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Free Silver and Financial Frictions

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in Economics

by

Colin Russell Weiss

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ABSTRACT OF THE DISSERTATION

Free Silver and Financial Frictions

by

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Doctor of Philosophy in Economics
University of California, Los Angeles, 2017
Professor Dora Luisa Costa, Chair

This dissertation studies how the economic uncertainty created by the Free Silver movement in the United States during the 1880s and 1890s affected the U.S. economy. Particular attention is paid to the importance of several financial frictions including debt default, costly bankruptcy, and intermediated credit in transmitting this uncertainty. It consists of three chapters. In Chapter One, "Is Devaluation Risk Contractionary? Evidence from U.S. Silver Coinage Agitation, 1878-1900," I identify the real effects of devaluation risk on interest rates and output by studying changes in silver coinage policy in the U.S. between 1878 and 1900. "Silver agitation" heightened fears that the U.S would abandon the gold standard and depreciate the dollar relative to gold. Using a high-frequency event study of corporate credit spreads, I show that silver news altered corporate credit spreads by 30-50 basis points per event day. To obtain my results, I build a series of silver coinage policy news shocks at the daily level and hand-collect daily corporate bond yield data that I separate by credit risk using newly-collected earnings and balance sheet data. Finally, I exploit these daily credit spread changes as shocks to estimate monthly impulse response functions for the dollar-gold

interest differential and industrial production. A 25-basis point increase in the speculative-safe spread due to an increased likelihood of future silver coinage raised the dollar-gold interest spread 80 percent relative to its mean and lowered industrial production by 3.19 percent at a trough of 12 months.

In Chapter Two, "Was the Election of 1896 a Turning Point for the U.S. Economy? Estimating the Effects of Political Uncertainty on Railroad Outcomes," I examine how firm-level activity responded to the resolution of political uncertainty in the context of the 1896 election in the U.S. This election is widely viewed as the ultimate defeat of the Free Silver movement. I use new hand-collected operations and balance sheet data for the railroad sector, one of the most important industries at the time, to examine the role of the 1896 election for the U.S. economy. I identify firm-level effects of the 1896 election by exploiting changes in corporate bond yields on days with news about the election as a source of cross-sectional variation. I find that railways with greater decreases in bond yields during the election saw greater income growth in the year after the election. I find no evidence that firms with large yield changes during the election invested more afterwards. I also present suggestive evidence about the importance of bank credit in explaining the income results and for why railroads with large yield changes did not invest more.

Finally, Chapter Three, "Monetary Regime Uncertainty and the News: Evidence from U.S. Silver Coinage Reporting, 1878-1897," studies the how the media covered the debate between Free Silver supporters and gold standard advocates using a newly-constructed panel of monthly counts of articles related to silver coinage in leading U.S. newspapers. I document several novel findings. First, as uncertainty about monetary policy increased, newspapers printed more articles using biased phrases regarding the monetary standard (gold or silver). Newspapers that targeted a rural, agrarian audience responded to higher uncertainty by increasing their usage of pro-silver phrases more relative to newspapers focused on an urban audience based in financial centers. Instead, these urban newspapers published more articles with pro-gold phrases. Lastly, regardless of the position of the newspaper on the coinage issue, biased phrases emerged during election campaigns rather than in descriptions of legislation.

The dissertation of Colin Russell Weiss is approved.

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2017

To my wife, Virginia:

who never stopped believing in me even when I sometimes did.

And to my parents:

who always supported me in this pursuit.

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Chapter 1

Is Devaluation Risk Contractionary? Evidence from U.S. Silver Coinage Agitation, 1878-1900

1.1 Introduction

Currency risk–including the risk of large fluctuations for floating exchange rates or sudden devaluations for fixed exchange rates–affects many developing economies today and potentially lowers their output (Gupta et al., 2007; Mitchener and Weidenmier, 2015; Schmuckler and Serven, 2002). Assessing the real effects of currency risk in a modern setting is an empirical challenge for a number of reasons. First, fluctuations in devaluation risk are often caused by shocks to other economic variables, such as output or asset prices, making it difficult to identify devaluation risk effects. Second, many changes in currency risk are quickly followed by actual exchange rate devaluations, again raising identification challenges.

I exploit the unique historical and institutional features of the U.S. monetary system at the end of the 19th century to estimate the effects of currency risk between 1878 and 1900 on economic activity. In the time period I study, the U.S. was on a gold standard (i.e. the dollar was convertible to a fixed amount of gold at the mint) but a political coalition of farmers and miners pressed for the additional convertibility of dollars to a fixed amount of silver. The preferred policy of this "Free Silver" movement would have resulted in a 50 percent depreciation of the dollar against gold.[1]

My paper consists of two distinct, but complementary, analyses. I first identify the effects of silver coinage news on corporate bond credit risk, a key component of private borrowing costs, by using a high-frequency event study approach. This approach relies on a new series of silver coinage policy news shocks at the daily level that I constructed using information from the historical financial press and a series of daily bond yields around event days. I then aggregate my daily credit risk premia changes from silver policy shocks to the monthly level to study how industrial production and the dollar-gold interest rate spread reacted to changes in expected future silver coinage.[2]

There are several advantages to the time period I study for understanding the real effects

[1]The Free Silver movement advocated a mint convertibility ratio of 16 ounces of silver for one ounce of gold at a time when the market prices of silver and gold fluctuated between 20 and 32 ounces of silver per ounce of gold. This would exhaust the Treasury's gold reserves and force it to suspend gold convertibility, leading to a 50 percent depreciation of the dollar against gold.

[2]High-frequency methods are often used to identify the effects of monetary policy shocks. See Gürkaynak et al. (2005) and Krishnamurty and Vissing-Jorgensen (2011) for examples. Similarly to this paper, Gertler and Karadi (2015) use high-frequency shocks to help identify lower frequency effects on industrial production.

of currency risk. Shocks to devaluation risk were due to political rather than economic factors, making endogeneity less of an issue. I also use the narrative record to verify that no economic news occurred on silver policy news days to further alleviate endogeneity concerns. Additionally, the U.S. never abandoned the gold standard between 1878 and 1900, despite the persistent threat posed by Free Silver, so I do not have to separate the effects of currency risk from the effects of an actual currency crisis. Finally, many companies were exposed to exchange rate risk on their balance sheets because devaluation would have raised the real debt burden. Seventy percent of corporate debt was payable in "gold coin" rather than dollars and was primarily issued by companies in the non-tradable sector.[3]

My analysis uses the differential changes in safe versus speculative-grade bonds to capture changes in the credit risk premium. Speculative bonds are more likely to be affected by silver coinage risk for three main reasons. First, although data limitations prevent a direct comparison of gold- and dollar-denominated bonds, the change in the gold debt burden due to devaluation was greater for speculative bonds than safe bonds. Second, devaluation fears weakened the financial system (through withdrawals of deposits), leading to contractions in credit and production, lowering corporate earnings. Speculative bond values respond more to fluctuations in earnings than safe bond values. Finally, since silver coinage affected the health of the financial system, news about silver coinage likely impacted speculators' ability and willingness to hold risky corporate bonds.

I find that silver coinage news changed the spread between safe and speculative corporate bonds and had its largest effect on bond yields after the Panic of 1893, when the Treasury likely lacked the gold reserves to withstand a run on gold. I obtain these results using daily corporate bond yield data from over 100 firms that I hand-collected and then separate by credit risk using information from earnings reports and balance sheets which were available to investors at the time. Silver news after the Panic of 1893 caused speculative yields to change by an additional 50 basis points. Additionally, my evidence suggests that differences in the gold debt burden between safe and speculative bonds can explain a large portion of the differential response of speculative bonds

[3]This is a case of currency mismatch, i.e., assets are denominated in one currency and liabilities in another. For an example of its relevance today, see Ranciere et al. (2010).

on event days, while overall credit conditions changed little on event days.

In the second part of the paper, I find that greater silver coinage risk immediately leads to a substantial increase in the interest rate differential between dollar and gold-denominated assets–which I call the currency risk premium–relative to its mean, and this effect persists for several months.[4] Industrial production also falls by a statistically significant amount due to higher silver coinage risk, reaching a trough at 12 months after the shock. My results are based on estimates of monthly impulse response functions to silver news. My estimated response of industrial production to silver coinage news is consistent with the qualitative evidence I present from the financial press. Devaluation risk had real effects because it raised expected default costs and contracted the supply of credit by worsening bank balance sheets through gold hoarding; I support these mechanisms with suggestive evidence.

My work addresses several issues in contemporary macroeconomics related to currency mismatch, exchange rate regimes, as well as the real effects of policy uncertainty.[5] Relative to the existing work, I study the effects of devaluation *risk* rather than actual currency crises on bond yields and output; in this regard, I relate to broader work studying the impact of political and economic uncertainty on aggregate output and firm outcomes (e.g. Baker et al., 2016; Caldera et al., 2016; Ludvigson et al., 2016). Additionally, I focus on how exchange rate expectations influence corporate bond yields and credit risk (in part through currency mismatch on firm balance sheets), while prior work has emphasized changes in government bond yields; and I connect changes in exchange rate risk to fluctuations in industrial production.

My results also have implications for historical work on silver coinage in the U.S. and the broader impact of gold standard expectations on economic activity. Economic historians have

[4]According to uncovered interest rate parity (UIP), this differential represents expected changes in the dollar-gold exchange rate. Some of the dollar-gold interest spread may also represent a risk premium, hence the name.

[5]Previous work on devaluations and currency mismatch has focused on identifying firm-level effects (Aguiar, 2005; Calomiris, 2007; Kalemli-Ozcan et al., 2015; Kim et al., 2015) or on studying cross-country variation in currency mismatch and economic activity after currency crises (Domaç and Peria, 2003; Gupta et al., 2007; Bordo et al., 2010). Other authors have also argued that exchange rate expectations are priced into assets during both modern and historical time periods (Schmuckler and Serven, 2002; Powell and Sturzenegger, 2003; Bailey and Bhaopichitr, 2004; Bordo et al., 2009; Mitchener and Weidenmier, 2015). This work has primarily focused on interest rate differentials for government bonds (with the exception of Bailey and Bhaopichitr, 2004).

argued that silver coinage created expectations that the U.S. would leave the gold standard, raising interest rates and increasing price level uncertainty (see Friedman and Schwartz, 1963; Calomiris, 1993; and Hallwood et al., 2000).[6] I present well-identified effects of silver coinage on borrowing costs and go beyond the existing literature by linking these changes in credit spreads to output changes, as has been done for the current time period.[7] Previous work linking expectations about the gold standard to output has focused on the Great Depression, but due to the bevy of policy changes during this time period, it is nearly impossible to systematically study how gold standard uncertainty contributed to output fluctuations in the U.S.[8]

The rest of the paper is organized as follows: Section 2 reviews the monetary institutions in the U.S. during the latter half of the 19th century; Section 3 describes the potential mechanisms linking devaluation risk, interest rates, and output; Section 4 discusses the methodology and results of the daily-level empirical analysis; Section 5 does the same for the monthly impulse response functions; Section 6 describes narrative evidence on silver coinage and industrial production; Section 7 concludes.

1.2 U.S. Monetary and Financial Institutions, 1878-1900

1.2.1 The Gold Standard and Silver Coinage in the U.S.

Prior to the Civil War (1861-1865), the U.S. operated under a bimetallic system where paper currency could be exchanged for a fixed amount of either gold or silver at the U.S. treasury. Under a bimetallic system, both metals are treated as money so long as the mint convertibility ratio approximates the market convertibility ratio. When these two ratios are not equal, the metal undervalued at the mint ceases to circulate as money and is used only for private purposes. After the suspension of

[6] A more recent study by Fulford and Schwartzman (2017) uses the 1896 U.S. presidential election to show how enhancing gold standard credibility increased bank leverage.

[7] Philippon (2009) and Gilchrist and Zakrajšek (2012) are examples of this literature. Krishnamurthy and Muir (2016) and Lopez-Salido et al. (2016) study the effect of credit spreads using longer time series.

[8] There are certainly individual episodes during the Great Depression that can be studied, but characterizing the response of output to all news about the gold standard is fraught with identification issues. See work by Temin and Wigmore (1990), Romer (1992), Edwards, Longstaff, and Marin (2015), Jalil and Rua (2016), Sumner (2015).

metallic convertibility during the Civl War, the Coinage Act of 1873 restored the fixed dollar-gold exchange rate at its historical level of $20.67 per ounce of gold, and the Resumption Act of 1875 set the date at which convertibility would resume at January 1, 1879. The Coinage Act omitted mention of silver coinage, essentially demonetizing silver and pushing the U.S. to a monometallic gold standard.

Silver regained some of its previous monetary status through two legislative acts that allowed a limited amount of currency to be convertible to silver. The first, occurring in 1878, was the Bland-Allison Act. This law required the Treasury to purchase between $2 and $4 million worth of silver bullion each month and convert it to currency. The second act was the Sherman Silver Purchase Act of 1890, which set a fixed weight (4.5 million ounces) of silver to be purchased at the market price and coined each month. At the time of its passage, the Bland-Allison Act's minimum monthly requirement would have added roughly 1.2 percent annually to the total money stock in 1879, *ceteris paribus*.[9] Silver purchases under the Sherman Act equaled approximately $5 million a month, which would have increased the 1890 money stock by 1.44 percent, *ceteris paribus*.

The deflation required to return to pre-war gold parity, as well as continued deflation under the gold standard, led a coalition of farmers and miners to push for a return of bimetallism at the antebellum mint ratio of 16 ounces of silver to one ounce of gold. They hoped the additional money created would raise the overall price level, easing their debt burden and boosting their exports by depreciating the dollar. The two silver purchase acts described above were compromise capitulations to the Free Silver movement. The controversial aspect of the bimetallism advocated by the Free Silver was the 16:1 mint ratio. Relative to the market price ratio of silver to gold between 1880 and 1896, this mint ratio would have overvalued silver–by the end of this time period the market ratio was closer to 32:1. Gold would thus have ceased to circulate as money and the dollar would have been devalued by up to 50 percent relative to gold.

Even these limited amounts of silver coinage created doubts about U.S. commitment to the gold standard, leading to gold outflows and negating the inflationary effect of the silver money

[9]This number represents an upper bound on the increase in the money supply. As Timberlake (1978) points out, the Treasury could avoid circulating silver if tax revenues were sufficient to cover the cost of purchasing silver.

injections. These fears of a gold standard exit were at their highest in the aftermath of the Panic of 1893, as the gold drain had pushed the Treasury's gold reserves to historic lows. The business community largely blamed the Sherman Act for the devastating Panic of 1893, and President Grover Cleveland signed its repeal into law in November of 1893 (Friedman and Schwartz, 1963; Jalil, 2015). Although the election of 1896 is widely seen as the unofficial end of the silver threat, this era of "limping" bimetallism ended for good with the passage of the Gold Standard Act of 1900 (Timberlake, 1978).[10] This law established gold as the only metal for which dollars could be exchanged at the Treasury.

1.2.2 Bond Markets and Financial Institutions

Here I review several pertinent features of the market for corporate bonds in the U.S., as well as the role of financial institutions in the operation of these markets. These details will become important when discussing the channels through which silver coinage risk affected bond yields.

By the end of the 19th century, the U.S. had a burgeoning market for long-term corporate debt. The primary sector issuing traded bonds were the railroads, but utility and industrial companies made significant inroads during the 1890s. Most railroad bonds were mortgages against the companies' property, particularly the lines of track, and were denominated in gold rather than dollars. There was significant variation in the liens these bonds had on the property. Some bonds were first or second liens on the main line of the company, while others, though liens on the entirety of the property, were junior to all other claims (often numerous) on the property. Additionally, other junior debt was unsecured or backed only by other issues of stocks and bonds. Most industrial and utilities debt was also not mortgaged against any property, making the safety of their bonds much more dependent on their earning capacity.

Financial institutions were both directly and indirectly involved in the trading of corporate securities. Their direct role as investors of bonds and stocks was small relative to the size of the market (they only owned about 3.5 percent of all corporate securities.)[11] Rather, the greater

[10]The use of "limping" refers to the inability to freely convert dollars to silver

[11]This is likely due in part to state and federal regulations. For instance, savings banks in New York could only hold

importance of the financial sector was in financing the purchase of stocks and bonds on credit, particularly for Wall Street traders. By 1910, one-third of all national and state bank loans were issued against stock and bond collateral (Pratt, 1912). If banks called in these loans and the borrower was unable to pay, the banks became owners of the securities, free to buy and sell these assets on the stock exchanges.

1.3 Devaluation Risk and the Real Economy: Transmission Mechanisms

Nominal devaluation risk can raise bond yields and lower real economic output through several channels. In models of fixed exchange rate devaluations, when foreign investors believe that a country's exchange rate peg will not be maintained they begin withdrawing capital from that country.[12] This decreases savings in the economy, raising borrowing costs and lowering investment.

Under the gold standard, this outflow of foreign money often took the form of gold outflows, producing deflation and thus contracting the economy. Deflation can raise the number of non-performing loans on bank balance sheets, lowering banks' net worth, leading to a decrease in credit. Further, if individuals respond to the fall in the banking sector's net worth by withdrawing deposits this will lead to a second round of contracting credit.[13] Additionally, if the dollar is expected to depreciate relative to gold, individuals may choose to hold more of their wealth in gold rather than bank deposits, also lowering bank reserves. If these two forces are strong enough, they can lead to bank runs. The U.S. indeed experienced large reversals in capital and gold flows in the time period I study: the average annual net purchase of American securities by foreigners of $200-300 million from 1885-1889 changed to an average annual net sale of American securities by foreigners of $60 million from 1890-1894 (Friedman and Schwartz, 1963). Additionally, the

first mortgage bonds of a railroad system or "part of a system" that was "controlled by a New York corporation which for five years has not defaulted and has paid four percent or higher dividends on its stock" (Selden, 1919).

[12] Obstfeld (1995) is an example of a model where fear of devaluation leads to a run on a country's currency.

[13] See Gertler and Kiyotaki (2011) for a model with this type of effect.

Panic of 1893 has been largely blamed (at least indirectly) on the uncertainty surrounding the gold standard in the U.S. (Friedman and Schwartz, 1963).

The second transmission mechanism highlighted in the theoretical literature is currency mismatch on borrowers' balance sheets.[14] When a borrower's liabilities are denominated in a foreign currency, but their assets are in the domestic currency, a devaluation raises the borrower's real debt burden, making it more likely they will default on their debt. This effect is exacerbated for firms that produce non-tradable goods and services, as they do not receive the main benefit of a devaluation: increased export competitiveness. As firms go out of business, this lowers production. In the time period I study, a substantial fraction of corporate debt was payable in gold rather than dollars and over 90 percent of the debt was issued by railroad companies, with a substantial portion of the remaining fraction coming from utilities providers, essentially firms providing non-tradable goods and services.[15] Depending on the year examined, 65 to 70 percent of the corporate debt in my bond dataset had interest or principal (or both) denominated in gold. These "gold clauses" in bond covenants were often necessary for bonds to be traded on the London Stock Exchange.[16] Most companies did not match their gold debt with holdings of gold-denominated assets.

A final channel specifically related to the safe-speculative bond spread reflects the financial distress caused by devaluation risk. As individuals sought to hold more of their wealth in gold this could impact bond spreads in several ways. If the speculators that disproportionately held riskier bonds had a greater need for gold, the mass sale of speculative bonds would result in a widening of the safe-speculative spread. Similarly, as individuals withdrew reserves from the banking system, this would increase banks' demand for liquidity, forcing them to call in loans, many of which had stocks and bonds as collateral. If the loans were not repaid, the banks took ownership of the securities, which they would then try and sell for gold. If more of the collateral was in speculative bonds, this would cause speculative yields to rise by more than safe yields. Indeed, in his chronology of the Panic of 1893, Sprague (1910) notes that the contraction of bank

[14] See Cespedes et al. (2004) as an example.

[15] For the empirical analysis, it is difficult to find a large enough sample of securities for tradables to conduct a quantitative analysis, though I am still exploring this possibility.

[16] I thank Michael Bordo for pointing this fact out to me.

loans in New York City in the months before the Panic "involved loss to holders of securities, especially those of the more speculative variety" (p. 164).

1.4 Daily-Level Event Study

Since devaluation risk can exacerbate financial frictions and increase real debt burdens, devaluation risk should affect firm borrowing costs. My empirical work first uses a daily-frequency event study to analyze the corporate bond market reaction to silver news. My primary regression compares yield changes between groups of bonds with different exposure to the effects of silver coinage. I later use these daily events as plausibly exogenous shocks to estimate monthly impulse response functions for the currency risk premium and industrial production. I describe the methodology used to estimate these impulse response functions at the beginning of Section 5.

To construct a series of events related to silver coinage policy, I employ the narrative approach most prominently used by Romer and Romer (1989, 2004) to study modern U.S. monetary policy.[17] I look for mentions of silver coinage policy news in the "Financial Affairs" section of the *New York Times* and the "Bankers Gazette" in *The Commercial and Financial Chronicle* between 1878 and 1890. Importantly, I drop events where there is other economic news released on the same day to avoid biasing my quantitative estimates.

The empirical analysis below uses a set of 21 news shocks related to silver coinage. These events occur over a span of 29 days, and the narrative record indicates that some news events affected financial markets across multiple days. Table 1.1 contains a brief description of each event, as well as a (+) or (-). These symbols indicate whether or not the news appeared to increase (+) or decrease (-) expected future silver coinage.[18] Events essentially fall into one of two categories: legislative action, such as the introduction of a bill to repeal the Sherman Act in December 1892,

[17]For a detailed description about the event selection procedure see the Appendix.

[18]The agreement of Republicans from the House and Senate on a new silver bill in July, 1890 is difficult to classify. I mark it as (+) because actual silver coinage did increase, but it is unclear if silver coinage increased by as much as people expected it to before the Sherman Bill passed. Subsequent results do not depend on the classification of this event, however.

or executive branch positioning, like the election of the pro-Gold William McKinley in November 1896.

1.4.1 Preliminary Analysis

I establish whether silver coinage news is *associated* with greater bond yield movements using two different methods. First, following Kuttner and Posen (2010), I test whether silver policy news contained additional information for bond yields relative to days without news. Essentially, I test the null hypothesis that there was no additional variance on days with silver news. I begin by constructing bootstrap estimates of the 5th and 95th percentiles for the distribution of yield changes on non-event days. Non-event days in my dataset are one, five, and ten days before each event, as well as a six month period in 1891 with no silver coinage news. I count the number of event dates which have average yield changes that are either above the 95th percentile or below the 5th percentile estimated from the non-event dates. I compare this number to a critical value from the binomial distribution. If the actual count exceeds the critical value, then one rejects the null hypothesis that the variance is the same for the two groups.

My second method uses a simple regression to test whether days with news about silver coinage are associated with greater changes in bond yields:

$$y_t = \alpha + \beta Silver_t + \mathbf{x}_t'\gamma + \varepsilon_t \tag{1.1}$$

where y_t is the average yield change in corporate bonds traded on date t; $Silver_t$ is a variable taking one of three values: zero for days with no silver news, one on days where expected future silver coinage decreases, and negative one on days when expected future silver coinage rises; $\mathbf{x}_t$ is a vector of month-year indicator variables, meant to control for the average level of bond yield volatility in a given month in a given year.

Average yield change data are based on daily closing price data for corporate bonds traded on the New York Stock Exchange (NYSE) I hand-collected from the *New York Times* and *Wall*

Street Journal. For each event day, I record the closing price for each bond sold on the NYSE that day, as well as the last price at which each bond sold before the event date.[19] I repeat this process for each of the non-event days in my dataset.

Eleven out of 29 event dates exceed the percentile bounds found using the Kuttner and Posen tail-based tests. Since the probability of seeing this many event dates in excess of the bounds under the null hypothesis is approximately 0.005 percent, I can easily reject the null hypothesis that average yield changes have the same volatility on days with silver coinage news when compared to days without silver coinage news. I repeat the above process using absolute values of the average daily change as an additional test and again reject the null hypothesis.

Estimates of Equation 1.1 confirm the finding that yields systematically changed by more on event days. Column (1) of Table 1.2 reports the coefficients on the silver event variable when the dependent variable is the average daily corporate bond yield change. The silver event variable is negative and statistically significant at the 1 percent level. The negative sign and magnitude of the coefficient imply that news that lowered expected future silver coinage lowered corporate bond yields by roughly nine basis points on average.

To gauge the magnitude of this estimated effect, I compare it to two other news shocks in 1895 that likely raised uncertainty.[20] The first event was a series of financial market panics in Europe due to political unrest and the failure of a South African mining company on November 8, 1895. On this day, the average U.S. corporate bond yield rose by about 5.7 basis points. The other event was a message from President Cleveland to Congress regarding a border dispute in South America between the U.S. and the U.K., which occurred on December 17, 1895. Over the next two days, corporate bond yields rose an average of 6.5 basis points per day. I therefore interpret the effect of silver news on corporate bond yields as economically significant.

The effect of silver news differs across time, and I argue below that this time-varying effect reflects changes in the ability of the U.S. to maintain the gold standard. All 11 event dates ex-

[19]This last part is necessary to calculate the change in yield.

[20]These items both received mention as the dominant current event in their respective months in the *Commercial and Financial Chronicle's* recap of the entire year.

ceeding the bootstrapped percentile bounds occurred after the Panic of 1893 began in May of that year. Figure 1.1 plots the absolute value of the average yield changes separated by whether they occur before or after of the Panic of 1893. The horizontal line is the bootstrapped 90th-percentile of the non-event day distribution. It is readily apparent that the post-Panic events saw much larger changes in corporate bond yields when compared to the average for events before the Panic of 1893. Column (2) of Table 1.2 reports coefficients for regressions that include an additional dummy that takes a value of one when a silver event occurs after the Panic of 1893. The value of the post-Panic dummy shows that silver news after the Panic of 1893 is associated with average yields changing by an additional 16.27 basis points, while events prior to the Panic have no effect on the average yield change.

This variation in the bond market response to silver news across time is likely due to changes in the ability of the U.S. government to maintain the gold standard. As mentioned in Section 2, the external drain of gold brought about by silver coinage (particularly under the Sherman Act) dwindled the Treasury's gold reserves, and these reserves were at their lowest in the years after the Panic of 1893. With the Treasury unable to withstand any serious run on gold, continued silver coinage was much more likely to force an end to gold convertibility during these low-reserve times.

Figure 1.2 shows the increase in yield changes for post-Panic silver events as well as the persistently low gold reserves after the Panic. In the figure, I plot the monthly time series of the average daily absolute change in yields due to silver news and a 12-month lagged moving average of the Treasury's gold reserves.[21] The vertical line at May 1893 marks the start of the Panic of 1893. Once the average gold reserves over the past 12 months are either just above $100 million or below it, there is a large jump in the yield changes on event days. This $100 million reserve threshold was important because it was the legal minimum necessary for the Treasury to continue issuing gold certificates.[22]

I modify Equation 1.1 to include the Treasury's gold reserves and its interaction with the silver event variable and find that higher gold reserves weaken the bond market response to silver

[21]The gold reserves data is taken from the 1897 Treasurer's Report.

[22]Certificates entitled holders to a fixed value of gold.

coinage news. This is evidenced by the statistically significant interaction terms reported in column (3) of Table 1.2. In column (4), I use the average of the Treasury's gold reserves over the past 12 months instead of the actual reserves of that month. In both cases, the sign of the coefficient indicates that the average bond yield changed by less on silver event days as gold reserves–and therefore the Treasury's abilities to maintain the gold standard–increased. Using the coefficient from column (4) implies that going from the average gold reserves over the past 12 months in July 1890 ($186.3 million), when the Sherman Act was passed, to those when a compromise repeal measure failed in the Senate in October 1893 ($105.365 million), increases the magnitude of the bond market response to silver news by approximately 12.23 basis points, or 50 percent of the actual difference in average yield change for these two events.[23]

1.4.2 Difference-in-difference: Safe Versus Speculative Bonds

To further establish plausibility that silver coinage news drives yield changes on event days, I compare yield changes between groups of bonds with different exposure to the effects of silver coinage on silver news days and non-event days. Bonds with greater credit risk should have seen a larger change in their yields in response to silver coinage news.[24] Safe bonds (those with low risk of default) would see smaller increases in their probability of default as the expected gold debt burden increased relative to bonds with higher default risk. The Appendix provides a simple credit risk model where this is true under plausible assumptions. Further, safe bonds had greater earnings cushions to withstand the contraction in earnings resulting from a lowering of the credit supply due to devaluation risk. Finally, since silver coinage likely weakened the aggregate economy and raised the demand for gold, investors would demand a higher risk premium for holding speculative bonds as expected silver coinage increased.

I separate bonds into different credit risk categories using statistics outlined in the first edi-

[23] I repeat the four specifications discussed above using the absolute value of the average yield change as the dependent variable and report the results in the Appendix.

[24] Given my emphasis on credit spreads, I would ideally compare riskier corporate bonds to safer U.S. government bonds, but public debt was small during this time period (less than 15 percent of GDP), and regulations limited trading in government bonds. I am in the process of collecting daily price data for British consol bonds to use as the safe asset.

tion of Moody's Manual (1909) that I calculate using annual earnings and balance sheet data that I collected from *Poor's Manual of Railroads*, which were available to investors at the time.[25] All analysis relying on safe-speculative yield spreads uses only the events from 1890 onwards because of a lack of availability of *Poor's Manual of Railroads* for 1880s events. The Appendix provides the exact details of the statistics used to determine credit risk. Essentially, I examine differential effects between safe, typically senior bonds whose interest obligations were easily met with historical earnings and riskier, often junior bonds, where earnings were barely enough to cover their interest.[26]

My regression analysis compares yield changes between two groups across time, thus following a standard difference-in-difference approach:

$$\Delta y_{i,t} = \alpha + \gamma Spec_i + \beta_1 Silver_t + \beta_2 (Silver_t \times Spec_i) + \mathbf{x'}_t \eta_1 + (Spec_i \times \mathbf{x'}_t)\eta_2 + \varepsilon_{it} \quad (1.2)$$

where the outcome variable, Δy, is the log-change of the average yield for bonds in rating group i traded at date t.[27] To construct this variable, I average yields across all safe or speculative bonds sold on date t, find each bond's previous sale price and calculate their previous yields, average the previous yields across rating group, and take the difference in logs for each rating group's average. There were typically 25-30 safe bonds and 10-15 speculative bonds traded per day. I use changes in logs in order to dampen the heteroskedasticity in yields across credit risk groups (Gilchrist and Zakrjašek, 2012).[28] The variable $Spec_i$ is a dummy that takes a value of one when the average yield change is for speculative bonds. $Silver_t$ takes one of three values: one on event days with news lowering expected silver coinage, negative one when the news increases expected silver coinage, and zero for non-event days. The coefficient, β_2, therefore captures the differential effect of silver

[25] Data limitations and using multiple bonds issued by the same firm dissuade me from using a structural credit risk model to quantitatively estimate default risk.

