Price Convergence Through a Financial Network: Does Financial Integration Impact Price Integration in Real Sectors?

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Abstract

How does financial integration impact price integration in real sectors? Using newly hand-collected data from a domestic exchange market during the Chinese Civil War (1945-1949), I model the connection between these two integrations measured respectively by capital flow costs (or domestic exchange rates) and commodity relative prices across cities. I use battle shocks to a financial hub in the exchange network to identify the impact of exchange rates on price convergence between a city pair connected to the hub. I find that (1) city pairs with a direct domestic exchange link exhibited faster commodity price convergence than others; (2) battles around financial hubs tended to raise capital flow costs between a connected city pair, decelerating price convergence by 4% - 8%; (3) a weak form of purchasing power parity holds: a 1% depreciation in the domestic exchange rates was associated with a 0.2%-0.3% reduction in inflation rate differentials; and (4) a higher inflation rate did not impede or strengthen the price convergence channel via domestic exchanges. These results imply that China's financial development was more sophisticated than expected relative to its status as an agricultural economy in the early 20th century.

Keywords: price convergence, financial network, domestic exchange

JEL codes: E31, G21, N25, N75

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1 Introduction

Financial development matters for real economic activities (King and Levine, 1993), which furthers economic growth (e.g., Black and Strahan, 2002) and impacts international trade (Manova, 2008; Caballero et al., 2018; and Paravisini et al., 2015). Furthermore, increasing international financial integration may lead to an increase in cross-country correlations in both consumption and GDP (Imbs, 2006), and large welfare gains by risk sharing (Colacito and Croce, 2010) and alleviating capital scarcity (Hoxha et al., 2013).

However, the real effects of domestic financial integration have long been understated. It is long assumed that financial markets have been highly integrated in an advanced economy such as the United States since early times. Only recently has more research attention been cast on US banking integrations between the late 1970s and mid-1990s due to deregulation. These domestic financial integrations expanded interstate trade by 17%-25% (Michalski and Ors, 2012), explained up to one-fourth of the rise in cross-state house price correlation (Landier et al., 2017), and increased output synchronization across states by 13% of its standard deviation (Goetz and Gozzi, 2019). For developing countries where these effects may be greater, a lack of data has discouraged similar investigations.

Using newly hand-collected data, I examine the impact of financial integration on the price comovement in real sectors in an underdeveloped economy. Specifically, I study a domestic exchange market in China during the Chinese Civil War (hereinafter referred to as "the Civil War") from 1945 to 1949. In this paper, financial integration is measured by capital flow costs or domestic exchange rates (explained later), and price comovement/integration is measured by convergence rate in commodity price differentials across regions. The domestic exchange market enabled cross-regional money transfers. Any city pair in the domestic exchange network was connected directly (for bilateral transactions) or indirectly via a financial hub city (for multilateral transactions). Since the financial hub was not necessarily on a transportation route for physical goods between the city pair, negative shocks to the hub city were more likely to affect capital flows than trade flows between them. These unique market and geographic features separated the domestic exchange network from the trade network, which provides a channel to investigate whether dysfunction in the financial network would impair cross-regional price integration by impeding capital flows.

To implement this research design, I first compile a dataset of commodity prices and the domestic exchange rates across leading cities from numerous archives by hand collection and digitization. The domestic exchange rates (or their premium/discount percentages) reflected relative money demand between cities. They were bounded by currency shipping costs and thus a good measure of cross-regional capital flow costs. The commodity prices are further used to construct a cross-city inflation rate panel with a weighted average method. I then document the detailed information of all major battles in the Civil War. Furthermore, the domestic exchange networks are recovered according to Ma (2013) and Ma (2016), and my data collection from historical newspapers. To resolve the simultaneity issue between cross-city price gaps and domestic exchange rates, I create a war risk measure as an instrumental variable for the exchange rates. The war risk measure identifies the network effect: battles around a financial hub undermined the channel of multilateral clearings between the hub and a connected city pair, thus raising the absolute premium in the exchange rates. This change impeded the capital flows between the city pair and decelerated the price convergence accordingly.

The main findings and contributions of this paper are fourfold. First, I show that the domestic exchange market provided an efficient channel for price convergence across regions, even in an underdeveloped economy with political uncertainty. During the Civil War, any pair of cities with a direct domestic exchange connection exhibited faster commodity price convergence (a half-life of 22.17 days) than those making payments only via a financial hub (23.73 days). These half-lives are much smaller than studies on other countries or in other periods, such as approximately 9 years in the United States (Cecchetti et al., 2002), 3-6 weeks in Mexico (Elberg, 2016), and on average 2.35 months in China during the late 1990s (Fan and Wei, 2006). This paper makes quantitative contributions to a strand of literature that investigates the institutional role and efficacy of the domestic exchange market before the introduction of the central banking system (Garbade and Silber, 1979; Bodenhorn, 1992; Phillips and Cutler, 1998; Knodell, 1998; and James and Weiman, 2010).

Second, in the domestic exchange network, a weaker connection to a financial hub due to battles decelerated the commodity price convergence between two other cities connected to it by 4%-8%. This result contributes to the research on market integration (Shiue, 2002; Jacks, 2006; Ejrnæs and Persson, 2010; and Hynes et al., 2012) with the implication that a financial system could play an essential role in leading market integration in addition to the influences from information and transport technology, institutional barriers to trade, geography, and monetary regimes.

