when party control of government changed. The first one consists of the formation of the reform-friendly government under the leadership of Earl Grey in November 1830. The Duke of Wellington's incensed speech against reform on November 2 unleashed a confidence crisis that led to his resignation two weeks later. The second government crisis occurred during the so-called Days of May in 1832. Most historians date the beginning of this crisis on May 7, the day on which the House of Lords considered the Reform Bill. Indeed, as Fraser (2013) notes, the placards in the street of London, which anticipated the debate were proved

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[38]Contentious gatherings are defined as occasions on which at least 10 or more persons assembled in a publicly accessible place and either by word or deed made claims that would, if realized, affect the interests of some person or group outside their own number. These gatherings include almost every event that could be considered a disturbance, disorder, riot, or protest in addition to the numerous meetings, rallies, marches, processions, celebrations, and other sanctioned assemblies during which people made claims (Horn and Tilly, 2000).

[39]The categories in Horn and Tilly (2000) are ELECTION, GOVERNMENT, PARL-REFORM, and REFORM+GOVT.

[40]The last contest of the 1832 elections took place after the period under study (January 8, 1833).

right: "Seventh of May, Crisis Day." As noted above, the crisis ended when Lord Grey was reinstated as Prime minister on May 16. We thus include a dummy variable that takes a value of 1 for the periods between November 2 and November 14, 1831 as well as between May 7 and May 16, 1832, and zero otherwise. As each of the changes in government were pursuant to votes of no confidence in the House of Commons, or their analog in the House of Lords, our analyses control for both ways that a British government could fall — by losing elections and by losing votes of no confidence.

Table 3 reports the effect of social unrest and political instability on the first (top panel) and second (bottom panel) moments of the Consol returns. The first model (column 1) follows the GARCH(1,1) specification described above. We include our three proxies for elite perceptions of the revolutionary threat (Swing riots, contentious gatherings, and reform votes) in the return equation. In the volatility equation, we include our two measures of political instability (Elections, and Government Turnover), as well as three additional control variables. The first one, *Foreign News*, takes the value of 1 for days in which the *Money Market and City Intelligence* published a story about military conflict in Continental Europe; and zero otherwise. The second one, *Settlement* takes the value of 1 for settling days; and 0 otherwise. The third one, *Shutting*, takes the value of 1 when trading in Consols "for money" was suspended ("shut"); and 0 otherwise.

An examination of the ARCH(1) and GARCH(1) terms shows that their coefficients sum up to a number less than 1, which is required to have a mean reverting variance process. With regard to the returns equation, the results indicate that its expected intra-day percentage change is essentially 0. The findings also suggest that neither social upheaval nor key parliamentary votes on franchise extension had a systematic effect on the Consol prices. These results do not change if we use a shorter time window to calculate the cumulative number of Swing riots/contentious gatherings (see the Online Appendix, Tables H4 and H5).

Regarding the second-moment components of the Consol returns distribution, the results indicate that Consol prices exhibited more volatility during days associated with stories about war/peace in Europe, as well in the two periods when party control of government changed. These findings are consistent with the analysis presented in the previous section. Substantively, they indicate that, in the case of government instability, the estimated daily standard deviation of Consol returns would increase by 0.53. The daily standard deviation of the returns in our sample is 0.41. Therefore, while the effect of events of this kind on Consol prices was not negligible, it was not extraordinarily large.[41]

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[41]In the case of *Foreign News*, the estimated increase in the Consol returns' daily standard deviation amounts to roughly 0.44.

Table 3: Political uncertainty and consol prices.

	Consol returns			
Swing riots	−0.001	−0.001		
	(0.000)	(0.000)		
Contentious gatherings	0.001	0.001		
	(0.000)	(0.000)		
Reform bill vote	−0.032	−0.033		
	(0.051)	(0.050)		
Volatility			0.096	
			(0.116)	
Constant	−0.009	−0.009	−0.013	−0.015
	(0.011)	(0.011)	(0.013)	(0.010)
	Consol volatility			
Swing riots		0.002	0.002	0.001
		(0.002)	(0.002)	(0.000)
Contentious gatherings		0.002	0.002	0.001
		(0.001)	(0.001)	(0.000)
Reform bill vote		−0.031	−0.000	0.047
		(1.214)	(1.282)	(0.222)
Elections	0.777*	0.695	0.751*	0.142**
	(0.421)	(0.433)	(0.417)	(0.065)
Government turnover	3.065***	2.788***	2.867***	0.946***
	(0.575)	(0.596)	(0.596)	(0.355)
Foreign news	2.296***	2.115***	2.092***	0.466***
	(0.302)	(0.352)	(0.359)	(0.168)
Settlement	2.128***	1.922**	1.936**	0.364
	(0.783)	(0.880)	(0.844)	(0.301)
Shutting	−0.133	−0.219	−0.233	−0.075
	(0.326)	(0.327)	(0.326)	(0.049)
Constant	−4.845***	−4.710***	−4.719***	−0.384***
	(0.413)	(0.423)	(0.413)	(0.140)
ARCH(1)	0.188***	0.194***	0.190***	−0.099***
	(0.046)	(0.050)	(0.048)	(0.032)
EARCH(1)				0.296***
				(0.086)
GARCH(1)	0.680***	0.657***	0.660***	0.853***
	(0.059)	(0.067)	(0.064)	(0.054)
Observations	922	922	922	922

Note: Robust standard errors are presented in parentheses. *indicates significance at a 10% level; **indicates significance at a 5% level; ***indicates significance at a 1% level. Table G1 in the Online Appendix provides descriptive statistics for all the variables included in our models.

