International Liquidity Shocks, the Real Economy and Social Unrest: China, 1931-1935

Fabio Braggion
CentER - Tilburg University

Department of Finance
PO Box 90153, NL 5000 LE Tilburg, The Netherlands
Telephone: +31 13 4668209, Fax: +31 13 4662875
E-mail: f.braggion@tilburguniversity.edu

Alberto Manconi*
CentER - Tilburg University

Department of Finance
PO Box 90153, NL 5000 LE Tilburg, The Netherlands
Telephone: +31 13 4662804, Fax: +31 13 4662875
E-mail: a.manconi@tilburguniversity.edu

Haikun Zhu
CentER - Tilburg University

Department of Finance
PO Box 90153, NL 5000 LE Tilburg, The Netherlands
Telephone: +31 13 4664057, Fax: +31 13 4662875
E-mail: h.zhu@tilburguniversity.edu

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Abstract

What are the social consequences of monetary shocks? We answer this question relying on a natural experiment from 1930s China, where the money supply contracted as a consequence of the 1933 US Silver Purchase program. Using a novel, hand-collected data set of loan contracts to individual Chinese firms and labor unrest, we find that the monetary shock led to a widespread, large credit contraction. We also find that firms borrowing from banks with a larger exposure to the monetary shock were more likely to experience labor unrest. These findings support Milton Friedman's (1992) conjecture that the US Silver Purchase program helped the Communist uprising in China, and contribute to our understanding of the (unintended) social consequences of monetary shocks.

Keywords: Silver Purchase Program, Banks, Social Unrest

JEL: E42, E51, G01, G21, N15, N25.

I. Introduction

Does a money supply contraction lead to credit rationing? And what are its consequences on social cohesion? Central as these questions are to banking, macroeconomics, and policy making, so far the available evidence offers very little guidance to answer them conclusively. Monetary policy reflects current economic conditions and possibly policy social objectives, and it is thus difficult to isolate the effects of a monetary shock. In this paper, we address these problems by turning to data from the 1930s, which provide us with a natural experiment.

In 1933 the US Federal government initiated a large scale Silver Purchase program with the aim of raising the price of silver. The program was undertaken for purely domestic reasons, but ended up having far-reaching, unintended consequences abroad, notably in China.

In the early 1930s, China was the main country under the silver standard: every unit of Chinese currency was fully convertible into silver. The outflow of silver triggered by the US purchase program thus resulted in a contraction of the Chinese monetary base. In their monumental *Monetary History*, Friedman and Schwartz (1963, pp. 483-490) consider the US Silver Purchase program a milestone in Chinese economic history; they argue that the resulting monetary depression ultimately brought the country to the 1949 Communist takeover. In the words of Milton Friedman, "*the US Silver Purchase program must be regarded as having contributed, if perhaps only modestly, to the success of the communist revolution in China*" (Friedman, 1992).

Our work provides new micro-econometric evidence on the effects of the Silver Purchase program on 1930s China's economic performance and social conditions. We collect a unique database of bank balance sheets and individual loans granted by Chinese banks to entrepreneurs between 1931 and 1935, and complement these data with information on riots and civil unrest in Chinese factories during the 1930s. First, we relate silver outflow to lending: banks more exposed

to the Purchase program shock (with lower pre-1933 silver reserves) are more likely to cut loans. Second, we bring to the data the Friedman-Schwarz hypothesis that the purchase program disrupted social order. We use hand-collected data on riots and civil disorders in Chinese industrial plants between 1931 and 1935 and relate them to their bank lenders' silver reserves. If banks exposed to the Silver Purchase program shock cut lending, firms borrowing from them will face financial constraints, limiting growth and potentially increasing workers' dissatisfaction and the likelihood of social unrest.

Our paper makes three contributions. First, it contributes to the literature on the real effects of international liquidity shocks (Bernanke and Blinder, 1992; Peek and Rosengren, 1997, 2000; Kashyap and Stein, 2000; Khwaja and Mian, 2008; Cetorelli and Goldberg, 2012; Schanbl, 2012). China in the 1930s offers many interesting parallels with financial crises and deflation episodes we witnessed in more recent times: In particular, a commitment to a fixed nominal exchange rate, a sudden appreciation of the real exchange rate and an outflow of financial resources that lead a country to deflation and economic downturn.

Second, in many of these instances, such economic phenomena have been accompanied by societal discontent that often erupted in full-fledge civil unrest. By extending our understanding of liquidity shocks and providing a quantitative assessment of their impact on social unrest and civil disorder, our analysis establishes a link to the literature on social unrest (Acemoglu and Robinson, 2000; Alesina et al., 1998, 2010; Alesina and Perotti, 1996; Andronikidou and Kovras, 2012; Brender and Drazen, 2008; Haggard et al., 1995; Martin and Gabay, 2012; Paldam, 1993; Ponticelli and Voth, 2014; Voth, 2011).

Third, it provides fresh evidence about the effects of the Silver Purchase program on the Chinese real economy. While very influential, the Friedman-Schwarz hypothesis has been subject

to criticism and reinterpretation. Brandt and Sargent (1989) and Rawski (1993), for instance, argue that the Silver Purchase program did not have important effects on the China's real economy. They agree that Chinese banks exported silver as a result of the program, but such an outflow did not translate into a decline of the money supply, consumption and real investment. Chinese banks could still back high level money supply by replacing their silver reserves with Republic of China treasury bonds.

Identifying a causal relationship between a monetary and credit shock and the real economy is challenging. First, in a modern economy monetary policy is a function of expected economic and, arguably, social outcomes, so that truly exogenous money supply shocks are rare. Second, even in the presence of a money supply shock, one has to distinguish credit supply effects (banks reduce their lending) from demand effects (firms borrow less, e.g. because of worsening growth prospects).

Our novel data set, combined with the natural experiment provided by the US Silver Purchase program, allows us to overcome these difficulties. First, 1930s China lacked a central monetary authority comparable to modern central banks (we discuss this in greater detail in Section II.A), so that the link between economic policy and money supply is much looser. Further, the Silver Purchase program shock originated from lobbying by the US silver industry, and was thus exogenous to economic consequences in China. Second, the level of detail of our data allows us to control for any credit demand effects, exploiting information about firms that borrow from multiple banks. To do so, we base our inferences on a differences-in-differences analysis based on pre-1933 silver reserves, as well as on a complementary approach drawn from the international liquidity shock literature (Khwaja and Mian, 2008; Schnabl, 2012).