Third, this paper applies the classical theory of purchasing power parity (PPP) to a domestic case: I show that 1% depreciation in the domestic exchange rate was associated with a 0.2-0.3 percentage point reduction in inflation rate differential. Numerous studies have tested multiple forms of PPP across countries using different currencies in both long term and short term (Adler and Lehmann, 1983; Krugman, 1978; Abuaf and Jorion, 1990; and Rogoff, 1996). Other studies have also examined across countries using the same currency like in a monetary union (Rogers, 2007 and Égert, 2007). However, when it turns to an intra-national case, most studies view "nominal exchange rates" as one across regions due to their unawareness of domestic exchange rates. Therefore, this paper is the first to confirm that a weak form of PPP existed between domestic exchange rates and cross-regional prices, to the best of my knowledge.

Finally, this paper is related to studies on China's economy with regard to domestic financial integration (Keller et al., 2015 and Ma and Zhao, 2020) and its integration with the rest of the world (Jacks et al., 2017 and Zhao and Zhao, 2018). While Keller et al. (2015) show that China's capital market was much less efficient than Britain's in the 18th and 19th centuries, my work, similar to Ma and Zhao (2020), reveals that the evolution in China's financial system developed more than expected relative to its status as an agricultural economy no later than the early twentieth century. As noted in Gat (2008), China's world share of GDP (32.9%) in 1820 was much higher than that (8.9%) in 1913. The great contrast between financial advance and economic falling-behind would motivate a revisit on what was the main driving force of China-West divergence.

The remainder of this paper is organized as follows. Section 2 provides the historical background of the domestic exchange market and the Chinese Civil War. Section 3 describes the data collection process and provides summary statistics. Section 4 describes the research design. Section 5 presents the main results of commodity price convergence. Section 6 examines whether the classical PPP theory could be applied to the domestic exchange rates scenario. Section 7 provides some robustness tests. Section 8 concludes my findings.

2 Historical Background

This section introduces domestic exchange and domestic exchange market and explains the importance of the Chinese Civil War period for the research setting.

2.1 Domestic Exchange

Just as foreign exchange is used to tender payments internationally, domestic exchange was used to transfer money inter-regionally (Garbade and Silber, 1979). Buyers could purchase domestic exchanges in one location to make payments or receive money in another while exchange sellers would take charge of currency shipping after all settlements. The *domestic exchange rate* was quoted as a price (or premium/discount) of every $1,000 payment. For example, a rate termed as "$1,000.25 (25 cents premium) *in* Chicago *on* New York" means that an additional 25 cents must be paid to transfer $1,000 from Chicago to New York.

Similarly, a rate of "$999.25 (75 cents discount) *in* Boston *on* Philadelphia" was to charge 75 cents below par for a $1,000 payment from Boston to Philadelphia.

The "fluctuations in these rates were influenced by relative differences in economic activity and bounded by the cost of shipping gold (currency)" (Phillips and Cutler, 1998). In other words, the domestic exchange rate or its absolute value measures currency shipping cost, indicating how fast capital flows across regions. Since these statements are relevant to the research idea, I will illustrate them in section 4.1.

2.2 Domestic Exchange Market

In the domestic exchange network, any two cities were linked to each other directly or indirectly. A direct link between two cities indicates that bilateral payments or trading in domestic exchanges existed, while an indirect link means multilateral payments were formed among these two cities and at least another hub city. Note that for a city pair, an existing direct link did not necessarily exclude in-between indirect links. Illustrative examples are shown in Figure 1. Since the indirect links between two cities provided an additional channel of capital flows between two cities besides the direct link (if any), they would affect the domestic exchange rates as well, which will also be explained in subsection 4.

Now a historical term in economics, the domestic exchange market once played an important role as an interregional payment system in the pre-central banking era. "Exchange rates between cities within the United States[1] existed during the nineteenth century and the first two decades of the twentieth" (Garbade and Silber, 1979). In contrast, as an underdeveloped country, contemporary China developed its domestic exchange market in the early twentieth century. The market prospered in the 1930s and the 1940s and disappeared around 1951 when China began its centrally planned economy. Figure 2 and Figure 3 display the domestic exchange network in China during the 1920s–1930s and the Civil War period of 1945-1949, respectively. In both figures, each black edge connecting a city pair indicates an in-between direct link. The direct links in the 1920s-1930s are recovered based on two Chinese works, Ma (2016) and Ma (2016), and those links during 1945-1949 are set if corresponding domestic exchange rates were reported in contemporary newspapers. Among all cities, Shanghai, Hankow, Tientsin, and Chungking were the largest financial hubs with the most direct links.

2.3 The Chinese Civil War Period

[1] The Federal Reserve System was created on December 23, 1913, in the United States.

The Chinese Civil War period manifested two main features: hyperinflation and countless battles. Both are crucial to the research design because they provide variations and identification.