[26] Based on a comparison of yields over the Panic of 1893 and 2008-9 Financial Crisis, speculative bonds are probably closest to B-rated bonds in the modern setting.

[27] My model for yield changes is a variant of the "constant-mean" model of expected returns used in event studies.

[28] As credit risk increases, the variance in yields also increases. Therefore, as bonds' credit risks change with the business cycle, their yield spreads and volatility are also likely to change. Using log changes helps control for changes in yield spreads simply correlated with the business cycle.

news on speculative-grade corporate bonds relative to safe corporate bonds. I expect to see a negative and statistically significant value of β_2 if silver coinage news is driving yield changes on event days. The last main term in Equation 1.1 is $\mathbf{x}_t$, a set of monthly and daily controls. Depending on the exact specification, these include a month-year dummy, 12-month realized volatility of an index of all common stock values, the monthly return on this index, the Treasury's monthly gold reserves, and the average term length of the bonds sold for each day.[29]

I control for differential effects between safe and speculative bonds on event days due to term structure differences using Edwards, Longstaff, and Marin (2015)'s weighting procedure. This procedure adjusts the weights in the speculative rating category such that the average term length of the speculative-grade bonds traded on date t matches the average term of length of the safe bonds traded on date t. These weights are then used when calculating the average yield change for speculative-grade bonds.

Before discussing quantitative estimates, I will first present some rough evidence supporting this identification strategy. Figure 1.3 plots 1-standard error bands around the mean of the absolute log-change in spreads for 10, five, and one day before each post-Panic of 1893 silver event as well as on the day of silver coinage news. The horizontal line at 1.38 represents the average absolute change in spreads on non-event days. In the figure, note that only the mean spread change on event days is more than one standard error away from the average across all non-event days. This suggests that there is no underlying trend driving differential changes in yields around silver news events.

My estimates of Equation 1.2 in Table 1.3 confirm that silver news caused speculative-grade bond yields to change by more than safe yields on event days. Since the dependent variable is the log change in yield, estimates reflect percent changes relative to the raw yield. Column (1) simply regresses average log-yield change on $Spec_i$, $Silver_t$, their interaction, and a constant, while Column (2) adds the vector of controls. The Event-Speculative interaction coefficients for these two columns show that news that lowered silver coinage risk lowered the safe-speculative

[29]The common stock price index is available through the NBER Macrohistory database (series m11025a).

spread by 1.58-1.74 percent of the total spread. Columns (3) and (4) repeat (1) and (2) using only event days after the Panic of 1893. The effect increases in magnitude to roughly 2.2 percent of the total spread when considering only events occurring after the Panic of 1893. For easier interpretation of the coefficients, I re-run the regressions using the average yield change in levels rather than logs and report the full results in the Appendix. Here, it suffices to note that when I use all events, the implied spread change due to silver news is 32.68 basis points, with the effect increasing to 52.48 basis points when using only Post-Panic of 1893 event days.

The economic significance of my estimated effects on yield spreads is substantial. Returning to the financial market panic in Europe on November 8, 1895, the weighted credit spread change on that day is 26 basis points, slightly less than the estimated effect of silver coinage news. My estimated effect is also sizable compared to monthly changes in the spread between safe and speculative bonds after the U.S. abandoned the gold standard in 1933, an event which economic historians have highlighted as leading to rapid economic recovery.[30] I calculate the change in the spread between junk bonds and Aaa-rated corporate bonds in the month after the U.S. abandoned gold in 1933.[31] The differential change from April to May of 1933 is 483 basis points. For events after the Panic of 1893, the estimated average *daily* change due to silver coinage news is 52.48 basis points, over 10 percent of the entire *monthly* change after the U.S. abandoned gold during the Depression.[32]

As an additional check, I also perform a regression using only speculative bond yields as the dependent variable and including safe bond yield changes as a regressor:

$$SpecYield_t = \alpha + \beta Silver_t + \gamma \text{SafeYield}_t + \mathbf{x'}_t\delta_t + \varepsilon_t \tag{1.3}$$

where $SpecYield_t$ is the average speculative bond natural logarithm yield change on date t; $Silver_t$

[30]Between March 1933, when Roosevelt suspended the gold standard, and June 1933, before the introduction of the NIRA, industrial production recovered 57 percent of its prior decline during the Depression. Jalil and Rua (2015), Sumner (2015), and Hausman, Rhode, Weiland (2016) are examples of the literature studying this episode.

[31]The junk bond yields are taken from Basile et al. (2015), and the Aaa yields are available through the NBER Macrohistory database.

[32]This comparison is merely suggestive since–depending on the persistence of credit spreads–mean reversion within the month may be an issue.

is again the $\{-1, 0, 1\}$ variable corresponding to days with increased future silver coinage, no silver news, and lower future silver coinage, respectively; SafeYield$_t$ is the average safe bond natural logarithm yield change, and $\mathbf{x}_t$ is the same set of controls as in Equation 1.2. The inclusion of SafeYield as a control variable is inspired by the "market return model" sometimes used to calculated expected returns in event studies. Here, I use the average safe bond yield change as a regressor to further rule out the possibility that speculative bonds always move by some factor relative to safe bonds.

Silver news remains an important determinant of speculative bond yield changes when I estimate Equation 1.3. The coefficient on silver coinage news is nearly identical in columns (1)-(4) to the silver event-speculative interaction term in columns (1)-(4) of Table 1.4. Here the silver event coefficients imply that news of lower silver coinage risk lowered speculative yields an additional 1.78-2.5 percent of their total yields. Regardless of how one might measure the "expected" speculative yield change on a given day, silver news has a statistically and economically significant effect on speculative bond yields.

The Appendix reports results for Equations 1.2 and 1.3 using the absolute values of the dependent variables. This is done to help mitigate mean reversion concerns, particularly when month-year fixed effects are included in the regression. It may be the case that yields were moving sharply in one direction prior to a silver event, and any news that would tend to move yields in the opposite direction ends up moving yields sharply simply due to reversion to the mean. Fortunately, although the magnitudes fall by about 50 percent, they are still significantly different than zero in every case.

A final issue is whether these changes to credit spreads from silver news disappeared after a few days. There is not a good monthly index for safe and speculative bond yields during my time period, so I construct some rough indices for 1893 and the first six months of 1894 and repeat for slightly different sets of bonds in 1895 and 1896. I plot these monthly yield spreads in Figures 1.4 and 1.5, respectively. The vertical lines mark months with silver coinage news. In Figure 1.4, the spread peaks around 15 percent in August 1893 when the House repeals the Sherman Silver Act

and remains several percent lower for the next six months. Similarly, Figure 1.5 shows the spread peaking just under 15 percent in August 1896, when Bryan delivers his failed speech on Wall Street and early state election results favor pro-gold candidates. The spread reaches its trough in November 1896, when Bryan is defeated, and remains close to this level for the next four months.

1.4.3 Silver Coinage and Default Risk Premia: Mechanisms

While the above results are certainly consistent with the proposed mechanisms through which silver coinage alters corporate borrowing costs, they cannot separate which channels mattered for yields on event days. I try to disentangle the different mechanisms affecting bond credit risk premia in several ways.

I first focus on the cross-sections of yields on event days in order to see whether more direct measures of a bond's exposure to dollar devaluation are correlated with yield changes on event days by running the following regression:

$$\begin{aligned} y_{i,t} = \alpha + \beta_1 Principal_{i,t} + \beta_2 EarningsDepreciation_{i,t} \\ + \beta_3 EarningsChange_{i,t} + \beta_4 \text{Default}_{i,t} + \mathbf{Event}_t' \gamma + \varepsilon_{i,t} \end{aligned} \tag{1.4}$$

where $y_{i,t}$ is the total yield change of bond i for each event Post-Panic of 1893 event, t[33]; $Principal$ is the amount of the bond outstanding (in millions of dollars), $EarningsDepreciation$ is the proportional change in the available earnings for bond i's interest after a hypothetical dollar devaluation against gold; $EarningsChange$ is the change in bond i's available earnings from the year prior; Default is a dummy taking a value of one if bond i is in default; $\mathbf{Event}$ is a vector of dummies for each of the events after the Panic of 1893. When the bond is sold on an event where silver coinage risk decreases the yield is multiplied by negative one.[34] All right-hand variables are based on information in *Poor's Manual of Railroads* and the *C*ommercial and Financial Chronicle.

$Principal$ is used as a proxy for a bond's liquidity. If illiquidity risk mattered for yield changes on event days, the amount outstanding should be negatively correlated with the magnitude

[33]For events that occur over multiple days, I sum the yield changes across each day of the event

[34]This is done to allow for the pooling of good and bad news events as well as for ease of interpretation.

of a bond's yield change on a day with silver news. $EarningsDepreciation$ captures the role of the gold debt burden.[35] It measures how much the earnings available to pay bond i's interest would change if the dollar value of more senior gold debt changed due to devaluation and therefore ate up more dollar earnings.[36]

$EarningsChange$ measures the responsiveness of credit risk due to general equilibrium effects at the bond level by calculating changes in available earnings during two periods of silver policy uncertainty (June-August 1893, June-August 1896). Firms that were particularly affected by an economic slowdown (say, because of higher currency hoarding in the location of the railroad) would see their earning decline the most during these sensitive periods. The summer of 1893 was plagued by continued silver coinage and low gold reserves, with business recovering after the repeal of the Sherman Act. The summer of 1896 was marked by renewed currency risk with the nomination of Bryan as a Free Silver candidate. To address seasonality, I calculate earnings changes in these periods relative to the previous summer (1892 or 1895).

The bond default indicator is included for two reasons. First, since silver coinage was viewed as harmful to the economy, this meant that holders of defaulted bonds likely had a lower recovery rate as silver coinage risk increased. Second, investors would demand a higher risk premium on defaulted bonds because the aggregate economy was likely to contract under increased silver coinage.

I find that all exposure measures, except the change in earnings, are statistically significant when entered individually in the regression (columns (1)-(4) in Table 1.5), but the amount outstanding coefficient has the opposite sign relative to that predicted. Larger issues of bonds (in terms of face value) have greater yield changes, which is at odds with the illiquidity risk channel of transmission. The same variables are statistically significant when all regressors are included. Again, the signs on their coefficients are consistent with the suggested transmission mechanisms

[35] In its August 3, 1896 issue, the *Wall Street Journal* performs a similar calculation for the Chicago, Milwaukee, and St Paul railroad to demonstrate the effect of dollar devaluation. They show how the company's total profits change in response to dollar devaluation and a change in the gold debt burden.

[36] The change in the dollar-gold exchange rate in this hypothetical devaluation is based on the average market silver-gold ratio in the year of the event and is taken from Bordo et al. (2009).

except for the amount outstanding. The coefficients in Column (5) imply that going from the average percentage decrease in earnings available after dollar depreciation ($\sim$6.8 percent) for safe bonds to that of speculative bonds ($\sim$130 percent) results in an additional 36.5 basis points in yield change. Similarly, going from the average value of the default indicator for safe bonds (zero) to that of speculative bonds (0.74) adds an additional 24.96 basis points to a bond's yield change. Together, this additional 62 basis points is roughly 75 percent of the average spread change between safe and speculative bonds.

The results of the regressions suggest that while default risk mattered for the spread changes on event days, illiquidity risk and risk premia were less important. Further evidence in support of this conclusion can be found by looking at the response of the money market on silver event days. If financing and liquidity constraints are important, the money market rates should have seen large changes in the same direction as the credit spread. Figure 1.6 plots the change in the safe-speculative spread on post-Panic of 1893 event days against the change in the average call loan rate on those days.[37] While there are a few days with large declines in the call rate and the safe-speculative spread, there is generally no relationship between money market and bond market changes.[38] Similarly, looking at the relationship between credit spread changes and changes in the amount of loans on New York City banks' balance sheets, as is done in Figure 1.7, also shows a lack of correlation between spread changes and financial conditions in a tight window around silver coinage events.

One final piece of evidence in favor of the default risk channel comes from the narrative at the time this silver news occurred. The financial press stresses the role of the railroads' gold debt when discussing bond price movements, but does not mention any sort liquidity or financing constraint for investors. After the repeal of the Sherman Silver Act in the House in August, 1893, the *Commercial and Financial Chronicle* wrote: "The question as to bonds is a very simple one– there is a great fear...for some months past that our railroads might soon be compelled to take

[37]The average call loan rate is simply the sum of the quoted high and low rates divided by two.

[38]A simple regression of the spread change on the average call loan rate change and a constant produces a coefficient on call rate changes with a t-statistic 0.76.

their earnings in depreciated silver...and they would consequently be unable to meet their gold obligations. Now, as this fear is partly dispelled, the prices of bonds rise sharply from this late depression," (Vol. 57, p. 366).

Similarly, after the nomination of William Jennings Bryan as the Democratic presidential candidate, the *Wall Street Journal* ran several articles discussing railways' gold debts and the impact of a potential Free Silver victory. In one, they discuss that the "danger of free silver" could be met by holding gold bonds *only* "if it were certain that roads could meet their interest in gold" and that, if the dollar devalued too much relative to gold, "it would be impossible for corporations which have only a small surplus above fixed charges to meet their interest in gold."

While one cannot draw definite conclusions from the above evidence, it strongly suggests that credit spread changes on event days were due more to changes in default risk rather than risk premia based on investor demand changes.

1.5 Monthly Impulse Response Functions

The daily bond yield data show that financial markets responded to silver coinage risk; In this section of the paper, I estimate impulse response functions with monthly data on exchange rate expectations and industrial production to investigate whether these responses were justified.

1.5.1 Methodology

I investigate the impact of silver coinage risk on exchange rate expectations and industrial production using the local projection technique pioneered by Jordà (2005) in which impulse response functions are computed through a series of OLS regressions at different forecast horizons. This approach offers more flexibility when compared to a traditional vector autoregression (VAR) technique in estimating the effect of the shock further and further into the future.

In this study, I compute impulses responses from 0 to 24 months after the initial shock, using two different measures of a shock to silver coinage risk. In the first series, the shock is the

monthly change in the safe-speculative credit spread due to silver coinage news. For each horizon, $h \in [0, 24]$, and outcome variable, z, I estimate the following regression:[39]

$$\begin{aligned} z_{t+h} &= \alpha + \beta_h Event\_Spread_t + \sum_{k=1}^{6}[\rho_k DollarRisk_{t-k} + \theta_k \ln(IndProd_{t-k}) \\ &\quad + \phi_k \ln(PriceLevel_{t-k})] + \psi t + \varepsilon_{t+h} \end{aligned} \tag{1.5}$$

where z is either industrial production or the currency risk premium; $Event\_Spread$ is the change in the actual, unweighted safe-speculative credit spread on silver coinage news days aggregated to the monthly frequency then divided by the total number of days with silver news in the month; $DollarRisk$ is the dollar-gold 60-day interest spread; $IndProd$ is the Miron-Romer seasonally-adjusted index of industrial production; and $PriceLevel$ is the general index of the overall price level (NBER Macrohistory series m04051). The dollar-gold interest spread is my measure of the currency risk premium and expands Calomiris' (1993) series for 1893-1896 to cover my entire time period.[40] I then use the resulting estimates for the β_h to calculate the impulse response functions.

My second approach for measuring the impact of silver coinage risk on industrial production is to use an external instruments method.[41] I use silver credit spread shocks as an instrument for dollar devaluation risk shocks and estimate the impulse response of industrial production to the instrumented value of the dollar devaluation risk premium. An advantage of this method is that dollar devaluation risk is arguably the true policy indicator because the transmission mechanism for silver coinage was primarily through exchange rate expectations. This method also alleviates concerns that the short window for measuring the shock may produce underestimates of the overall

[39] Depending on the information/selection criterion, the optimal lag length varies from 2 to 11 lags. I choose to use a lag length of 6, selected by the HQIC, but my findings are generally robust to the number of lags.

[40] This series takes the interest rate differential between the 60-day commercial paper rate in New York City, which was payable in dollars, and the implied gold interest rate from 60-day and "sight" (spot) bankers' bills of exchange to capture the currency risk premium. These data are available through the National Monetary Commission's *Statistics for the United States, 1867-1909* and the *Commercial and Financial Chronicle*.

[41] See Mertens and Ravn (2013) and Gertler and Karadi (2015) for examples in the context of fiscal and monetary policy respectively.

effect. I then estimate the following set of local projections for horizons $h \in [0, 24]$:

$$\begin{aligned} IndProd_{t+h} = \alpha + \beta_h DollarRisk_t \\ + \sum_{k=1}^{2} [\rho_k \ln(DollarRisk_{t-k}) + \theta_k \ln(IndProd_{t-k}) + \phi_k \ln(PriceLevel_{t-k})] \\ + \psi t + \varepsilon_{t+h} \end{aligned} \tag{1.6}$$

where I instrument for $DollarRisk_t$ with $Event\_Spread_t$. The first-stage regressions also include a constant, two lags of the currency risk premium, industrial production, and the price level, as well as a time trend.

To help solidify that my silver events are not driven by shocks to other variables, I test whether industrial production, the price level, and the currency risk premium Granger cause my $Event\_Spread$ variable. Specifically, I look at whether this is true in a VAR specification with six lags of each of the four variables. Following Mertens and Ravn (2013), I use first differences of industrial production and the price level in the VAR because I cannot reject the null hypothesis of a unit root in either case. The null hypothesis is that industrial production, the price level, and the currency risk premium *do not* Granger cause $Event\_Spread$.

1.5.2 Impulse Response Function Estimates

I begin by showing the raw time series for the currency risk premium and the spread changes on event days, as these form the basis for the urrency risk impulse response and the "first stage" of the external instruments impulse response. Figure 1.8 shows that these shocks correlate to large changes in the 60-day dollar-gold interest spread. It is also apparent that the currency risk premium was fairly small over this entire time period, never reaching more than two percent.[42] Dollar devaluation was likely perceived to be a tail event: a low-probability but very large shock.

My impulse is simply the estimated daily causal effect of 1.75 percent of the total spread. Given the raw values of the safe-speculative yield spread over the time period I study, this cor-

[42]This would suggest that the second moment effect of a silver news shock was greater than the first-moment effect. Consider the case where the decision to leave the gold standard is a Bernoulli random variable. The expected value of this variable is p, while the variance is $p(1-p)$. When p is small, as appears to be the case in this setting, the variance is larger than the expected value.

responds to approximately a 25 basis point increase in the spread in levels. Since an increase in future silver coinage risk corresponded to an increase the safe-speculative spread, I will refer to a positive realization of my shock as an increase in expected future silver coinage. The dashed lines around my impulse responses represent 90 percent confidence bands, which are estimated using Newey-West standard errors. The usage of these standard errors for local projection impulse response functions follows from Jordà (2005).

An increase in expected future silver coinage immediately raises the dollar-gold interest spread by a statistically significant 13.33 basis points, as seen in Figure 1.9. Further, the increase in currency risk appears to be persistent, with peak effects coming one and five months after the initial shock. At one month out, the implied effect is 16.73 basis points, or 80 percent of the average currency risk premium during the time period. The five-month peak is 17.44 basis points or close to 90 percent of the average risk premium. The estimated impulse response function for this interest rate differential therefore supports the Friedman and Schwartz hypothesis that silver coinage in the U.S. raised expectations that the U.S. would abandon gold and depreciate the dollar.

Figure 1.10 displays the contractionary effect of increased expected silver coinage on industrial production. The negative effect of increasing the risk of future silver coinage on industrial production confirms the belief of the contemporary financial community about silver's impact. The impact reaches a trough at 12 months after the shock and stays negative and significantly different from zero for several months after the trough. Further, the delayed response (it takes eight months to achieve statistical significance) is similar to that found in studies of modern monetary policy (Ramey, 2016). Industrial production drops 3.19 percent at the trough of 12 months and is still around one percent lower 18 months after the silver coinage news. The trough effect is roughly 40 percent of the standard deviation of the 12-month change in industrial production during this period. The estimated 12-month effect also captures about 35 percent of the fall in production from 1892 to 1893 (the onset of the Panic). Additional evidence of the contractionary effect of silver coinage can be found in the Appendix, which reports impulse response functions for monthly railroad earnings and bank clearings as well.

I find a similarly harmful effect of silver coinage risk on industrial production using the external instruments methodology. Figure 1.11 plots the response of industrial production to a 16.75 basis point increase in the currency risk premium.[43]. The F-statistic on the credit spread instrument ranges from 9.5-9.8 depending on the horizon h, very close to the accepted weak instrument threshold.[44] Similar to when the credit spread shocks were used directly, the effect of an increase in currency risk has a statistically significant negative impact after nine months, with the trough effect again reached at 12 months after the initial shock.[45] At the trough, industrial production is 3.77 percent lower than it otherwise would have been. The shape of the impulse response using the external instruments approach also matches that when industrial production was regressed directly on the credit spread change on silver event days.

My estimated response of industrial production is slightly smaller than the estimated one-year response of output to twin banking and currency crises reported in Cerra and Saxena (2008). Given that my sample includes the Panic of 1893, it would be inappropriate to compare my measured effect of devaluation risk to the response solely coming from a currency crisis. Depending on the subsample of countries used in estimation they find output is between four and six percent lower one year after the onset of the twin financial crises.

Returning to the potential question of whether silver events are simply correlated with shocks to other economic variables, I cannot reject that changes in industrial production and the price level do not Granger cause silver news. I can reject the null hypothesis for the currency risk premium. Table 1.6 reports the p-values for each of these variables in the first column. If changes to industrial production or prices are causing the currency risk premium to change, then this still may be an issue. I discuss below how I work around this problem.

I estimate paths for industrial production that are qualitatively similar to those in Figures 1.10 and 1.11 using only events that were unlikely to be strongly correlated with prior economic

[43]This magnitude is derived from the first-stage estimation of the response of the currency risk premium to an average monthly silver credit spread shock

[44]Adding more lags to the regressions significantly reduces the first stage F-statistic, but the resulting impulse response for industrial production is virtually identical to one estimated with fewer lags.

[45]I again use Newey-West standard errors to calculate confidence bands. An alternative method for calculating standard errors is the Wild recursive bootstrap, which I am in the process of implementing.

conditions as a robustness check. Figure 1.12 plots the response of industrial production under three scenarios: estimated using the original data, estimated setting the spread changes for the four summer of 1893 months to zero, and estimated dropping the summer of 1893 events and the August and November 1896 events.[46] In their paper on modern U.S. monetary policy shocks, Romer and Romer (2004) follow a similar procedure for the months of nonborrowed reserve targeting in the U.S. between 1979 and 1981. Despite changing the values in my shocks series, the estimated paths are fairly similar. They all show silver coinage risk leading to a contraction in output, with the trough effect occurring between 12 and 16 months in all cases. It is especially reassuring to see that dropping the events with the largest changes in credit spreads does not undo the initial finding of a negative effect of silver risk on output.

1.5.3 Silver Coinage Risk and Output: Transmission Channels

I present suggestive evidence that devaluation risk lowered output by weakening the banking sector. Data limitations prevent formal testing of the validity of the money and banking mechanisms using monthly impulse response functions, but some rough measures support these channels.[47] The National Monetary Commission published quarterly and later monthly gold imports/exports at New York City in its *Statistics for the United States, 1867-1909*. Further, a rough estimate of the currency-deposit ratio can be constructed at a higher frequency. I use total currency outside the treasury and individual deposits in national banks to approximate the true currency-deposit ratio.[48] Finally, the total amount of loans outstanding at national banks in New York is also available at a relatively high frequency. These variables are all available at irregular frequencies, making formal analysis nearly impossible.

All three variables tend to reach peaks or troughs around months with silver coinage news. Figures 1.13 and 1.14 plot these two series between 1889 and 1900. For example, when it becomes

[46] These last two specifications have only 10 and eight non-zero months respectively.

[47] Fulford and Schwartzman (2017) provide compelling evidence that gold standard expectations mattered for bank leverage in response to the election of 1896.

[48] These data are available through the NBER Macrohistory database, and the total deposits are the sum of three different series.

clear that Congress will not repeal the Sherman Act in the spring of 1893, there is also a sharp break in the currency-deposit ratio (it increases) and a large export of gold; both reverse in the summer of 1893 after President Cleveland calls an emergency session of Congress to repeal the Sherman Act. Loans also bottom out right as the Sherman Act is repealed. Similarly, fear about a Free Silver presidential candidate in 1896 again coincides with large gold outflows, a rise in currency hoarding, and a fall in bank loans. The currency-deposit ratio then begins declining again and loans increase in the month after the pro-gold McKinley is elected President. Such patterns suggest that silver coinage expectations were indeed operating through a money supply channel.

1.6 Silver Coinage and Output: the Narrative Record

Narrative accounts from the financial and business press highlight the importance of silver coinage policy for production decisions. Specifically, newspapers and trade publications tracked business climate changes in response to two silver events: the repeal of the Sherman Silver Act in November, 1893, and the election of President McKinley in 1896. Regarding the former, the press emphasize the renewed ability of companies to borrow both short- and long-term after its occurrence. One week after the Sherman Repeal was signed into law, the November 10, 1893 issue of the *Railroad Gazette* notes that several railroad companies have recently secured new loans or successfully issued new stocks and bonds. Two of the railroad companies that saw the largest changes in their bond yields on the Sherman Repeal event days, the Missouri, Kansas, and Texas and the New York, Lake Erie, and Western, were among the companies selling new securities. It was a marked change from previous months where companies had trouble selling securities to meet their short-term obligations. That the narrative record indicates substantial easing in the credit markets after the Sherman repeal highlights how silver coinage policy news affected the broader economy.

The economic repercussions of the defeat of the Free Silver movement in the election of 1896 also received considerable attention in the media. Both the *Railroad Gazette* and the *Railway Age* published articles in the weeks after the election attributing increased economic activity to the

election results. The *Railway Age* even sent a survey to railroad and industrial companies asking how the businesses adjusted their activity in response to the pro-gold victory. Some companies reported increases in hours and employment for car shops or orders for new equipment since the results of the election became known. Often, the responses note that it is the first time in years the shop has worked this many hours. Most companies also reported plans to shed workers and decrease purchases of equipment if Bryan had won the election. Clearly, the risk of abandoning the gold standard mattered for economic decisions.

Firms reported increases in work hours and capital expenditures regardless of their prior profitability and cash holdings. Financially secure companies, such as the Chicago, Rock Island, and Pacific Railway and the New York Central and Hudson River Railroad, increased their shops' workday length to nine hours a day. Similarly, companies that had either seen profits completely disappear in the aftermath of the Panic of 1893, such as the Missouri Pacific Railway and the Wabash Railroad, or had struggled for years even before the 1893 downturn–like the Atlantic and Pacific Railroad–also increased the hours of their workforce and engaged in capital improvements. For those companies that had previously been bleeding profits, this was a much more dramatic reversal in activity, mirroring the stronger change in their borrowing costs noted earlier.[49]

1.7 Concluding Remarks

This paper studies the impact of currency risk on interest rates and output using the historical experience of the U.S. with silver coinage and the gold standard. I find that increases in expected future silver coinage raised dollar devaluation expectations and bond credit spreads while lowering industrial production. I argue that these contractionary effects emerge through two mechanisms: the increase in the gold debt burden that would result from dollar depreciation and the disruption of financial intermediation brought about by the contraction in the money supply. Both channels

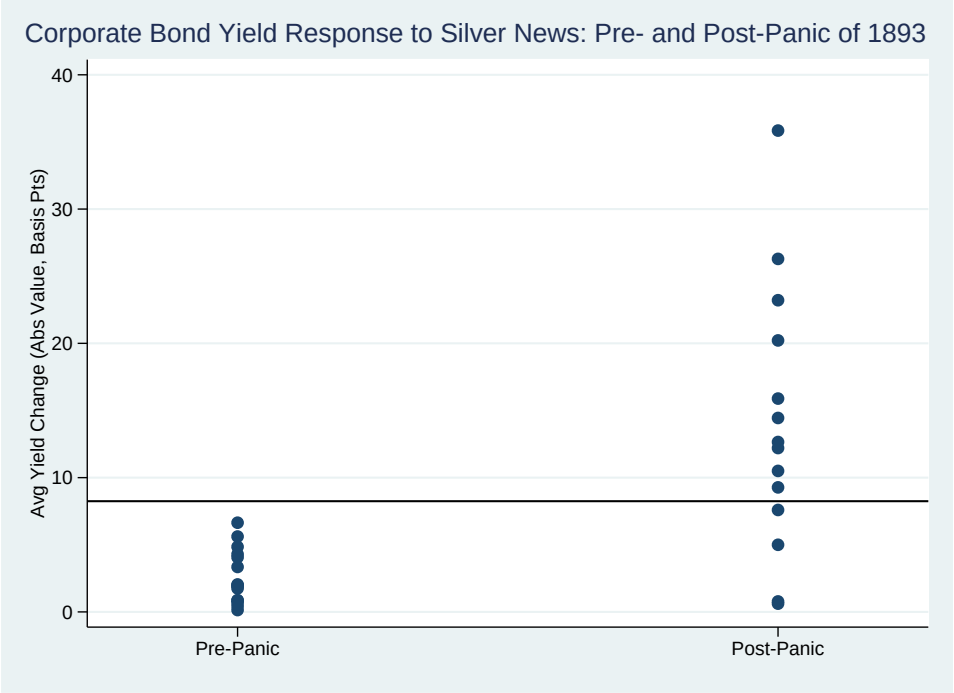
[49]Indeed, while the West Shore subsidiary of the New York Central increased its shop hours from eight hours a day to "full time" (likely 10 hours), the Wabash increased its shop hours from 24 a week to 54 a week. Most firms did not provide detailed enough survey answers to facilitate a broader comparison of firm profitability and change in activity.

cause credit costs to increase and spending to decrease, lowering aggregate demand and output. Since actual devaluations contract output through similar channels, it may be unsurprising that I find that non-trivial devaluation risk has only slightly smaller output effects than those estimated for currency and banking crises in the previous literature.

My findings have implications for current policymakers. One of the largest macroeconomic questions today is the future of the Euro. Greece, in particular, has come close to dropping out of the Euro and adopting a new, depreciated currency, while all of its debt would still be payable in Euros. Additionally, many developing and middle-income countries have adopted *de facto* dollar pegs while also borrowing heavily in dollars. In many instances, these countries face vastly different economic shocks than the United States, undermining the credibility of their dollar peg. My work suggests that this exchange rate uncertainty has produced harmful economic effects independent of any other economic policies. Further, given new work highlighting the economic expansion that occurred once the U.S. actually devalued the dollar against gold during the Great Depression, my results imply that these countries are doing more harm by trying to maintain their exchange rate pegs (Hausman et al., 2016; Jalil and Rua, 2016).