We find that the liquidity shock has an important impact on bank loan provision. Banks with lower pre-1933 silver reserves have a smaller loan portfolio after the silver shock. This aggregate result is confirmed by our loan level analysis: firms borrowing from a bank with lower pre-shock silver reserves experience a reduction in credit *from that bank* after 1933. This result obtains with borrowing firm fixed effects, i.e. we are able to compare differential changes in lending to a given firm by different banks, allowing us to rule out credit demand effects and to isolate the money supply contraction as the main driver of the credit crunch. The effects are also economically important: for instance, a 1% decline in pre-1933 silver reserves leads to a 0.25% reduction in credit to the average firm in our sample.

As a further check against credit demand effects, in a future draft we will compare borrowing firms operating in traded and non-traded sectors. The world-wide recession of the 1930s might reduce the expected credit worthiness of Chinese borrowers, driving banks to curb lending. Alternatively, the Silver Purchase program, by increasing the price of silver, might make Chinese products less competitive and reduce the expected cash flows generated by Chinese borrowers, again inducing banks to restrict credit. Either alternative explanation predicts that our effects should be stronger for firms in traded sectors; in contrast, a simple supply of credit story predicts no difference between traded and non-traded sectors.

In the second part of our analysis, we turn our attention to the liquidity shock's social impact. Combining our data with hand-collected information from Chinese newspaper archives, we find that firms borrowing from banks with lower pre-1933 silver reserves are also more likely to experience some form of unrest on the workplace. Also in this case, the magnitude of the effect is substantial: a 1% decline of pre-1933 silver reserves leads to 0.30% higher likelihood of labor unrest.

The remainder of the paper is organized as follows. Section II provides the historical background. Section III discusses the empirical methodology and the identification strategy. Section IV presents the data. Section V discusses the results. Section VI concludes.

II. Historical Background

A. Banking in 1930s China

In the mid-1930s there were approximately 160 domestic banks in China, with over 1,300 branches. Four banks, the Central Bank of China, The Bank of China, the Bank of Communications and the Farmers Bank of China, were known also as "modern banks" or "government banks". They were large in size, displayed a closer relationship with the government, and were entrusted with some central banking activities such as managing government debt, issuing legal tender and control foreign exchanges (Tamagna, 1942, p. 121). The remaining banks were known as "native banks". They were smaller, older, and operating on a local scale within their headquarters province (Tamagna, 1942, p. 57). Many of the native banks did not even have limited liability: their shareholders were responsible for the obligations of the bank with their personal wealth (Tamagna, 1942, p. 59).

Banks were permitted to issue their own bank notes and to accept deposits. Up to 1935, bank notes were subject to a 100% reserve requirement, at least 60% of which had to be held in the form of silver. The remaining 40% could be met by holding government securities. Native banks could also obtain bank notes issued by modern banks, by depositing a reserve consisting of 60% silver, 30% treasury bonds, and the remaining 10% sight draft at a branch of the modern bank (Tamagna, 1942, p. 69 and p 140). Such "indirect" issuance of modern bank notes was quite widespread: in the 1930s notes issued indirectly constituted more than 25% of the total notes issued by native banks. Native banks also issued notes backed by copper. The copper notes circulated only locally, at the provincial level. There was no central bank, nor were there reserve requirements or deposit insurance.

B. The Silver Purchase Program

The US Silver Purchase program was initiated in May 1933 with the approval of an amendment proposed by Senator Thomas from Oklahoma to the Farm Relief Bill. The provisions of the amendment established the legal ground on which the US government could use silver to back up expansions of the money supply. Empowered with the new legislation, President Roosevelt ordered US mints to buy all newly produced US silver offered to them up to December 31, 1937 at 64.64 cents per ounce, at a time when the market price was 44 cents per ounce (Friedman and Schwartz, 1963, p. 483).

By purchasing silver at a high price, the government provided an implicit subsidy to US silver producers. It also aimed to boost inflation, as the purchase of silver was financed with newly minted currency. The Thomas amendment resulted in a considerable rise of the silver market price. As shown in Figure 1, the price of silver in New York climbed from 15 cents per ounce in 1932 to about 20 cents per ounce in 1934. The powers of the US Federal government to purchase silver were further extended with the Silver Purchase Act passed by the Congress in 1934. The Silver Purchase Act gave the Federal Government outright powers to purchase silver at home and abroad until the market price reached at least $1.29. By the end of 1935, the price of silver in the New York market increased to almost 70 cents per ounce (Figure 1).

President Roosevelt undertook this program to accommodate the lobbying of farmer and silver producing states. Between 1928 and 1932, the price of silver had dropped by about 30%, and silver producing states increasingly demanded some action from the Federal government to reverse the trend. By 1932 the so-called silver bloc became particularly influential in the Congress. Out of the 14 Senators of the silver producing states, 12 were Democrats (like President Roosevelt) and strong advocates of undertaking policies to raise silver prices. The interests of silver producing states were also backed by farmer states, which saw policies intended to raise silver prices as a way increase inflation and raise the prices of agricultural products.

Interestingly, advocates of various forms silver purchase programs argued that such a policy would have beneficial effects in countries on the silver standard, such as Mexico and China. While it could have made some sense for Mexico, which had significant silver mining activities, it is difficult to rationalize this belief for China, which mined very tiny amounts of silver.

Increasing silver prices had a very visible impact on the silver reserves of China, the world's major country on the silver standard. Large amounts of silver were exported to take advantage of the increasing market price. Figure 2 shows the amount of silver held in China between 1931 and 1935. Around 1933, the Chinese silver stock takes a sharp downward turn, decreasing by about 15%.

To stem the silver outflow, the Chinese government imposed high export duties on silver, with the intention of curbing the profits on silver exports. Official Chinese customs data show that silver outflow was close to zero during 1935. However, smuggling made these regulations ineffective: estimated silver smuggling amount between 1934 and 1936 are roughly 250 million of Chinese silver dollars.