2.3.1 Hyperinflation

The wartime hyperinflation was enormous. For example, based on price data of 22 kinds of commodities in the Chungking city, the general price level rose by 3,092,332,200% from 1946.1 to 1949.4. According to my calculation (see Table 2), 20 leading cities on average experienced a 1.6% daily inflation rate. To fight against inflation, China implemented a currency reform on August 19, 1948[2]. The hyperinflation, however, worsened after the reform. The daily inflation rate was on average 7.14% after August 19, 1948 compared to 1.02% before that day.

The hyperinflation provides an opportunity to observe dramatic and highly frequent changes in both cross-city prices of individual goods and general price levels within a relatively short time (less than four years). These variations are necessary for estimating price convergence rates. Moreover, currency reform can also be used for robustness tests in future work.

2.3.2 Battles

Since the Civil War first broke out in the north of China between the Nationalist government (NG) and the China Communist Party (CCP), most of the major battles occurred north to the Yangtze River before 1949. Figure 4 shows the geographical and temporal distribution of major battles from 1945.10 to 1949.4. Battles were very heterogeneous: some severely blocked the transportation routes between cities while others took place in rural areas. Due to CCP's military strategy[3], leading cities were not attacked on purpose, so major battles were thereby reviewed as exogenous shocks. In particular, the effect of battles on a hub city was exogenous to the direct economic connection between two other cities in the domestic exchange network. Therefore, I will use some battle measure as an instrumental variable in section 4.

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[2] A new currency, Gold Yuan Certificate, was issued to replace the old currency, Fabi. The replacement rate was 1 unit of Gold Yuan for 3 million units of Fabi.

[3] The CCP's military strategy: (1) to eliminate NG's troops was the primary goal; (2) first to occupy rural areas, then to capture small towns, and finally to attack large cities.

3 Data

To measure cross-city price convergence and the effect of battles, I hand-collected and digitized[4] sheets from multiple forms of numerous archives. I compiled a novel data set of commodity prices and domestic exchange rates across leading cities in China with information on all major battles during its Civil War period. This section documents the data collection process and describes the data collected.

3.1 Cross-City Prices, Exchange Rates, and Battle Information

All sheets containing commodity prices and domestic exchange rates are stored in historical archives. The main sources are *The Financial Weekly*[5] and *The Credit News*[6]. Some of the sheets are in the electronic (scanned) version, some of them are in paper version, but most are stored as microfilm slides in the National Library of China. Figure 5 and Figure 6 show a sample sheet from a microfilm archive and how I used the projector to collect it.

In total, I collected the daily prices of 6 commodities (coal, rice, wheat, oil, cotton, and cotton yarn) and domestic exchange rates across 20 leading cities[7], with the longest span from 1945.12.17 to 1949.4.26. Based on the cross-city commodity prices, I constructed a cross-city daily inflation rate panel, which will be discussed later in subsection 3.2. I will use inflation rates across regions to test purchasing power parity within China.

I also collected information on major battles from *The History of the Chinese People's Liberation Army (1945-1949)*. The battle information includes battle size, casualty, location (area), and duration. In total, 104 major battles from 1945.9 to 1949.4 are compiled as a panel. Based on it, I will construct two measures of war risk in subsection 4.3.

3.2 Construction of Cross-City Inflation Rate

Generally, the archives do not include data of cross-regional inflation rates. The contemporary Nationalist government constructed inflation rates (price indices), but only for a few cities such as Shanghai and Chungking. The Research Department, the Central Bank of the Republic of China adopted a *Weighted Average Method* to calculate the inflation rate:

[4] 19 undergraduates at UCLA have made outstanding efforts to help me digitize thousands of tables and sheets from archives. They are Carol Cheng, Sui Shan Cheng, Qinhan Hu, Xurui Hu, Laura Li, Jiayu Lyu, Enjie Ma, Jingjing Nie, Yilin Pan, Grace Shi, Xiaolan Shi, Minwoo Son, Yuru Xie, Yiyi Yao, Boyang Yu, David Yu, Saite Yuan, Nicole Zhang, and Yifan Zhao.

[5] Internal reports published by the Central Bank of the Republic of China

[6] A newspaper published by the Agency of the Credit and Statistics

[7] They are Canton, Chengtu, Chungking, Foochow, Hankow, Hsuchow, Kaifeng, Kunming, Kweilin, Kweiyang, Lanchow, Nanchang, Nanking, Ningpo, Shanghai, Sian, Peiping, Tientsin, Tsinan, and Tsingtao with 11 in the south and 9 in the north of China.

$$\pi_t \approx \log \frac{P_t}{P_{t-1}} \triangleq \frac{\sum_k [w^k \cdot \log(\frac{p_t^k}{p_{t-1}^k})]}{\sum_k w^k} \approx \frac{\sum_k [w^k \cdot \frac{(p_t^k - p_{t-1}^k)}{p_{t-1}^k}]}{\sum_k w^k} = \frac{\sum_k (w^k \cdot \sigma_t^i)}{\sum_k w^k} \tag{1}$$

where π represents the inflation rate, P denotes the price index, p^k is the price of commodity k, w^k is a weight assigned to commodity k, and σ^i is the price change rate of commodity k. Table 1 shows the weights (add up to 100%) assigned to 22 categories of commodities adopted by the Central Bank. Most of the commodities included in Table 1 are agricultural goods, which implies that contemporary China was an underdeveloped agricultural economy.

