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

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Abstract

What are the social consequences of liquidity 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 resulting bank liquidity 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 exacerbated social tensions in 1930s China, and contribute to our understanding of the (unintended) social consequences of liquidity shocks.

Keywords: Silver Purchase program, bank liquidity, 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 1930s China, which provide us with a natural experiment.

In late 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 same period. 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 lending.

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. We find evidence consistent with this argument.

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 leads the country to deflation and economic downturn.

Second, in many of these instances, the contraction of the economy has been accompanied by societal discontent, often erupting in full-fledged 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, 2013; Paldam, 1993; Ponticelli and Voth, 2014; Voth, 2011).

Third, our paper 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 a high level of money supply by replacing their silver reserves with Republic of China treasury bonds. Our micro-level evidence suggests that the availability of this alternative reserve instrument did not prevent credit rationing.

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, likely, 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 credit demand effects, exploiting information about firms that borrow from multiple banks. To do so, we base our inferences on a differences-in-differences approach based on pre-1933 silver reserves, building on 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 the *same* 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 in principle 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. The overall effect likely lies in the middle; thus, a comparison across the two kinds of sectors allows us to appraise the economic relevance of the credit demand channel.

In the second part of our analysis, we turn our attention to the liquidity shock's social impact. Combining our data with survey data from the bureau of social affairs of the city government of greater Shanghai, 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 0.07% 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 200 domestic banks in China, with over 1,300 branches (Liu, 2007). 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 nearly 70 cents per ounce (Figure 1.A).

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 a very limited amount 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 1.B shows the yearly percentage growth rate of the Chinese stock of silver between 1931 and 1935; while the stock is stable in the years prior to the Silver Purchase program, it takes a sharp downward turn after 1933, 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 this regulation ineffective: estimated silver smuggling amounts between 1934 and 1936 are roughly 250 million of Chinese silver dollars. During the spring of 1935, the Chinese government became the controlling shareholder of two “modern” banks with which it already had a close relationship, the Bank of China and the Bank of Communication. Such a move corresponded to an attempt to boost the credit capacity of the two institutions (Cheng, p. 99).

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.

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 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 the Chinese dollar kept appreciating, exports fell dramatically. Compared 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 (as well as its impact on social order). 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 (Brandt and Sargent, 1989). 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 Purchase program 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 requirement, 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 Table 1, 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 the 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 assets. By legal requirement, the proportion of silver to treasury bonds cannot be reduced any further. 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 by 20 dollars, and cash holdings increase three-fold.

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; and (3) Information on labor disputes (for brevity, "riots"). All of our data refer to the years starting in 1931 and ending in 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 are 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 for a smaller subset of contracts also additional terms such as interest rate, duration, whether collaterals are pledged, or 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.[1]

In total, the sample covers 763 industrial loans, made by 51 banks to 242 individual firms. The bank lenders in this set are representative of the domestic banking sector in 1930s China, and comprise 47 "modern" banks and 4 other financial institutions (the Shanghai Trust Co., Ltd; the Central Trust of China; the Postal Remittances & Savings Bank; and the Joint Savings Society of Yienyieh, Kincheng, Continental and China & South Sea Banks).

At the time of writing (April 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, out of a total of 27 industries based on the International Labor Organization 1923 classification, widely in use in China in the 1930s. The most important industries in our set are transportation and textiles (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

[1] Khwaja and Mian (2008) and Schnabl (2012) also focus on this variable.

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 the 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 insurance. There is no evidence showing that trusts materially differ from banks in terms of savings and lending practices, so we include them in our data (all the findings are robust to excluding them). In this draft, we complement these data with information from two additional sources: the Financial and Commercial Monthly Bulletin 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 allows 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 141 institutions (127 banks 14 other financial 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 3.8 million Chinese dollars. The minimum value of silver reserve we observe is 0 Chinese dollars (for 46 banks in our sample that do not issue any bank notes), while the maximum value is about 130 million Chinese dollars. Different banks can thus be expected to have very different exposures to the Silver Purchase program "shock", justifying our empirical approach.