The unreformed regime's survival chances could also have affected Consol prices and volatility. We test this conjecture in our second model, reported in column 2. In this case, we include our proxies for revolutionary threat in both the return and the volatility equations. The results indicate that neither riots nor parliamentary votes had an effect on the security's volatility. In addition, the coefficients of elections and government turnover are still positive and statistically significant after we control for revolutionary threats in the volatility equation. More importantly, note that if both *Swing Riots* (cf. Aidt and Franck, 2015) and *Foreign News* are interpreted as good proxies for perceived revolutionary threats, then we should expect the coefficients of both variables to be statistically significant. Yet, this is not the case.

We further probe the potential indirect effects of revolutionary threats on Consol prices in our third model (reported in column 3). Specifically, we consider the possibility that the risk premium depends on the conditional variance:

$$r_t = \alpha + \delta h_t^2 + \epsilon_t,$$

where h_t^2 is defined as before. The coefficient of the conditional variance in the returns equation is not statistically significant. Therefore, revolutionary threats as measured by Consols' conditional variance do not affect the security's average prices.

Finally, in our fourth model, we examine the asymmetric effect of shocks on volatility. We exclude our proxies of the revolutionary threats in the return equation, and estimate the volatility equation using the following E-GARCH process:

$$ln(h_t^2) = \eta + Z_t\lambda + \gamma_1\xi_{t-1}^2 + \gamma_2 ln(h_{t-1}^2) + \gamma_3\left(|\xi_{t-1}^2| - \sqrt{\frac{2}{\pi}}\right),$$

where $\xi_t = \frac{\epsilon_t}{h_t^2}$, which is distributed as $N(0,1)$. The negative γ_1 coefficient implies that negative innovations (unanticipated price decreases) are more destabilizing than positive innovations. The effect, however, is smaller than the symmetric effect (0.278). In fact, the relative scales of the two coefficients imply that the symmetric effect dominates the negative leverage. The results indicate that neither riots nor parliamentary votes had an effect on Consol price volatility. More importantly, the estimated effects of elections and government turnover are robust when we consider the asymmetric effect of shocks on volatility.

Why would Consol prices depend on the probability that policies would change when one party takes over government from another? According to Stasavage (2003), partisan divisions over the public debt in the early post-Revolution state had largely disappeared by the 1830s. After the Consolidated Fund Act of 1787, enacted by a Tory government, the payment of interest

on the Consols was mandated by statute (Chester, 1981, pp. 178–85). In other words, the government of the day lacked the authority to refuse payment. Thus, after this point — and probably before (since earlier enactments had limited government discretion) — no investor would have thought that the Tories were significantly likelier to default on paying the interest due on Consols than were the Whigs. Yet, as several scholars have noted, because investors may still hold back on making investments whose profits will depend on government policies, partisan turnover is often associated with increased uncertainty (Bernanke, 1983; Canes-Wrone and Park, 2012; Cox and Weingast, 2018). Unlike Consols, the other major government "funds" (Bank of England and East India Company) were objects of intense partisan contention in the early post-Revolution state. For example, companies involved in prominent partnerships with Britain government had greater exposure to political governance shocks (Bogart and Angel, 2019; Stasavage, 2003). This long history of partisan dispute implies that uncertainty about whether the Whigs would remain in power or the Tories would return following the the narrow escape directly affected Bank of England and East India stocks.

Considering the cross-asset linkages uncovered above, qualms about which party would emerge victorious in the aftermath of the narrow escape should have also exerted an indirect effect on Consol prices. When investors withhold politically sensitive investments, they usually put their money into relatively liquid securities, so that they are able to move quickly once their uncertainty about government policy is resolved. Therefore, the fraction of financial transactions that are relatively short-term and speculative, such as the Consols market, increases during periods of government uncertainty, even if bond markets are insulated from partisan influence.

Conclusion

Did fears that Britain's regime would be toppled by revolution drive Consol prices during Britain's reform era? Recent work in political science has suggested as much (Dasgupta and Ziblatt, 2015), while work in financial economics comes to a different conclusion (Mitchell *et al.*, 2002). We have reconsidered Consol price movements during the reform crisis, highlighting the role of two factors — financial spillovers and government turnovers — that might confound efforts to attribute Consol yield spikes to revolutionary fears.

We first show that Consol yields did not exhibit unusual behavior during the reform era, once one controls for financial spillovers via a battery of lagged asset prices. The same controls applied to French *Rentes*, however, show abnormal negative returns. In other words, our analyses suggest that investors did see a revolutionary threat to *Rentes* but did not see a similar threat to Consols.

Bolstering this first finding, we also examine other assets that should have been at risk in the event of revolution — including land and regime-dependent securities such as Bank of England stock. We show that land prices *increased* during most of the reform crisis and that regime-dependent securities varied enough in their behavior during the crisis so that investors could still benefit from intraregime diversification.

Turning to our second factor, government turnovers, we show that uncertainty about European affairs and about partisan political control of Britain's cabinet were systematically related to movements in Consol prices. In contrast, neither riot intensity nor reform bill votes showed any systematic effect on the Consols market. We thus offer an alternative explanation of the volatility of Consol prices during the reform period. We argue that financial spillovers, coupled with ordinary political risks, drove the Consols market in the early 1830s. Therefore, we conclude that Britain's *perilous question* did not pose a fundamental threat to the stability of the regime or property rights.

Our findings also have implications for the emerging literature that uses historical financial market data to explore political reactions to revolutionary threats. While we focus on Britain's Great Reform Act, our approach is general enough to accommodate other similar episodes. We, thus, recommend that future studies examine the entire range of assets that would be at risk from revolution and take financial spillovers into account.

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