Accordingly, I apply their method and weights to construct an inflation rate panel of all 20 leading cities. Due to data availability, I can only use the five (coal, rice, wheat, oil, and cotton) of the 22 categories. However, those commodities are all agricultural goods, and as marked in red in Table 1, their weights add up to 62.8%, which is a good representation of the general price level.

3.3 Descriptive Statistics

The domestic exchange rates and commodity prices varied much across cities and fluctuated dramatically as the war continued. Table 2 display the summary statistics of commodity prices and domestic exchange rates, respectively.

To exclude systemic noises from hyperinflation, the price of each commodity is reported as a log difference at the city-pair level, or a log relative price. Intuitively, if it is easy to transport some good, the cross-regional price gap is small. On average, cotton yarn displays the smallest price gap (0.162), while the log relative price of coal was greatest (0.942).

Domestic exchange rates and their absolute values are an indicator of currency shipping costs, which are reported as a premium/discount percentage (hereinafter quoted in this format). A mean of premium (absolute premium) at 3.0% (resp. 5.9%) with a standard deviation of 9.1% (resp. 7.6%) indicates a much higher capital flow cost in China than that in the United States. The United States scarcely experienced a premium over 0.1% and a standard deviation over 0.04% (Garbade and Silber, 1979). Table 2 also shows very high (a mean of 1.6%) and volatile (a standard deviation of 7.6%) cross-city daily inflation rates.

The price data features a positive correlation between capital flow costs and commodity relative price. As shown in Figure 7, except for the case of coal, a higher capital flow cost between a city pair generally indicates a greater in-between commodity price gap. This basic correlation motivates a formal model regarding the impact of capital flow costs on cross-regional price convergence in the next section.

The battle information is summarized in Table 3. A battle of average size lasted around three weeks, with around 36,000 soldiers involved and resulting in 9,300 casualties. The battle influence on each city could be heterogeneous since half of the leading cities were in the south. The average distance to the front was approximately 937 kilometers (with a standard deviation of 483 kilometers).

Another important feature contained in Table 2 and Table 3 concerns a time trend. Apparently, most price and battle variables display a much larger value in post-reform period than in pre-reform period, indicating that the financial system and real sectors were more senstive to a high political uncertainty towards the late stage of the Civil War.

4 Research Design

This section describes the research design and how to implement it in detail. Two properties of the domestic exchange rates are linked to relevant empirical specification and identification.

4.1 Properties of Domestic Exchange Rates

Remark 1 *Fluctuations in domestic exchange rates were influenced by relative differences in economic activity and bounded by the cost of shipping gold (currency).*

This remark was earlier claimed by Phillips and Cutler (1998). I will informally prove the second part of this remark and illustrate the first part by an example.

The second part: consider an exchange buyer who wants to transfer \$1,000 from location A to location B. He can either purchase a domestic exchange on New York at a rate DR, or ship the money by himself at a cost C per \$1,000. Therefore, DR must be no more than $1,000 + C$. Similarly, an exchange seller will never sell it for $DR < 1,000 - C$ since then he would rather fulfill the currency shipping obligation incurring C.

The first part: for a trading period of T, no matter how many transactions occur, there are only two directions of money flows between locations A and B. If the domestic exchanges in A on B add up to x dollars, and the exchanges in B on A sum up to y dollars, suppose $x > y$, then apparently, only $x - y$ dollars of currency will be finally shipped. Thus a price in $[1000 + \frac{x-y}{x} \cdot C, 1000 + C]$ is acceptable for a seller of exchanges in A on B, and similarly, a price in $[1000 - \frac{x-y}{x} \cdot C, 1000]$ is acceptable for a seller of exchanges in B on A. Therefore, more imbalance in domestic exchange transactions will be more likely to generate a high rate in A on B, and a lower rate in B on A.

For more illustration, see another example in Figure 8

Remark 2 *For two locations A and B with direct domestic exchange trading, a new location C connecting to them will decrease the fluctuation range of the exchange rates between A and B due to a reduction in shipping costs.*

Since a new location C connecting to A and B will generate multilateral payments among them. After settlement, currency was shipped via the cheapest routes among A, B, and C.

For more illustration, see another example in Figure 9

4.2 Main specification

Inspired by Elberg (2016), I am interested in how a change in the domestic exchange rate affected the cross-city price convergence. Consider a general specification of convergence:

$$\Delta P_{c,t} = \underbrace{\beta}_{\text{auto convergence trend}} \cdot P_{c,t-1} + \Gamma_0 \cdot X_{c,t} + \underbrace{\Gamma_1 \cdot X_{c,t}}_{\text{shifts in convergence trend}} \cdot P_{c,t-1} + Lags + FEs + \varepsilon_{c,t} \quad (2)$$

In the above equation, the output variable is $\Delta P_{c,t} = P_{c,t} - P_{c,t-1}$,where $P_{c,t}$ is the price differential $P_t^i - P_t^j$ between a city pair $c(i,j)$ at time t. $X_{c,t}$ is a vector of controls that may influence convergence rate. FE resprents a variety of fixed effect. Finally, $Lags$ represents a bundle of lagged terms[8] of $\Delta P_{c,t}$.