According to the classification of the Chinese Bankers' Yearbook (1936), there were 6 types of financial institutions, namely, central government banks, provincial government banks, commercial and savings bank, agricultural and industry-specialized bank, overseas Chinese bank, and other financial institutions, including trusts, savings societies, etc. Out of the 141 banks in our sample, 4 were established by the central Chinese government, 18 by provincial governments, 66 were commercial and savings banks, 33 agricultural and industrial-specialized banks, 6 were owned by overseas Chinese, and 14 other financial institutions.

Table 2 (panel B) reveals that the average loan in our sample amounts to 220,000 Chinese dollars. For a limited set of loans, we also have maturity and interest information: the average duration of a loan is about 12-22 months; the average monthly interest rate is about 0.95%.

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 growing 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 plan to analyze them as well in a future draft of the paper. 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 social consequences of the liquidity 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 an analogous survey published on the journal Economy Statistics Monthly from 1933 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 partitions the number of riots, distinguishing them based on the underlying reason. We identify in total 812 riots cases between 1931 and 1935 in Shanghai (Table 3, Panel A). There are multiple causes for riots during our sample period, and 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 disagreements.

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 (measured by the log-silver holdings $Silver$), or alternatively banks with a larger outstanding stock of bank notes issued, relative to their size (measured by the notes-to-total assets ratio $Notes\ ratio$).

We begin by looking at the aggregate loan volume reported on banks' balance sheets, and regress them on the banks 1931 $Silver$ reserves or the $Notes\ ratio$. 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 the bank's loan portfolio by between 0.18% and 0.25%. A larger exposure to the shock, measured in terms of the stock of notes issued ($Notes\ ratio$), is also associated with a larger drop in lending, although the effect is not statistically significant in all specification. Finally, we do not detect an economically meaningful difference in the impact of the shock on small and large banks (below and above the median, columns (6) and (7)).

These results suggest an economically large impact of the shock on banks' lending volume. The estimates, however, could be confounded by credit demand effects associated with individual firms. For instance, it may be that banks with larger silver reserves tend to lend to more efficient firms, or less risky firms less exposed to the international economic crisis of the 1930s, also predicting higher lending growth for banks with larger silver reserves, but due to credit demand, not supply, effects.

To address this potential concern, we turn to our data on individual matched bank-loan contracts. Following the literature on bank liquidity shocks (e.g. Khwaja and Mian (2008) and Schnabl (2012)), we absorb the impact of credit demand by controlling for firm fixed effects in the following specification:

$$L_{fbt} = \alpha_{f0} + \alpha_f \times Post_t + \alpha_t + \beta_0 Silver\ Reserves_{b,1931} +$$

$$\beta Post_t \times Silver\ Reserves_{b,1931} + \gamma' x_{fbt} + \varepsilon_{fbt} \qquad (1)$$

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 fixed effects, allowing for a different firm-specific intercept before and after the 1933 shock. 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.[2] That is to say, we estimate:

$$\Delta L_{fb} = \alpha_f + \beta Silver\ Reserves_{b,1931} + \gamma' \Delta x_{fb} + \varepsilon_{fb} \qquad (1')$$

Identification in equation (1) (or (1')) mostly originates from the cross-sectional differences of banks' silver reserves. In principle, banks with larger amount of pre-shock silver reserves are better able to absorb the liquidity shock, and thus should be less likely to ration credit after 1933. As Khwaja and Mian (2008) and Schnabl (2012), we estimate equation (1') on the set of firms that borrow from at least two banks (this restriction allows us to control for firms fixed effects).

We report the estimates of (1') in Table 5. The results lend 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 in Table 5 imply that a 1%

[2] 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).

decline in 1931 silver reserves will curb lending by about 0.25% in the aftermath of the Silver Purchase program.