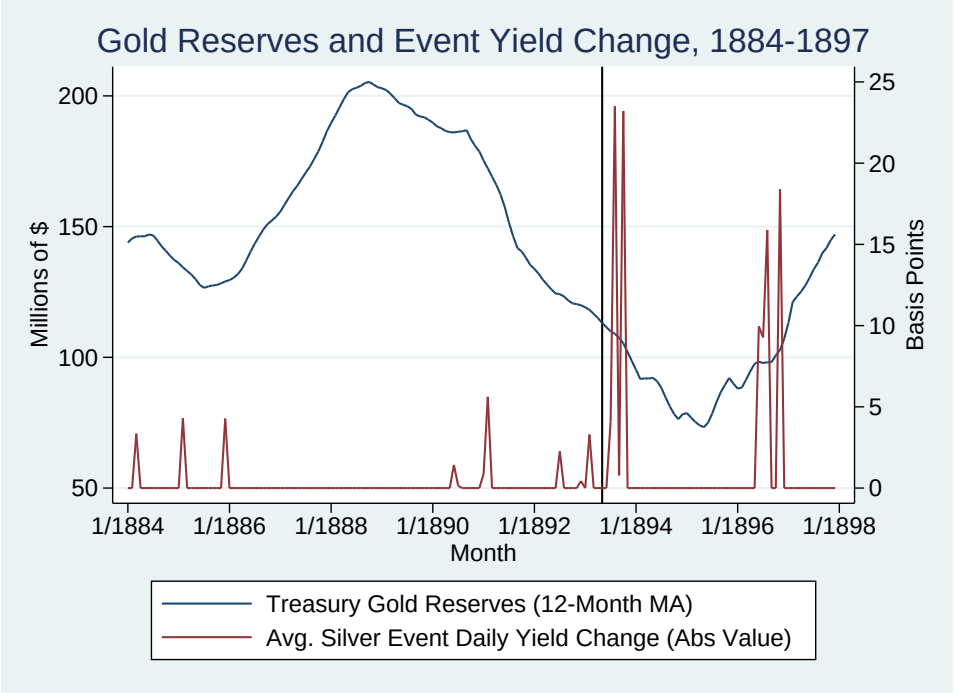
1.8 Figures and Tables

Figure 1.1:



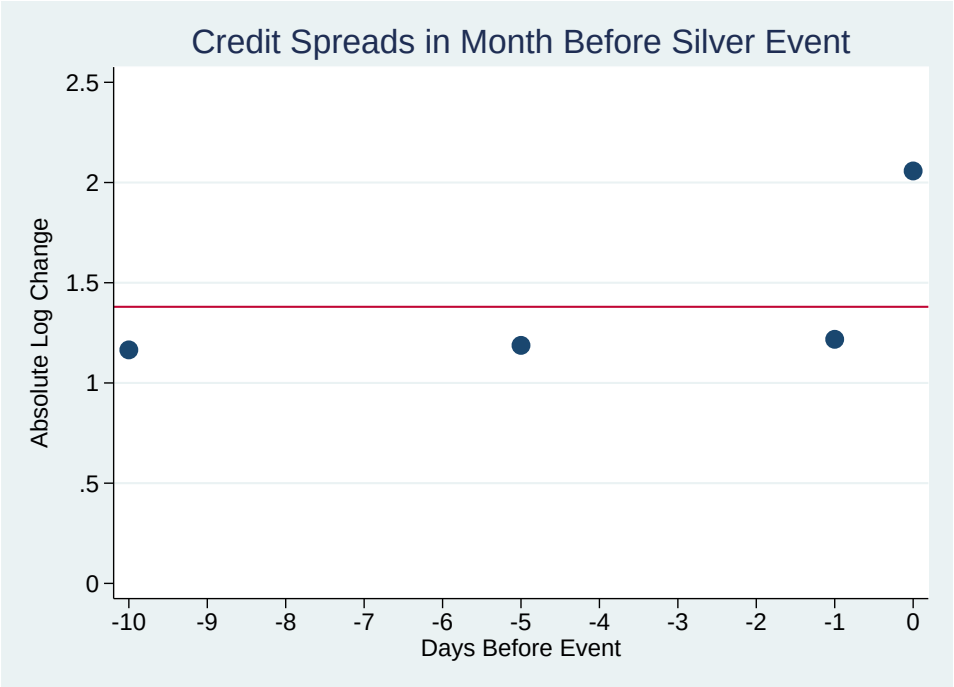
Horizontal line is bootstrapped 90th percentile for non-event days.

Figure 1.2:



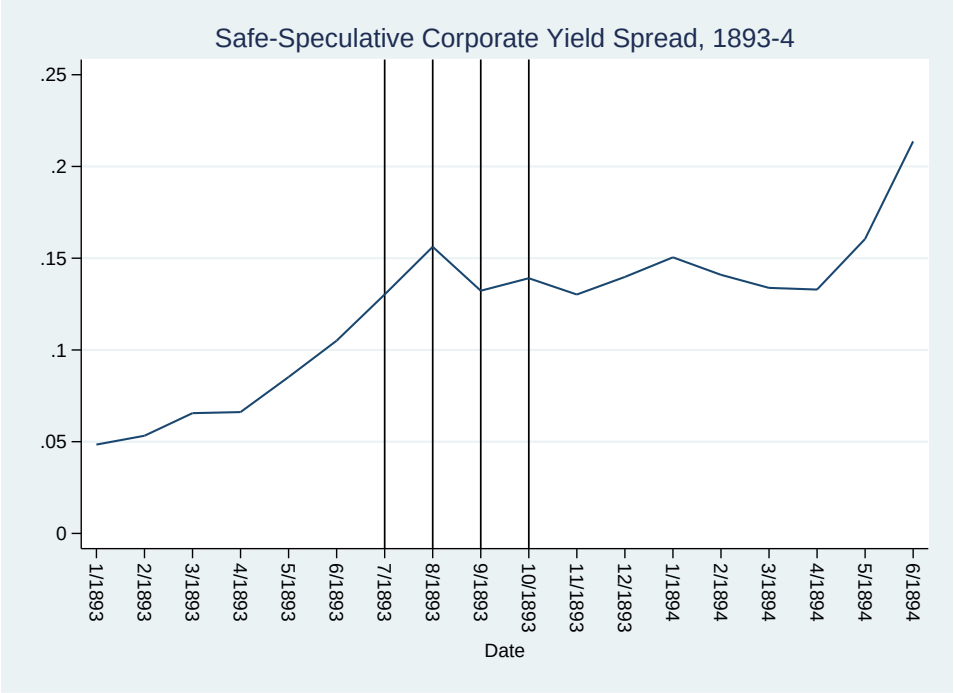
Vertical Line is beginning of Panic of 1893.

Figure 1.3:



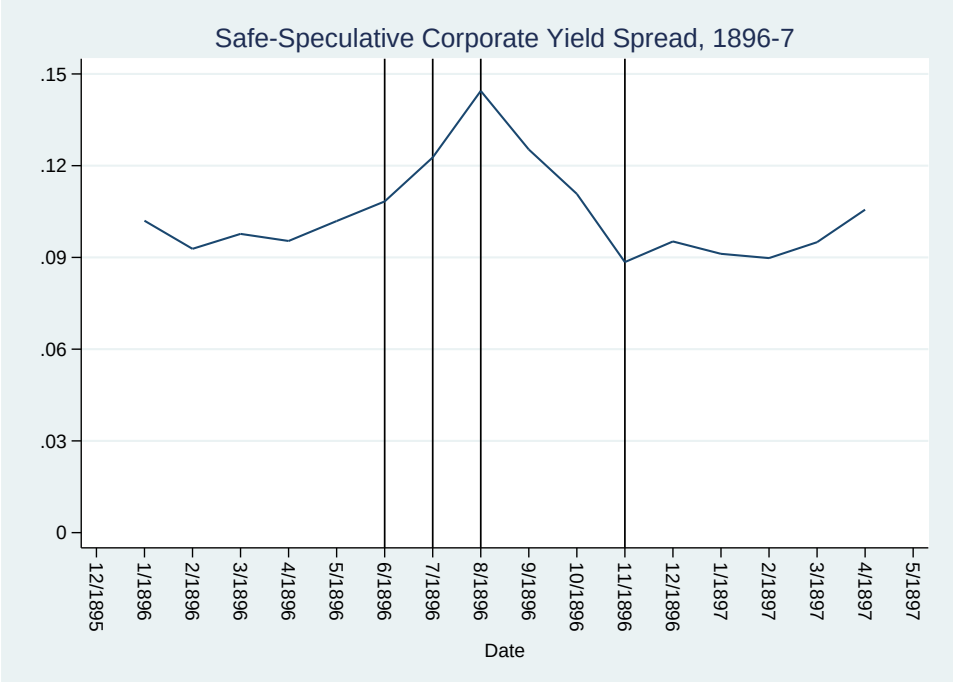
Horizontal line is average absolute value log-change in safe-speculative spread.

Figure 1.4:



Vertical lines are months with Post-Panic of 1893 silver news.

Figure 1.5:



Vertical lines are months with Post-Panic of 1893 silver news.

Figure 1.6:

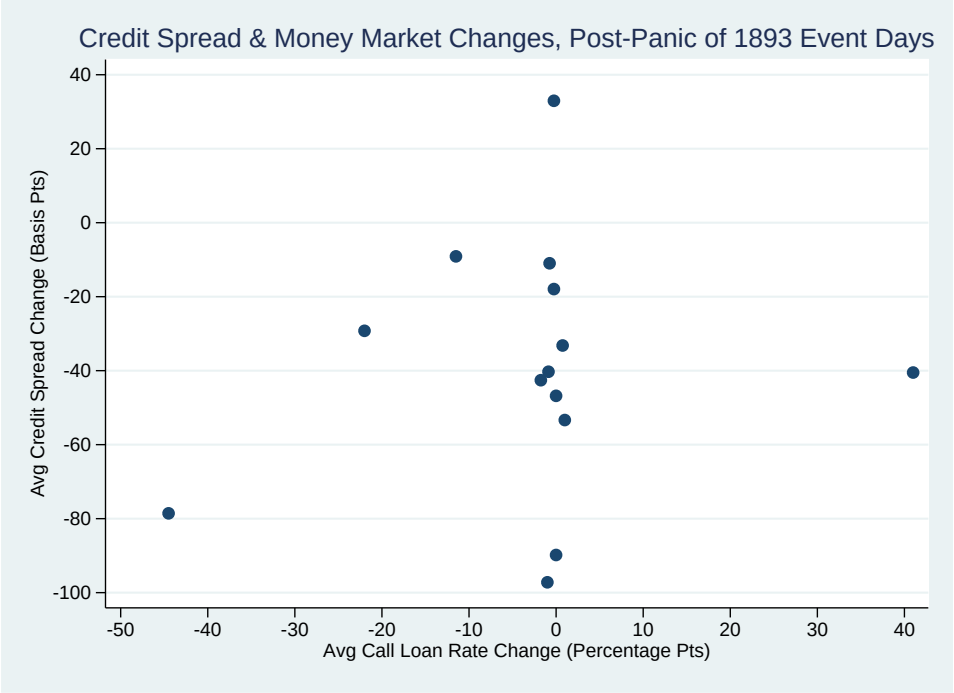


Figure 1.7:

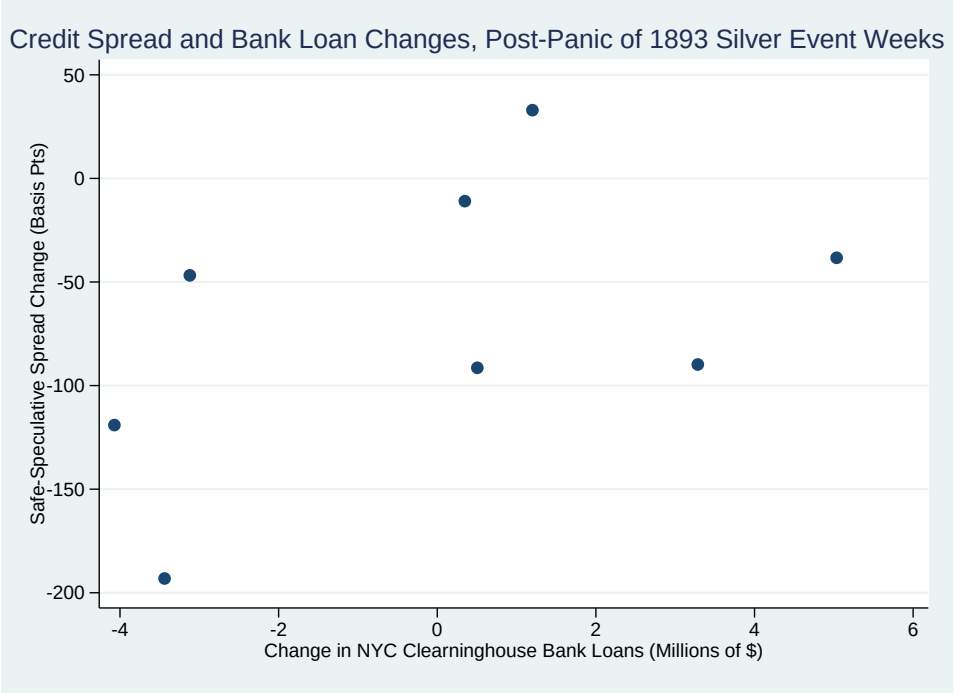


Figure 1.8:

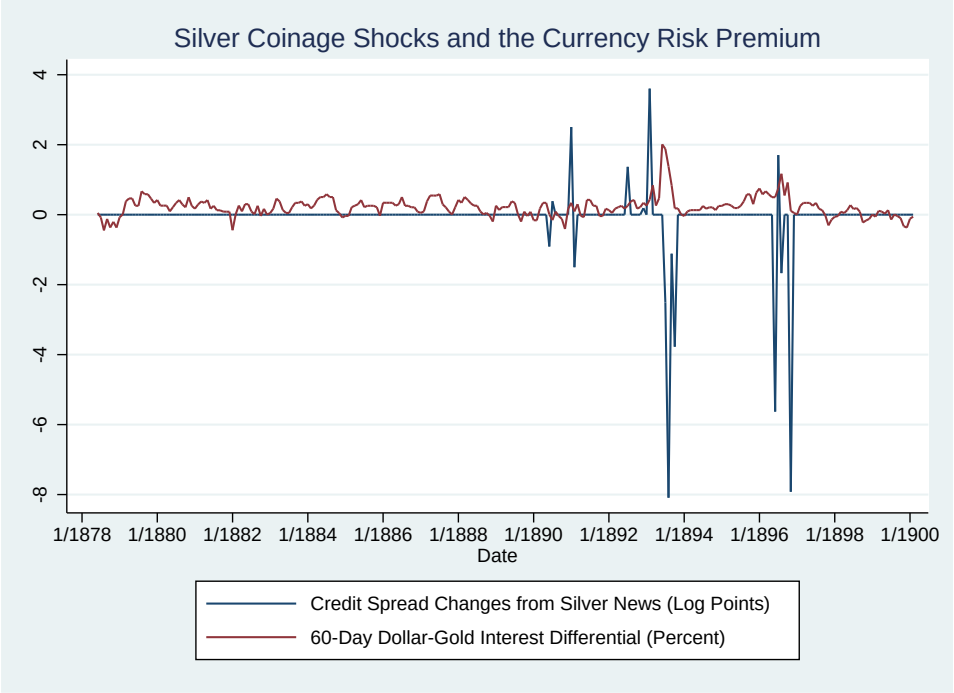
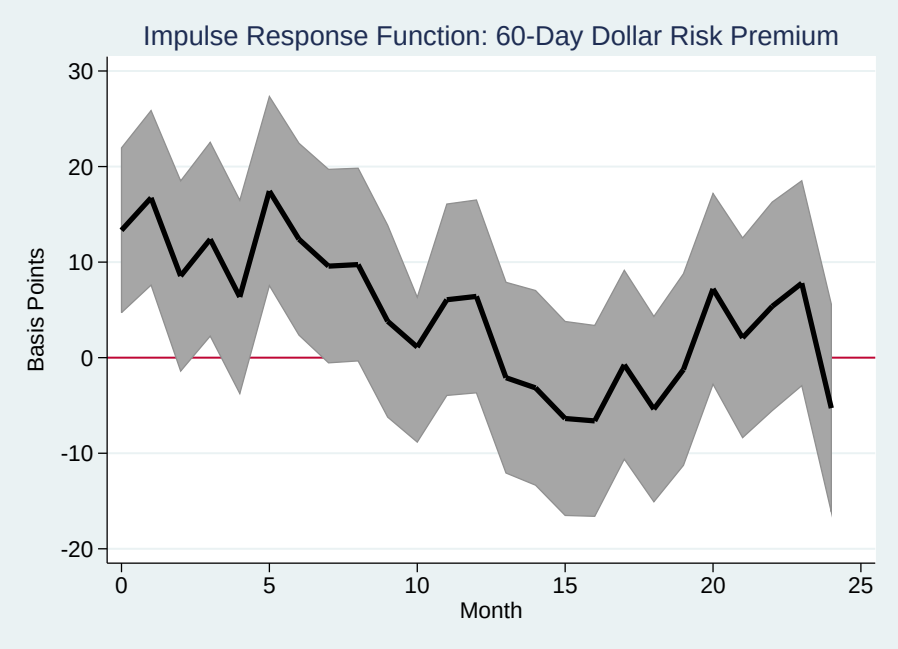
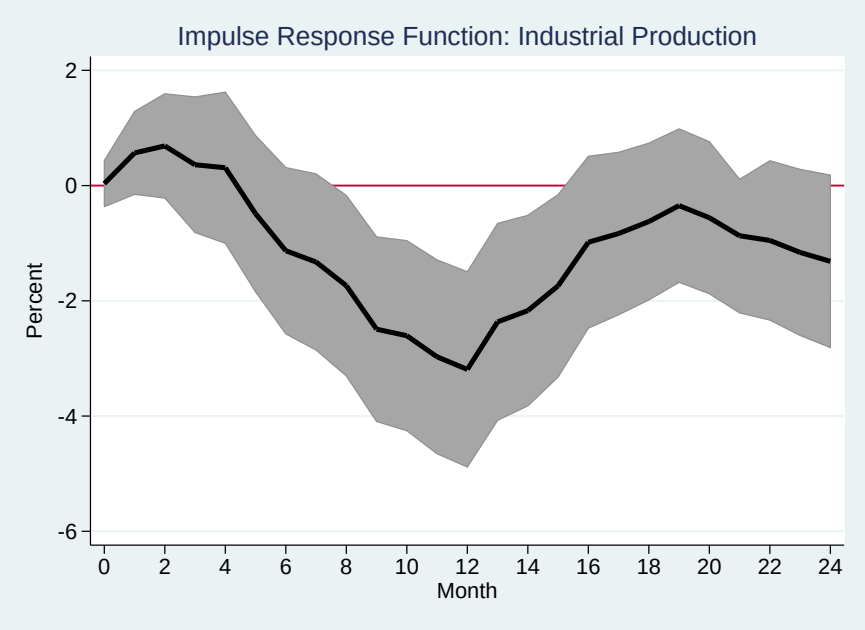


Figure 1.9:



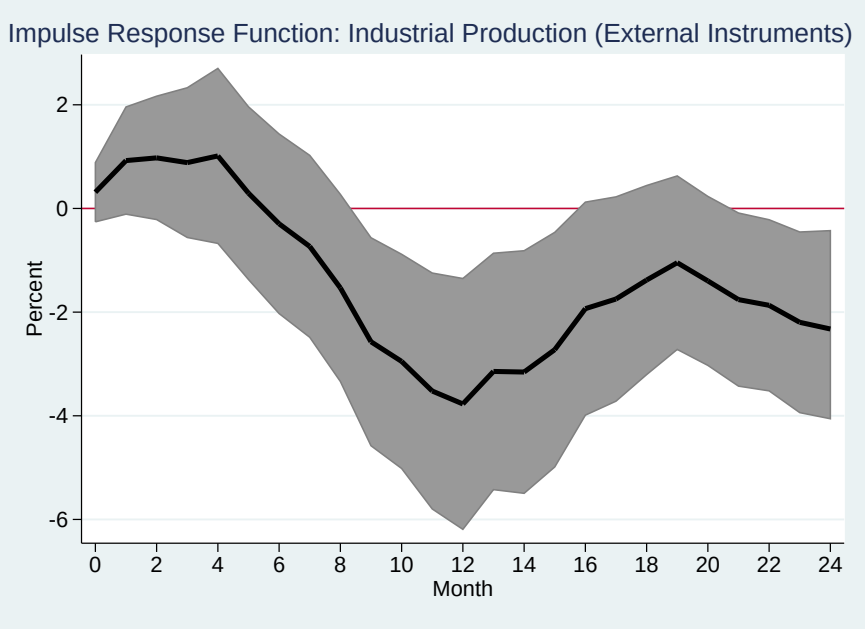
Impulse is a 1.75 log point increase in the safe-speculative bond log spread due to silver coinage news. Results based on estimating Equation 1.5 for currency risk premium. Shaded area is 90% confidence interval constructed using Newey-West standard errors.

Figure 1.10:



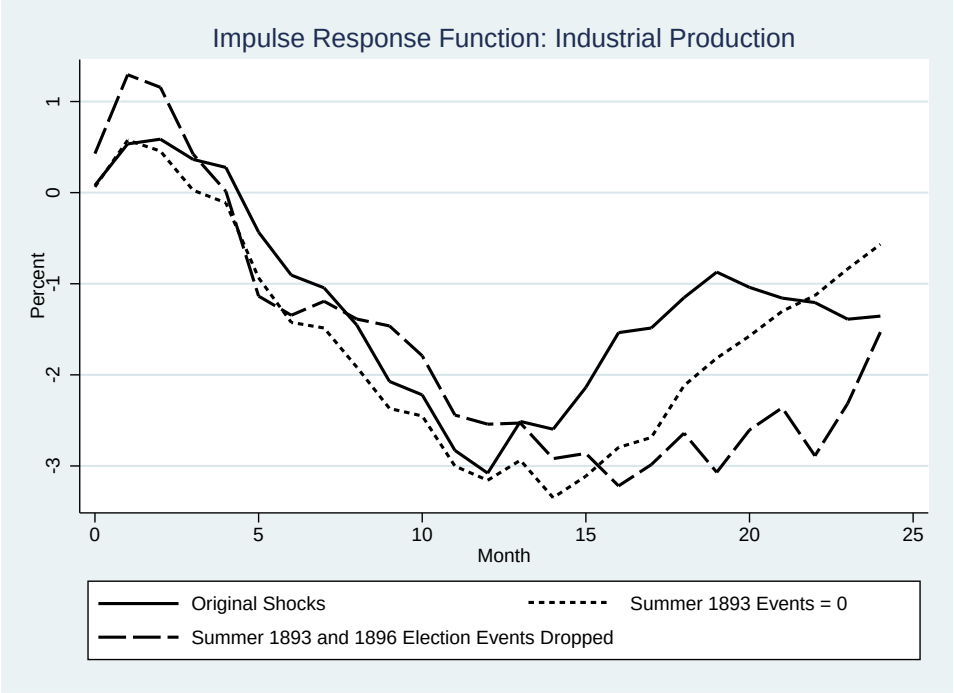
Impulse is a 1.75 log point increase in the safe-speculative bond log spread due to silver coinage news. Results based on estimating Equation 1.5 for industrial production. Shaded area is 90% confidence interval constructed using Newey-West standard errors.

Figure 1.11:



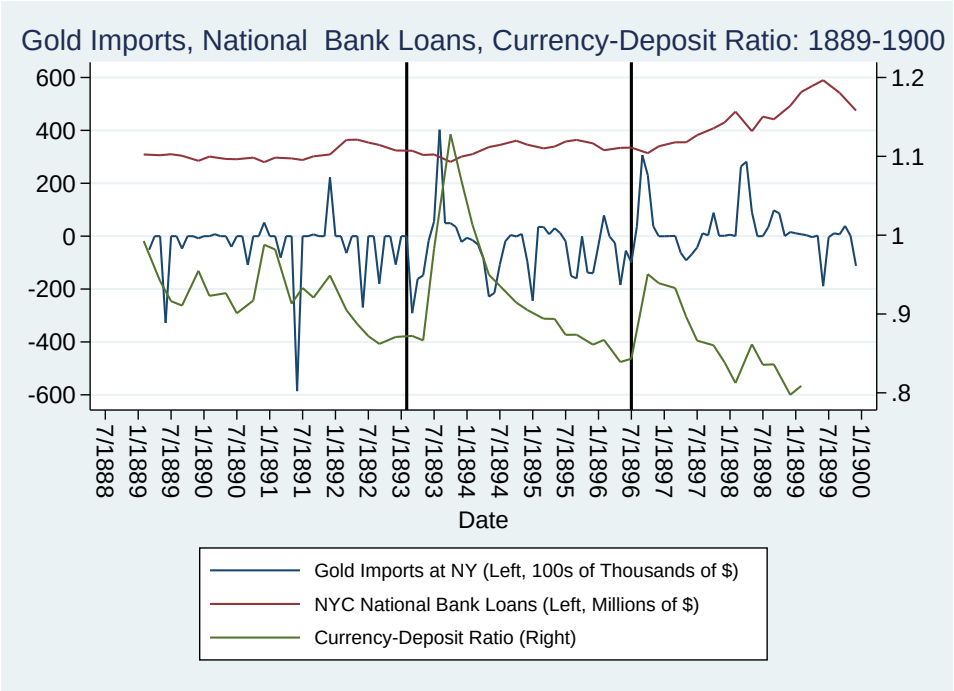
Impulse is a 16.75 basis point increase in the currency risk premium. Results based on estimating Equation 1.6. Shaded area is 90% confidence interval constructed using Newey-West standard errors. First-stage F-statistic: 9.5-9.8.

Figure 1.12:



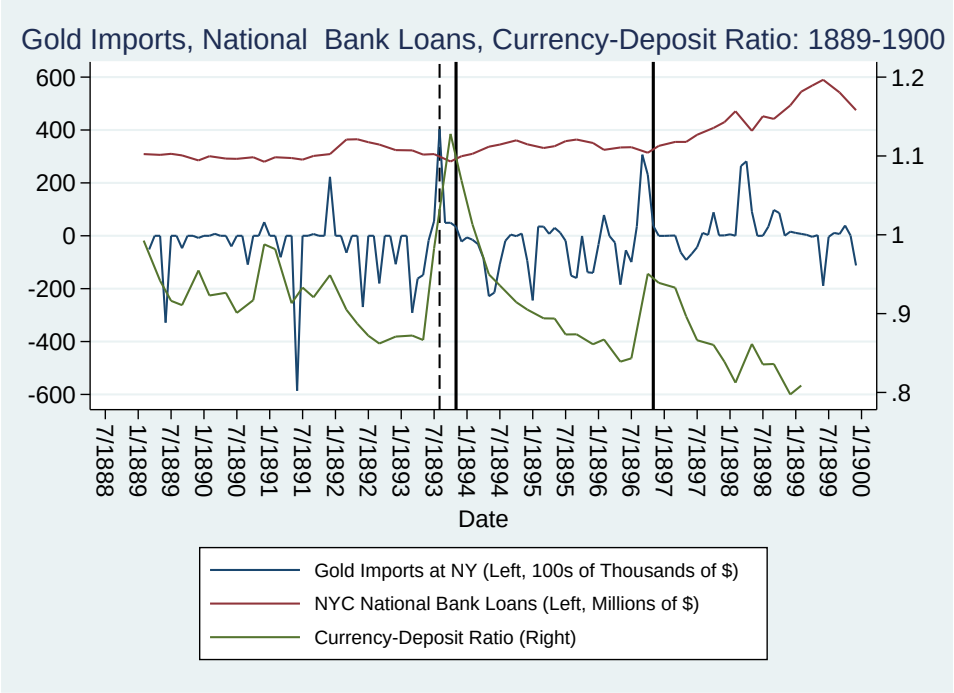
Impulse is a 2.92 log point increase in the safe-speculative bond log spread due to silver coinage news.