Failing to stop the trend, Chinese government finally decided to abandon the silver standard. An official announcement was made in November 1935, declaring all silver to be government property. Any kind of silver exchange was also forbidden, and paper notes were issued one to one against the silver Chinese dollars in circulation.[1] The trends demonstrated by the lower left and lower right graphs regarding silver shipment in Shanghai correlate strongly with the above one on national level.

C. Interpretations

Friedman and Schwartz (1963) and Friedman (1992) argue that the Silver Purchase program had a devastating effect on the Chinese economy. As silver was at the basis of the Chinese monetary standard, the outflow of silver corresponded to both a sharp contraction in the money supply and an appreciation of the Chinese dollars vis-à-vis major foreign currencies. The decline in money supply produced a sharp

[1] To maintain a stable value of the new currency: legal tender notes, the Chinese government sent large amount of silver to the UK and the US, which is reflected by the last three peaks from late 1935 to 1937.

reduction of imports, domestic consumption, and investment. At the same time, the rising silver prices corresponded to an appreciation of the Chinese dollar, with detrimental effects for the export sector. As Chinese dollar kept appreciating, exports fell dramatically. Compared that to 1929, the export value of China's major goods such as silk and tea was down by 65% in 1935 (Yu, 1937, pp. 224-225).

Brandt and Sargent (1989) recognize that the Silver Purchase program led to an increase of silver prices and an outflow of silver from China. However, they argue that the Silver Purchase program had mainly an effect on relative prices, but not on the real economy. With higher silver prices Chinese banks could back up the same or even a larger amount of paper money with any given amount of silver. Chinese banks exploited the arbitrage opportunity offered by higher silver prices and sold part of the silver abroad. As the law allowed them, they substituted their silver reserves with Republic of China treasury bonds. The Brandt and Sargent (1989) argument rests on two assumptions. First, from the perspective of investors, Chinese treasury bonds were as good as silver to back up the currency (i.e. the perceived risk of the government default was very low). Second, prices in China were flexible enough to insulate the real economy from any adverse effect driven by the outflow of silver and deflation.

Consistent with this hypothesis, they show that in China M1 declines as a result of the outflow of Silver, but M2 remained constant or even increased during the 1930s. They also present macroeconomic evidence showing only a mild decline in GPD and other macroeconomic aggregates.

At the end of the day, whether the Silver Purchase program had an impact on the Chinese real economy remains an empirical question, which we want to address in this work. We examine here a specific consequence: the silver outflow's effect on banks provision of credit and firms' investment. To the extent that silver was the main element used to back the currency, an outflow of silver would drain banks of the necessary resources needed to support lending, thus leading to a credit crunch.

III. Theoretical Framework

The Friedman-Schwartz hypothesis can be applied to the Chinese economy via three channels: (1) the outflow of silver leads to an appreciation of the Chinese dollar, hurting especially the export sector; (2) the outflow of silver leads to a reduction of the number of bank notes in circulation; given nominal frictions in the economy, the money supply contraction leads to a decline in output, consumption, and investment; (3) the outflow of silver deprives banks of the necessary resources needed to lend to the private sectors, which in turn leads to a credit crunch.

Our analysis focuses on the third channel. An outflow of silver is unlikely to lead to a credit crunch if Chinese banks could freely exchange silver with Chinese Treasury bond to back up their notes. This happens when treasury bonds are considered "as good as silver" in assuring the payments of the bank notes. If this is not the case, given a reduction of silver reserves, the bank will also reduce the amount of loans outstanding and increase the proportion of its cash in hand.

To illustrate this case, in Table 1 we present an example based on a fictional Chinese bank balance sheet around 1933. Before the silver a shock, the bank has a balance sheet as in Table 1, panel A. Our bank is financed with notes, deposits, and shareholder capital. On the assets side, the bank makes loans to entrepreneurs, and holds Republic of China treasury bonds, silver, and cash. Note that in this example 80% of the notes issued are backed by silver: the bank is using a larger proportion of silver than legally required to sustain the amount of notes it has issued.

After the Silver Purchase program, the bank may sell silver on the international markets to make a profit from the higher silver price. In our example, it can sell up to 20 Chinese dollars of silver: by legal requirements, the bank has to maintain at least 60% of the value of its notes in silver reserves (assume for simplicity that the surplus generated by the silver sale is paid out immediately to the bank's shareholders). In order to respect the legal reserve requirements, the bank has to buy 20 dollars' worth of Chinese Treasury bonds.

The transactions we just discussed lead to a new balance sheet, in Table1, panel B. Under the "real bill" doctrine that Chinese treasury bonds are as good silver, as assumed in Brandt and Sargent (1989), nothing more happens. The bank's shareholders receive higher dividends, the amount of money supply remains unchanged, and the amount of loans to the private sector untouched.

In contrast, if the bank fears that that Chinese government may default on its debt (i.e. treasury bonds are not "as good a silver"), the bank may want to further restructure its liabilities. By legal requirements, the proportion silver treasury to treasury bonds cannot be reduced. However, the bank can reduce the amount of loans granted to the private sector, and increase the amount of cash held. This will generate a situation like the one presented in Table 1, panel C, where loans are reduced of 20%, and cash reserves increase four times as much.

This framework encompasses both the Friedman-Schwarz hypothesis and the alternative interpretation put forward, for instance, by Brandt and Sargent (1989). Which hypothesis provides a better account of the economic and social impact of the US Silver Purchase program in 1930s China is, thus, an empirical question.

IV. Data

Our data contain three pieces of information: (1) Loan contracts; (2) Bank balance sheet data; (3) Information on labor disputes (for brevity, "riots"). All of our data refer to the years starting in 1931 until 1935, when China abandons the silver standard.

A. Loan contracts

Individual loan information is collected both from provincial and city archives in seven Chinese major provinces/cities: Beijing, Canton, Chongqing, Nanking, Shandong, Shanghai, and Tianjin. These areas were chosen because of their economic importance in inter-war China. For instance, Shanghai and Tianjin were the main financial centers; Nanking was the capital city of China at the time; Canton is one of the oldest

and largest trading harbors. Individual loan contracts report the issuing bank's name, the identity of the borrowing firm, the loan amount, issue date, and terms such as interest rate, duration, as well as weather collaterals are pledged. In a small number of cases, they also report the purpose of the loan. The loan amount is the most widely populated data item, so we focus on it for the majority of our tests.[2]

In total, the sample covers 540 industrial loans, made by 43 banks to 164 individual firms. The bank lenders in this set are representative of the domestic banking sector in 1930s China, and comprise 43 "modern" banks.