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 world-wide Great Depression 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 again 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 (as in Zeitz, 2013) as well as railways (available from Woodhead (1931-1935)). We are collecting these data at the time of writing (April 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 Liquidity 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 as a weighted average of bank silver reserves:

$$Available\ silver_f = \sum_b \frac{Silver_b/d(f,b)}{\sum_b 1/d(f,b)} \quad (2)$$

where $Silver_b$ denotes the log-1931 silver reserves of bank b used throughout, and $d(f,b)$ is the distance between firm f and bank b, measured in km. $Average\ silver$ is going to be larger if banks in the vicinity of firm f have larger silver reserves. It thus captures the ability of the likely lenders of firm f to absorb the Silver Purchase program shock. As an alternative, we also construct an inverse distance-weighted average of banks' $Notes\ ratio$ ($Notes\ exposure$).

We then relate the index to whether or not labor disputes or outright riots occur at a given firm's plant in a given year ($Riot$), as well as to a measure of the intensity of the disputes, namely the (log-)number of riot occurrences in a given year. We estimate:

$$Riot\ intensity_{ft} = \alpha + \beta_0 Av.silver_{f,1931} + \beta Post_t \times Av.silver_{f,1931} + \gamma' x_{ft} + \varepsilon_{ft} \quad (3)$$

As before, we collapse the sample to firm averages before and after 1933 as in Bertrand et al. (2004) and estimate:

$$\Delta Riot\ intensity_{ft} = \alpha + \beta Available\ silver_{f,1931} + \gamma' \Delta x_f + \varepsilon_f \quad (3')$$

The control variables x include Shanghai city district, industry, and firm nationality fixed effects. The results are reported in Table 6. 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 0.07% higher likelihood of experiencing any riots, and about 0.06% more expected riots.

Do these estimates justify Friedman's (1992) claim that the US Silver Purchase program ultimately 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 contributing 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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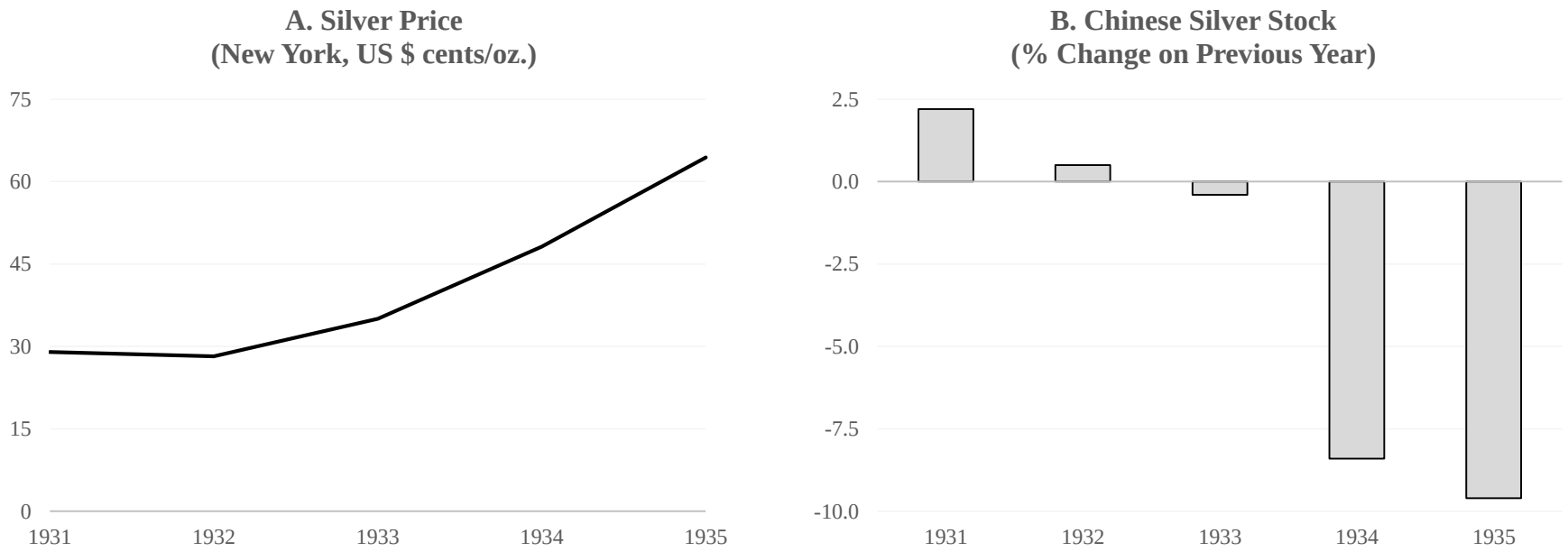