Figure 1.13:



Vertical lines mark rejection of Sherman Repeal (3/1893) and nomination of Bryan (7/1896)

Figure 1.14:



Dashed vertical line is passage of Sherman Repeal in House (8/1893).
Solid vertical lines mark Sherman Repeal (11/1893) and McKinley Election (11/1896)

Table 1.1: Silver Policy News

Date	Description
March 4, 1884	*Juilliard v. Greenman* Legal Tender Case Decision (+)
February 27, 1885	Repeal of Bland-Allison Voted Down (+)
December 9, 1885	Pres. Cleveland calls for repeal of Bland-Allison in 1st message to Congress (-)
December 22, 1885	Senator Beck delivers speech shooting down B-A repeal (+)
June 9, 1890	Compromise silver purchase measure passes House (-)
June 18, 1890	Senate passes free silver measure (+)
July 8, 1890	New silver bill agreed upon by Republican conferrees of House and Senate (+)
January 15, 1891	Free sliver bill passes Senate (+)
February 20, 1891	House Coinage committee votes against Senate silver bill (-)
July 5, 1892	Free silver bill passes Senate (+)
July 13-14, 1892	Free silver rejected in House (-)
December 7, 1892	Introduction of Sherman Act repeal (-)
February 9-10, 1893	House refuses to consider act repealing Sherman Act (+)
June 30-July 1, 1893	Pres. Cleveland orders emergency session of Congress to repeal Sherman Act in August (-)
August 26, 28-29, 1893	House repeals Sherman Act by 2-1 majority (-)
September 28, 1893	Pres. Cleveland writes letter stating he will only accept unconditional repeal of Sherman Act (-)
October 24, 1893	Compromise repeal fails to pass Senate (-)
June 13, 15-16, 1896	Republicans announce campaign platform for gold standard (-)
July 1, 1896	Free silver Democrats to control presidential nomination (+)
August 13, 1896	William Jennings Bryan speech on Wall St disappoints (-)
November 2 & November 4, 1896	Election of Republican candidate William McKinley (-)

Table 1.2: Event Study: Daily Average Corporate Bond Yield Change

	(1)	(2)	(3)	(4)
Silver Event	-9.147^{***}	0.889	-27.053^{***}	-28.3678^{***}
	(1.84)	(1.15)	(6.08)	(6.27)
Post-Panic of 1893 Event		-16.27^{***}		
		(3.61)		
Treasury Gold Reserves			-0.32	
			(0.36)	
Treasury Gold Reserves (Moving Average)				1.047
				(3.65)
Event x Gold Reserves			0.149^{***}	
			(0.04)	
Event x Gold Reserves (Moving Average)				0.151^{***}
				(0.04)
N	233	233	233	233

Notes: Results based on estimating Equation 1.1. All specifications include month-year dummies. In last two columns "Treasury's Gold Reserves" is average of Treasury's gold reserves over last 12 months. Heteroskedastic standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 1.3: Event Study: Speculative vs. Safe Corporate Bond Yield Changes

	(1)	(2)	(3)	(4)
Silver Event	-0.241^{**}	-0.329^{**}	-0.365^{**}	-0.541^{*}
	(0.10)	(0.14)	(0.16)	(0.29)
Event x Speculative	-1.737^{***}	-1.578^{***}	-2.257^{***}	-2.167^{***}
	(0.31)	(0.30)	(0.46)	(0.51)
Speculative	0.209^{*}	268.2	0.233^{*}	281.7
	(0.12)	(178.83)	(0.13)	(179.80)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	448	448	426	426

Notes: Results based on estimating Equation 1.2. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. All specifications include a constant term. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 1.4: Event Study: Speculative Yield Changes

	(1)	(2)	(3)	(4)
Silver Event	-1.812^{***}	-1.777^{***}	-2.377^{***}	-2.511^{***}
	(0.25)	(0.26)	(0.36)	(0.41)
Safe Change	0.687^{***}	0.394^{*}	0.672^{***}	0.367
	(0.19)	(0.22)	(0.19)	(0.23)
Constant	0.164	38.65^{**}	0.190	42.92^{**}
	(0.12)	(21.3)	(0.12)	(21.76)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	224	224	213	213

Notes: Dependent variable is the weighted average change in the natural logarithm of the yield of all speculative-grade corporate bonds traded each day. Speculative bond average weighted so average term length matches average term length of safe bonds traded. Results based on estimating Equation 1.3. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table 1.5: Post-Panic Event Yield Changes and Bond Characteristics

	(1)	(2)	(3)	(4)	(5)
Amount Outstanding	0.310^{*}				0.202^{**}
	(0.18)				(0.91)
Earnings after Depreciation		-30.739^{***}			-29.631^{***}
		(5.13)			(2.05)
Change in Earnings			-92.465		-45.430
			(57.45)		(47.71)
Default				61.01^{***}	33.734^{**}
				(22.08)	(16.81)
N	757	756	504	795	504
R^2	0.0447	0.2061	0.0463	0.113	0.2748

Notes: Dependent Variable is YTM change in basis points of corporate bonds traded on event days multiplied by negative one on (-) event days (see Table 1). Results based on estimating Equation 1.4. All columns include event fixed effects. Standard errors clustered at the firm level in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 1.6: Granger Causality Test P-Values

	(1)	(2)	(3)	(4)
Industrial Production	0.975	0.991	0.908	0.955
Price Level	0.618	0.952	0.633	0.829
Currency Risk Premium	0.000	0.266	0.02	0.414

Notes: Reported p-values are for null hypothesis each variable does not Granger cause the silver event credit spread shock. Actual tests use first difference of industrial production and price level. Column (1) contains original series of credit spread changes, Column (2) gives summer of 1893 events a value of zero, Column (3) drops events occurring in the summer of 1893, and Column (4) drops August and November 1896 events as well.

1.9 Appendix

1.9.1 Event Selection Procedure

This section details how I construct my series of silver coinage policy news events. I begin by searching two phrases in the *New York Times* archives on ProQuest: "silver bill" and "silver," "gold," "currency" between June 1878 and December 1899. I look for large observations in the monthly counts of articles containing these phrases and explore the returned articles in these months. Figure A.1 below plots the monthly article counts for these two search terms. When an article mentions a new potential change to silver coinage policy, I initially mark the date as an event. To be considered a "new" potential change, it has to be the first time the public learns of it. For instance, when a July 16 article discusses a bill that was proposed on July 8 and first mentioned in the *Times* on July 9 but provides no new information about the bill, I only include July 9 as an event date.

After this initial search, I find 35 events related to silver coinage policy. I next remove events if they are not mentioned in the "Financial Affairs"/"Financial Markets" section of the *New York Times* or the weekly recap in the Bankers' Gazette of *The Commercial and Financial Chronicle*. I use this qualification as a means of eliminating "events" that do not actually contain new or relevant information regarding silver coinage policy. Sometimes, the newspapers report potential changes

to silver coinage policy that do not actually change expected future silver coinage. I use financial market participants to gauge whether expected future silver coinage changed as a result of silver news because they had strong economic incentives to update their information set regarding silver coinage policy. For example, on September 24, 1885, the *Times* ran an article mentioning a new silver bill Senator Warner plans to submit to Congress; however, there is no description of this event in the "Financial Affairs" section. Further, I find no later articles mentioning this bill, so I drop this event, since it fails to receive any attention on Wall Street and no additional coverage in the media.

Additionally, sometimes silver news is discussed in the financial section of the *New York Times*, but I drop these events for other reasons. This is most prominent for a series of events in 1894 after the repeal of the Sherman Silver Act where Free Silver proponents in Congress attempted to pass legislation implementing the policy. President Cleveland's strong anti-silver stance had been known for a decade by this point and his refusal to accept anything but an unconditional repeal of the Sherman Act was also well-publicized. By the time he actually vetoed the Free Silver bill on March 29, 1894, "it had little or no influence on the stock market" because it was "so confidently anticipated" (*New York Times*, 3/30/1894). Prior to the veto, when the Senate passed the silver bill to send it to President Cleveland, prices initially fell upon learning of the Senate's actions, but "those who recalled how steadfastly Mr. Cleveland has stood for right principles in the past...checked the decline and brought about the closing recovery" (*New York Times*, 3/16/1894). This muted the earlier market response to the news about the silver bill. Given my inability to track within-day changes, I also drop this date from my list.

Finally, I remove dates where there is other economy-wide news discussed on the same day as the silver event. The latter criterion is added to ensure that the market response is solely due to silver coinage news and is not contaminated by some other aggregate shock. There is one main event violating this rule: President Cleveland's announcement of his intention to call an extra session of Congress in September 1893 to repeal the Sherman Act (June 6, 1893). As he did this, the Midwest, particularly Chicago, was experiencing a banking panic, which in turn was affecting

New York City banks.

I also check whether my event list is comprehensive over the time period I study. I cross-reference dates on my list with two other sources documenting the political battles over silver coinage: Timberlake (1978) and Frieden (1997). I find no silver coinage events in Timberlake (1978) or Frieden (1997) that is not in my initial set of 35 events. Table A.1 lists the eliminated event dates, a brief description, and why they were removed from the final event set.

Figure A.1:

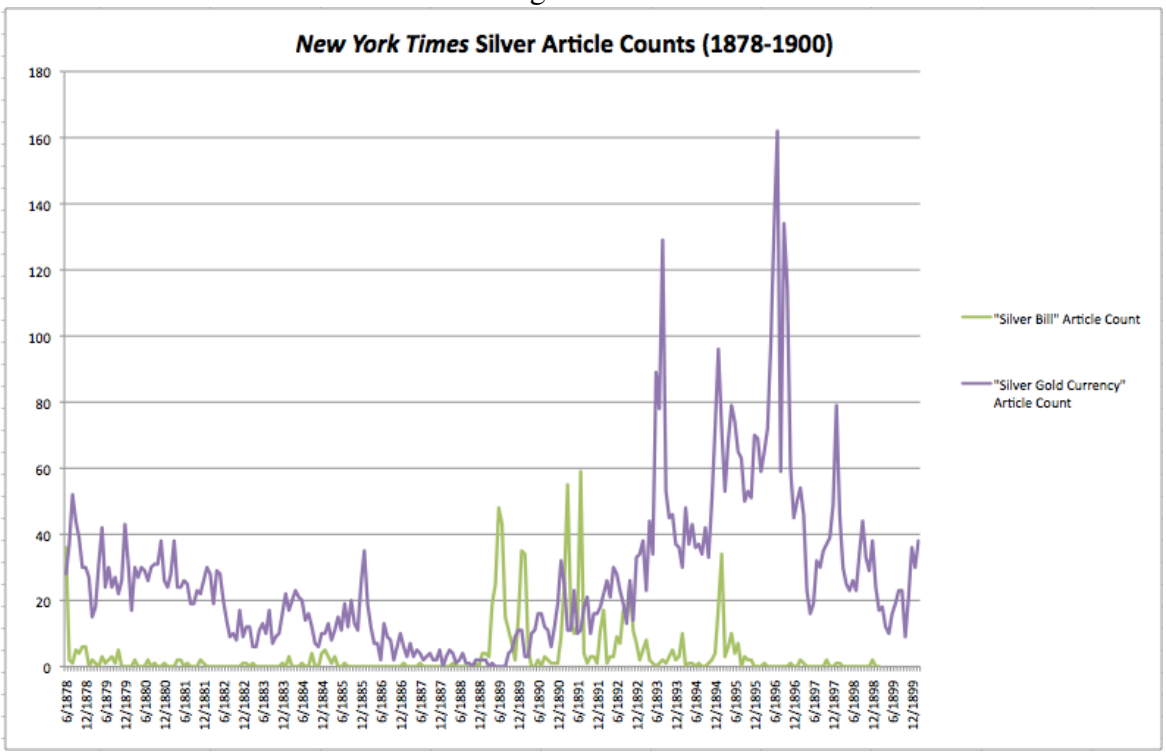


Table A.1: Eliminated Event Dates

Date	Event	Why Removed
May 1, 1879	House makes silver bill special order for next day	No mention in "Financial Affairs"
Dec. 15, 1882	Proposed bill limits silver coinage	No mention in "Financial Affairs"
Sept. 23, 1885	Sen Warner plans to introduce new silver bill	No mention in "Financial Affairs"
Jan. 28, 1886	Sen Sherman introduces new silver bill	No mention in "Financial Affairs"
April 8, 1886	Free silver bill voted down in house	No mention in "Financial Affairs"
April 5, 1888	Silver "scheme" added to Senate bond purchasing bill	No mention in "Financial Affairs," railroad strikes occurring
April 24, 1890	Republicans of House and Senate agree on compromise silver bill	No mention in "Financial Affairs"
May 19, 1890	Pres. Harrison declares he will not accept free coinage bill	No mention in "Financial Affairs,"
June 6, 1893	Pres. Cleveland plans to call extra session of Congress in Sept to repeal Sherman	Banking panic in midwest
Mar 15, 1894	Bland free silver bill passes Senate	Within day changes, markets ultimately care little
Mar 28, 1894	Pres. Cleveland vetoes Bland bill	Discounted by markets (not seen as news)
April 4, 1894	House refuses to override Cleveland veto	No mention in "Financial Markets"
Feb 1, 1896	Senate passes free silver bill	Passage seen as "foregone conclusion" by financial markets
Feb 14, 1896	House rejects Senate silver bill	No mention in "Financial Markets"

1.9.2 Bond Rating Criteria

The rating procedure relies on similar earnings and balance sheet data and calculations to that used in Moody (1909). The data are taken from various issues of *Poor's Manual of Railroads*. The process begins by collecting firm-level data for the ten years prior to that when the bond was traded. To make the variables comparable across railroad companies of different sizes, everything is calculated in **per-mile** terms. Therefore, I first record the average annual railway mileage for each company. Next, I gather the following variables:

Net Income : The sum of net earnings from operations and miscellaneous income that typically

comes from trackage rentals, equipment leases, and dividends and interest from stocks and bonds of other companies. Net earnings takes gross earnings and subtracts "operating expenses." These expenses include maintenance costs and general costs for "conducting transportation."

Margin of Safety : This variable is the ratio of profits to net income per mile. Profits are calculated by taking net income per mile and subtracting off interest payments, taxes, and rental fees.

Stocks Outstanding : The sum of all common and preferred stock reported on the company's balance sheet. This is the book value of equity.

Bonds Outstanding : The sum of all bonds outstanding (book value). This is typically listed as "funded debt" on a company's balance sheet.

Rentals Capitalized at 5% : This takes the total annual rentals paid by the company and multiplies it by 20. Essentially, this gives a sense of the total liabilities of the rental companies for which the lessee is responsible. The 5 percent capitalization rate was used by Moody (1909) since the exact interest or dividend rate for the lessor's bonds and stocks may not be publicly available.

Stocks and Bonds Owned by Company : The sum of the book value of all equity and debt held by the company as reported on the asset side of the balance sheet. Sometimes the individual stocks or bonds are listed, but often they are listed under the umbrella category of "stocks and bonds owned." I also included the book value of "securities held at the Treasury" as reported on the balance sheet as part of stocks and bonds owned.

Net Capitalization : I calculate this by summing stocks and bonds outstanding and rentals capitalized at 5 percent and then subtract stocks and bonds held by the company.

Net Income on Net Capital : As the name implies, this is the annual net income divided by the net capitalization in that year.

I then take the 10-year average of all these variables. The limited availability of some volumes of *Poor's Manual of Railroads* prevents me from having the data for the entire 10-year period for most companies. In these cases, I simply average across the years for which I do have data.

The next step is to calculate three bond-level variables for each of the bonds in my dataset. The key for determining the values of the variables defined below is knowledge of each bond's place in the capital structure (e.g. senior versus junior debt). When possible, I follow the ordering presented in Moody (1909). Otherwise, I try to best extrapolate his system for the capital structures in my years. Fortunately, each company's report in *Poor's Manual of Railroads* typically includes information on every bond, such as what it is secured against and what lien it has on the property. Moody's procedure is not an exact science, so in many cases I have to make judgment calls. Even if the precise ordering is not correct, I am still broadly correct in characterizing debt as senior or junior.

Bonds with the highest seniority are the prior liabilities outstanding for companies that have merged or been reorganized. For example, the Cleveland, Cincinnati, Chicago, and St. Louis formed in 1889 as the consolidation of three smaller railroads: the Cincinnati, Indianapolis, St. Louis, and Chicago; the Cleveland, Columbus, Cincinnati, and Indianapolis; and the Indianapolis and St. Louis. The outstanding bonds of these smaller companies would get first claim to income before *any* debt issued by the consolidated company.

Next in the capital structure are typically bonds with first lien to some or all of the railroad's property. I treat bonds with first lien on different properties of a company as having the same seniority, as long as the property already exists. For instance, some bonds are issued to back construction of new railway lines. These bonds are **not** subject to the same lien as bonds secured against track that has already been laid and is in use.

Following first-lien bonds in the capital structure are the second, third, fourth, etc. claims to property as well as bonds that have a general lien to the entire property subject to all prior liens. Unsecured bonds are the next-highest ranking group, followed by two special groups of bonds. First are income bonds, which pay interest **only** when there is enough net income left after all other bond interest and rental costs have been paid to meet the coupon obligations of the income bonds. In this manner, income bonds are similar to preferred stock, but they have a set maturity during which the principal is returned to the holder. The other group of bonds are those of rented companies whose income is not listed separately from the company they are leased to. Only income bonds have a lower claim to income. As an example of this type of situation, the Atchison, Colorado, and Pacific company is leased to the Central Branch of the Union Pacific. All Central Branch bond issues have seniority over the Atchison, Colorado, and Pacifc debt.

Having discussed the general strategy behind determining the capital structure for each railroad company, I will now describe the bond-level variables used to help me rate the bonds. Again, variables are in per-mile terms when appropriate.

Average Income Available : This takes the average net income collected for each company and subtracts the interest payments for more senior bonds. Information on each bond's coupon rate and amount outstanding is listed in the company reports in *Poor's Manual of Railroads*.

Interest Required : This variable is simply the coupon rate of the bond multiplied by the amount outstanding, which is then divided by the average mileage of the railroad.

Factor of Safety : I calculate a bond's factor of safety by subtracting its interest required as well the interest required for all bonds with the same claim to income from the average income available. This is then divided by the initial average income available.

In some cases, the use of the 10-year average mileage to transform the bond-level variables into per-mile figures is inappropriate because the company has undergone a large expansion in recent years and the bond itself was issued to cover that expansion. In this case, using the 10-year average

would grossly underestimate the current capacity of the railroad company and overstate the level of indebtedness of the company relative to its earning potential. To deal with this issue, I also calculate the interest required per mile using the average mileage of the company in the year prior to the event date, and use this second version of interest required to calculate another factor of safety for the bond.

Moody (1909) initially had 10 ratings classifications for railroad bonds, and he lists the general qualifications for each category in this initial volume. I will summarize the general properties here. Bond ratings are based on several features: the earning power of the railroad, the profitability of the company, the indebtedness of the company relative to its earning capacity, the factor of safety of the individual bond, as well as the value of the property that the bond is secured against (if it is secured at all). In performing the ratings, Moody compared these factors amongst subgroups of railroads based on geographic location of the company and the nature of its business, as statistics tend to vary by group. He lists the broad groups in his 1909 volume, and I try to follow this within-group comparison strategy. Next I will discuss the types of bonds I assign each rating to:

Aaa : These are the safest bonds. Bonds receiving this rating typically are issued by large, historically profitable companies that are not overly capitalized relative to their major competitors. The bonds themselves have high factors of safety and often have first claim to income. Moody argues that these bonds value should not be impacted by minor changes in the company's profitability or earnings, but only by changes in the time-value of money.

Aa : Similar to Aaa bonds, these bonds are also very safe. The lower ranking usually reflects a lesser claim to income or a smaller, less valuable property against which the bond is secured.

A : Although still relatively secure, these bonds have a higher potential for default than Aaa or Aa bonds. In my dataset, I typically assign an A rating to bonds with an average to above-average factor of safety, but whose issuing company is less financially secure. For example, several of the more senior issues of the Chesapeake and Ohio have factors of safety above

50 percent, but the company itself struggled to turn a profit in recent years.

Baa : Bonds with a Baa rating typically reflect bonds with average factors of safety that are fairly low in the payout hierarchy or those that are first liens of companies struggling to turn a profit. For instance, some of the junior debt of the Louisville and Nashville rates as Baa because, although the company's property is large and its profits alway positive, the company is heavily capitalized and so lower-ranked debt may be more in danger of defaulting.

Ba and B : I define these two both here because there are only slight differences between the two ratings. Bonds with either of these rating typically have factors of safety below 50 percent or are outranked by bonds with very low factors of safety, even if their own factors of safety are relatively high.

Caa : The first of the ratings which I categorize as a "junk" bond. Bonds with a Caa rating tend to have factors of safety below 15 percent. What tends to push their rating above a 'C' for example is if they have fewer bonds ranked ahead of them in the capital structure.

Ca : Few bonds receive a Ca rating specifically. They have similarly low factors of safety to Caa bonds but are typically outranked by other Caa bonds.

C : C bonds tend to have factors of safety that are zero or would be negative, and the company overall is heavily capitalized and struggles to make a profit. They are typically not secured against any valuable property, but may be secured against other bonds of the company. Most income bonds in my dataset have 'C' ratings, reflecting their low position in the payout chain and the overall weakness of the companies that issue income bonds.

D : The lowest possible rating. Bonds with 'D' rating include a company with a 3rd income bond series (meaning it is outranked by two other income bonds) and an income bond for which there was never enough profit to pay its interest over the preceding 10-year period.

As mentioned in Section 4, I use two broad rating categories in my empirical analysis: safe and speculative bonds. Safe bonds are those which initially receive a Aaa or Aa rating, while specula-

tive bonds have a Caa rating or worse based on the above criteria. In part, I focus on these groups because I am most confident in my assignment of these ratings. Additionally, as highlighted in footnote 16, the spread between these two groups of bonds in the modern setting has been found to primarily reflect default risk compensation rather than between-group differences in some other factor.

1.9.3 Additional Results

This section presents additional results for the event study and other impulse response functions. First, I estimate equations 1.1, 1.2, and 1.3 using the absolute value of the average yield change as the dependent variable. In these regressions, the event variable becomes an indicator taking a value of one on days with silver coinage news. Next I show the results for estimation of equations 1.2 and 1.3 when the dependent variable is the yield change in levels, and repeat with absolute value of yield changes as well. These are shown in Tables A.5-A.8, and the estimated coefficients are consistent with the findings in the main text of the paper. Finally, Figure A.2 displays impulse response functions for four other variables: the log of the general price level, the log of aggregate railroad earnings, the log of bank clearings, and the yield on a "high-grade" railroad bond index constructed by Macaulay (1937). All of the estimated responses are consistent with increased silver risk having contracting aggregate demand and thus the aggregate economy.

Table A.2: Event Study: Daily Absolute Average Corporate Bond Yield Change

	(1)	(2)	(3)	(4)
Silver Event	3.136**	-0.394	9.173*	11.794**
	(1.41)	(0.70)	(5.07)	(4.80)
Post-Panic of 1893 Event		6.714***		
		(2.55)		
Treasury Gold Reserves			0.605	
			(0.605)	
Treasury Gold Reserves (Moving Average)				3.512
				(3.27)
Event x Gold Reserves			−0.057*	
			(0.03)	
Event x Gold Reserves (Moving Average)				−0.072**
				(0.03)
N	233	233	233	233

Notes: Results based on estimating Equation 1.1. Dependent variable is absolute value of the average daily change in corporate bond yields. Silver event is indicator variable taking value of 1 on news days. All specifications include month-year dummies. In last two columns "Treasury's Gold Reserves" is average of Treasury's gold reserves over last 12 months. Heteroskedastic standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.3: Event Study: Speculative vs. Safe Corporate Bond Absolute Yield Changes

	(1)	(2)	(3)	(4)
Silver Event	0.035	−0.076	0.210**	−0.091
	(0.08)	(0.09)	(0.11)	(0.16)
Event x Speculative	0.666**	0.653***	1.077**	0.958**
	(0.32)	(0.24)	(0.45)	(0.43)
Speculative	0.807***	−275.1*	0.807***	−221.9
	(0.09)	(157.74)	(0.09)	(167.80)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	448	448	426	426

Results based on estimating Equation 1.2, with dependent variable replaced by absolute value of weighted average change by rating group. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. All specifications include a constant term. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.4: Event Study: Speculative Absolute Yield Changes

	(1)	(2)	(3)	(4)
Silver Event	0.684^{**} (0.283)	0.588^{***} (0.23)	1.198^{***} (0.39)	0.882^{**} (0.38)
Safe Change	0.477^{**} (0.23)	0.147 (0.21)	0.423^{*} (0.22)	0.178 (0.21)
Constant	1.038^{***} (0.12)	-10.197^{**} (4.24)	1.062^{***} (0.12)	-8.594^{*} (4.50)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	224	224	213	213

Notes: Dependent variable is the absolute value of the weighted average change in the natural logarithm of the yield of all speculative-grade corporate bonds traded each day. Speculative bond average weighted so average term length matches average term length of safe bonds traded. Results based on estimating Equation 1.3. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.5: Event Study: Speculative vs. Safe Corporate Bond Yield Changes (Levels)

	(1)	(2)	(3)	(4)
Silver Event	-1.095^{*} (0.45)	-1.443^{**} (0.60)	$-1.676**$ (0.74)	-2.333^{*} (1.28)
Event x Speculative	-32.417^{***} (5.58)	-32.679^{***} (6.05)	-46.532^{***} (7.85)	-52.488^{***} (10.21)
Speculative	1.626 (1.90)	82.9 (81.48)	2.416 (1.99)	125.860 (83.63)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	452	452	430	430

Notes: Results based on estimating Equation 1.2. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. All specifications include a constant term. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.6: Event Study: Speculative vs. Safe Absolute Yield Changes (Levels)

	(1)	(2)	(3)	(4)
Silver Event	0.159	−0.247	0.989**	−0.138
	(0.38)	(0.39)	(0.50)	(0.72)
Event x Speculative	13.789**	10.891***	26.539***	17.715**
	(5.74)	(4.17)	(7.80)	(7.55)
Speculative	17.138***	−108.510	17.138***	−70.775
	(1.50)	(157.74)	(71.45)	(80.18)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	452	452	430	430

Results based on estimating Equation 1.2, with dependent variable replaced by absolute value of weighted average change by rating group. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. All specifications include a constant term. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.7: Event Study: Speculative Yield Changes (Levels)

	(1)	(2)	(3)	(4)
Silver Event	−29.972***	−30.557***	−42.939***	−49.439***
	(4.65)	(5.23)	(6.23)	(8.75)
Safe Change	3.232***	2.47***	3.144***	2.307***
	(0.73)	(0.86)	(0.71)	(0.21)
Constant	3.15*	90.678	3.765*	130.448*
	(1.88)	(67.95)	(1.97)	(71.24)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	226	226	215	215

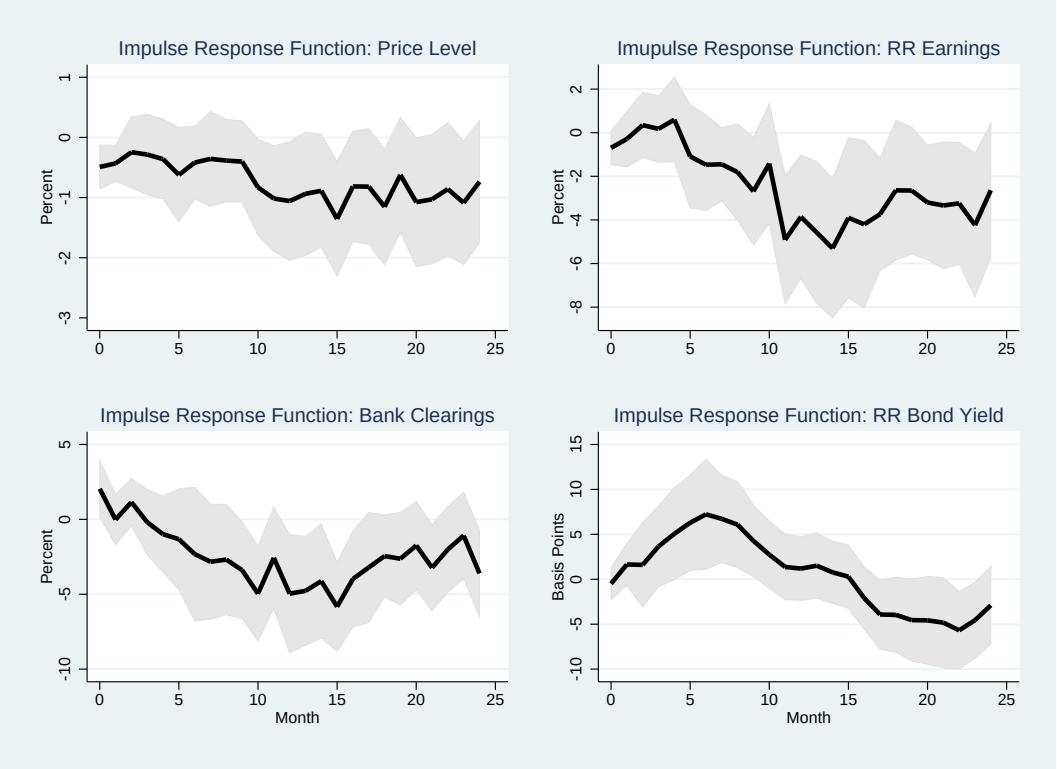
Notes: Dependent variable is the weighted average change in the yield of all speculative-grade corporate bonds traded each day. Speculative bond average weighted so average term length matches average term length of safe bonds traded. Results based on estimating Equation 1.3. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Table A.8: Event Study: Speculative Absolute Yield Changes (Levels)

	(1)	(2)	(3)	(4)
Silver Event	13.606^{***}	10.845^{***}	25.73^{***}	17.701^{**}
	(5.14)	(4.10)	(7.06)	(7.27)
Safe Change	2.148^{**}	0.814	1.821^{**}	0.90
	(0.90)	(0.77)	(0.86)	(0.78)
Constant	14.829^{***}	-109.755^{*}	15.487^{***}	-71.337
	(2.11)	(66.00)	(2.04)	(73.87)
Month-Year Dummies?	N	Y	N	Y
Additional Controls?	N	Y	N	Y
Post-Panic Events Only?	N	N	Y	Y
N	226	226	215	215

Notes: Dependent variable is the absolute value of the weighted average change in yield of all speculative-grade corporate bonds traded each day. Speculative bond average weighted so average term length matches average term length of safe bonds traded. Results based on estimating Equation 1.3. Additional controls include 12-month average of Treasury's gold reserves, common stock index 12-month realized volatility, common stock index monthly holding period return, and average term length of bonds traded. Heteroskedastic-robust standard errors in parentheses. *p<0.1, **p<0.05, ***p<0.01.

Figure A.2:



Impulse is a 1.75 log-point increase in safe-speculative spread due to silver news. Shaded areas are 90-percent confidence intervals based on Newey-West standard errors.

1.9.4 Default Risk and the Dollar-Gold Exchange Rate: Simple Model

Here I describe a simple, illustrative model to show how changing the probability of dollar devaluation affects the probability a firm defaults on its debt, as well as how this differentially impacts firms already at greater risk of defaulting. There are two periods in this model. In period 1, firm i has debt denominated in gold with a dollar value of D_{i1} and the dollar value of the firm is V_{i1}. The firm's debt consists of a zero-coupon bond. The period 2 value of firm i is $V_{i2} = V_{i1}\varepsilon_{i2}$. ε_{i2} has a log-normal cumulative distribution, H, with a mean of unity. The firm defaults in period 2 when the dollar value of its debt exceeds the dollar value of the firm, i.e. $D_{i2} < V_{i2}$ or $D_{i2} < V_{i1}\varepsilon_{i2}$. Hence there exists a cutoff value, ε^*_{i2}, such that for any $\varepsilon_{i2} < \varepsilon^*_{i2}$ the firm defaults on its debt in period 2. The dollar-gold exchange rate in period 2 is also uncertain. With probability p the exchange rate is 1, while it is $1 + \gamma$ with probability $1 - p$. Thus, we can write the probability the

firm defaults in period 2 as:

$$pH\left(\frac{D_{i1}}{V_{i1}}\right)+(1-p)H\left(\frac{(1+\gamma)D_{i1}}{V_{i1}}\right)$$

From this, we see that $p<1$ raises the probability of default.