Suppose $P_{c,t}$ is a stationary sequence. Its half-life represents the time it takes $P_{c,t}$ to decay from some initial value $\widehat{P}$ to its half value $\frac{1}{2}\widehat{P}$. In the above equation, without any other factors, $P_{c,t}$ would converge by itself with a convergence rate of $(1+\beta)$. This implies a half-life of $-\ln(2)/\ln(\beta+1)$. Please note that a higher convergence speed is equivalent to a lower convergence rate or a shorter half-life. For the details of the half-life, please check subsection **A2** in the appendices.

Taking into account all the covariates, $P_{c,t}$ converges with a rate of $(1+\beta+\Gamma_1 \cdot X_{c,t-1})$, or a half life of $-\ln(2)/\ln(\beta+\Gamma_1 \cdot X_{c,t-1}+1)$.

4.3 Identification

A simple intuition is that money in the domestic exchange market flowing from one city of high (low) price levels to another city of low (high) price levels would promote (discourage) in-between price convergence. However, according to **Remark 1**, the domestic exchange rates between a city pair reflected both the relative economic activity (imbalance in capital flows/relative money demand) and currency shipping costs. These two factors influenced

[8] I choose the order of lagged terms based on Elberg (2016) and Cecchetti et al. (2002).

the demand and supply in the domestic exchange market, respectively. Since trading volume data is not available, there is an ambiguity of how capital flows changed if a higher domestic exchange rate appeared. Furthermore, a common simultaneity issue also occurs: cross-city price differentials and domestic exchanges of the same period were determined simultaneously.

To resolve these issues, recall that in **Remark 2,** the currency shipping costs (or absolute value of the premium) in domestic exchange transactions between a city pair $c(i, j)$ would be likely to decrease by connecting to another hub city h, and so would the rate fluctuation range. In other words, disconnecting from the hub city h was more likely to lead to a higher absolute premium in exchange rate between i and j. Therefore, battles around a hub city, a supply shifter, can be used as an instrumental variable to identify the effect of domestic exchange.

The construction of battle instruments depends on the following logic. First, a threat from battles around a hub h impeded the indirect channel of capital flows between i and j via h. Second, if close to h but far from i and j, a battle was not likely to affect economic activities, especially trade flows within i and j as long as h was not a pivot right on their transportation route between i and j .Third, weakened capital flows decelerate price convergence between i and j. Please note that the second point is a key identifying assumption to be tested afterwards.

Accordingly, I create a measure of indirect war risk. It is the war risk to a city pair $c(i, j)$ indirectly via all connected hub cities. The construction is as follows: (1) for a city pair $c(i, j)$ with domestic exchange rates, find all the hub cities directly connected to both i and j; (2) for any hub $h(c)$, calculate the average influence from ongoing battles at time t as:

$$battle_{h,t} = \sum_{b(t)} \frac{\text{casualty}_{b(t)}}{\text{distance}_{b(t),h}} \tag{3}$$

where $b(t)$ represents some ongoing battle, $\text{casualty}_{b(t)}$ represents the casualty in battle $b(t)$, and $\text{distance}_{b(t),h}$ represents the distance between $h(c)$ and $b(t)$; apparently, $battle_{h,t}$ puts more weight on a battle if it was severe or close to h; (3) finally, $IW_{c,t}$ the indirect war risk to $c(i, j)$ at time t via all connected hubs. In other words, $IW_{c,t}$ is the sum of $battle_{h,t}$ over all $h(c)$:

$$IW_{c,t} = \sum_{h(c)} battle_{h,t} \tag{4}$$

To test the identifying assumptions stated above, I also create a measure of war risk confronting a city pair directly. For city i in a city pair $c(i, j)$,

$$battle_{i,t} = \sum_{b(t)} \frac{\text{casualty}_{b(t)}}{\text{distance}_{b(t),i}} \tag{5}$$

where $b(t)$ represents some ongoing battle, $\text{casualty}_{b(t)}$ represents the casualty in battle $b(t)$, and $\text{distance}_{b(t),i}$ represents the distance between i and $b(t)$; finally, the direct war risk targeting $c(i,j)$ at time t is $DW_{c,t}$.

$$DW_{c,t} = battle_{i,t} + battle_{j,t} \tag{6}$$

Should hypotheze be true, whereby indirect war risks $IW_{c,t}$ affected price convergence but direct war risk $DW_{c,t}$ did not, then the domestic exchange market is indeed a meaningful channel for price integration across regions.

5 Commodity Price Convergence

This section focuses cross-city commodity price convergence. Accordingly, the variable $P_{c,t}$ in **Equation (2)** switches to log commodity price differentials (for eliminating hyperinflation noise): $p_{k,c,t} = \log(p^i_{k,t}) - \log(p^j_{k,t})$ for a city pair $c(i,j)$ at time t, where $p^i_{k,t}$ is the (level) price of commodity k in city i. As in subsection 4.2, cross-city price gaps had its own convergence pattern, the following results thereby show which factors influenced the pattern.

5.1 The Effect of Direct/Indirect Domestic Exchange Links

I first study the effect of direct/indirect links in the domestic exchange network without exchange rate data. The direct link is defined in subsection 2.2. The specification is adjusted accordingly:

$$\Delta p_{k,c,t} = \beta p_{k,c,t-1} + \beta_1 \cdot DL_c \cdot p_{k,c,t-1} + \beta_2 \cdot DIS_c \cdot p_{k,c,t-1} + FEs + \varepsilon_{c,t} \tag{7}$$

where $DL_c = 1$ if a direct link exsited between a city pair c. DIS_c is the distance between a city pair c. FEs resprents a variety of fixed effects.