At the time of writing (January 2015), we do not yet have detailed accounting information on the borrowing firms in this set. We are currently consulting archives to retrieve these data, and we plan to incorporate them in a future draft of the paper. Based on the available information from the loan contracts, however, we can conclude that our sample borrowers are also highly representative of the 1930s Chinese economy. They cover a cross-section of 18 different industries, based on the International Labor Organization 1923 classification, widely in use in China in the 1930s, out of a total of 27 industries. The most important industries in our set are transportation and textile. (48% and 13% of the aggregate loan amount, respectively), consistent with the massive railway construction underway during the period, as well as the historical role of the textile industry played in Chinese industrial development.

B. Bank balance sheet data

Bank balance sheet data are retrieved from the Bankers' Weekly journal, a review published by the Shanghai Banking Association on a weekly basis from May 1917 through to March 1950. Each issue contains annual reports of both national and regional banks as well as 8 leading trusts. In the 1930s, trusts engage in various financial businesses, including collecting deposits, extending loans, selling insurances. There is no evidence showing that trusts differ from banks in terms of savings and lending practices. In this draft, we complement these data with information from two additional sources: the Financial and Commercial Monthly Bulletin

[2] Schnabl (2012) also focuses on this variable.

of the Bank of China (henceforth FCMB) issued by the economics research department of the Bank of China from 1934 to 1939, and Liu (2007). The FCMB is a widely adopted, reliable source providing data on the Chinese banking sector during the first half of the 20th century. It mainly reports data on banks' notes issuance and the related silver stock. The FMCB also provides other useful data such as silver prices, silver shipping in China, and interest rates in various Chinese cities. Liu (2007) reports general information on bank ownership as well as bank location and capital. The ownership information will allow us to distinguish among banks fully owned by the government, banks fully owned by private individuals and "hybrid" banks with both the government and the private sector in their ownership base.

From these sources, we also retrieve data on bank silver reserves, total cash, initial capital, securities, total assets, deposits, equity, and total loans. The key variable of interest in our analysis is each bank's stock of silver, defined as the amount of silver held by a bank to back up its note issuance. All in all, we are able to retrieve complete data balance sheets data for 43 (42 banks and 1 trust) institutions.

We present the descriptive statistics of our sample in Table 2, panels A and B. Prior to the implementation of the US Silver Purchase program, there is significant cross-sectional dispersion in the level of reserves across our sample banks. The average bank has silver reserves of 25 million Chinese dollars. The minimum value of silver reserve we observe is 122,000 Chinese dollars while the maximum value is about 390 million Chinese dollars. Different banks can thus be expected to have very different exposures to the Silver Purchase program "shock", justifying our empirical approach. Out of the 43 banks in our sample, 5 were fully owned by the government, 32 owned by private individuals and 6 displayed a hybrid structure. Table 2 (panel B) reveals that the average loan in our sample was about 150,000 Chinese dollars. For a limited number of loans we also have maturity information: the average duration of a loan was about 15-18 months.

C. Riots

The final piece of data used in our analysis is information on riots and social unrest in China around the Silver Purchase program. To the extent that we aim to take the Friedman-Schwarz hypothesis in a literal sense to the data ("*the US Silver Purchase program must be regarded as having contributed, if perhaps only modestly, to the success of the communist revolution in China*", Friedman (1992)), this is simply a proxy for the extent of popular support for the Communist insurrection in the 1930s.

An alternative could be Communist Party membership data in different locations throughout China over our sample period. These data are not readily available, but we are currently working to obtain them, and a future draft of the paper will analyze them as well. That said, Party membership data are also not above criticism, in that they can suffer from two potential biases. First, membership data from contemporary 1930s sources will likely *understate* the real extent of Communist support, given that joining the party was a criminal offense at the time. On 12 April 1927, the military force of Chiang Kai-shek started a violent suppression of Communist Party organizations in Shanghai, known as the Shanghai massacre of 1927. The hostile attitude of the Chinese government to Communist Party carried on until at least 1937 (Harrison, 1972, pp. 91-96). Second, membership data from later sources will likely *overstate* Communist support, given the incentives to trace back one's party membership to the early days of the Revolution following the Communist takeover in 1949.

In light of these considerations, in the current draft we focus on more general information about labor unrest. This helps us address the broader economic consequences of the monetary shock, beyond the scope of the Friedman-Schwarz hypothesis. We retrieve these data from the survey "Industrial Disputes in Shanghai since 1928" conducted by the bureau of social affairs of the city government of greater Shanghai for 1931 and 1932. We then follow the same survey published on the journal Economy Statistics Monthly for until the end of 1935. Throughout the analysis, we use the term "riot" to refer to any instance of social unrest; this includes strikes, disputes, or legal cases between owners and employees over labour conditions. The survey from where we retrieved the data already divides the number of riots distinguishing them per

underlying reason. We identify in total 840 riots cases between 1931 and 1935 in Shanghai (Table 3, Panel A). There are multiple causes for riots during our sample period, but as illustrated in Table 3, panel B, the majority can be related to worsening economic conditions: the top causes of riots are employee dismissal, bankruptcy, and salary disagreement.

V. Testing the Friedman-Schwarz Hypothesis

In this section, we bring the Friedman-Schwarz hypothesis to the data. We decompose their argument into three components, and evaluate the empirical support of each of them separately. First, did the US Silver Purchase program lead to a contraction of lending in China? Second, did the reduction in lending impact real economic activities? Third, were there material social consequences of the US Silver Purchase program?

A. Impact of the Silver Purchase Program Shock on Lending

We start by documenting the impact on lending of the Silver Purchase program. Given the nature of the shock, we conjecture that the credit contraction should be primarily driven by banks with a larger exposure to the Silver Purchase, i.e. banks with ex ante smaller silver reserves.

We begin by looking at the aggregate loan volume reported on banks' balance sheets, and regress them on the banks 1931 silver reserves. The estimates, reported in Table 4, are consistent with the Friedman-Schwarz hypothesis. They imply that a 1% decline of 1931 silver reserves will shrink its loan portfolio between 0.18 and 0.25%.