The following is a numerical example designed to demonstrate that a decrease in the probability of the dollar-gold exchange rate remaining constant has a larger effect on the probability of default for firms already at greater risk of defaulting. Consider two firms: $i=s$ (for safe) and $i=j$ (for junk). Assume initially that $p=1$ and the firms have the following cutoff values: ε^*_{s2} and ε^*_{j2} with $\varepsilon^*_{s2}<\varepsilon^*_{j2}$. Specifically, assume that firm s has a default probability of 0.005 and firm j has a default probability of 0.2. Additionally, note that the cumulative distribution function for ε can be written as $\Phi\left(\frac{\ln(\varepsilon)-\mu}{\sigma_\varepsilon}\right)$, where μ and σ_ε are the mean and standard deviation of $\ln(\varepsilon)$. For this example, suppose $\mu=-0.125$ and $\sigma_\varepsilon=0.5$ (which implies a mean of 1 for ε). For each firm i let $\tilde{\varepsilon}_{i2}\equiv\frac{\ln(\varepsilon_i 2)-\mu}{\sigma_\varepsilon}$. With default probabilities of 0.005 and 0.2, $\tilde{\varepsilon}^*_{s2}=-2.58$ and $\tilde{\varepsilon}^*_{j2}=-0.84$ respectively. Now, let ε^{**}_{i2} be the cutoff value for firm i when the dollar-gold exchange rate is $1+\gamma$. Under this scenario, $\tilde{\varepsilon}^{**}_{i2}=\frac{\ln(1+\gamma)}{\sigma_\varepsilon}+\tilde{\varepsilon}^*_{i2}$. Letting $\gamma=0.5$, this implies that $\tilde{\varepsilon}^{**}_{i2}\approx 0.811+\tilde{\varepsilon}^*_{i2}$. The cutoff values for each firm under this exchange rate are $\tilde{\varepsilon}^{**}_{s2}\approx -1.77$ and $\tilde{\varepsilon}^{**}_{j2}\approx -0.03$. Thus firm s defaults with probability 0.0384 and firm j defaults with probability 0.488 under a dollar-gold exchange rate of $1+\gamma$.

Next, suppose that p decreases from 1 to 0.99. With a recovery rate of 0.5, this implies the yield on the bond for firm s falls $-0.01\times 0.005\times 0.5+0.01\times 0.0384\times 0.5$ or 1.67 basis points. Likewise the yield on the bond for firm j falls $-0.01\times 0.2\times 0.5+0.01\times 0.488\times 0.5$ or 23.4 basis points. Therefore, an increase in the probability of dollar devaluation raises the yield on a speculative bond by more than it raises a safe bond's yield. The main empirical specification of this paper uses the log-change in yield, and it remains to be seen if this is greater for the junk bond in this example. To make this comparison, assume that the risk-free yield is 4 percent and does not change as the devaluation probability of the dollar changes. Thus, the initial yields when $p=1$ are

4.25% and 14% for the safe and junk bonds respectively. Finally, this means the log-change for the safe bond is 0.003992 while the log change for the junk bond is 0.016576. In other words, an increase in the probability of devaluation sees a larger increase in the log of the yield of the junk bond relative to the log of the yield of the safe bond.

Chapter 2

Was the Election of 1896 a Turning Point for the U.S. Economy? Estimating the Effects of Political Uncertainty on Railroad Outcomes

2.1 Introduction

Policy uncertainty as a source and explanation of business cycle fluctuations has grown in popularity recently (Baker et al., 2016). Given the relative novelty of this hypothesis, the existing literature has yet to reach a consensus on exactly how important policy uncertainty is for economic activity and what the precise mechanisms through which this uncertainty affects the economy are.[1] Theories debate the role of investment costs and irreversibilities, nominal rigidities and search frictions in labor market, precautionary savings, and financial frictions in transmitting policy uncertainty.[2] For the empirical literature, difficulty comes in finding exogenous changes in policy uncertainty.[3] Therefore, more research is necessary to refine our understanding of how policy uncertainty affects the economy.

I use the U.S. presidential election of 1896 as a specific case to study how the resolution of policy uncertainty affects firm-level outcomes. In this election, the two candidates differed sharply in the policy they advocated for the dollar-gold exchange rate. One favored a continuation and strengthening of the current gold standard policy where the dollar price of gold was fixed at the mint. The other candidate favored a policy of unlimited silver coinage that would have devalued the dollar by 50 percent relative to gold.[4] Figure 2.1 shows that the dollar risk premium, the compensation demanded by investors for risk that the dollar would depreciate against gold, spiked in July of 1896 after the nomination of the latter candidate. Ultimately, the candidate supporting the gold standard won the election and the threat of unlimited silver coinage died out.[5] The role of the election of 1896 in the subsequent economic boom in the U.S. in 1897 and 1898 is disputed.[6]

[1] The classic mechanism through which uncertainty was proposed to affect the economy was outlined in Bernanke (1983), but was more recently brought to attention in Bloom (2009).

[2] For non-convex investment costs, see Bloom (2009). The role of nominal rigidities are studied in Born and Pfeifer (2014) and Leduc and Liu (2016). Financial frictions are present in the models of Gilchrist et al. (2014) and Alfaro et al. (2014).

[3] The fact that policy uncertainty may respond to economic developments is highlighted in Pástor and Veronesi (2013). Ludvigson et al. (2016) summarizes the overall problem with identifying the economic impact of uncertainty.

[4] The candidates differed on other economic policies such as tariffs and the regulation of railroad rates, but these issues were much smaller in importance. The election is viewed by contemporaries and histories primarily as a referendum on the gold standard.

[5] Timberlake (1978) and Calomiris (1993).

[6] While not completely dismissing the election of 1896 as an important event, Noyes (1909) places far more weight on the wheat crop boom in 1897.

To identify firm-level effects for this aggregate policy, I exploit variation in the changes in firms' bond yields on dates with election-related news. Weiss (2016) shows that corporate bond yield changes for news related to silver coinage (including the election of 1896) are correlated with the gold debt burden of the company and the reduction in earnings from the economic uncertainty created by the threat of silver coinage. These yield changes are measured in a tight window around the event dates, making it unlikely that the price of debt is changing for any reason other than news about the gold standard. This identification strategy requires the price of corporate bonds traded on the stock exchanges, constraining the analysis to firms within a single sector that issued traded corporate debt: the railroads.[7]

I study how railroad income and investment and maintenance spending changed in the years after the election of 1896 with new, hand-collected operations and balance sheet data gathered from the annual *Poor's Manual of Railroads* volumes and excerpts of annual reports published in the *Commercial and Financial Chronicle.* In my regression analysis, I find that railways with greater yield changes during election events saw greater growth in their net income in the year after the election. This effect remains after controlling for pre-election differences in railways outside of their bond yield changes. Additionally, I rule out that the 1897-8 wheat boom explains the relationship between yield changes and net income using the 1891 wheat boom as a placebo test.

Railroad investment in the years after the 1896 election is uncorrelated with firms' yield changes during election events. This is true using either changes in equity or debt outstanding as the investment variable, as well as when I use the change in the total value of the railroad property. I show that railway expansion was instead correlated with pre-election net income to debt ratios, and that the aftermath of the wave of defaults during the Panic of 1893 resulted in greater on emphasis towards using cash and equity for new construction.

Finally, I present suggestive evidence that railways with large yield changes and income growth tended to be located in areas where the election of 1896 caused the greatest change in bank behavior. As bank credit shrank prior to the election and then rebounded afterward so too

[7]Industrial and utilities companies also issued traded bonds, but lacked the detailed earnings and balance sheet data provided by the railroads to their stockholders.

did overall business activity, boosting railroad earnings. Additionally, I show that several railways with large income growth instead used the additional cash to pay out dividends rather than expand their mileage.

These findings show that policy uncertainty, at least of a specific form, does affect firm outcomes. At least for the largest firms in the U.S. economy at the time, investment does not seem to be the primary channel through which these companies were impacted. Instead, I argue that the reduction in bank credit brought on by election uncertainty hurt small economic actors which in turn reduced the income of the railroads.[8] This therefore adds to the existing literature on policy uncertainty and firm behavior which has primarily focused on investment outcomes as the source of economic fluctuations resulting from uncertainty.[9] Several papers have studied the firm-level impact of devaluations, I expand our understanding of the costs of exchange rate crises by showing that devaluation risk also alters firm performance.[10]

Additionally, my work highlights the impact the election of 1896 had on the U.S. economy. Contrary to what some contemporaries argued, my results demonstrate that the election did contribute to the recovery that began in 1897. Fulford and Schwartzman (2017) also study the election of 1896 but focus on bank outcomes. I complement their work by showing how the election affected the railways. My work also draws on the existing historical literature discussing how silver coinage in the U.S. affected the credibility of the gold standard.[11] Finally, this work expands the literature studying policy uncertainty in historical U.S. settings.[12]

I organize the rest of the paper into 7 additional sections. Section 2 describes the relevant U.S. history leading up to and including the election of 1896. Section 3 discusses the ways in which the uncertainty surrounding the election could have affected the U.S. economy. Section 4 presents

[8]Bordo et al. (2016) show formally that economic policy uncertainty reduces bank credit in the U.S. My results therefore suggest that this reduction in bank credit has broader effects.

[9]Existing empirical work emphasizing this channel includes Julio and Yook (2012), Alfaro et al. (2016), and Gulen and Ion (2016). Giavazzi and McMahon (2012) focus their study on electoral uncertainty and household savings.

[10]This literature includes Aguiar (2005), Bleakley and Cowan (2008), Kalemli-Ozcan et al. (2015), and Kim et al. (2015).

[11]This literature has its roots in Friedman and Schwartz (1963) and includes more formal studies like Calomiris (1993) and Hallman et al. (2000).

[12]Baker et al. (2014) and Mathy and Ziebarth (2017) are other papers using U.S. history to explore political uncertainty.

the main empirical specification, and Section 5 describes the data collected for the regressions. Section 6 shows the main results and some robustness tests, while Section 7 outlines suggestive evidence for the mechanisms explaining the results. Section 8 concludes.

2.2 The 1896 Election in Historical Context

Beginning in 1878, the U.S. operated under a "limping" bimetallism monetary regime. Gold could be exchange for dollars (and vice versa) at the Treasury at a fixed price in unlimited quantities, while a limited amount of silver was coined each month. This system emerged as the result of three legislative acts. First, the Coinage Act of 1873 restored the previous dollar-gold fixed exchange rate of $20.67 per ounce of gold, while the Resumption Act of 1875 reinstated this system beginning January 1, 1879.[13] Returning to this level of dollar-gold parity required significant deflation, which hurt individuals with large dollar-denominated debts. Additionally, prices of traded agricultural goods saw relative deflation as well (Frieden, 1997). To generate some inflation and appease these sections of the population harmed by gold resumption, Congress passed the Bland-Allison Act in 1878. This bill required the Treasury purchase and coin $2-4 million of silver each month with the intention of expanding the money supply.

The injection of silver coins into the money supply each month did little to halt the secular decline in prices that continued throughout the 1880s. The amount of silver coined monthly was increased by the Sherman Silver Purchase Act of 1890. This law stoked fears that the U.S. would abandon gold convertibility, and, as a result, foreign investors withdrew gold and capital from the U.S. Financial panic struck in 1893; unlike most other U.S. banking panics, the Panic of 1893 started in the Midwest before spreading to the East Coast.[14] Importantly, this meant the areas that suffered the most during this economic depression were primarily agricultural. Already reeling from their rising debt burdens and falling prices, farmers and silver miners increased their agitation

[13] All metallic convertibility (gold and silver) at the mint had been suspended during the U.S. Civil War.

[14] In technical terms, the panic originated at the periphery of the banking network and then reached the core East Coast national banks.

for the end of the gold standard.

This coalition of farmers and miners instead wanted a system of unlimited silver coinage at a mint price for silver that would result in sharp devaluation of the dollar.[15] This policy of "Free Silver" had its share of advocates since the 1870s, but the cries grew loudest after the Panic of 1893. Despite the repeal of the Sherman Silver Act in the fall of 1893, the economy remained fragile in the following years. This weak recovery without silver coinage only strengthened supporters of Free Silver.

Unsurprisingly, the first Presidential election after the Panic, in 1896, primarily focused on the economy, particularly the coinage issue. Going into the party nominating conventions in the summer of 1896, the American public watched closely to see what platforms the parties would adopt. The Republican convention occurred first in mid-June. There the Republicans nominated William McKinley for president and adopted a platform explicitly supporting a gold standard. Previously, gold-supporting candidates had offered mild concessions to silver by espousing their support for silver if an international agreement could be reached, but this ceased with the 1896 Republican platform.

Conversely, the Democratic convention in July was controlled by Free Silver advocates, who nominated William Jennings Bryan to champion their cause. It was at this convention that Bryan made his infamous "Cross of Gold" speech, and the population at large came to realize there was a possibility of a Free Silver victory in the November election. Figure 2.1 plots the interest spread between short-term dollar and gold-denominated assets; this spread in part captures dollar devaluation expectations. As can be seen, the spread jumps in July 1896, indicating investors assigned an increased probability to dollar devaluation.

The possibility of a Bryan victory became severely discounted after mid-August (though not entirely so) for several reasons. First, Bryan traveled to New York City determined to give a speech and "take possession of the 'enemy's country,'" but the speech was sparsely-attended and

[15]This devaluation would occur because the Treasury would overvalue silver relative to gold in comparison to their market prices, hence the dollar would depreciate against gold under unlimited silver coinage.

poorly-received.[16] Second, early state elections resulted in the defeat of many Free Silver candidates, pointing to a similar outcome in the Presidential election. Despite these signals, uneasiness remained on the eve of the election, especially in financial circles. The currency risk premium on dollar debt again jumps in October 1896 after declining in September, and the interest rates to borrow money short term skyrocketed. All of these fears were dispelled by the results of the election, confirming the rejection of the Free Silver platform in an electoral college landslide.[17]

As briefly discussed above, the election-driven uncertainty surrounding the future value of the dollar likely had immediate economic consequences. The nomination of Bryan raised the demand for gold at home and abroad, as gold was hoarded in the U.S. and exported to Europe.[18] A microcosm of this phenomenon took place in the day before and after the election. On November 2nd, there was "a long line of persons at the [New York] Sub-Treasury drawing out gold," but, on November 4th, the situation reversed and gold was "deposited in large amounts in banks and tendered at the various sub-treasuries."[19] Additionally, stock and bond trading increased dramatically and prices soared as a result of the election results after a sharp decline in July from the Bryan nomination. The channels through which these changes affected the broader economy will be discussed in greater detail in the next section.

2.3 Exchange Rate Uncertainty and Economic Activity: Channels

Policy uncertainty can effect the economy through several mechanisms. The classic channel proposed for linking uncertainty with economic decisions is through the irreversibility and non-convex adjustment costs of investment.[20] When these frictions are present, uncertainty creates incentives

[16] *Commercial and Financial Chronicle* v.64, p.14.

[17] Initial returns suggested McKinley won the popular vote by a record 1 million votes. In actuality, he won the popular vote by only 600,000.

[18] The *Commercial and Financial Chronicle* notes that gold exports resumed on July 20th and that there were also considerable withdrawals of gold from the Treasury for the purpose of hoarding (v. 64 p.14).

[19] *Commercial and Financial Chronicle* v.64, p.16.

[20] Bernanke (1983) and Bloom (2009) outline this mechanism in greater detail.

to postpone investment spending until the uncertainty is mitigated. It is certainly possible that these investment frictions were present for the railways in 1890s. Their investment spending primarily went into the construction of new track and the building of new locomotives and cars, both costly to reverse.

While irreversibility and adjustment costs have received the bulk of the attention, other channels have been proposed for transmitting uncertainty to the economy. Some authors have argued that nominal rigidities and search frictions in the labor market are key for linking uncertainty to the real economy, though the importance of nominal rigidities in the 1890s is debatable.[21] Others posit that precautionary savings increase in times of high uncertainty.[22] Finally, Gilchrist et al. (2014) argue that financial frictions cause uncertainty to alter the ability of firms to use debt to finance investment.

The above mechanisms may be important in different settings, but the primary way uncertainty about the future gold value of the dollar affected the real economy was through the provision of credit.[23] Silver coinage risk likely affected the provision of credit in two ways. First, it impaired larger firms' access to direct financing: the demand for bonds and equities fell. In particular, firms with large amounts of bonds payable in gold rather than dollars saw their security prices fall the most.[24] Second, smaller firms (as well as individual borrowers) saw a reduction in bank (intermediated) credit.[25] The supply of bank loans contracted because of the increased demand for gold as a result of the electoral uncertainty. Under the gold standard, an increased demand for gold without a change in the supply of gold necessarily results in deflation, leading to more defaults on loans Banks contracted their supply of credit to repair their balance sheets, and firms operating on credit were forced to shut down.

[21] Born and Pfeifer (2014) and Leduc and Liu (2016) use general equilibrium models to show that these frictions are key for the transmission of uncertainty shocks to the aggregate economy. Calomiris and Hubbard (1989) argue against the importance of nominal rigidities for business cycles in the 1890s in general. Hanes (1993) and Allen (1992) challenge the notion that cyclical wage behavior changed between 1890 and today.

[22] Giavazzi and McMahon (2012) present evidence from German elections on this channel.

[23] The discussion in this section draws from the model of Holmstrom and Tirole (1997).

[24] About 70 percent of railway debt was denominated in gold rather than dollars. For evidence of the importance of gold debt in asset price behavior during the election see Weiss (2016).

[25] See Fulford and Schwartzman (2017) for evidence that the 1896 election influenced bank behavior.

Both types of credit provision could impact railroad outcomes once the electoral uncertainty ceased after the McKinley victory. The direct finance channel is more straightforward. Here, as investors worried less about the railways' gold debt burdens, the supply of capital available for debt and equity issuance increased. This would directly lead to greater railroad construction in the years after the 1896 election. The importance of intermediated credit is less explicit. Because branch-banking was generally not allowed in the U.S. at the time, the railways did not typically borrow from commercial banks to finance their own investments, as most banks lacked the funds required by the railroads. Instead, bank credit mattered in how it affected the general level of economic activity where the railroads operated. As smaller businesses ceased to operate without adequate credit, this likely lowered the amount of freight and passengers using the railroads, lowering railway earnings. Figure 2.2 shows that both railroad construction and earnings reached a trough in 1896 before growing again in 1897.

2.4 Empirical Strategy

The main focus of this paper is to compare a set of outcomes across railway companies in the year(s) after the 1896 election. To attribute the outcomes to the election of 1896, a source of firm-level variation not driven by economic shocks occurring after the election is needed. The variation I employ is in the average bond yield changes on dates in 1896 with election-related news. Weiss (2016) presents evidence that the magnitude of bonds' yield changes in response to silver coinage news corresponded to their current default status and how the income available to pay the interest on these bonds would change under a dollar devaluation. In addition, yield changes may also correlate with the severity of the business slowdown due to a reduction in credit from silver risk.[26]

It is not enough–as noted above–to have a source of firm-level variation; it also needs to be uncorrelated with other economic shocks that could affect firm earnings and investment decisions. The use of variation in *daily*-level yield changes from election news addresses the main threat to

[26]The decrease in business activity would put another strain on the income available to repay interest on firms' existing debt.

identifying the economic effects of political uncertainty: reverse causality. Since the yield changes are in a narrow window around the news about political uncertainty, they are presumably not the result of of another economic shock that would alter uncertainty. Weiss (2016) shows that silver coinage news dates and their effect on bond yields cannot be predicted by shocks to industrial production and prices, bolstering the above claim.

My approach is therefore to run regressions of the form:

$$\Delta \ln(y_i) = \alpha + \beta Yield_i + \mathbf{x'}_i\boldsymbol{\gamma} + \varepsilon_i \tag{2.1}$$

for a series of annual outcomes y for each firm, i. The outcomes I currently use are net income per mile of railroad, maintenance spending per mile of railroad, funded debt (bonds) outstanding, equity outstanding, and cost of railroad and equipment.[27] The former three are balance sheet variables, and their percent change is meant to capture railway investment in the years after the 1896 election. Typically, the literature studying firm investment in a modern setting uses reported capital expenditures to measure investment. Unfortunately, there was not uniform reporting during this time period, and many firms do not list their annual capital expenditures. Net income changes capture firms' changing ability to service their debts, since net income takes gross earnings and subtracts off operating expenses.[28] Maintenance spending is included since it can be used as a substitute for investment, and many railways reported what would today be considered capital expenses under maintenance spending. Additionally, railways may have lowered maintenance spending expenditures as a means to save additional dollar earnings in anticipation of an increase in the burden of their gold interest payments. Income and maintenance spending are in per mile terms to control for variation in railway size, while the balance sheet variables are not since they are meant in part to study changes in railway size.

The main regressor of interest is $Yield_i$, which is an average yield change across all of firm i's bonds sold on at least one election news date.[29] Due to variation in yield changes across the

[27] In the future, I plan to collect gross earnings data as well.
[28] See the following section for more information on what constitutes net income.
[29] The Data section describes the news dates in greater detail.

news dates each bond-date yield change is de-meaned before being averaged across dates. After this first round of averaging is done, the average yield changes are averaged across bonds within a firm.[30] All but one of the election events signified "good" news regarding the commitment of the U.S. to the gold standard, and on these days the average yield change was negative. For the one election event with news increasing uncertainty about the gold standard and raising bond yields I multiply all yield changes by negative one to make everything uniform across events.

Given the above facts, If the election was an important determinant of future economic activity, there should be a negative and statistically significant value for the coefficient β. This implies that railroads with greater *decreases* in their bond yields from election news had larger increases in the outcome of interest after the election.

The vector of control variables, $\mathbf{x}_i$, is included to rule out other firm characteristics correlated with election news yield changes that could affect future firm outcomes. Perhaps the biggest potential confounder is that many of the firms with large yield changes were in receivership or had just reorganized at the time of the election. Therefore, there is the possibility that any of the improvement in outcomes for these could simply be the product of better management after the election rather than any resolution of policy uncertainty due to the election. I thus include a dummy for whether firms were reorganized during the Panic of 1893 and exited receivership around the election. I also include pre-election period changes in the outcome variables to control for differing pre-trends.[31] As additional controls in the investment regressions I include various measures of each railroad's ability to invest. These measures include net income's percent of total funded debt, the average yield on traded bonds, and Tobin's q.[32]

[30]The results reported currently use the yield changes constructed from this averaging process, but I have experimented with re-ordering how the yield changes are average as well as using the median yield change across bonds. In the future, I can also work with a weighted average based on the total amount of each bond outstanding.

[31]I do not have the pre-election data for the value of the railroad property, but this will be collected soon. Additionally, many firms only started reporting detailed maintenance spending data after the 1896 election, so including a pre-trend for maintenance spending would shrink my sample by a large number.

[32]Since Tobin's q requires the market price of equity and many firms in my sample did not have their stock traded on the exchanges, I report regressions with and without Tobin's q as a control.

2.5 Data Collected

The first step in running the empirical analysis involves selecting a set of election news dates and collecting the corporate bond yield changes on these dates. The news dates are those used a part of the Weiss (2016) event study. I describe how events were selected in detail in that paper. For this study, it suffices to note there are four election events: the announcement of the Republican platform on the gold standard, the beginning of the Democratic Convention in Chicago, William Jennings Bryan's Wall Street speech, and the election of William McKinley. Section 2 describes these events and their importance in greater detail. An additional note is that, for the election of McKinley and the adoption of a gold standard platform, the press at the time explicitly indicates that this news affected financial markets on days other than when the event actually happened, so yield changes on these extra days are included.

The bond yield data is calculated from the closing price on the New York Stock Exchange listed in the *New York Times* for each news date. Since the regressions use yield *changes*, I need to calculate the previous yield to maturity for each bond. I do this using the Bond Quotations section of the *Wall Street Journal* on the day before the event. The Bond Quotation lists the most recent sale price of each bond up until the publishing date. Across all event dates, I gather yield changes for 178 bonds within 81 firms.

The annual firm outcomes are hand-collected from excerpts of each company's annual reports to their stockholders. The data from these annual reports are summarized in annual editions of *Poor's Manual of Railroads* as well as in the *Commercial and Financial Chronicle*, which sometimes also publishes the comments of the president and other officers of the company. Figures 2.3 and 2.4 present examples of the two sections from these reports used in the data collection for this paper. In particular, the net income and maintenance spending are listed under "Operations" while the bonds and equity outstanding, as well as the cost of the railroad and its equipment are listed on the balance sheet. Net income is directly read off the "Operations" report, and maintenance spending would be found by summing the "Maint. of Way and Structures" and the "Maintenance

of Equipment" rows in the example shown.[33] Bonds outstanding is read directly off the balance sheet item "Funded Debt Outstanding" while equity outstanding sums the "Common Stock" and "Preferred Stock" rows. The cost of the property is again directly read from the item "Cost of Road and Equipment" on the balance sheet. All variables are collected for the years 1891-1900 when possible.[34]

For the "Operations" variables (income and maintenance spending), the change used in the empirical analysis is calculated for the first full reporting year after the election of 1896. Many railways, including the ones shown in Figures 2.3 and 2.4, reported their statistics for the years ending June 30. For companies employing this procedure, the changes in income and maintenance spending used in the regressions are for 1896-7 to 1897-8. The change in balance sheet variables are calculated for the period 1896 to 1900. The change over a longer time span is used due to time-to-build constraints.[35] This is particularly true for railways, who could more readily adjust their rolling stock of cars and locomotives, but had to perform extensive surveying for the construction of new lines.

The pre-period changes are calculated for 1891-96 for the balance sheet outcomes and the for 1892-94 for net income. This specific period for net income corresponds to the depths of the Panic of 1893 when credit was at its scarcest and overall business activity was at its weakest.[36] The income-to-debt ratio is calculated using the latest data reported prior to the 1896 election season (i.e. 1895). Tobin's q is calculated using the amount of equity outstanding on either January 1, 1899 or June 30, 1898 and the quoted sale price for January 3rd, 1899. Table 2.1 lists the summary statistics, including the number of firms with non-missing values, for all variables.

A limitation of the empirical strategy is that it restricts the analysis only to firms with bonds

[33]For some companies, a separate listing called "Motive Power" includes expenses for repairing locomotives. For these companies this is also included in maintenance spending. Though there may be some discrepancy across firms in the reporting of operating expenses, my aim is to have internally (within the firm) consistent measures of maintenance spending to calculate year-to-year changes.

[34]I have not collected the cost of property data for many railways prior to 1896.

[35]The exact end year is due to data availability issues for many railroads in 1899.

[36]I use this period as a pre-trend for net income because the uncertainty caused by the election may have weakened the economy in 1896, so there would likely be strong correlation between this pre-period change and firm yield changes on election news dates.

traded on the New York Stock Exchange. This is a very small subset of firms relative to the total economy, but their importance to the U.S. economy is large relative to their fraction of total firms. Based on Romer (1989)'s estimates of current-price GNP, the combined net income of the 81 railroads in my data set was approximately 1.7 percent of this figure.[37] Unfortunately, several data availability issues shrink this sample even more. First for the companies that underwent reorganizations at some point, they often have missing years of earnings and balance sheet data when ownership was transferred from the receivers to the new company.[38] Additionally, many companies only started separately listing their various operating expenses, which is what enables me to record maintenance spending after 1896. Some railroads also altered how they reported various figures including maintenance spending and the cost of their property, which makes it impossible to use these numbers to calculate yearly changes.

A final issue that constrains the samples used in the regressions is the presence of large idiosyncratic shocks to individual railway operations in either the base year or the post-election year. These were shocks in the truest sense of being unpredictable, as they often involved weather-related disasters or disease outbreaks. Due to the already small sample size, these outliers have a large combined effect on the regression analysis, so the reported results use samples excluding these railways with bad individual shocks. The Appendix reports a list of these companies dropped from the regressions and the reasons why these railways are excluded.

2.6 Results

2.6.1 Balance Sheet Variables

I begin by reporting the results for the firm investment outcomes as the theoretical connection between yield changes and investment is more direct. Tables 2.2-2.4 show the results for the

[37] A more intuitive comparison would their gross earnings to GNP, but I currently lack this data. Based on their fraction of total railroad net income, a rough guess would be that these 81 firms had combined earnings equal to 4.3 percent of 1896 GNP.

[38] These reorganized companies were also often combined with other failed companies, again limiting the ability to compare variables across time.

change in bonds outstanding, equity outstanding, and the cost of the railroad and equipment, with and without the controls. In no case is the average yield change on a firm's bonds negatively and statistically significantly related with the investment outcome variable. In some cases the coefficient on yield changes is positive, but not statistically significant. It would therefore appear that the return of capital (both from domestic and foreign sources) due to the resolution of gold standard uncertainty was not the impetus for increased railroad investment after 1896.

An examination of the coefficients on the control variables reveals some of the factors contributing to firms' balance sheet allocations in the latter half of the 1890s. At the center of these allotment decisions is the financial distress created by the Panic of 1893. This is directly evidenced by the significant and positive coefficient on the Panic reorganization dummy in the equity regression. Firms that defaulted on at least some of their bond interest during the Panic were deemed to have an unsustainable level of debt. Thus, firms in receivership exchanged some of their bonds for new issues of preferred equity, leading to an increase in equity outstanding after the Panic. The broader view that railroads had overextended themselves with debt prior to the Panic likely helps explain the negative and significant coefficient on pre-election bond growth in the bond regression.[39] Railroads that had previously issued a lot of debt were hesitant to sell new debt for fear of increasing the likelihood of going into default during the next economic slowdown. Lastly, there is some evidence that firms with larger debt burdens before the election saw smaller increases in the cost of their property after the election. This is suggested by the positive and significant coefficient on the net income to debt ratio in the cost change regression.

2.6.2 Operations Variables

Turning to railways' net income and maintenance spending, it would appear the election of 1896 played a greater role in affecting these variables afterwards. The results are presented in Table **??**. In both cases the coefficient on election event yield changes is negative and statistically significant

[39]For example, the *Commercial and Financial Chronicle* praised the Atchison, Topeka, and Santa Fe's issuance of equity to fund the purchase of smaller lines rather selling new debt. This railway was one of the defaulting firms during the Panic of 1893.

with and without the control variables. The significance of the maintenance spending results is driven by a single observation, the Philadelphia and Reading Railroad, as dropping it from the regression removes the statistical significance. The negative sign of the coefficients indicates railways with greater *decreases* in their yields on days with election news had greater increases in their net income *and* their maintenance spending. Given that net income is calculated by subtracting operating expenses (including maintenance spending) from gross earnings, these results suggest that railways with larger yield changes during the election had greater changes in overall earnings after.[40]

In the net income regression the coefficient on yield changes implies that a one standard deviation greater decrease in yields of around 15 basis points raises net income growth by approximately 4.5 percent, or 1/4 of its standard deviation and mean. For the sake of comparison, simply being reorganized during the Panic raised income growth after the election by around 10 percent and a standard deviation greater fall in income during the panic raised income growth after 1896 by 5.5 percent. Therefore, it would seem the election results were not the only or the dominant factor in determining income growth in 1897 and 1898, but they certainly contributed to the reduction in railroads' default risk.[41] In Section 7, I present suggestive evidence on why firms with greater yield changes saw larger net income changes after the election.