Figure 1 Silver Prices and Changes in Chinese Silver Stock, 1931-1935
Panel A. reports the silver price quotes in New York over the period 1931-35 (source: *Financial and Commercial Bulletin of the Bank of China*, 1931-1935). Panel B. reports yearly changes in the Chinese stock of silver reserves (source: Rawski (1984)).

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

A. Prior to 1933 US Silver Purchase Program

Assets		Liabilities	
Loans	140	Notes	100
Treasury bonds	20	Deposits	100
Silver reserves	80	Capital	50
Cash	10		

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

Assets		Liabilities	
Loans	140	Notes	100
Treasury bonds	40	Deposits	100
Silver reserves	60	Capital	50
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	50
Cash	30		

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 dollars. Panel B provides summary statistics for the loan contracts in our sample, by year. Loan amounts are expressed in thousands of Chinese dollars. Loan duration is expressed in month. The monthly interest rate is expressed in percentage points. The data are hand-collected, and retrieved from a number of archival sources described in greater detail in the text.

A. Bank level variables (Chinese $000)

	N	Mean	St. dev.	Min	Max
Bank assets	551	35,620	115,508	67	1,342,242
Equity	484	3,187	8,092	23	103,845
Cash	551	2,818	8,566	0	87,409
Loan	539	21,506	73,041	34	962,871
Notes issuance	523	4,889	16,717	0	179,924
Silver reserve	376	3,835	13,031	0	129,026
Deposit	514	25,593	85,817	9	992,941
Net income	544	307	1,076	-291	14,822

B. Loan Contract Characteristics

	N	Mean	St. dev.	Min	Max
Loan amt (Chinese $000)	763	220	678	0.20	9,000
Loan duration (months)	552	16	19	1	96
Monthly rate (%)	507	0.95	0.32	0.13	4.50
Total nr.	763				

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	811	200	928	1	8,876
Case duration (days)	811	26	25	3	319
Riot nr.	812				

B. Causes of Labor Disputes

Causes	
Employer dismisses workers	554
Salary disagreement	106
Treatment bargain	68
Union activity	19
Other	65

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 the overall loans ($Total\ loans$) extended by bank b around 1933 (average after 1933 minus average prior to 1933). The variable $Silver\ reserves$ is the natural logarithm of bank's silver reserves in 1931 (or the earliest available value prior to 1933, columns (1)-(3)). We alternatively define it as the average ratio of issued notes to total assets prior to 1933 in column (4). Column (5) includes both $Silver$ and $Notes\ ratio$. Columns (6) and (7) apply the same specification in column (2) for small and large banks, respectively (log of total equity below/above the sample median). All other data are collapsed and time-averaged before and after 1933. x is a vector of control variables, including bank size, equity ratio, cash to bank assets ratio, return on assets, and an indicator for no retained earnings. Specifications (3) to (5) include banks that do not issue notes through the sample period and we add an indicator for no notes issuance as control. 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.