These results suggest an economically large impact of the shock on banks' lending volume. They estimates, however, could be confounded by loan demand effects associated with individual firms. To address this concern, we turn to our data on individual loan contracts. We report two complementary tests. In the first one, we estimate:

$$L_{fbt} = \alpha_f + \alpha_b + \alpha_t + \beta Post_t \times Silver\ Reserves_{b,1931} + \gamma' x_{fbt} + \varepsilon_{fbt} \quad (1)$$

The dependent variable is the natural logarithm of the dollar amount lent to firm f by bank b in year t. We regress this variable on an indicator variable $Post$, equal to 1 in the years subsequent to the implementation of the US Silver Purchase program (1933 onwards), the banks' 1931 reserves $Silver\ Reserves$, and an interaction term, as well as a vector x of control variables, including firm, bank, and year fixed effects. A positive β coefficient would indicate that banks that had larger silver reserves before the shock could extend larger loans after the purchase program. We estimate (1) by collapsing the data down to firm-bank pair averages before and after 1933, so as to be immune from the Bertrand et al. (2004) critique of autocorrelation in the standard errors.[3] Identification in equation (1) mostly originates from the cross-sectional differences of banks' silver reserves. In principle, banks with larger amount of pre-shock silver reserves should be less likely to reduce loan amounts once silver starts to outflow from China.

In a second test, we follow Khwaja and Mian (2008) and Schnabl (2012) and estimate:

$$\Delta L_{fb} = \alpha_f + \alpha_b + \beta \Delta Silver\ Reserves_{b,1931} + \gamma' x_{fb} + \varepsilon_{fb} \quad (2)$$

The dependent and explanatory variables are labelled as in the previous equation. Specification (2) is estimated on data collapsed down to firm-bank pair averages, before and after 1933. As Khwaja and Mian (2008) and Schnabl (2012), we estimate equation (2) in the sub-sample of firms that borrow from at least two banks: such a restriction allows us to control for firms fixed effects. In this model, identification relies mostly on firms' fixed effects, which, in principle should control for firms' demand both before and after the shock. We report the estimates of (1) and (2) in Tables 5 and 6. We report separate results between for full sample and a sub-sample of syndicated loans. In both cases, the analysis lends support to the Friedman-Schwarz hypothesis: banks with a larger exposure to the Silver Purchase program shock appear to be quicker to cut down on their lending activity. The estimates of (1) in Table 5 imply that a 1% decline of silver as in 1931 will curb lending by about 0.24% in the aftermath of the Silver Purchase program.

[3] Equivalently, one could cluster the standard errors around firms, banks, or firm-bank pairs. We obtain similar results with these alternative approaches, omitted for brevity (but available upon request).

Moreover, our empirical strategy alleviates the potential confounding effect of loan demand by individual firms. The presence of borrowing firm fixed effects in the regression equation implies that the *same* firm, borrowing from two different banks, will experience a drop in lending from the bank with lower 1931 silver reserves.

Taken together, these findings support the first part of the Friedman-Schwarz hypothesis. The outflow of silver from China, driven by the US Silver Purchase program, leads to a reduction in credit, the more severe the lower the pre-Purchase program silver reserves of a given bank. The credit contraction cannot be explained by demand conditions, nor is it subsumed by variation in the strength of the lending relationship between a given firm and bank, supporting a causal interpretation for our evidence.

B. Impact on Real Economic Activity

In a future draft of the paper, we plan to take to the data the second part of the Friedman-Schwarz hypothesis. Did the reduction in lending originated by the US Silver Purchase program lead to a contraction of real economic activity in China? The existing literature has largely focused on aggregate figures to answer this question, with mixed results: Friedman (1992) finds it did, Brandt and Sargent (1989) find it did not. A possible explanation for this conflicting evidence is that aggregate statistics are more subject to the confounding effects of the ongoing Great Depression world-wide and political instability in China, which make it difficult to attribute changes in aggregate output to any one driver and isolate the direction of causality.

To address these difficulties, we propose to resort to micro data, and relate cross-sectional variation in firm- or plant-level output to changes in credit driven by the silver shock. Micro data on economic activity in 1930s China are available for a number of industries, such as textiles (Zeitz, 2013). We are collecting these data at the time of writing (January 2015), and plan to

incorporate this evidence in the next draft of the paper. Once the data are available, we plan to run tests on similar specifications as the ones described in the previous section.

C. Social Consequences of the Monetary Shock

Finally, we look at the social consequences of the Silver Purchase program shock. To establish the connection between the contraction of credit and social unrest, we assume that industrial plants in 1930s China borrow primarily from banks headquartered near them, or with branches in their proximity. This assumption is motivated by the literature on relationship lending (e.g. Petersen and Rajan, 2004; Degryse and Ongena, 2005), which finds that geographical distance is an important determinant of credit availability. To the extent that this applies to modern banking, we believe it is a valid assumption also for 1930s China, when commuting costs were arguably higher than in contemporary times.

We construct an index of local silver reserves availability around each firm in our sample, by adding up the silver reserves of all banks with either headquarters or branches within a 15 km radius around the firm's headquarter.[4] We then relate the index to whether or not labor disputes or outright riots occur at a given firm in a given year, as well as to various measures of the intensity of the disputes, namely the number of occurrences in a given year, the number of employees involved, and the average duration of the dispute. We estimate:

$$Riot\ intensity_{ft} = \alpha_f + \alpha_t + \beta Post_t \times Available\ Silver_{f,1931} + \gamma' x_{ft} + \varepsilon_{ft} \quad (3)$$

The dependent variable is a measure of riot intensity at firm f in year t, and $Available\ Silver$ denotes the index of silver availability around firm f. As before, we collapse the sample to firm averages before and after 1933 as in Bertrand et al. (2004). The results are reported in Table 7.

[4] We obtain similar results with alternative radiuses in the 10-20 km range.

They indicate that the social impact of the credit contraction above is substantial. A 1% smaller pool of reserves around a given firm is associated with a 0.30% higher likelihood of experiencing any riots, 0.07% more expected riots, involving 0.34% more employees, and lasting 0.52% longer.