2.6.3 Robustness of Net Income Results

The only outcome variable significantly correlated with yield changes from election news so far is net income. The big threat to attributing this finding specifically to the election results is the possibility that election yield changes are correlated with some other shock occurring around the same time as the election. I have already argued that one challenge is the reorganization of several railroads in 1896. Although I control for this fact in my regression, I also re-estimate equation 2.1 without the reorganized railroads and report the results in Column (1) of Table 2.6. Again the

[40] I am currently working on gathering the the gross earnings data in order to formally test this hypothesis.

[41] Since net income is earnings after subtracting operating expenses but before subtracting interest payments, I equate an increase in net income as a reduction in default risk.

correlation on yields is negative, statistically significant and very close in magnitude to the original estimate.

A second potential confounder is the Alaskan gold rush that began affecting the contiguous U.S. in late 1897. In particular, the *Commercial and Financial Chronicle* suggests that the gold inflows raised business activity in Oregon and Washington. Some of the railways with the largest yield changes from election news also operated in these states. Again, I adopt the strategy of dropping these firms and re-estimating (2.1). These results are reported in Column (2) of Table 2.6. As before, the coefficient on yields remains largely unaffected.

Perhaps the largest threat to my identification strategy is the wheat crop boom that occurred in 1897 and 1898. In conjunction with bountiful wheat harvests, there was also a failure of European wheat crops raising overall demand and driving up wheat prices. Again, many of the firms with the largest yield changes also happened to be some of the crop-carrying lines in the west and mid-west of the United States. The *Commercial and Financial Chronicle* classified the major railroads by their geographic location and their main source of business. Using these categories, I drop the railroads designated "Central" and "Crop-Carrying" and re-estimate (2.1). Despite the loss of 20 observations, the coefficient on yield changes is still statistically significant and the correct sign as shown in Column (3) of Table 2.6.

I also conduct a placebo test to see if the agricultural boom and not the reduction of gold standard uncertainty drives the income change results. This test uses the 1891 wheat crop boom as the sample. Similar to in 1897 and 1898, the European wheat crop failed, sending demand for American wheat soaring. The main difference between these two episodes is that silver coinage risk and a possible dollar devaluation remained in issue in 1891 and 1892, but not in 1897 and 1898. I therefore take the firms whose fiscal year began in June 1891 (in order to maximize the effect of the crop boom on reported earnings) and plot their income growth in 1891-2 against their 1896 election news yield changes in Figure 2.5. I repeat this exercise for the same set of firms using their 1897-8 income growth instead in Figure 2.6. Here, the relationship between yield changes in income growth is negative, while in Figure 2.5 they are positive. It would therefore appear that the

exceptional wheat crop of 1897 and 1898 is not behind the correlation between election news yield changes and post-election income growth.

2.7 Qualitative Evidence

2.7.1 The Relationship Between Electoral Uncertainty and Net Income

In Section 3, I argued that railways' business would be impeded by the reduction of bank credit to small firms and individuals. Here, I present suggestive evidence for this mechanism. For a more complete accounting of the importance of the election of 1896 in determining bank behavior see Fulford and Schwartzman (2017); I draw from their findings as well as additional sources to see how it relates to the railways.

Using state-level national bank data compiled by Weber (2000), these authors show how bank leverage increased around the election.[42] Seeing which states saw the largest increases is informative for understanding why some railways saw large gains in their earnings and income. For example, Washington had the largest percentage increase in deposits over total bank assets, allowing banks to expand credit. The Northern Pacific was one of the railways with the largest net income growth. Its main line also terminated in Washington. Other states where national banks increased leverage after the election include Arizona, California, Louisiana, New Mexico, Oregon and Utah. Not surprisingly, many railroads with lines running through these states saw large income gains in the year after the election. These railways include the Atchison, Topeka, and Santa Fe (Arizona, California, New Mexico), the Oregon Improvement Company (Oregon and California), the Texas and Pacific (Louisiana), and the Rio Grande Western (Utah). In addition, three of the five railways listed saw below-median yield changes (i.e. more negative) on election news days.[43]

An examination of the national banks entering receivership between October 1895 and Oc-

[42]National banks were a subset of the commercial banking universe. Because they were regulated at the federal level their data is more accessible.

[43]A fourth, the Oregon Improvement, would have been below the median except for one outlier bond yield change.

tober 1896 lends more evidence to the importance of bank credit for railway earnings.[44] Montana had one national bank enter receivership during this time period; its liabilities equaled about 15 percent of remaining Montana banks' total deposits. Washington had four national banks placed in the hands of receivers with around 4 percent of surviving Washington bank deposits.[45] This again points to the importance of bank credit in helping generating business for the railroads, as the main line of the Northern Pacific ran through these two states. Similarly, Louisiana had a proportionally large national bank enter receivership in 1896, and two of the largest income gains in the year after were in the Missouri Pacific and Texas and Pacific, important railways running through Louisiana.

It would be difficult to quantitatively study the relationship between bank credit growth and railway income for a variety of reasons. A brief look at the raw data, however, points to the importance of bank credit provision around the time of election in affecting overall economic activity. This is seen in the fact that many of the railroads with the largest gains in net income operated in states with the largest increase in bank deposits after the election. In addition, some of these states also saw the failure of relatively large national banks in the year prior to the election, which would have reduced credit access.[46]

2.7.2 Uses of Additional Income Post-Election

Having demonstrated a relatively robust relationship between yield changes and income growth after the election of 1896, it remains to be seen what the railways did with their additional earnings. The regression results suggest that these same companies with large income gains as a result of the election results did not invest more after. To see this visually, Figure 2.7 plots 1896-1900 cost of property growth against post-election year income changes. Five observations in particular stand out for having net income growth over 50 percent but which expanded their property by less than

[44]These are the reporting dates used in the annual report of the Comptroller of the Currency.

[45]These were two of the fifteen states with national banks entering receivership between during this time period.

[46]It is also possible that the revitalization of the railroads helped bank credit growth after the 1896 election. For evidence on this during the Panic of 1873 see Cotter (2015). The pitfall of this argument in the context of 1896 is finding a separate shock that would affect railroad earnings growth that has not been controlled for or addressed in the robustness checks.

10 percent. Below I discuss how these five companies used their additional earnings after 1896.

The stories of these five railways after 1896 provide useful evidence on the borrowing limits the railroads faced during this time period. One company, the Fort Worth and Denver City, still operated at a net loss in 1898 despite a large expansion in net income in percentage terms. By 1900, the company only turned a very small profit, with the additional income insufficient to finance further interest payments on new debt. Given these facts, it is unlikely that the company would have been able to issue new bonds or equity except at very low prices.

Two of the companies used the additional income they accrued to eventually resume dividend payments or interest on income bonds.[47] By 1901, the Missouri Pacific had saved enough of their earnings to pay out dividends on its stock for the first time in 10 years.[48] Similarly, the St. Louis Southwestern earned enough to pay interest on its 2nd mortgage income bonds. This was the first time since these bonds had been issued in 1890 that interest was paid.

For two other companies, their ownership structure limited their ability to invest after the election. Upon its reorganization, the Northern Pacific gave its existing preferred stockholders the right to block new debt and preferred stock issues without majority approval. Given that the company had defaulted on its debt obligations in 1893 and hadn't paid dividends for some time, it is easy to see why preferred stockholders would potentially be wary of issuing new debt that would initially lower their expected dividends. The Oregon Railroad and Navigation faced a different set of circumstances. A majority of the stock of this company was held by the Union Pacific. The Union Pacific used the dividends of the Oregon Railroad and Navigation as an additional source of income, so was unlikely to give this up (at least temporarily) to finance new construction.

[47] Income bonds were much like a preferred stock in that the interest was promised only if the company had earned enough to pay it out. Unlike equity, income bonds had a defined maturity and principal though.

[48] Or since the Sherman Act had been implemented and heightened fears that the gold standard would be abandoned.

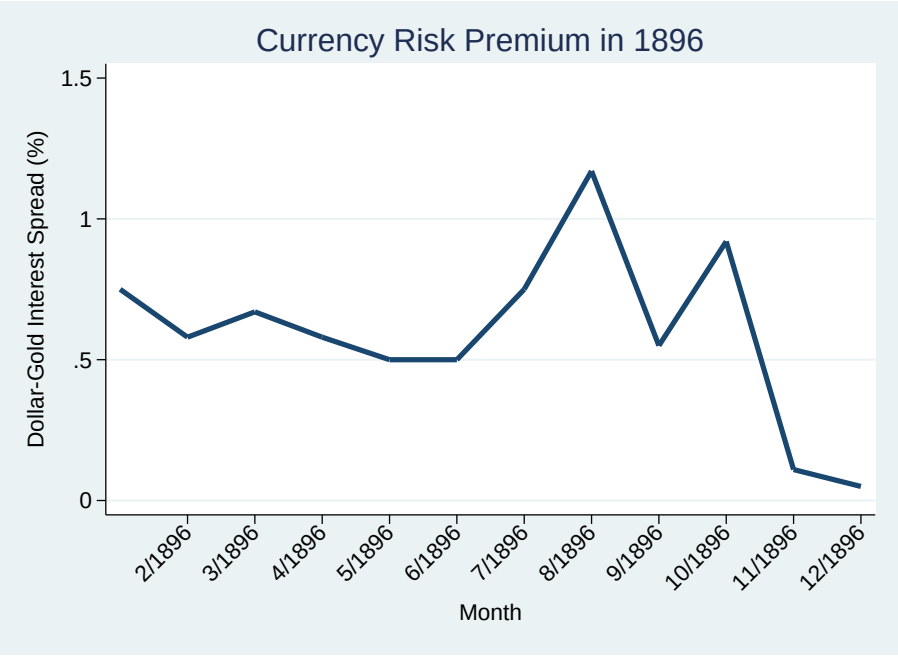
2.8 Conclusion

I present new evidence that the results of the 1896 presidential election raised economic activity in the years afterward. In particular, I show that railroads with greater decreases in their bond yields on election news dates saw greater increases in their net income in the year after the election. On the other hand, there appears to be no relationship between election-related bond yield changes and railroad investment after the election. I argue and present suggestive evidence that the uncertainty related to the election and the gold standard reduced bank credit, and railroads with the biggest earnings growth after 1896 operated primarily in areas with greater changes in bank activity due to the election. Finally, I present several reasons why the railroads with the largest income changes did not also invest more after the election.

Overall, these findings indirectly point to the importance of financial intermediaries in propagating policy uncertainty. This complements recent research by Bordo et al. (2016), who show that bank credit responds negatively to increases in economic policy uncertainty using a VAR framework. The role of the Panic of 1893 in inhibiting new debt issuance after the 1896 election also demonstrates how financial frictions and financial crises can mitigate the positive effects of reductions in uncertainty. This is a corollary to the finding of Alfaro et al. (2016) that increases in uncertainty cause more damage when the economy faces financial frictions. Finally, many of the theoretical models studying the effects of uncertainty rely on mechanisms related to adjustment costs and investment irreversibility as well as access to direct (un-intermediated) finance. My results instead point to future work studying uncertainty in models with financial intermediation.

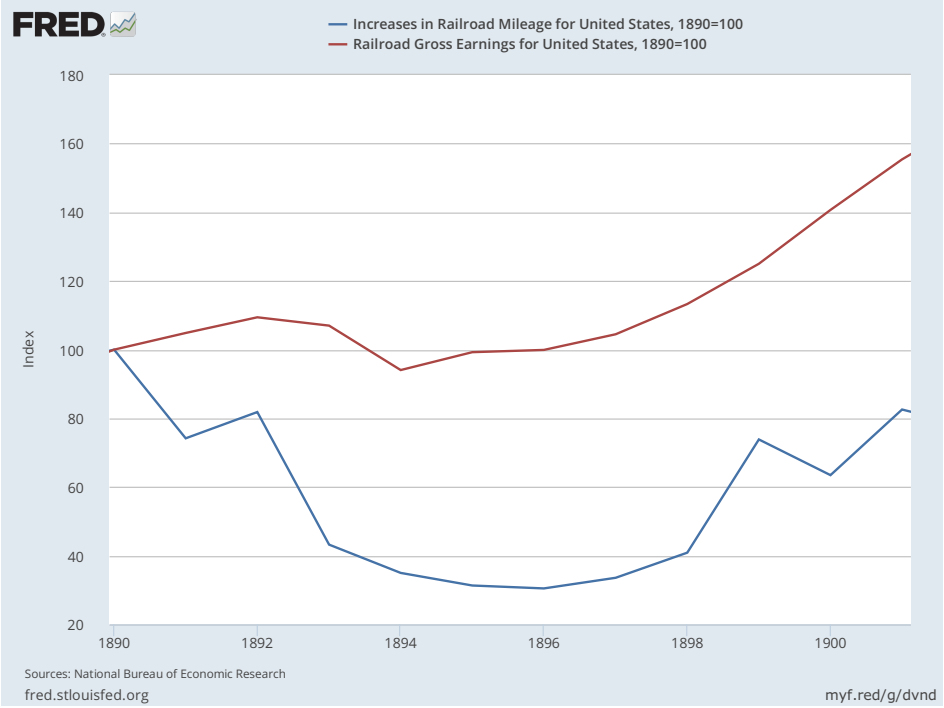
2.9 Figures and Tables

Figure 2.1:



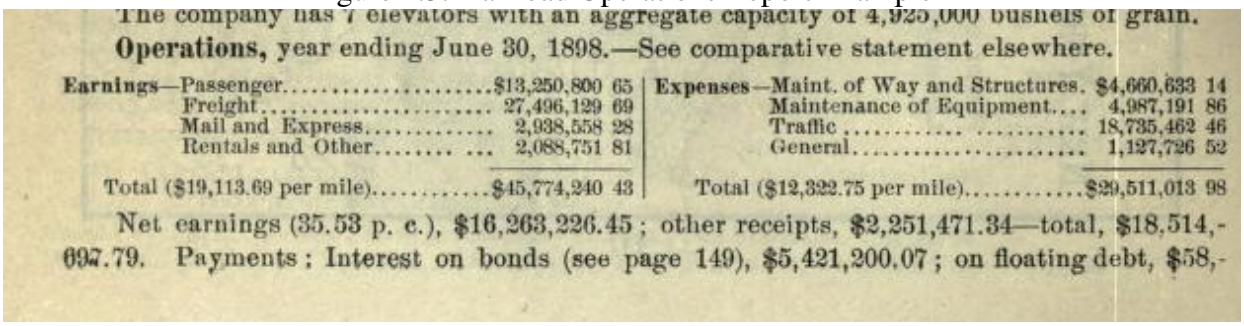
Data from Weiss (2016).

Figure 2.2:



Data from NBER Macrohistory Database available through FRED.

Figure 2.3: Railroad Operations Report Example



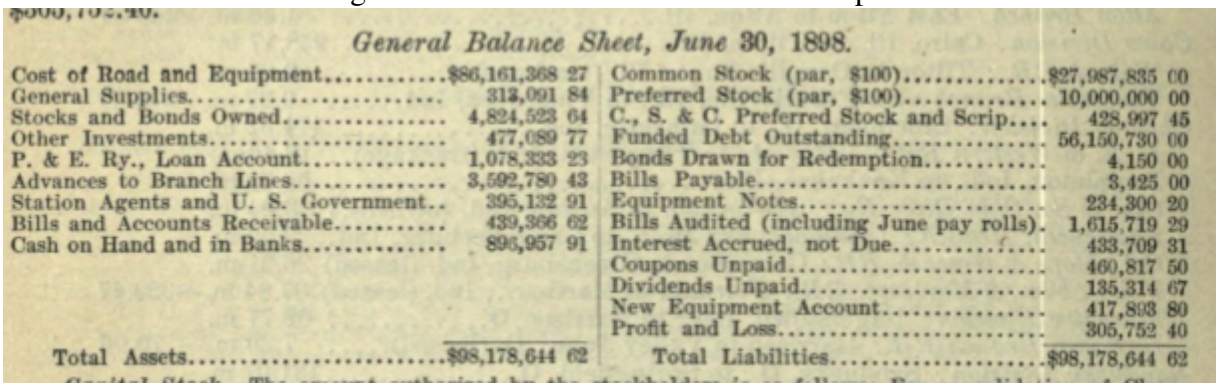
The company has 7 elevators with an aggregate capacity of 4,925,000 bushels of grain.

Operations, year ending June 30, 1898.—See comparative statement elsewhere.

Earnings—Passenger	$13,250,800 65	**Expenses**—Maint. of Way and Structures	$4,660,633 14
Freight	27,496,129 69	Maintenance of Equipment	4,987,191 86
Mail and Express	2,938,558 28	Traffic	18,735,462 46
Rentals and Other	2,088,751 81	General	1,127,726 52
Total ($19,113.69 per mile)	$45,774,240 43	Total ($12,322.75 per mile)	$29,511,013 98

Net earnings (35.53 p. c.), $16,263,226.45; other receipts, $2,251,471.34—total, $18,514,-697.79. Payments: Interest on bonds (see page 149), $5,421,200.07; on floating debt, $58,-

Figure 2.4: Railroad Balance Sheet Example



General Balance Sheet, June 30, 1898.

Cost of Road and Equipment	$86,161,368 27	Common Stock (par, $100)	$27,987,835 00
General Supplies	313,091 84	Preferred Stock (par, $100)	10,000,000 00
Stocks and Bonds Owned	4,824,523 64	C., S. & C. Preferred Stock and Scrip	428,997 45
Other Investments	477,089 77	Funded Debt Outstanding	56,150,730 00
P. & E. Ry., Loan Account	1,078,333 23	Bonds Drawn for Redemption	4,150 00
Advances to Branch Lines	3,592,780 43	Bills Payable	3,425 00
Station Agents and U. S. Government	395,132 91	Equipment Notes	234,300 20
Bills and Accounts Receivable	439,366 62	Bills Audited (including June pay rolls)	1,615,719 29
Cash on Hand and in Banks	896,957 91	Interest Accrued, not Due	433,709 31
		Coupons Unpaid	460,817 50
		Dividends Unpaid	135,314 67
		New Equipment Account	417,893 80
		Profit and Loss	305,752 40
Total Assets	$98,178,644 62	Total Liabilities	$98,178,644 62

Figure 2.5:

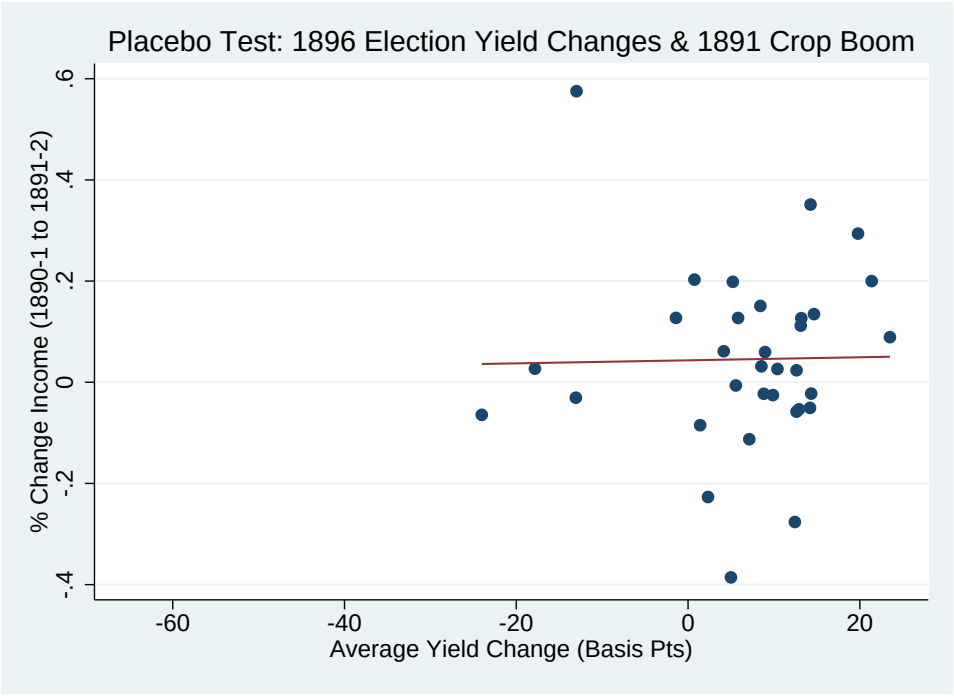


Figure 2.6:

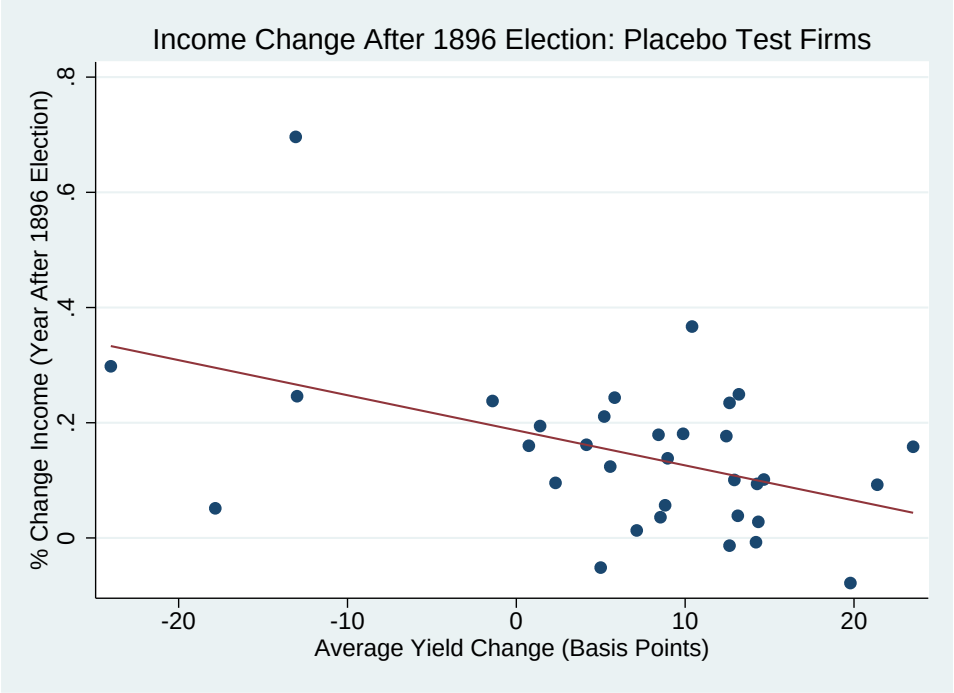


Figure 2.7:

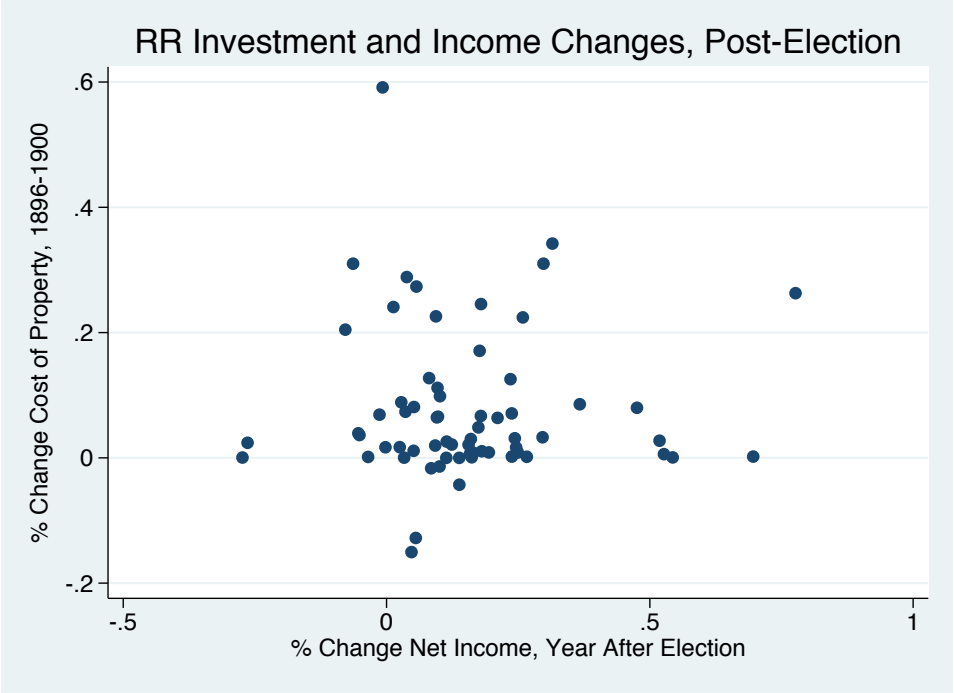


Table 2.1: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Income Change (%)	70	14.408	18.477	-38.159	69.628
Maintenance Spending Change (%)	66	11.049	21.998	-54.211	114.187
Bonds Outstanding Change (%)	75	17.325	81.820	-224.822	594.767
Stock Outstanding Change (%)	74	13.028	34.594	-72.757	179.176
Cost of RR Change (%)	73	7.994	12.964	-16.202	59.143
Election Event Yield Change (Basis Pts)	81	6.167	15.099	-67.337	52.226
Panic of 1893 Income Change (%)	76	-19.627	40.493	-151.311	148.021
Panic of 1893 Reorganization	81	0.210	0.410	0	1
Pre-Election Net Income to Debt (%)	81	6.952	3.803	1.270	22.600
Pre-Election Bond Change (%)	71	14.423	45.838	-164.706	270.682
Pre-Election Stock Change (%)	70	10.965	31.055	-58.445	150.408
Pre-Election Bond Yield (%)	81	6.633	3.538	3.853	22.648
Tobin's q	62	0.650	0.605	0.025	3.2

Table 2.2: Election Event Yield Changes and 1896-1900 Bond Growth

	(1)	(2)	(3)
Yield Change	1.422	0.685	0.786
	(0.939)	(0.868)	(1.120)
1891-96 Change		-0.479^{**}	-0.251
		(0.237)	(0.337)
Income-to-Debt		8.063	12.060
		(8.919)	(12.526)
Panic Reorganization		2.710	4.422
		(16.424)	(15.940)
Average Yield		-2.118	-1.752
		(4.220)	(5.099)
Tobin's q			-2.943
			(2.474)
N	68	63	50

Notes: Dependent variable is $100 * (\ln(BondsOutstanding_{1900}) - \ln(BondsOutstanding_{1896}))$. All regressions include a constant. Heteroskedastic-robust standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2.3: Election Event Yield Changes and 1896-1900 Stock Growth

	(1)	(2)	(3)
Yield Change	-0.233	-0.256	-0.024
	(0.447)	(0.291)	(0.352)
1891-96 Change		-0.129	-0.220
		(0.164)	(0.189)
Income-to-Debt		4.509	6.379
		(2.770)	(4.005)
Panic Reorganization		30.387^{**}	33.307^{**}
		(11.740)	(13.180)
Tobin's q			-10.925
			(9.466)
N	67	62	49

Notes: Dependent variable is $100 * (\ln(StocksOutstanding_{1900}) - \ln(StocksOutstanding_{1896}))$. All regressions include a constant. Heteroskedastic-robust standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2.4: Election Event Yield Changes and 1896-1900 Property Cost Growth

	(1)	(2)	(3)
Yield Change	-0.052	0.051	0.070
	(0.137)	(0.155)	(0.198)
Income-to-Debt		1.057^{***}	0.833
		(0.323)	(0.570)
Panic Reorganization		2.54	2.354
		(4.478)	(5.563)
Average Yield		1.182	1.159
		(0.827)	(0.945)
Tobin's q			-0.067
			(1.683)
N	64	64	51

Notes: Dependent variable is $100 * (\ln(RRCost_{1900}) - \ln(RRCost_{1896}))$. All regressions include a constant. Heteroskedastic-robust standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2.5: Election Event Yield Changes and Year-After Growth

	Net Income	Net Income	Maintenance	Maintenance	Maintenance (No Phil & Reading)
Yield Change	-0.450^{***}	-0.301^{***}	-0.154^{**}	-0.191^{**}	-0.156
	(0.153)	(0.093)	(0.071)	(0.087)	(0.127)
Panic Inc Change		-0.203^{***}		-0.075^{**}	-0.082^{**}
		(0.066)		(0.033)	(0.036)
Debt Burden				0.491	0.446
				(0.470)	(0.506)
Panic Reorg		10.282^{**}		-0.687	-1.181
		(4.312)		(3.910)	(4.137)
N	63	59	60	56	55

Notes: Dependent variable is the log-change in net income or maintenance spending multiplied by 100 for the first full reporting year after the election of 1896. The last column excludes the Philadelphia and Reading Railroad from the regression. All regressions include a constant. Heteroskedastic-robust standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2.6: Net Income Robustness Checks

	(1)	(2)	(3)
Yield Change	-0.301^{**}	-0.288^{***}	-0.324^{***}
	(0.136)	(0.084)	(0.095)
Panic Inc Change	-0.113	-0.174^{***}	-0.239^{***}
	(0.082)	(0.064)	(0.083)
Panic Reorganization		8.096^{*}	4.891
		(4.410)	(4.682)
N	48	57	39

Notes: Dependent variable is log-change in net income multiplied by 100 for first full reporting year after the election of 1896. Column (1) drops railways reorganized during the Panic of 1893. Column (2) excludes railways in the Pacific Northwest. Column (3) drops all "central" and "crop-carrying" railroads from the regression. All regressions include a constant. Heteroskedastic-robust standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

2.10 Appendix

Table B.1: Omitted Railroads

Railway	Excluded Regressions	Reason
St. Louis Southwestern	Income, Maintenance, Bond, Stock, Cost	Large yield change in opposite direction skews average yield variable (weekly change for bond is in correct direction).
Colorado Midland	Income, Maintenance	Massive increase in operating expenses to build new rolling stock in 1896 to facilitate sale of company (in receivership).
Union Pacific, Denver, Gulf	Maintenance, Bond, Stock, Cost	Property damage from floods raises maintenance spending in pre-election observation. As part of reorganization, company joined with smaller companies, increasing post-election balance sheet.
Pittsburgh, Shenango, Lake Erie	Maintenance, Bond, Stock, Cost	Merged with several other companies to form much larger company.
Philadelphia & Reading	Bond, Stock, Cost	Reorganization plan creates several new companies. Difficult to disentangle pre and post-reorganization changes.
Chicago & Northern Pacific	Income	Merged with other lines to create larger company during reorganization.
Ohio Southern	Income	Rate war drives down post-election earnings.
Wabash	Income	Coal miners strike after election lowers net income by at least $350,000.
San Antonio & Aransas Pass	Income	Strongly affected by yellow fever quarantine in Louisiana.
Duluth & Iron Range	Maintenance	Large increase in construction expenditure (outlier).
Columbus, Hocking Valley, Toledo	Cost of RR	Reorganized in 1898-9, there is ambiguity in how certain values are reported on the balance sheet across regimes.
Lehigh Valley	Cost of RR	Audit in 1897 causes revaluation of cost of property independent of any investment.
New York, Suquehanna, Western	Cost of RR	Change in how property values are reported after 1896.