Three hypothese are (1) cities far from each other exhibited a slower (with a positive coefficient) convergence in commodity prices for a higher trade cost; (2) a direct link between a city pair allowed faster capital flows, and thus, a faster in-between price convergence speed; and (3) the price convergence between two cities was slower if more hubs (links) were needed to connect them.

Table 4 shows the effect of direct links during 1945-1949. On average, the convergence rate changed by -0.003 due to a direct domestic exchange link. In other words, city pairs had a shorter half-life of 22.17 days compared to 23.73 days in those only with an indirect link. Table 5 shows that if it takes an additional hub/link to connect a city pair then in-between convergence rate would be changed by +0.004. Finally, using the domestic exchange links in the 1920s-1930s as an instrument for those links during the Civil War, Table 6 confirms the accelerating impact of direct links.

5.2 The Effect of Domestic Exchange Rates

The main results of this paper are related to the effect of domestic exchange rates on price convergence. As a measure of capital flow costs across cities, the absolute value of domestic exchange rates is the main factor of interest. The specification is as follows:

$$\Delta p_{k,c,t} = \beta p_{k,c,t-1} + \gamma_0 \cdot |DR_{c,t-1}| + \gamma_1 \cdot |DR_{c,t-1}| \cdot p_{k,c,t-1} + Controls + Lags + FEs + \varepsilon_{c,t} \quad (8)$$

where $|DR_{c,t}|$ is the absolute value of premium percentage in domestic exchange rate between a city pair c (in city i on city j). $Controls$ represents a vector of control variables that may influence convergence rate. FEs resprents a variety of fixed effects. Finally, $Lags$ represents a bundle of lagged terms[9] of $\Delta p_{k,c,t}$.

Two expectations are (1) the linear term $|DR_{c,t-1}|$ would not affect price convergence because it is only an add-on to the price gap; (2) the interaction term $|DR_{c,t-1}| \cdot p_{k,c,t-1}$ should have a decelerating impact (or a positive coefficiency) on $\Delta p_{k,c,t}$ since a higher value in $|DR_{c,t-1}|$ indicates a raised currency shipping cost, thus impeding price convergence. The results in Table 8 are consistent with these expectations. A coefficiency of 0.028-0.041 combined with a mean of 6% in $|DR_{c,t-1}|$ implies that capital flow costs in the domestic exchange market on average decelerated the commodity price convergence across regions by 4%-8%.

To test the identifying assumption that battles surrounding financial hubs did not affect the trade flows between a connected city pair, I add the direct war risks, $DW_{c,t}$, into Equation 8, and the results in Table 9 almost stay the same as in Table 8 except the insignificant coefficiencies of $DW_{c,t}$ terms as expected.

[9] I choose the order of lagged terms based on Elberg (2016) and Cecchetti et al. (2002).

5.3 IV Results

A change in today's domestic exchange reflects a change in capital flows in a city pair, thereby affecting the convergence pattern in price gaps from yesterday to today. However, the simultaneity issue occurs between the rates and gaps in the same period. The solution to endogeneity is to use the war risk instrumental variable described in Equation 4 for domestic exchange rates (capital flow costs). Battles around a hub city impeded the capital flows between a city pair by increasing currency shipping costs (thus raising the absolute premium in exchange rates). Since the financial hub was not necessarily a trading pivot, the effect of a financial network in terms of capital flows are separated from that of a trade network in terms of goods flows.

Table 10 and Table 11 display the IV results without and with exclusion controls for identification, respectively. Generally, the IV results strengthen the impact of domestic exchange rates. With direct war risk measure (exclusion condition) controlled, the effect is more significant.

6 The Purchasing Powerful Parity

This section observes from another perspective the association between cross-city price gaps and domestic exchange rates: the Purchasing Power Parity (PPP).

The classical PPP theory links general price levels of two countries to the exchange rate of their currencies without frictions:

$$e_{A/B} = \frac{\text{Price Level in A}}{\text{Price Level in B}} \tag{9}$$

where $e_{A/B}$, the nominal exchange rate, represents how many units of A's currency one unit of B's currency switches to.

A similar hypothesis in this research is that the relative price ratio of two regions in a country equals the domestic exchange rates without frictions. Let $DR_{c,t}$ denote domestic exchange rate (in i on j) in terms of city pair $c(i,j)$, and $P_{i,t}$ and $P_{j,t}$ be price levels at city i and j at time t. An absolute form of the (domestic) PPP is thus:

$$DR_{c,t} = \frac{P_{i,t}}{P_{j,t}} \tag{10}$$

Remember that I do not directly construct price indices across cities, but base-year basket costs can be absorbed by the city-pair fixed effect so I can turn to a relative form of PPP:

$$\%\Delta \text{ in } DR_{c,t} \approx \log(\frac{DR_{c,t}}{DR_{c,t-1}}) = \log(\frac{P_{i,t}}{P_{i,t-1}}) - \log(\frac{P_{j,t}}{P_{j,t-1}}) \approx \pi_{i,t} - \pi_{j,t} = \Pi_{c,t} \quad (11)$$

where $\%\Delta$ means percentage change (change rate), $\pi_{i,t}$ and $\pi_{j,t}$ denote city i and $j's$ inflation rates, and $\Pi_{c,t}$ represents the inflation rate differential between city pair $c(i,j)$.