Do these estimates justify Friedman's (1992) claim that the US Silver Purchase program led to the success of the Communist uprising? Perhaps not, but taken together with our previous results they certainly suggest that it had a visible impact on labor relations. In addition, as we discuss in the data section, in a future draft of the paper we plan to integrate these findings with tests looking directly at Communist party membership, on which we are currently working to obtain data.

VI. Conclusions

Using a novel, hand-collected micro dataset on credit and social unrest in 1930s China, we take to the data the Friedman-Schwarz hypothesis that the 1933 US Silver Purchase program originated a monetary shock in China, which resulted in a contraction of the economy and social unrest ultimately leading to the success of the Communist uprising. Our evidence is consistent with this argument. Indeed, we find that banks with the largest exposure to the Silver Purchase program shock curb their lending activity after 1933, and that social unrest is more likely at firms borrowing from these banks. We are currently in the process of expanding our data set to cover micro-level data on real economic activity as well as Communist party membership around 1933, to be used in a future draft of the paper.

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Table 1 Illustration: Fictional Aggregate Chinese Bank Balance Sheet around 1933

A. Prior to 1933 US Silver Purchase Program

Assets		Liabilities	
Loans	150	Notes	100
Treasury bonds	10	Deposits	100
Silver reserves	90	Capital	60
Cash	10		

B. Post-1933 – "Real Bill" Doctrine
(Treasuries "as good as silver")

Assets		Liabilities	
Loans	150	Notes	100
Treasury bonds	40	Deposits	100
Silver reserves	60	Capital	60
Cash	10		

C. Post-1933 – No "Real Bill" Doctrine
(Treasuries <u>not</u> "as good as silver")

Assets		Liabilities	
Loans	120	Notes	100
Treasury bonds	40	Deposits	100
Silver reserves	60	Capital	60
Cash	40		

Table 2 Bank Balance Sheets and Loans – Summary Statistics

Panel A reports summary statistics on balance sheet data for the Chinese banks in our sample. All figures are expressed in thousands of Chinese silver dollars. Government-owned banks are classified as "Government", privately owned ones as "Private", and banks funded by both the government and private parties as "Hybrid". Panel B provides summary statistics for the loan contracts in our sample, by year. The data are hand-collected, and retrieved from a number of archival sources described in detail in the text.

A. Bank level variables (Chinese $000)

	N	**Mean**	**St. dev.**	**Min**	**Max**
Bank assets	184	82,668	185,144	858	1,342,242
Initial capital	199	3,355	4,889	200	24,712
Cash	184	15,905	39,103	31	301,202
Loan	176	25,099	46,052	2	381,948
Securities	174	8,402	24,450	0.13	252,904
Issuance reserves in cash	178	8,540	16,824	30	119,115
Deposits	184	54,083	113,983	300	766,291
Silver reserve	175	25,090	55,933	122	391,443
Bank ownership: *Government*	5				
Private	32				
Hybrid	6				

B. Loan Contract Characteristics

	1931		*1932*		*1933*		*1934*		*1935*	
	Mean	**St. dev.**	**Mean**	**St. dev.**	**Mean**	**St. dev.**	**Mean**	**St. dev.**	**Mean**	**St. dev.**
Loan amt (Chn. $000)	135	546	77	193	261	304	357	819	286	1,129
Loan duration (months)	15	12	15	14	26	24	17	22	12	16
Monthly rate (%)	1.25	0.67	1.02	0.14	0.94	0.24	0.88	0.24	0.9	0.39
Nr. loans	58		94		79		166		143	
Total nr. loans	540									

Table 3 Labor Disputes – Summary Statistics

The table reports summary statistics on labor disputes in our sample. Panel A summarizes the intensity in terms of number of employees involved and duration. Panel B reports a breakdown of the causes of the dispute. The data are retrieved from the survey "Industry Disputes in Shanghai since 1928" conducted by the Bureau of social affairs of the city government of greater Shanghai (1931-32), and analogous surveys published by the Economic Statistics Monthly journal (1933-35).

A. Labor Disputes – Intensity

	N	**Mean**	**St. dev.**	**Min**	**Max**
Employees involved	839	205	925	1	8,876
Case duration (days)	839	26	25	2	319

B. Causes of Labor Disputes

	1931	*1932*	*1933*	*1934*	*1935*
Riot no.	220	159	183	139	139
Causes					
Employer dismisses workers	144	101	100	77	60
Company stops operating	15	15	14	15	33
Salary disagreement	34	26	45	23	22
Improve treatment	25	14	24	24	20
Other	2	3	–	–	4

Table 4 Silver Reserves and Credit Around 1933 – Bank-Level
The table reports the estimates of:

$$\Delta L_b = \alpha_b + \beta Silver\ Reserves_b + \gamma' x_b + \varepsilon_b$$

The dependent variable is the change in the natural logarithm of total loans extended by bank b around 1933 (average after 1933 minus average prior to 1933). The variable $Silver\ Reserves_b$ denotes the bank's average silver reserves (units: 1 = Chinese $10 million) over the period 1931 up to and including 1933. All other data are collapsed and time-averaged before and after 1933. Both specifications include bank headquarters fixed effects. x is a vector of control variables, including bank assets and equity ratio. All variables are defined in detail in the appendix. The t-statistics, reported in parentheses, are based on standard errors clustered around banks. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	(1)	(2)
Silver reserves	0.241***	0.188***
	(2.72)	(3.99)
ΔBank assets		-1.558***
		(-2.96)
ΔEquity ratio		-0.091**
		(-2.43)
Intercept	-1.850***	0.164
	(-45.39)	(0.72)
Bank HQ f.e.	Y	Y
N	43	39
R^2	0.309	0.487

Table 5 Silver Reserves and Credit around 1933 – Loan-Level
The table reports the estimates of:

$$L_{fbt} = \alpha_f + \alpha_b + \alpha_t + \beta Post_t \times Silver\ Reserves_b + \gamma' x_{fbt} + \varepsilon_{fbt}$$

The dependent variable is the natural logarithm of total loans extended by bank b to firm f in year t. The variable $Silver\ Reserves_b$ denotes the bank's silver reserves prior to 1933 (units: 1 = Chinese $10 million). $Post$ is an indicator variable equal to 1 for years following 1933. x is a vector of control variables including firm, bank, and year fixed effects. Following Bertrand et al. (2004), the equation is estimated on changes around 1933, after collapsing and time-averaging the data before and after 1933, so as to run:

$$\Delta L_{fb} = \alpha_f + \alpha_b + \beta Silver\ Reserves_b + \gamma' \Delta x_{fb} + \varepsilon_{fb}$$