Listed railroads are dropped from regressions for reasons other than missing observations. Some railroads listed for one outcome variable in this table may have missing values for other outcome variables.

Chapter 3

Monetary Regime Uncertainty and the News: Evidence from U.S. Silver Coinage Reporting, 1878-1897

3.1 Introduction

The gold value of the dollar was perhaps the most dominant political and economic issue in the U.S. in the last two decades of the 19th century. Economists have sought to understand the debate over whether to keep the dollar backed solely by gold or to also have it convertible into silver for a variety of purposes. Poole and Rosenthal (1993) examine whether the gold-silver debate realigned Congressional voting patterns from the pre-existing pattern. Others, such as Frieden (1997) and Gramm and Gramm (2004), study the reasons why individuals advocated for silver coinage in the U.S.[1] Despite this scholarly attention towards the politics and economic motivations for silver coinage, little is known about how the media covered this issue during the 1880s and 1890s. Recent work highlighting the role of the media in affecting voting outcomes (Dellavigna and Kaplan, 2007; Chiang and Knight, 2011) and economic expectation formation (Carroll 2003; Doms and Morin, 2004) demonstrates the importance of studying media behavior during the era of the gold standard and silver coinage.

In this paper, I examine how media bias in covering silver coinage and the gold standard responded to monetary conditions using a panel of seven major newspapers. I collect a new series of monthly counts for articles containing biased phrases related to silver and gold coinage between 1878 and 1897 to perform this analysis. The newspaper panel consists of two papers which explicitly supported the gold standard, three favoring unlimited silver coinage, and two without clearly-defined positions. The search terms used to construct the article count include both pro-silver and pro-gold phrases and the phrases are chosen based on the historical narrative. I then explore how the article counts correlate with three measures of the stance of monetary policy. In particular, I focus on proxies indicating the credibility of the gold standard and the demand for silver coinage.

I study the relationship between monetary outcomes and usage of biased phrases based on several documented empirical patterns. First, Carroll (2003) shows that the number of articles

[1] Additionally, a vast literature has studied the economic consequences of silver coinage and the uncertainty over the gold standard in the U.S. See Weiss (2016) for a summary of this literature.

discussing inflation in the *New York Times* and *Washington Post* fell during the 1980s and 1990s as inflation also declined. Binder (2014) describes a similar drop in front-page articles in the *New York Times* discussing inflation, deflation, or the Federal Reserve from the Volcker disinflation to the final years of the Great Moderation.[2] Finally, Larcinese et al. (2011) find that the partisanship of newspapers is an important determinant of the intensity of coverage for economic news depending on the party of the incumbent President.

I show that a weakening of gold standard credibility–proxied by a fall in the Treasury's gold reserves–corresponds to an increase in the number of articles containing phrases favoring either the gold standard or silver coinage. Additionally, as the demand for silver coinage likely increased–which I capture as a fall in the price of agricultural goods–biased articles discussing gold and silver also rose.[3] The magnitude of the correlation is sizable, as well as a standard deviation fall in one of the monetary proxies typically predicts a 0.5-0.75 standard deviation increase in biased-phrase articles.[4] These relationships remain when I use only articles that are not classified as editorials and when I use smoothed versions of the monetary conditions. Not only do worse economic conditions correspond to more economic reporting, but, in this setting at least, they come with an increase in slanted reporting.

I further explore how newspapers slanted their reporting on the gold standard and silver coinage by examining the content of the articles using biased language to describe gold and silver. I find articles discussing gold and silver in a charged manner tend to focus on the electoral process. On average, between one-third and one-half of articles using one of the biased search terms also contained either the word "election" or "convention." The original set of article counts and the series of counts also containing "election" or "convention" tend to be strongly positively correlated; in some cases their contemporaneous correlation is nearly one. Interestingly, Larcinese et al. (2011) find no evidence of partisanship in inflation coverage between 1996 and 2005. My

[2]The Great Moderation is generally classified as a period of unusual macroeconomic stability lasting from 1985 to 2007.

[3]A common explanation given for the support for a switch from gold to silver coinage was the secular decline in agricultural prices during the 1880s and 1890s. See Frieden (1997) for further discussion.

[4]The effect varies slightly across newspapers and search terms.

results suggest that this may be because monetary policy is removed from the electoral process due to the independence of the Federal Reserve.

I contribute to several additional strands of the economic literature studying the role of the media beyond the above-cited papers focusing on economic reporting.[5] Several papers have examined media bias and its affect on voting behavior, as well as why newspapers choose to adopt a partisan bias.[6] I add to this literature by documenting the importance of the electoral process in driving newspaper slant. In addition, several papers have studied how the media reported on a variety of political issues during the late 19th and early 20th centuries, but none have looked at the topic of silver coinage.[7]

I organize the paper into five additional sections. Section 2 provides the historical background for the era I study. Section 3 presents the econometric framework, while Section 4 describes the main data used. In Section 5, I present and discuss my main regression results, as well as several robustness checks and suggestive evidence. Section 6 concludes the paper.

3.2 The Free Silver Movement and the Gold Standard

The U.S. had a bimetallic monetary system–where paper currency could be exchanged for fixed amounts of gold or silver–up until the Civil War (1861-1865). During the Civil War (1861-1865), the federal government suspended convertibility in an effort to aid war funding and investors and financiers believed this suspension to be temporary (Calomiris, 1993). The Coinage Act of 1873 returned the U.S. to the gold standard at the historical exchange rate of $20.67 per ounce of gold, but made no mention of convertibility to silver. The Resumption Act of 1875, which set the return

[5]Other papers studying economic reporting, specifically monetary news, include Doms and Morin (2004) and Berger et al. (2011).

[6]Dellavigna and Kaplan (2007), Chiang and Knight (2011), and Gentzkow et al. (2011) study the media's effect on voting outcomes. Gentzkow and Shapiro (2010) explore what drives media bias.

[7]These papers include Gentzkow et al. (2006), who study how partisan influence waned in the reporting of corruption scandals, Dyck et al. (2013), who examine how magazine readership in congressional districts affected voting on corporate scandal investigations, and Costa and Kahn (2017), who study how the media covered typhoid fever as deaths from typhoid fell due to urban health improvements. Rockoff (1990) explains how the *Wonderful Wizard of Oz* is an allegory for the Free Silver debate, but his paper is not a systematic or quantitative study of the media and the gold standard.

date to the gold standard, also ignored silver coinage. Falling prices in preparation for a return to the gold standard, particularly relative prices for agricultural and mining goods, led farmers and miners to retroactively dub the Coinage Act the "Crime of '73."

To atone for this crime, farmers and miners pushed for a return to bimetallism, with unlimited coinage of silver and gold at the historical mint ratio of 16 ounces of silver per ounce of gold.[8]. This coalition hoped that the higher money supply induced by the coinage of silver would raise the price level and reduce their real debt burden. Miners also hoped the increased demand for silver would allow them to receive a better price for the metal. Finally, the most controversial feature of the proposed bimetallism was the 16:1 mint ratio of silver to gold. Between 1878 and 1897, the ratio based on the market prices of silver and gold was usually between 24:1 and 30:1, meaning silver would be overvalued at the mint and gold would be undervalued under bimetallism. This would make it profitable to sell silver to the Treasury in exchange for gold, exhausting the Treasury's gold reserves, forcing an end to the gold standard and depreciating the dollar. This depreciation of the dollar would have greatly benefited both agricultural and mining interests at the time (Frieden, 1997).

The end to the gold standard was staunchly opposed by industrial and financial interests. These interests believed that maintaining a gold standard permitted better access to global markets, particularly for financial capital.[9] An end to gold convertibility would remove vital sources of investment funds. Railroad companies would be particularly hard hit by the devaluation induced by Free Silver bimetallism, as most of their debts were denominated in gold rather than dollars. The financial press at the time believed that the increase in the railroads' debt burden would spell ruin for the economy.[10]

Given the strong economic interests for each side of the issue, it should perhaps come as no surprise that neither side was able to attain victory until November, 1893. In 1878, Congress passed

[8]The support of unlimited silver coinage became known as the "Free Silver Movement"

[9]Indeed, Friedman and Schwartz (1963) note that foreign holdings of U.S. assets declined sharply as uncertainty about the gold standard increased.

[10]The *Wall Street Journal* ran an article in 1896 suggesting that a switch to silver coupled with a slight increase in wages would wipe out railroads' profits. They also frequently quoted railroad executives suggesting that silver coinage would bring about the bankruptcy of all companies.

the Bland-Allison Act, which required $2-4 million of silver coined each month, over President Hayes' veto. This law was immediately unpopular with both sides and repeal attempts began in 1879. The amount of monthly silver coinage was increased, but still limited, by the passage of the Sherman Silver Purchase Act in July, 1890. Again, there were several attempts in 1891 and 1892 to both end silver coinage and to switch to unlimited silver coinage, with neither side able to achieve their goal.

The political deadlock that had prevailed for over a decade ended after the Panic of 1893. After the financial markets collapsed in May of 1893, President Grover Cleveland called an emergency session of Congress for August of that year with the intention of repealing the silver purchase clause in the Sherman Act, which was seen as responsible for the crisis. The repeal was finalized in November, effectively ending silver coinage in the U.S. Free Silver legislators again pushed for silver coinage despite the repeal, as prices for farm goods remained low, but were overruled in Congress and by President Cleveland.[11]. Table 3.1 lists all the months during which there was a vote on a silver coinage provision after the passage of the Bland-Allison Act and demonstrates the long-running nature of this issue.

Although additional silver coinage ended with the repeal of the Sherman Act in 1893, official gold reserves at the Treasury remained low in the following years.[12] To replenish reserves, several issues of government bonds were sold to the public in exchange for gold during this time. A controversial private sale of bonds to a J.P. Morgan-led syndicate in February 1895 provoked outrage from opponents of the gold standard. Critics particularly disliked the resale of the bonds from the syndicate to the general public for a substantial profit to the syndicate (Garbade 2012). This action served to reinforce their belief that the gold standard was forced upon the American people by Wall Street financiers.

The presidential campaigns in 1896 made the gold standard the primary issue, as continued economic weakness in particular fueled Free Silver advocates. At their party convention, the Republicans adopted an explicit plank supporting the gold standard, while the Free Silver advocates

[11]Figure 3.1 plots the price level for agricultural goods during this time period
[12]See Figure 3.1.

were able to nominate their preferred candidate, William Jennings Bryan, as the Democratic Candidate. Bryan was soundly defeated in a sharp rebuke of silver policies, and the U.S. explicitly adopted a monometallic gold standard in 1900, with little silver agitation after the 1896 election.

3.3 Econometric Framework

The main quantitative analysis of this paper seeks to determine whether newspapers increased their usage of biased phrases as uncertainty about the gold standard and demand for "Free Silver" increased. Additionally, I look for differential responses across newspapers with different editorial slants. For instance, did newspapers that favored the gold standard increase their usage of pro-gold phrases by more in response to increased gold standard uncertainty than did pro-silver newspapers? To address these issues, I estimate models of the monthly count of pro-gold or pro-silver articles based on the level of uncertainty about the ability of the U.S. to remain on the gold standard and the political pressure for silver coinage.

Since the dependent variables here are count variables, ordinary least squares (OLS) is an inappropriate regression technique to use. Instead, count data are typically analyzed using Poisson or negative binomial regression. I use a zero-inflated negative binomial model to account for over-dispersion and excess zeros in the monthly article counts. The zero-inflated model adds a second binary process to the negative binomial distribution. Following Costa and Kahn (2015), assume that the observed article count for search term i in month j, c_{ij} can be written thusly:

$$c_{ij} = z_{ij} c^*_{ij}$$

Here z_{ij} is an indicator value that can be modeled with either a logit or probit specification, and c^*_{ij} is an unobserved variable with a negative binomial distribution. The probability of zero articles in month j can then be written:

$$Pr(c_{ij} = 0) = Pr(z_{ij} = 0) + Pr(z_{ij} = 1) * Pr(c^*_{ij} = 0) = p_{ij} + (1 - p_{ij}) g(0)$$

where p_{ij} is the probability that z_{ij} is zero and $g(\cdot)$ is the negative binomial distribution. Conversely, for any strictly positive article count m, the probability of a monthly article count m is:

$$Pr(c_{ij} = m) = (1 - p_{ij})g(m)$$

I predict an excess zero using two variables: the number of months since a vote on a silver coinage provision in either house of Congress and the number of months until a national (presidential) election. If there was not a specific bill related to silver coinage being discussed or an imminent election, newspapers may have had little motivation to run articles related to silver coinage and the gold standard.

The negative binomial portion of the model is specified in the following way for every search term:

$$Pr(c_i = m) = F(\mu_i + MONETARY'\boldsymbol{\beta}_i + \delta_i COUNT) + \varepsilon_{ij}$$

$MONETARY$ is a vector of proxies for nominal state of the economy, in particular uncertainty about the future of the gold standard, and $COUNT$ is the total number of articles each month in the newspapers. The main coefficients of interest are thus the $\boldsymbol{\beta}_i$'s. I discuss the monetary proxies used in the next section. For now it suffices to note that lower values of the proxies imply higher gold standard uncertainty and silver agitation, so if biased reporting increases with higher uncertainty, the $\boldsymbol{\beta}_i$'s will be *negative.*

For each search term, I estimate three regressions: one for a set of pro-gold standard newspapers, one for Free Silver-supporting newspapers, and one for newspapers with no obvious bias. All regression equations are estimated using maximum likelihood methods. I cluster standard errors at the newspaper-year level. The dispersion coefficient α, is also reported in the results to show the necessity of the negative binomial specification. An estimated value of α that is statistically significant from zero suggests that the data are over-dispersed. Finally, I report the Vuong test

statistics for each regression in a separate table.[13] A positive, significant Vuong statistic shows that the zero-inflated model is preferred to a simple negative binomial distribution.

3.4 Data

I first construct a dataset of monthly article counts for search terms of politically-charged phrases related to silver coinage between June, 1878 and December, 1897 to measure the effect of gold standard uncertainty on the reporting of the coinage issue. I obtain these counts for seven newspapers: *New York Times*, *Chicago Daily Tribune*, *San Francisco Chronicle*, *Washington Post*, *St. Louis Post-Dispatch*, *Atlanta Constitution*, *Cincinnati Enquirer*.[14] These were all widely-circulated newspapers in print over the entirety of the time period studied.[15]

An additional source of variation of newspapers is their intended audience and the editorial stance of the newspaper. The geographical variation stretches a newspaper in a gold-mining center (San Francisco), the rural south (Atlanta), to cities with large financial exchanges (New York and Chicago). Most of these newspapers also explicitly supported one side of the coinage debate in their editorials and also in their advertisements. Figures 3.2 and 3.3 display advertisements for weekly versions of the *Enquirer* and the *Post-Dispatch* in other newspapers that promote their support of Free Silver.[16] Only the *San Francisco Chronicle* and *Washington Post* had no strong, well-documented stance on the gold standard. In addition to the *Post-Dispatch* and the *Enquirer*, the *Atlanta Constitution* was also ardently pro-Silver. The *New York Times* and *Chicago Tribune* conversely supported the gold standard.

Having identified the newspapers to be used in the study, I next determine the phrases to search. I settle on four terms: two that display a preference for the gold standard, and two that

[13]The test statistic is constructed from regressions that do not use clustered standard errors.

[14]I am in the process of collecting these counts for the *New York Herald* which had a different political affiliation from the *New York Times*.

[15]According to the dataset compiled in Gentzkow et al. (2011), these seven newspapers were all in the top fifth percentile for circulation in 1880 and 1890.

[16]These weekly editions were aimed at readers working in the agricultural sector, who were perceived to be too busy to read a newspaper daily.

show affinity for silver coinage. The pro-gold terms were "honest money" (in reference to a gold standard) and "cheap money" (alluding to the abundance of coin present under free silver coinage). The two biased expressions for silver I searched were "goldbug" and the combined phrases "wall street" and "gold standard."[17] All of these terms are readily found in editorials of the time either deploring or advocating silver coinage. In fact, opponents of the Free Silver movement coalesced into the "Honest Money League" to stop the eastward spread of "silver fever" amongst Democrats during 1895 and 1896 (Dunnell 1896).

Table 3.2 presents summary statistics for the article counts by newspaper and search term. There is substantial variation in the mean monthly count across all newspapers, and the variations correspond nicely with the editorial stances of the newspapers. The *Atlanta Constitution*, *St. Louis Post-Dispatch*, and *Cincinnati Enquirer* all tend to use pro-silver phrases more than the other newspapers. Conversely, the *New York Times* and *Chicago Tribune* both have much higher usages of the pro-gold terms. This provides further evidence that the phrases I searched accurately reflect the bias I have assigned them. Also worth noting is that, in almost all cases, the monthly standard deviation of the article count is much greater than the monthly average, suggesting the necessity of using the negative binomial model in the regressions. Finally, there are large number of zeros in nearly every case. Figure **??** presents a histogram of the "goldbug" article counts for the pro-silver newspapers as a representative case. It is readily apparent that the number of zero-article months dwarfs all other counts.

I seek to quantify the relationship between reporting and monetary conditions, especially the commitment of the U.S. to the gold standard. I choose three measures that focus on uncertainty surrounding the gold standard. The first variable is net gold held at the U.S. Treasury. This is the Treasury's gold reserves; as noted in Section 2, the Treasury needed adequate gold reserves to remain on the gold standard. As gold reserves dropped close to–and, in some months, fell below–the $100 million minimum, uncertainty about the ability of the U.S. to continue gold convertibility should have increased. Additionally, reserves likely fell as individuals "ran" on gold in the belief

[17]The usage of wall street and gold standard in the same article shows slant because Free Silver supporters viewed the gold standard as a means for the financial sector to profit at the expense of everyone else.

that the gold standard would be abandoned The gold reserve data are taken from the 1897 *Annual Report of the Secretary of the Treasury on the State of the Finances*.

The second monetary condition attempts to capture the demand for silver coinage. The measure I use is the Warren-Pearson price index for farm goods. According to Frieden (1997), the main reason for farmers' support of silver coinage was the higher relative prices of traded agricultural products that would result from the depreciation under a silver standard.[18] Thus, declines in the price of farm goods while on the gold standard should create more political pressure for silver coinage. As political pressure for silver increased, newspapers may have increased the number of articles discussing monetary policy.

The last variable assessing monetary uncertainty is a monthly index of all U.S. stock prices. This index comes from the Cowles Commission report and was accessed via the NBER Macrohistory database. Although stocks are a real asset, there are numerous studies showing that asset prices declined as silver coinage became more likely.[19] Therefore, an increased likelihood of silver coinage should be reflected in lower stock prices.

One measure of monetary uncertainty that I do not include in the reported regressions is the currency risk premium constructed in Calomiris (1993) and expanded in Weiss (2016). The currency risk premium is the interest rate differential between a dollar-denominated short-term asset and a gold-denominated asset of the same maturity. This interest spread should reflect the expected depreciation of the dollar against gold as well as a premium for bearing currency risk. When I estimate the models using only the currency risk premium and the total number of articles as regressors the currency risk premium is often statistically significant, but as the other monetary variables are added in it loses its significance, so I do not include it in the final regressions.

The final data collected are total monthly article counts for each of the newspapers in my panel, Table 3.3 provides summary statistics for all of these independent variables.

[18] An alternative story of political support for silver coinage is that the increase in the money supply would raise the overall price level and lower the debt burden for farmers. When I re-run the regressions using an index of the general price level, I get very similar results, as the two price indices are almost perfectly correlated.

[19] Weiss (2016), Hallwood et al. (2000), and Mitchener and Weidenmier (2015) are examples of this literature.

3.5 Results and Discussion

3.5.1 Main Specifications: Uncertainty and Reporting

Tables 3.4-3.6 show that an increase in monetary uncertainty is associated with an increase in articles containing pro-gold standard phrases. The most robust predictors are the Treasury's gold reserves and the price level for agricultural goods. This implies that as doubts about the Treasury's ability to maintain the gold standard increased and prices for farm goods decreased, newspapers published more biased articles regarding the gold standard.

Importantly, the strongest marginal effects are for the pro-gold newspapers, with the average marginal effects almost never statistically significant for the *San Francisco Chronicle* and *Washington Post*. A standard deviation decrease in gold reserves predicts an additional 7.9 articles containing the phrase "honest money" in the pro-gold papers, while only predicting an additional 1.4 "honest money" articles in pro-silver newspapers. For the *New York Times* and *Chicago Tribune* these are 0.7 and 0.4 standard deviation increases in "honest money" articles, respectively. Similarly, a one standard deviation fall in the farm goods price level is associated with an additional 6.4 "honest money" articles in pro-gold newspapers, but only 0.72 more "honest money" articles in the pro-silver papers. This corresponds to 0.56 and 0.34 standard deviation increases in "honest money" articles in the *Times* and *Tribune*. The same pattern holds for articles containing the phrase "cheap money," but on a smaller scale.

Turning to the results for the pro-silver phrases reported in Tables 3.7-3.9, greater uncertainty about the gold standard is again associated with an increase in biased gold standard reporting. In this case, however, the effects are statistically significant primarily for the pro-silver newspapers. It therefore appears that pro-gold and moderate newspapers did not start using more pro-silver phrases as Free Silver became a greater threat. For the pro-silver newspapers, the impact is again relatively large.[20] A standard deviation decline in gold reserves correlates with 1.3 more articles

[20] Although the average marginal effects are statistically insignificant for the search term "goldbug," this is in part due to the limited use of the term by the *Cincinnati Enquirer*. Dropping the *Enquirer* from the estimation leads to a statically significant marginal effect for gold reserves.

containing the phrases "Wall Street" and "gold standard." A fall in agricultural prices of the same magnitude corresponds with 3.15 more articles using "Wall Street" and "gold standard. Especially for the farm price index effect, the effects are sizable in a relative sense: the effect of a standard deviation fall is an increase in articles of 0.4-1.2 standard deviations across the three pro-silver papers. The marginal effects are larger for "goldbug" articles, but they are not quite statistically significant.

A comparison of the marginal effects across search terms within each editorial slant provides an additional sanity check on the results. They are almost universally larger for the terms with a matching bias. If the relationship between article counts and economic conditions was completely spurious, it would likely not be the case that the effects would be larger for the biased phrases corresponding to the slant of the newspaper. It is therefore not implausible to think that newspapers are increasing the bias in their reporting in response to the worsening economic conditions.[21]

Finally, Table 3.10 reports the Vuong statistics for each of the regressions, and the zero-inflated model appears to be the correct specification.[22] Across all newspaper types and search terms, the z-score is statistically significant. Additionally, the majority of scores are significant at the one-percent level. This is again evidence in favor of using the zero-inflated model.

3.5.2 Robustness Checks

I see how much of the relationship between bias and monetary uncertainty in the newspapers with an editorial slant is in actual reporting relative to editorial pieces by re-estimating the regressions using article counts that do not contain editorials. These counts are based on ProQuest's classification of newspaper articles, and so the accuracy of these results reflects how well this system categorizes editorial articles.[23] I focus only on the pro-gold and pro-silver papers for two reasons. First, this is where the original results were strongest; second, given that these papers had an

[21] It is beyond the scope of this paper to prove that the measured relationship is at least in part causal.

[22] As noted in the table, the statistics are calculated from regressions that do not cluster the standard errors, as Stata cannot calculate the Vuong statistic with clustered standard errors.

[23] In particular, my concern is that ProQuest underestimates the number of editorial articles in each newspaper.

observable editorial position, they were therefore more likely to publish editorials reflecting this slant.

Tables C.1-C.4 in the Appendix show that, even excluding editorial articles, there is a clear relationship between monetary policy and biased reporting. Almost every coefficient retains its statistical significance found in the original specification.[24] Additionally, the average marginal effects remain statistically significant and sizable. The extent to which monetary bias crept into newspaper articles as demand for silver coinage increased was therefore not limited to editorial articles only.

An additional robustness check whose results are reported in the Appendix uses smoothed values of the monetary variables. Specifically, I employ 12-month backward moving averages of the three proxies. This check is done to ensure that months with particularly high or low values of the monetary uncertainty measures are not driving the results. The coefficients on gold reserves and agricultural prices remain negative and statistically significant across all search terms and newspaper types.

3.5.3 How the Media Used Biased Phrases

Studying media coverage of a single issue permits a more detailed look into exactly how the editorial slant of the newspapers permeated their articles. For the newspapers with a clearly-defined position on the coinage issue, these loaded expressions served as a convenient way to label supporters and opponents of each paper's preferred policy. Therefore, in the pro-gold *New York Times*, the headline regarding the rejection of a motion supporting Free Silver reads "Georgia Wants Honest Money," while the sub-headline on an article describing the call for all organizations supporting William Jennings Bryan to attend a convention of Democratic Clubs states "All Cheap-Money Men Invited."[25] Similarly, the pro-gold *Chicago Tribune* partially titles an article describing the

[24]The "Cheap Money" and "Wall Street" "Gold Standard" regressions for the pro-silver papers include only the *Post-Dispatch* and *Enquirer*, as ProQuest returned zero editorial articles in either case for the *Constitution*. Including the unaltered counts for the *Constitution* does not meaningfully change the results.

[25]The phrase "cheap money" appears nowhere in the text of the actual call published in the paper.

withdrawal of Free Silver opponents from a state Democratic convention "Honest Money Men Give Free Silverites Full Swing." The *Tribune* continues this behavior in headlining the news of a Republican party in support of the gold standard in 1896 as "Honest Money Wins."

Across the political spectrum, things were no different at the pro-silver papers. The *Atlanta Constitution* titled an article discussing the defeat of a local politician who supported gold in Wyoming as "Wyoming Shelves a Goldbug." Further, in an article discussing whether the Democratic platform supports monometallism, the *Constitution* leads by stating the "goldbug cranks" among others "who have taken a contract to commit the democratic party of the south to the financial views of Wall street."

An examination of the time series of the aggregated article counts for each biased phrase aggregated reveals the potential importance of elections in motivating usage of bias. These series are plotted in Figure 3.5. Across each search term, the article count reaches its highest points in 1895 or 1896, when silver coinage was the primary electoral issue.[26] Smaller spikes also occur around the election of 1892, where the Sherman Act was an issue. The quotes containing the biased phrases cited above almost universally discuss some part of the electoral process. Browsing through headlines of the articles containing charged phrases suggests this pattern is a regularity.

I collect monthly counts for articles containing one of the biased phrases and, in addition, either the word "election" or "convention" in each of the "slanted" newspapers to gain a sense of the quantitative importance of elections in biased reporting on silver coinage. I start by calculating the fraction of biased articles that also contain "election" or "convention" for each non-zero month.[27] Table 3.11 presents the means of these fractions across the newspapers. For "honest money" articles, around 50 percent of the articles in the *Chicago Tribune* and *New York Times* also have the word election or convention in them. For the rest of the search terms, the averages typically range from 1/4-1/3 of total articles containing the biased phrase.[28] This is a non-trivial proportion, and

[26]Although the election itself was held in November 1896, the electoral process stretched back into 1895 as states voted on representatives at the nominating conventions.

[27]By non-zero month, I mean months in which the article count for the biased phrase is greater than zero.

[28]The fractions are higher for "honest money" articles likely due to the existence of the "Honest Money League" mentioned in Section 4.

supports the importance of the electoral process in driving biased reporting.

Additional evidence regarding the relationship between elections and media bias can be found in the correlations between total biased articles and biased article containing the words "election" or "convention." I report the basic correlation coefficients in Table 3.12. In all cases, they are very close to one. Therefore, as the number of articles containing one of the biased phrases regarding silver coinage increases, so too does the count for election-related articles containing the biased phrase.

The connection between biased articles and the legislative process in the monetary context is much weaker. Recall that during this time period the U.S. had no central bank, so the monetary rule was determined solely through Congress. The correlation coefficients between biased phrase articles and articles mentioning the phrase "silver bill" are much closer to zero.[29] It appears that, for these papers, using biased phrases when discussing legislative specifics was relatively uncommon.

The following story thus likely explains the connection between poor monetary conditions and reporting using biased phrases. First, the decline in the economy made the gold standard and silver coinage a popular issue with at least some factions of the electorate. In response, elections hinged in part on the position of the candidates on this matter. As newspapers reported the electoral process they used these biased phrases as convenient labels for the two proposed policies and their respective supporters.

3.6 Concluding Remarks

Using a newly-constructed dataset of silver coinage article counts in seven newspapers, I show that biased reporting on the gold standard increased as economic conditions worsened. In particular, as uncertainty about the ability of the U.S. government to maintain gold convertibility and the demand for silver coinage rose, so too did articles containing biased phrases describing the gold standard and silver coinage. I also present evidence that these increases in biased-phrase usage are more

[29] In many cases, they are also statistically indistinguishable from zero as well.

likely tied to the electoral process rather than the legislative procedure.

Silver coinage and the gold standard was a pressing political and economic issue during the 1890s, and newspaper coverage reflected this importance. While the slant of the newspapers towards silver coinage was likely driven in part by the political beliefs of their readers, the intensity of these newspapers' usage of biased phrases in their coverage still varied across newspapers with the same editorial slant. Given macroeconomic research on the role of the media in economic expectation formation (Carroll, 2003), a potential next step in research would be to consider whether the intensity of biased coverage affected household and firm decision-making.

Additionally, my suggestive evidence on the importance of elections in driving biased media coverage has political implications. Larcinese et al. (2011) found that economic reporting in the U.S. corresponds to the partisan bias of the newspaper and the political party of the president, *except* in the case of reporting on inflation. Controlling inflation is the primary task of the politically independent Federal Reserve, and t of recent research argues that monetary policy works through influencing individual expectations about the future (e.g. Campbell et al., 2012). My findings suggest that anything that makes monetary policy more subject to electoral influence opens the door for more media bias in reporting on inflation, which could negatively impact economic expectation formation.