						Small Banks	**Large Banks**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Silver	0.252***	0.183***	0.181***		0.184***	0.163	0.169***
	(4.15)	(3.50)	(3.64)		(3.71)	(0.31)	(2.84)
Notes ratio				-0.001	-0.003*		
				(-0.52)	(-1.87)		
Δ Bank size		0.415***	0.362***	0.709***	0.365***	3.317***	0.383***
		(5.63)	(5.44)	(3.11)	(5.89)	(4.19)	(2.95)
Δ Equity ratio		0.017***	0.009***	0.005***	0.009***	0.004***	0.014***
		(-4.57)	(-4.22)	(-4.05)	(-4.20)	(-4.20)	(-4.34)
Δ Cash ratio		-0.003	-0.003*	0.001	-0.003	-0.001	-0.002
		(-1.52)	(-1.82)	(0.45)	(-1.61)	(-0.41)	(-0.46)
Δ ROA		0.015	0.011*	0.004	0.011*	-0.000	0.009
		(1.05)	(1.88)	(0.59)	(1.90)	(-0.07)	(0.49)
Δ No ret. earnings		-0.003	-0.007	0.020	-0.013	0.056**	0.012
		(-0.04)	(-0.17)	(0.44)	(-0.29)	(-2.25)	(0.17)
No notes			-0.017	-0.065*	-0.057	0.013	-0.026
			(-0.61)	(-1.98)	(-1.37)	(0.61)	(-0.59)
Intercept	0.071***	0.039	0.053**	0.088***	0.091***	-0.030	0.061*
	(3.00)	(1.64)	(2.61)	(3.38)	(2.81)	(-1.43)	(1.89)
N	43	42	77	127	77	31	46
R^2	0.352	0.675	0.599	0.407	0.615	0.622	0.595

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

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

The dependent variable is the change in natural logarithm of loans extended by bank b to firm f (average after 1933 minus average prior to 1933). The variable $Silver\ reserves$ is the natural logarithm of bank's silver reserves in 1931 (or the earliest available value prior to 1933, columns (1) to (3)). We alternatively define it as the average ratio of issued notes to total assets $Notes\ ratio$ prior to 1933 in column (4). Column (5) includes both $Silver$ 1931 and $Notes\ ratio$. x is the vector of control variables used in Table 3. In addition, the regression includes a full set of borrowing firm 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. Columns (3) to (5) include banks that do not issue bank notes throughout the sample period (and add an indicator for no notes issuance). 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.

	OLS	FE			
	(1)	(2)	(3)	(4)	(5)
Silver	0.277***	0.262***	0.251***		0.257***
	(3.52)	(2.90)	(3.25)		(3.55)
Notes ratio				0.046**	-0.053*
				(-2.45)	(-1.92)
Δ Bank size	0.152	0.586	0.506*	1.439***	0.767**
	(0.20)	(1.45)	(1.77)	(3.08)	(2.49)
Δ Equity ratio	0.180**	-0.028	-0.013	0.061***	0.004
	(-2.47)	(-0.47)	(-0.50)	(2.72)	(0.13)
Δ Cash ratio	0.065***	0.029**	0.029**	0.026**	0.041***
	(-4.95)	(-2.31)	(-2.36)	(-2.23)	(-2.80)
Δ ROA	-0.431	-0.191	-0.186	0.094	-0.081
	(-1.11)	(-0.81)	(-1.02)	(0.43)	(-0.43)
Δ No ret. earnings	-0.460	-0.218	-0.205	0.357	-0.183
	(-0.74)	(-0.31)	(-0.36)	(0.73)	(-0.45)
No notes			1.437**	1.211***	0.903
			(2.15)	(-2.95)	(1.34)
Intercept	2.004**	-1.484	-1.311*	1.369***	-0.853
	(-2.53)	(-1.71)	(-1.90)	(5.15)	(-1.25)
Firm f.e.	N	Y	Y	Y	Y
N	309	227	240	274	240
R^2	0.028	0.885	0.883	0.863	0.887