In columns (1)-(2), the bank's silver reserves are averaged over the period 1931-1933. In columns (3)-(4), only reserves as of 1931 (the first year in the sample period) are considered. All variables are defined in detail in the appendix. Panel A reports regression estimates based on the entire sample of loan contracts; panel B on a sub-sample of syndicated loans. The t-statistics, reported in parentheses, are based on standard errors clustered around banks. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

A. Overall Loan Sample

	Silver reserves: 1931-1933		Silver reserves: 1931	
	(1)	(2)	(3)	(4)
Silver reserves	0.146***	0.127***	0.245**	0.219*
	(4.02)	(2.94)	(2.68)	(1.80)
ΔBank assets		0.371		1.072
		(0.32)		(1.02)
ΔEquity ratio		0.068		0.030
		(0.79)		(0.28)
Intercept	1.346**	1.329**	1.111**	0.840
	(2.55)	(2.38)	(2.27)	(1.69)
Bank HQ f.e.	Y	Y	Y	Y
Firm f.e.	Y	Y	Y	Y
N	334	334	301	301
R^2	0.978	0.978	0.978	0.978

Table 5 Silver Reserves and Credit around 1933 – Loan-Level – cont'd

B. Syndicated Loans Sub-Sample

	Silver reserves: 1931-1933		Silver reserves: 1931	
	(1)	(2)	(3)	(4)
Silver reserves	0.084***	0.060***	0.121**	0.064
	(3.16)	(3.57)	(2.08)	(1.39)
Relationship strength	0.065	0.068	0.082	0.087
	(1.26)	(1.34)	(1.32)	(1.44)
ΔBank assets		0.212		0.242
		(0.31)		(0.34)
ΔEquity ratio		0.081		0.091
		(1.30)		(1.39)
Intercept	0.994	0.976	0.465	0.427
	(1.40)	(1.36)	(0.55)	(0.541)
Bank HQ f.e.	Y	Y	Y	Y
Firm f.e.	Y	Y	Y	Y
N	221	221	192	192
R^2	0.982	0.983	0.981	0.981

Table 6 Silver Reserves and Credit around 1933 – Loan-Level, Alternative Specification
The table reports the estimates of:

$$\Delta L_{fbt} = \alpha_f + \alpha_b + \beta \Delta Silver\ Reserves_{b,1931} + \gamma' x_{fbt} + \varepsilon_{fbt}$$

The dependent variable is the change natural logarithm of total loans extended by bank b to firm f in year t. The variable $Silver\ Reserves_b$ denotes the bank's 1931 silver reserves (units: 1 = Chinese $10 million). x is a vector of control variables including firm, and bank headquarter fixed effects. As in Khwaja and Mian (2008) and Schnabl (2012), the sample is restricted to firms that borrow from at least two banks. In columns (1)-(3) the model is estimated on this sample; in columns (4)-(6), the sample is restricted to the subset of syndicated loans. The t-statistics, reported in parentheses, are based on standard errors clustered around banks. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Overall Sample			**Syndicated Loans**		
	(1)	(2)	(3)	(4)	(5)	(6)
Silver reserves	0.130***	0.135***	0.096	0.043***	0.049***	0.053
	(3.53)	(3.23)	(1.08)	(4.60)	(3.85)	(1.27)
Relationship strength				0.066***	0.066***	0.067***
				(3.65)	(3.62)	(3.49)
[Control variables omitted from the table]						
Bank characteristics	N	N	Y	N	N	Y
Bank HQ f.e.	N	Y	Y	N	Y	Y
Firm f.e.	Y	Y	Y	Y	Y	Y
N	255	255	255	242	242	242
R^2	0.965	0.965	0.965	0.989	0.989	0.989

Table 7 Silver Reserves and Credit around 1933 – Loan-Level, Alternative Specification
The table reports the estimates of:

$$Riot\ intensity_{ft} = \alpha_{ind} + \alpha_{loc} + \alpha_t + \beta Post_t \times Available\ Silver_{f,1931} + \gamma' x_{ft} + \varepsilon_{ft}$$

The dependent variable is a measure of labor dispute ("riot") intensity at firm f in year t. We consider an indicator variable equal to 1 if there is any labor dispute (column (1)), the natural logarithm of the number of disputes (column (2)), the natural logarithm of the number of employees involved in the dispute (column (3)), and the natural logarithm of the dispute's duration, expressed in number of days (column (4)). The variable $Available\ Silver_b$ denotes an index of silver reserves availability at banks located within a 15 km radius of firm f as of 1931 (units: 1 = Chinese $10 million). $Post$ is an indicator variable equal to 1 for years following 1933. x is a vector of control variables including industry, firm location, and year fixed effects. Following Bertrand et al. (2004), the equation is estimated on changes around 1933, after collapsing and time-averaging the data before and after 1933, so as to run:

$$\Delta Riot\ intensity_f = \alpha_{ind} + \alpha_{loc} + \beta Available\ Silver_{f,1931} + \gamma' x_f + \varepsilon_{ft}$$

All variables are defined in detail in the appendix. The t-statistics, reported in parentheses, are based on standard errors clustered around firms. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Riot	**ln(Nr. riots)**	**ln(Nr. employees)**	**ln(Duration)**
	(1)	(2)	(3)	(4)
Silver reserves	-0.194***	-0.0759*	-0.346	-0.515***
	(-2.69)	(-1.79)	(-1.40)	(-2.68)
Bank assets	5.620**	2.248*	5.002	10.680*
	(2.15)	(1.73)	(0.71)	(1.80)
Equity ratio	1.001**	0.593**	2.282	3.562***
	(2.36)	(2.31)	(1.42)	(3.00)
Intercept	0.141	-0.001	0.011	2.125
	(0.09)	(-0.00)	(0.00)	(0.54)
Industry f.e.	Y	Y	Y	Y
Firm district f.e.	Y	Y	Y	Y
N	437	437	437	437
R^2	0.102	0.108	0.104	0.101