Alternatively, I will test an even weaker form of PPP, a proportional relationship between the change rates of domestic exchange rate and cross-city inflation rate differentials:

$$\%\Delta \text{ in } DR_{c,t} \propto \Pi_{c,t} \quad (12)$$

with the following empirical specification:

$$\Pi_{c,t} = \theta_0 \cdot \Pi_{c,t-1} + \theta_1 \cdot (\%\Delta \text{ in } DR_{c,t}) + \theta_2 \cdot (\%\Delta \text{ in } DR_{c,t-1}) + FEs + \varepsilon_{c,t} \quad (13)$$

If this weak form of PPP holds, θ_1 or θ_2 should be significantly positive.Table 13 confirms this relationship. Column (1) is the main specification, while column (2), (3), and (4) control for lagged terms. On average, 1% depreciation in the domestic exchange rate is significantly associated with a 0.2-0.3 percentage point reduction in inflation rate differential.

7 Robustness Tests

7.1 The Effect of the Currency Reform

There is a concern that the context hyperinflation itself rather than domestic exchange market played a crucial role in promoting cross-regional price convergence. Intuitively, in an economy of highly monetary uncertainty, people may be more risk averse in cross-regional transactions because price changes too frequently for accurate accounting over the goods' transportion time. Therefore, price integration is supposed to be slow during the hyperfinflation period. This subsection partially resolves the concern by examining the effect of the Currency Reform on price convergence.

As stated in background section, the Nationalist government implemented the Currency Reform on August 19, 1948 to fight against inflation. However, the Reform failed: the daily inflation rate was on average 7.1% in the post-Reform period compared to 1.0% before August 19, 1948. As people could not anticipate the implementation date, the Reform provided a natural experiment on the impact of raised inflation rates on price convergence.

The interaction terms with a Reform dummy displayed insignificant impacts on both the influence of domestic exchange rates and the distance on price convergence, as shown in

Table 14. This result implies that a higher inflation rate did not impede or strengthen the price convergence channel via domestic exchange markets.

7.2 Alternative Measures of Capital Flow Costs

Besides the absolute value of premium in domestic exchange rate, the subsection provides three alternative measures of capital flow costs as referenced by Garbade and Silber (1979): (1) a 6-day moving average of the absolute premium in domestic exchange rates, $\underset{\hat{t}\in[t,t-5]}{mean}|DR_{c,\hat{t}}|$; (2) the max value of the absolute premium over the past 6 days, $\max_{\hat{t}\in[t,t-5]}|DR_{c,\hat{t}}|$; or (3) the standard deviation of the absolute premium over the past 6 days, $\underset{\hat{t}\in[t,t-5]}{std.}(DR_{c,\hat{t}})$. Generally, as shown in Table 15, the effect of domestic exchanges is robust to different measures of capital flow costs.

7.3 City-Pair Heterogeneous Convergence

Further robustness concerns are whether with heterogeneous auto-convergence rates across city pairs, capital flow costs in terms of domestic exchanges would still alter convergence trends. In this sense, a specification with heterogeneous auto trend is:

$$\Delta p_{k,c,t} = \beta_c \cdot p_{k,c,t-1} + \gamma_0 \cdot |DR_{c,t-1}| + \gamma_1 \cdot |DR_{c,t-1}| \cdot p_{k,c,t-1} + controls + Lags + FEs + \varepsilon_{c,t} \quad (14)$$

where β_c represents a city-pair specific auto-convegence rate. Results in Table 16 show that the coefficiencies of interaction term (of capital flow costs) are comparable to those in Table 8 and Table 9. This implies the effect of domestic exchange rate is robust to heterogeneous convergence setting.

8 Conclusion

This paper shows that the wartime domestic exchange market provided a meaningful channel for price convergence across regions. First, city pairs with a direct link exhibited faster commodity price convergence (a half-life of 22.17 days) than others (23.73 days). Second, in the domestic exchange network, a weaker connection to a financial hub due to battles decelerated the commodity price convergence between two other cities connected to it by 4%-8%. Since the financial hub was not necessarily a trading pivot, the effect of a financial network in terms of capital flows are separated from that of a trade network in terms of goods flows. It also provides an implication for research in financial networks: impaired connections to a node (like a branch) in the financial system may weaken the communication between two others connected to this node, even if a direct link already exists between them. Furthermore, the weak form of purchasing power parity holds between the change in domestic exchange rates and cross-city inflation rate differentials. On average, a 1% depreciation in the domestic exchange rate was associated with a 0.2-0.3 percentage points reduction in inflation rate differential. In a sense, this paper fills the blank in this classical theory regarding an interregional scenario with the historical domestic exchange rates. Finally, the effect of domestic exchange markets on price convergence is independent of hyperinflation. A higher inflation rate did not impede or strengthen the price convergence channel via domestic exchange markets.