3.7 Figures and Tables

Figure 3.1:

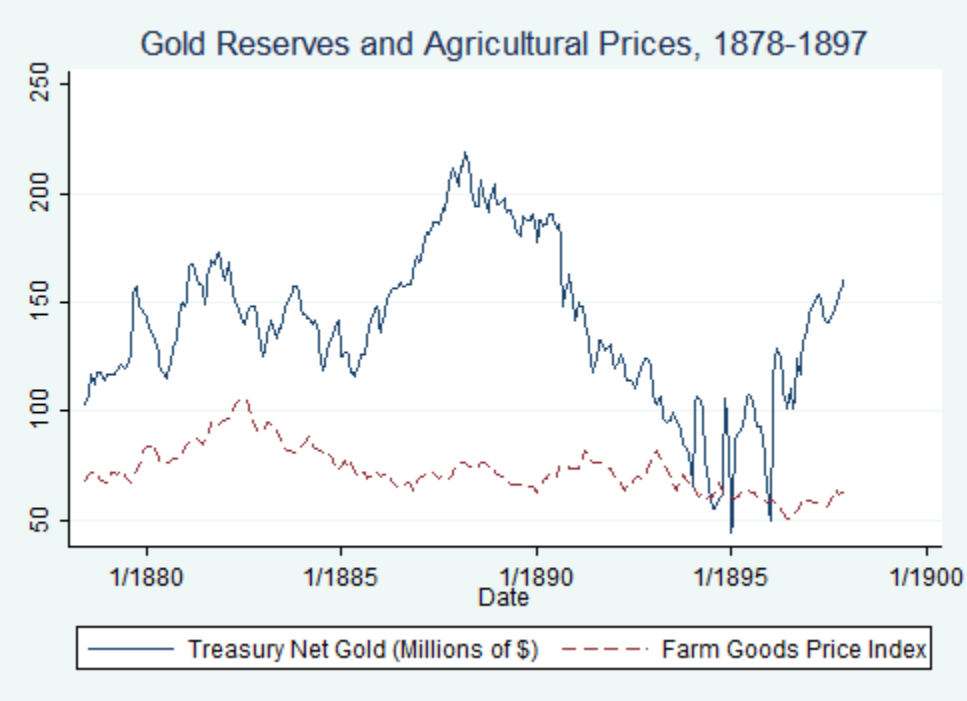
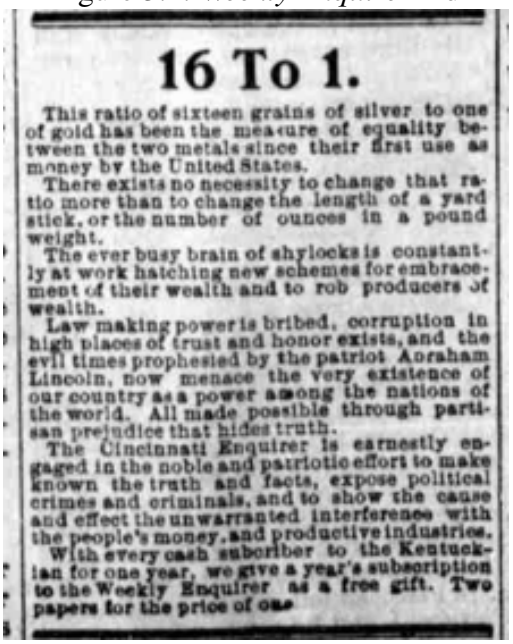


Figure 3.2: *Weekly Enquirer* Ad



16 To 1.

This ratio of sixteen grains of silver to one of gold has been the measure of equality between the two metals since their first use as money by the United States.

There exists no necessity to change that ratio more than to change the length of a yard stick, or the number of ounces in a pound weight.

The ever busy brain of shylocks is constantly at work hatching new schemes for embracement of their wealth and to rob producers of wealth.

Law making power is bribed, corruption in high places of trust and honor exists, and the evil times prophesied by the patriot Abraham Lincoln, now menace the very existence of our country as a power among the nations of the world. All made possible through partisan prejudice that hides truth.

The Cincinnati Enquirer is earnestly engaged in the noble and patriotic effort to make known the truth and facts, expose political crimes and criminals, and to show the cause and effect the unwarranted interference with the people's money, and productive industries.

With every cash suboriber to the Kentuckian for one year, we give a year's subscription to the Weekly Enquirer as a free gift. Two papers for the price of one

Figure 3.3: *Weekly Post-Dispatch* Ad

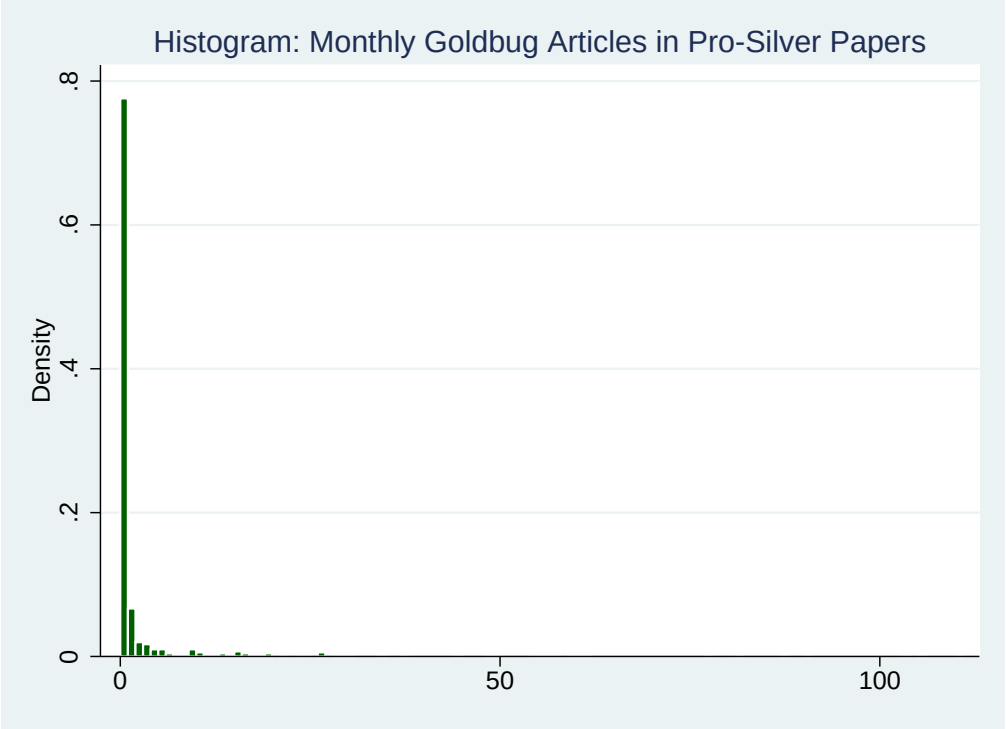
THE ST. LOUIS WEEKLY POST - DISPATCH

ONLY 50 CENTS A YEAR.

THE GREAT FREE SILVER PAPER

The Post-Dispatch Is the Only Metropolitan Paper That Championed the Free Silver Cause in Advance of the Nominating Conventions. It Stands Pat for Free Silver, for Western Men and Measures, for the Peoples Ages not the Political Bosses, Plutocrats, Combines, Trusts and Corporation Oppression.

Figure 3.4:



Note: Bin width is 1.

Figure 3.5:

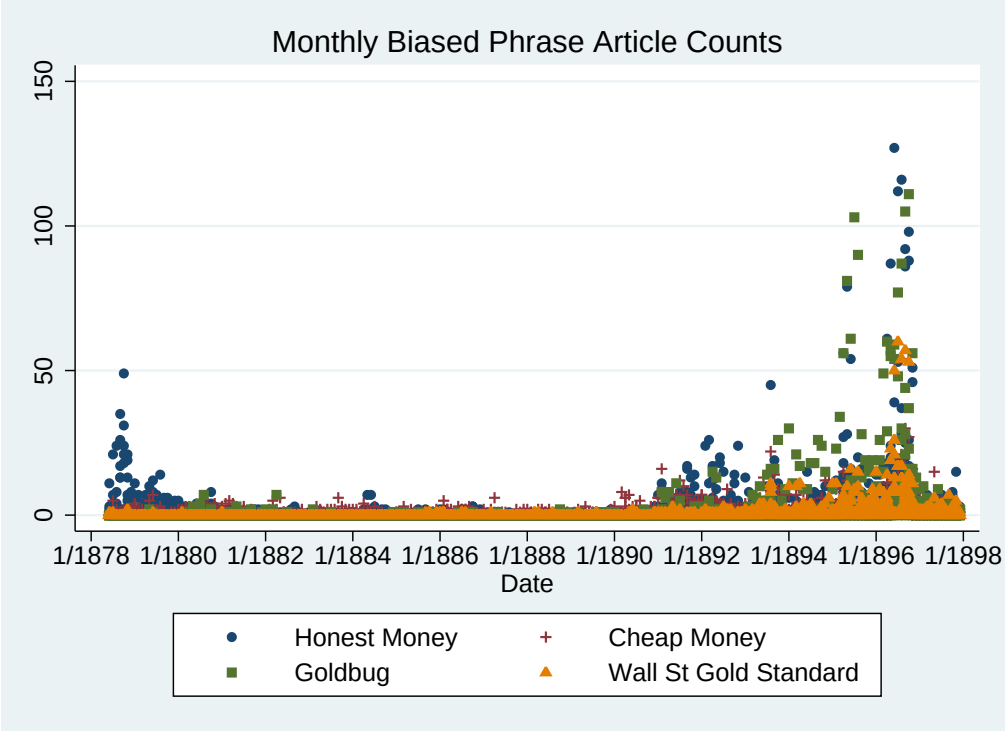


Table 3.1: Silver Coinage Voting Months

1879-1890	**1890-1892**	**1892-1893**	**1893-1896**
April 1879	February 1890	March 1892	December 1893
May 1879	April 1890	May 1892	February 1894
June 1879	May 1890	July 1892	March 1894
February 1880	June 1890	December 1892	April 1894
February 1885	July 1890	January 1893	February 1895
January 1886	December 1890	February 1893	January 1896
February 1886	January 1891	August 1893	February 1896
April 1886	February 1891	September 1893	
January 1890	January 1892	October 1893	

Table 3.2: Summary Statistics–Article Counts By Newspaper

Search Term	*NY Times*	*Chi Daily Trib*	*Atl Consti-tution*	*StL Post-Dispatch*	*Cin Enq*	*San Fran Chron*	*Wash Post*
Honest Money							
Mean	4.83	7.23	1.25	1.76	1.37	0.77	1.63
St Dev	11.40	18.80	3.39	4.89	2.72	2.19	3.77
Cheap Money							
Mean	1.78	2.83	0.55	0.44	0.46	0.47	0.56
St Dev	2.96	5.54	1.07	0.94	0.89	1.49	1.68
Goldbug							
Mean	0.41	0.57	5.76	3.55	0.31	0.31	0.64
St Dev	1.52	2.11	14.54	14.78	0.95	0.75	3.19
Wall Street Gold Stan-dard							
Mean	0.52	0.43	1.58	1.67	0.70	0.47	0.15
St Dev	1.82	1.37	3.98	8.03	2.66	1.37	0.50

Table 3.3: Summary Statistics–Control Variables

Variable	Mean	Std Dev
Net Gold	139.89	35.25
Farm Price Index	73	10.91
Stock Index	53.91	7.34
New York Times Total Articles	5931.29	808.13
Chi Daily Tribune Total Articles	5943.91	1238.75
San Fran Chronicle Total Articles	3366.02	1174.2
Wash Post Total Articles	4805.35	2977.39
St Louis Post-Dispatch Total Articles	3435.52	1092.35
Atlanta Constitution Total Articles	4345.36	945.88
Cincinnati Enquirer Total Articles	4735.88	1276.19

Table 3.4: Zero-Inflated Negative Binomial Regression Results–Pro-Gold Search Terms and Pro-Gold Papers

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.029^{***}	-0.224^{**}	-0.017^{***}	-0.041^{***}
	(0.0069)	(0.114)	(0.0044)	(0.014)
Farm Prices	-0.075^{***}	-0.583^{**}	-0.070^{***}	-0.167^{***}
	(0.016)	(0.244)	(0.016)	(0.044)
Stock Index	-0.014	-0.111	0.0055	0.013
	(0.017)	(0.133)	(0.023)	(0.054)
Total Articles	-0.0002	-0.0015	-0.0003^{**}	$-.0007^{*}$
	(0.00013)	(0.0011)	(0.00013)	(0.0004)
Vote Months	0.056^{***}	-0.014	0.084^{**}	-0.0038^{*}
	(0.02)	(0.015)	(0.042)	(0.002)
Months Until Election	0.021	-0.005	0.005	-0.0002
	(0.02)	(0.011)	(0.033)	(0.002)
α	1.50		1.01	
	(0.24)		(0.23)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.5: Zero-Inflated Negative Binomial Regression Results–Pro-Gold Search Terms and Pro-Silver Papers

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.022^{***}	-0.039^{**}	-0.006^{*}	-0.0028^{*}
	(0.006)	(0.017)	(0.003)	(0.0015)
Farm Prices	-0.038^{**}	-0.066^{*}	-0.060^{***}	-0.029^{**}
	(0.019)	(0.036)	(0.018)	(0.0095)
Stock Index	-0.073^{***}	-0.128^{***}	0.019	0.009
	(0.019)	(0.049)	(0.018)	(0.009)
Total Articles	0.0001	0.0001	0.0002^{*}	0.0001^{*}
	(0.0001)	(0.0002)	(0.0001)	(0.00004)
Vote Months	0.022	-0.01	2.16	-0.004^{***}
	(0.018)	(0.009)	(1.53)	(0.001)
Months Until Election	0.047^{***}	-0.023^{**}	1.06^{*}	-0.002^{***}
	(0.013)	(0.010)	(0.63)	(0.0007)
α	1.34		0.77	
	(0.27)		(0.21)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.6: Zero-Inflated Negative Binomial Regression Results–Pro-Gold Search Terms and Moderate Papers

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.011^{*}	-0.013	-0.007^{*}	0.0004
	(0.0066)	(0.009)	(0.004)	(0.002)
Farm Prices	-0.017	-0.020	-0.054^{***}	0.017
	(0.022)	(0.026)	(0.02)	(0.013)
Stock Index	-0.057^{**}	-0.069^{*}	-0.037	-0.033
	(0.026)	(0.038)	(0.025)	(0.021)
Total Articles	0.0001	0.0001	0.0002^{***}	0.0005^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Vote Months	0.025^{**}	-0.009^{**}	4.16^{***}	0.0000
	(0.012)	(0.004)	(0.037)	(0.0000)
Months Until Election	0.032^{**}	-0.011	-35.92^{***}	
	(0.015)	(0.008)	(2.93)	
α	1.33		1.04	
	(0.35)		(0.26)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Moderate newspapers are *San Francisco Chronicle* and *Washington Post*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.7: Zero-Inflated Negative Binomial Regression Results–Pro-Silver Search Terms and Pro-Gold Papers

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.004	-0.002	-0.007	-0.003
	(0.009)	(0.004)	(0.008)	(0.004)
Farm Prices	-0.034	-0.016	-0.144^{***}	-0.063^{***}
	(0.029)	(0.014)	(0.029)	(0.018)
Stock Index	-0.045	-0.022	-0.029	-0.013
	(0.057)	(0.030)	(0.026)	(0.011)
Total Articles	0.0005^{**}	0.00026^{*}	0.000	0.000
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Vote Months	0.111^{***}	-0.0027	8.29^{***}	-0.0003
	(0.018)	(0.0019)	(0.35)	(0.0002)
Months Until Election	-0.055^{*}	0.0014	-1.11^{***}	0.00004
	(0.029)	(0.0012)	(0.053)	(0.00002)
α	4.66		1.17	
	(1.49)		(0.58)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.8: Zero-Inflated Negative Binomial Regression Results–Pro-Silver Search Terms and Pro-Silver Papers

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.04^{***}	-0.227	-0.024^{***}	-0.036^{**}
	(0.008)	(0.155)	(0.006)	(0.017)
Farm Prices	-0.110^{**}	-0.598	-0.106^{***}	-0.289^{**}
	(0.047)	(0.412)	(0.045)	(0.116)
Stock Index	0.012	0.067	0.021	0.031
	(0.054)	(0.304)	(0.034)	(0.05)
Total Articles	0.0005	0.003	0.0003	0.0004
	(0.0003)	(0.003)	(0.0002)	(0.0003)
Vote Months	8.01^{***}	-0.063^{*}	0.356	-0.0007^{***}
	(0.31)	(0.038)	(0.64)	(0.0003)
Months Until Election	-8.69^{***}	0.068^{*}	-0.060	0.0001
	(0.35)	(0.042)	(0.29)	(0.0004)
α	5.45		1.94	
	(1.39)		(0.42)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.9: Zero-Inflated Negative Binomial Regression Results–Pro-Silver Search Terms and Moderate Papers

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.005	-0.002	-0.008	-0.002
	(0.006)	(0.003)	(0.007)	(0.002)
Farm Prices	-0.126^{***}	-0.052^{**}	-0.145^{***}	-0.044^{***}
	(0.033)	(0.021)	(0.036)	(0.016)
Stock Index	-0.006	-0.0024	0.0003	0.0001
	(0.045)	(0.019)	(0.032)	(0.01)
Total Articles	0.0002^{***}	0.0001^{**}	-0.0000	0.0000
	(0.0001)	(0.00004)	(0.0001)	(0.0000)
Vote Months	17.52^{***}	-0.0004^{**}	0.115^{***}	-0.005
	(0.24)	(0.0002)	(0.028)	(0.004)
Months Until Election	-11.95^{***}	0.0002^{***}	0.036	-0.002^{*}
	(0.17)	(0.0001)	(0.029)	(0.001)
α	1.72		1.11	
	(0.52)		(0.43)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Moderate newspapers are *San Francisco Chronicle* and *Washington Post*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.10: Vuong Test Statistics of Zero-Inflated Model

	"Honest Money"	"Cheap Money"	"Goldbug"	"Wall St Gold Standard"
Pro-Gold Papers	1.35^{*}	1.69^{**}	2.44^{***}	4.25^{***}
Pro-Silver Papers	2.69^{***}	3.44^{***}	3.66^{***}	2.37^{***}
Moderate Papers	1.84^{**}	3.32^{***}	2.88^{***}	2.60^{***}

Note: Vuong Tests for regressions run without robust standard errors. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table 3.11: Election-Related Biased Article Proportions

	"Honest Money"	"Cheap Money"	"Goldbug"	"Wall St Gold Standard"
New York Times	0.605	0.323		
Chicago Tribune	0.469	0.260		
Atlanta Constitution			0.362	0.279
St. Louis Post-Dispatch				
Cincinnati Enquirer				

Note: Averages are for monthly fractions of biased-phrase articles also containing the words "election" or "convention."

Table 3.12: Biased Article Count Correlations

	Phrase & "Election/Convetion"	"Silver Bill" Articles
NYT Honest Money	0.981	0.169
NYT Cheap Money	0.845	0.160
Chi Trib Honest Money	0.974	0.017
Chi Trib Cheap Money	0.924	0.184
Atl Const Goldbug	0.942	0.041
Atl Const Wall St	0.865	0.076
StL P-D Goldbug		0.031
StL P-D Wall St		0.048
Cin Enq Goldbug		0.016
Cin Enq Wall St		0.002

3.8 Appendix: Robustness Checks

This section provides the tables for the robustness tests using non-editorial articles and the smoothed values of the monetary conditions series.

Table C.1: Robustness Check: Non-Editorial Pro-Gold Articles and Pro-Gold Papers

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.028^{***}	-0.159^{*}	-0.013^{***}	-0.023^{**}
	(0.0081)	(0.091)	(0.0044)	(0.010)
Farm Prices	-0.075^{***}	-0.428^{**}	-0.069^{***}	-0.121^{***}
	(0.019)	(0.189)	(0.019)	(0.033)
Stock Index	-0.018	-0.101	-0.008	-0.014
	(0.018)	(0.106)	(0.022)	(0.040)
Total Articles	-0.0002	-0.0011	-0.0003^{*}	$-.0005$
	(0.00015)	(0.0010)	(0.00016)	(0.0003)
Vote Months	0.045	-0.013	0.155	-0.005^{*}
	(0.052)	(0.031)	(0.138)	(0.003)
Months Until Election	0.027	-0.008	0.046	-0.0015
	(0.04)	(0.038)	(0.054)	(0.001)
α	1.64		1.11	
	(0.43)		(0.30)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.2: Robustness Check: Non-Editorial Pro-Gold Articles and Pro-Silver Papers

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.022^{***}	-0.037^{**}	-0.004	-0.0016
	(0.005)	(0.015)	(0.003)	(0.0016)
Farm Prices	-0.036^{**}	-0.060^{*}	-0.048^{**}	-0.021^{*}
	(0.018)	(0.031)	(0.024)	(0.011)
Stock Index	-0.073^{***}	-0.121^{***}	-0.008	-0.004
	(0.020)	(0.046)	(0.019)	(0.008)
Total Articles	0.0001	0.0001	0.0002^{*}	0.0001^{**}
	(0.0001)	(0.0002)	(0.0001)	(0.00004)
Vote Months	0.022	-0.011	24.27^{***}	-0.0003^{***}
	(0.017)	(0.009)	(0.62)	(0.00005)
Months Until Election	0.046^{***}	-0.023^{**}	10.55^{***}	-0.0001^{***}
	(0.011)	(0.009)	(0.26)	(0.00002)
α	1.26		0.64	
	(0.28)		(0.18)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. Cheap Money regression does not include the *Constitution*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.3: Robustness Check: Non-Editorial Pro-Silver Articles and Pro-Gold Papers

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.006	-0.002	-0.006	-0.002
	(0.009)	(0.004)	(0.008)	(0.003)
Farm Prices	-0.024	-0.010	-0.150^{***}	-0.059^{***}
	(0.029)	(0.011)	(0.028)	(0.015)
Stock Index	-0.046	-0.019	-0.035	-0.014
	(0.057)	(0.025)	(0.026)	(0.011)
Total Articles	0.0005^{**}	0.0002	0.000	0.000
	(0.0002)	(0.00013)	(0.0002)	(0.000)
Vote Months	0.135^{***}	-0.0021	10.25^{***}	-0.00004^{***}
	(0.034)	(0.0015)	(0.45)	(0.00001)
Months Until Election	-0.099^{**}	0.0016	1.06^{***}	-0.0000^{***}
	(0.049)	(0.0011)	(0.041)	(0.00000)
α	5.33		1.10	
	(1.63)		(0.56)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.4: Robustness Check: Non-Editorial Pro-Silver Articles and Pro-Silver Papers

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.041^{***}	-0.226	-0.013	-0.012
	(0.008)	(0.154)	(0.010)	(0.010)
Farm Prices	-0.104^{**}	-0.576	-0.265^{***}	-0.24^{**}
	(0.047)	(0.397)	(0.034)	(0.098)
Stock Index	0.014	0.080	0.041	0.037
	(0.054)	(0.297)	(0.054)	(0.048)
Total Articles	0.0005	0.003	0.0002	0.0001
	(0.0003)	(0.003)	(0.0002)	(0.0002)
Vote Months	8.03^{***}	-0.056^{*}	0.073	-0.003
	(0.31)	(0.033)	(0.11)	(0.004)
Months Until Election	-8.71^{***}	0.060^{*}	0.066^{*}	-0.003
	(0.35)	(0.036)	(0.035)	(0.0007)
α	5.48		1.58	
	(1.40)		(0.84)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. Wall Street Gold Standard regression does not include *Constitution*. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.5: Robustness Check: Smoothed Monetary Conditions, Pro-Gold Papers and Pro-Gold Phrases

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.035^{***}	-0.213^{**}	-0.022^{***}	-0.052^{***}
	(0.0069)	$(0.087$	(0.0042)	(0.013)
Farm Prices	-0.067^{***}	-0.412^{**}	-0.077^{***}	-0.183^{***}
	(0.020)	(0.175)	(0.020)	(0.051)
Stock Index	0.016	0.101	0.049	0.116
	(0.028)	(0.176)	(0.038)	(0.089)
Total Articles	-0.0003	-0.0016	-0.0003^{**}	$-.0008^{*}$
	(0.0002)	(0.0012)	(0.00015)	(0.0005)
Vote Months	0.044^{**}	-0.012	7.90^{***}	-0.001^{***}
	(0.018)	(0.023)	(0.57)	(0.0003)
Months Until Election	0.017	-0.005	-1.60^{***}	0.0002^{***}
	(0.03)	(0.017)	(0.10)	(0.0001)
α	1.62		1.11	
	(0.27)		(0.28)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.6: Robustness Check: Smoothed Monetary Conditions, Pro-Silver Papers and Pro-Gold Phrases

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.028^{***}	-0.038^{***}	-0.012^{***}	-0.006^{***}
	(0.004)	(0.012)	(0.004)	(0.002)
Farm Prices	-0.014	-0.019	-0.04^{*}	-0.021^{*}
	(0.029)	(0.039)	(0.022)	(0.012)
Stock Index	-0.052^{*}	-0.070	0.025	0.013
	(0.030)	(0.045)	(0.027)	(0.014)
Total Articles	0.0003^{**}	$0.0004*$	0.0002^{**}	0.0001^{**}
	(0.00015)	(0.0002)	(0.0001)	(0.00005)
Vote Months	0.012	-0.004	-3.14^{***}	0.002
	(0.016)	(0.006)	(0.63)	(0.007)
Months Until Election	0.052^{***}	-0.019^{***}	-8.94^{**}	0.006
	(0.012)	(0.006)	(3.76)	(0.017)
α	0.92		0.81	
	(0.19)		(0.25)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.7: Robustness Check: Smoothed Monetary Conditions, Moderate Papers and Pro-Gold Phrases

	"Honest Money"		"Cheap Money"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.020^{***}	-0.023^{**}	-0.018^{***}	0.0004
	(0.006)	(0.010)	(0.004)	(0.002)
Farm Prices	-0.004	-0.005	-0.083^{***}	0.017
	(0.030)	(0.034)	(0.021)	(0.013)
Stock Index	-0.029	-0.033	0.025	-0.033
	(0.038)	(0.045)	(0.028)	(0.021)
Total Articles	0.0001	0.0001	0.0001	0.0005^{***}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Vote Months	0.016	-0.005	2.67^{***}	0.0000
	(0.026)	(0.009)	(0.44)	(0.0000)
Months Until Election	0.038^{**}	-0.012^{*}	-23.62^{***}	
	(0.019)	(0.007)	(3.38)	
α	1.23		0.92	
	(0.27)		(0.26)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Moderate newspapers are *San Francisco Chronicle* and *Washington Post*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table C.8: Robustness Check: Smoothed Monetary Conditions, Pro-Gold Papers and Pro-Silver Phrases

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.020^{***}	-0.011^{*}	-0.029^{***}	-0.014^{**}
	(0.007)	(0.006)	(0.009)	(0.007)
Farm Prices	$-0.069*$	-0.036	-0.143^{***}	-0.070^{***}
	(0.037)	(0.024)	(0.031)	(0.023)
Stock Index	0.058	0.030	0.095^{***}	0.046^{**}
	(0.057)	(0.036)	(0.037)	(0.024)
Total Articles	0.0005^{**}	0.00024	0.0001	0.000
	(0.0002)	(0.00014)	(0.0002)	(0.0001)
Vote Months	9.21^{***}	-0.0011^{**}	10.62^{***}	-0.0012^{***}
	(0.27)	(0.0019)	(0.34)	(0.0004)
Months Until Election	-0.43^{***}	0.0001^{**}	1.09^{***}	-0.0001^{***}
	(0.015)	(0.0000)	(0.033)	(0.00004)
α	4.12		1.70	
	(1.27)		(0.59)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Gold newspapers are *New York Times* and *Chicago Daily Tribune*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.9: Robustness Check: Smoothed Monetary Conditions, Pro-Silver Papers and Pro-Silver Phrases

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.047^{***}	-0.160^{**}	-0.042^{***}	-0.056^{***}
	(0.012)	(0.076)	(0.007)	(0.020)
Farm Prices	-0.10^{**}	-0.339^{*}	-0.185^{***}	-0.242^{**}
	(0.046)	(0.182)	(0.050)	(0.097)
Stock Index	0.078	0.265	0.109^{**}	0.143^{*}
	(0.059)	(0.223)	(0.045)	(0.075)
Total Articles	0.0003	0.001	0.0002	0.0002
	(0.0004)	(0.002)	(0.0002)	(0.0002)
Vote Months	8.67^{***}	-0.022^{**}	12.65^{***}	-0.0001^{**}
	(0.21)	(0.010)	(0.64)	(0.00006)
Months Until Election	-9.42^{***}	0.024^{**}	-4.22^{***}	0.00005^{**}
	(0.23)	(0.011)	(0.20)	(0.00002)
α	4.80		1.87	
	(1.41)		(0.37)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Pro-Silver newspapers are *Atlanta Constitution*, *Cincinnati Enquirer*, and *St. Louis Post-Dispatch*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

Table C.10: Robustness Check: Smoothed Monetary Conditions, Moderate Papers and Pro-Silver Phrases

	"Goldbug"		"Wall Street Gold Standard"	
	Coefficient	Average Marginal	Coefficient	Average Marginal
Net Gold	-0.013^{**}	-0.005^{*}	-0.032^{***}	-0.010^{**}
	(0.006)	(0.003)	(0.008)	(0.004)
Farm Prices	-0.133^{***}	-0.056^{**}	-0.167^{***}	-0.053^{**}
	(0.043)	(0.027)	(0.050)	(0.021)
Stock Index	0.043	0.018	0.157^{***}	0.050^{**}
	(0.044)	(0.019)	(0.047)	(0.022)
Total Articles	0.0001^{*}	0.000	-0.0001	-0.0000
	(0.0001)	(0.00004)	(0.0001)	(0.0000)
Vote Months	11.79^{***}	-0.0002^{**}	0.10^{***}	-0.007
	(0.47)	(0.0001)	(0.028)	(0.005)
Months Until Election	-8.05^{***}	0.00015^{**}	0.030	-0.002
	(0.32)	(0.0001)	(0.021)	(0.0014)
α	1.77		0.96	
	(0.53)		(0.50)	

Notes: Standard errors clustered at the newspaper-year level reported in parentheses under each coefficient. Delta-method standard errors for marginals. All regressions include a constant. Moderate newspapers are *San Francisco Chronicle* and *Washington Post*. The three monetary uncertainty proxies (net gold reserves, agricultural price index, stock price index) are 12-month backward moving averages. *** $p < 0.01$, **$p < 0.05$, * $p < 0.1$

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