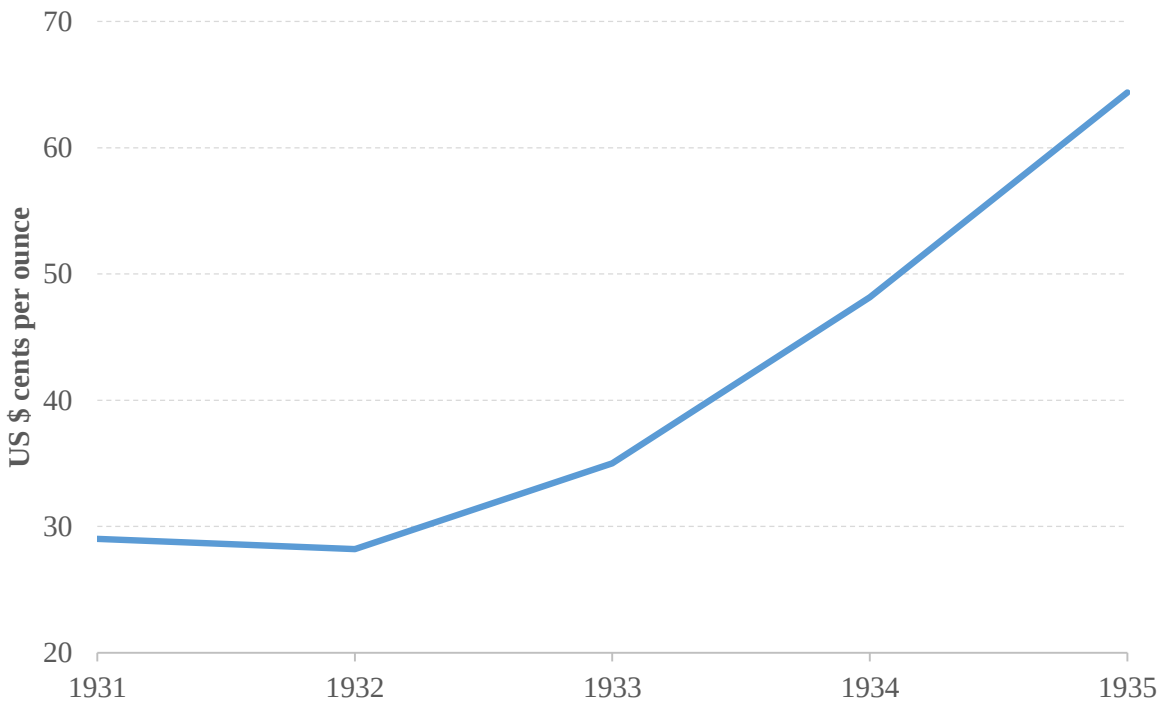

Figure 1 Silver Prices around 1933
The graph plots the time series of silver prices over the period 1931-1935, on the New York stock market.
Source: *Financial and Commercial Monthly Bulletin of the Bank of China* (1931-1936).

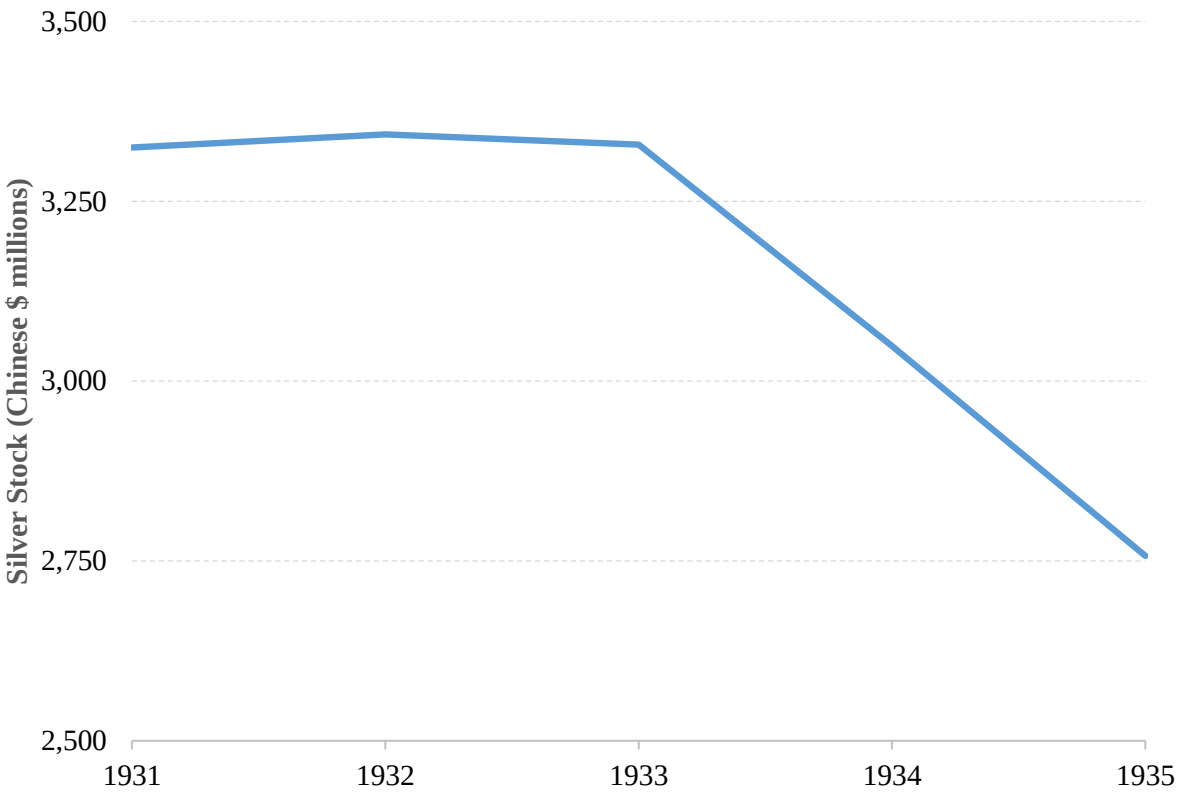

Figure 2 Chinese Aggregate Silver Stock, 1931-1936
The graph plots the time series of the Chinese silver stock, expressed in millions of Chinese dollars, over the period 1931-1935. Source: Rawski (1984).