Table 6 Impact of the Liquidity Shock on Labor Disputes
The table reports the estimates of:

$$\Delta Riot_f = \alpha + \beta Available\ silver_f + \varepsilon_{ft}$$

The dependent variable is the change in measure of labor dispute ("riot") at firm f (average after 1933 minus average prior to 1933). The data on labor disputes are hand-collected from contemporary surveys conducted in Shanghai in 1931-35. In columns (1) to (3), $Riot$ is an indicator equal to 1 if there is any labor dispute, and 0 otherwise. In columns (4) to (6), $Riot$ is measures labor dispute intensity, defined as the natural logarithm of number of labor disputes. The variable $Available\ silver$, in columns (1), (2), (4), and (5), is the average of the natural logarithm of available Silver in banks around firm f, weighted by the inverse distance between the firm and each banks. Alternatively, it is $Notes\ exposure$, the distance-weighted average of bank's notes to total assets ratio prior to 1933, in column (3) and (6). All specifications also include Shanghai district fixed effects, and specifications (2)-(3) and (5)-(6) also include industry and firm nationality 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. All variables are defined in detail in the appendix. The t-statistics, reported in parentheses, are based on standard errors clustered around individual firm plants. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Riot (Y/N)			ln(1 + Number of riots)		
	Silver		Notes ratio	Silver		Notes ratio
	(1)	(2)	(3)	(4)	(5)	(6)
Available silver	-0.058*	-0.067**		-0.053**	-0.060**	
	(-1.77)	(-1.97)		(-1.98)	(-2.16)	
Notes exposure			0.077**			0.059**
			(2.55)			(2.31)
District f.e.	Y	Y	Y	Y	Y	Y
Industry f.e.	N	Y	Y	N	Y	Y
Nationality f.e.	N	Y	Y	N	Y	Y
N	1739	1739	1739	1739	1739	1739
R^2	0.012	0.049	0.051	0.008	0.046	0.047

Table A.I. Variable Definitions

Variable	Definition
Total loans	The natural logarithm of 1 plus the total annual amount of outstanding loans of a given bank in a given year (log of Ch$ 10 MM).
Loan amount	The natural logarithm of 1 plus the loan amount granted by a given bank to a given firm (log of Ch$ 10 MM).
Riot	Indicator variable equal to 1 if an industrial dispute occurs at a given firm in a given year, and 0 otherwise.
Number of riots	The number of industrial disputes that occur at a given firm in a given year.
Silver	The natural logarithm of 1 plus the silver reserves of a given bank in 1931, or the earliest available date prior to 1933 (in our sample, never later than 1932; log of Ch$ 10 MM).
Notes ratio	The ratio of bank notes issued by a given bank, divided by its total assets, averaged over the 1931-1933 period (expressed in percentage points).
Available silver	Inverse distance-weighted average of the log-silver reserves around a given firm's plant in the Shanghai city area. For each firm plant f in the sample, it is computed as: $$Available\ silver_f = \sum_b \frac{Silver_b / d(f,b)}{\sum_b 1/d(f,b)}$$ where $Silver_b$ denotes the log-silver reserves of bank b as of 1931, and $d(f,b)$ the distance between plant f and bank b (measured in km).
Notes exposure	Inverse distance-weighted average of the notes-to-assets ratio (*Notes ratio*) of banks around a given firm's plant in the Shanghai city area. It is computed similarly to *Available silver*, replacing *Silver* by *Notes ratio*.
Bank size	The natural logarithm of 1 plus a given bank's equity (log of Ch$ 10 MM).
Equity ratio	Equity divided by total assets (expressed in percentage points).
Cash ratio	Cash holdings divided by total assets (expressed in percentage points).
ROA	Net income divided by total assets (expressed in percentage points).
No ret. earnings	Indicator variable equal to 1 if a bank has 0 retained earnings in a given year, and 0 otherwise.
No notes	Indicator variable equal to 1 if a bank has not issued any bank notes, and 0 otherwise.