Although China had fallen behind the West for approximately 200 years until recent decades, it contained some development potential, unlike sub-Saharan Africa. The effectiveness of the wartime domestic exchange market reflects such economic sophistication inheriting from its pre-industrialization era. For instance, Wu (2016) characterizes *Piaohao*, a set of regional financial firms developed in Shanxi province in the 19th century which functioned well as modern bank networks. The giant gap between the evolving financial institution and economic stagnation would lead to a revisit on the main driving force of China-West divergence.

References

Abuaf, N. and Jorion, P. (1990). Purchasing power parity in the long run. *The Journal of Finance*, 45(1):157–174.

Adler, M. and Lehmann, B. (1983). Deviations from purchasing power parity in the long run. *The Journal of Finance*, 38(5):1471–1487.

Black, S. E. and Strahan, P. E. (2002). Entrepreneurship and bank credit availability. *The Journal of Finance*, 57(6):2807–2833.

Bodenhorn, H. (1992). Capital mobility and financial integration in antebellum america. *The Journal of Economic History*, 52(3):585–610.

Caballero, J., Candelaria, C., and Hale, G. (2018). Bank linkages and international trade. *Journal of International Economics*, 115:30–47.

Cecchetti, S. G., Mark, N. C., and Sonora, R. J. (2002). Price index convergence among united states cities. *International Economic Review*, 43(4):1081–1099.

Colacito, R. and Croce, M. M. (2010). The short and long run benefits of financial integration. *American Economic Review*, 100(2):527–31.

Égert, B. (2007). Real convergence, price level convergence and inflation differentials in europe.

Ejrnæs, M. and Persson, K. G. (2010). The gains from improved market efficiency: trade before and after the transatlantic telegraph. *European Review of Economic History*, 14(3):361–381.

Elberg, A. (2016). Sticky prices and deviations from the law of one price: Evidence from mexican micro-price data. *Journal of International Economics*, 98:191–203.

Fan, C. S. and Wei, X. (2006). The law of one price: evidence from the transitional economy of china. *The Review of Economics and Statistics*, 88(4):682–697.

Garbade, K. D. and Silber, W. L. (1979). The payment system and domestic exchange rates: Technological versus institutional change. *Journal of Monetary Economics*, 5(1):1–22.

Gat, A. (2008). *War in human civilization*. Oxford University Press.

Goetz, M. R. and Gozzi, J. C. (2019). Financial integration and the co-movement of economic activity: Evidence from us states. *Available at SSRN 2362274*.

Hoxha, I., Kalemli-Ozcan, S., and Vollrath, D. (2013). How big are the gains from international financial integration? *Journal of Development Economics*, 103:90–98.

Hynes, W., Jacks, D. S., and O'rourke, K. H. (2012). Commodity market disintegration in the interwar period. *European Review of Economic History*, 16(2):119–143.

Imbs, J. (2006). The real effects of financial integration. *Journal of International Economics*, 68(2):296–324.

Jacks, D. S. (2006). What drove 19th century commodity market integration? *Explorations in Economic History*, 43(3):383–412.

Jacks, D. S., Yan, S., and Zhao, L. (2017). Silver points, silver flows, and the measure of chinese financial integration. *Journal of International Economics*, 108:377–386.

James, J. A. and Weiman, D. F. (2010). From drafts to checks: the evolution of correspondent banking networks and the formation of the modern us payments system, 1850–1914. *Journal of Money, Credit and Banking*, 42(2-3):237–265.

Keller, W., Shiue, C. H., and Wang, X. (2015). Capital markets in china and britain, 18th and 19th century: Evidence from grain prices. Technical report, National Bureau of Economic Research.

King, R. G. and Levine, R. (1993). Finance, entrepreneurship and growth. *Journal of Monetary economics*, 32(3):513–542.

Knodell, J. (1998). The demise of central banking and the domestic exchanges: Evidence from antebellum ohio. *The Journal of Economic History*, 58(3):714–730.

Krugman, P. R. (1978). Purchasing power parity and exchange rates: Another look at the evidence. *Journal of international economics*, 8(3):397–407.

Landier, A., Sraer, D., and Thesmar, D. (2017). Banking integration and house price comovement. *Journal of Financial Economics*, 125(1):1–25.

Ma, D. and Zhao, L. (2020). A silver transformation: Chinese monetary integration in times of political disintegration, 1898–1933. *The Economic History Review*, 73(2):513–539.

Ma, J. (2013). The chinese domestic exchange network in the 1920s and 1930s. *Shanghai Economic Review*, (3):45–55.

Ma, J. (2016). The construction of chinese financial network in the 1920s and 1930s. *China Review of Economic History*, (5):153–167.

Manova, K. (2008). Credit constraints, equity market liberalizations and international trade. *Journal of International Economics*, 76(1):33–47.

Michalski, T. and Ors, E. (2012). (interstate) banking and (interstate) trade: Does real integration follow financial integration? *Journal of Financial Economics*, 104(1):89–117.

Paravisini, D., Rappoport, V., Schnabl, P., and Wolfenzon, D. (2015). Dissecting the effect of credit supply on trade: Evidence from matched credit-export data. *The Review of Economic Studies*, 82(1):333–359.

Phillips, R. J. and Cutler, H. (1998). Domestic exchange rates and regional economic growth in the united states, 1899-1908: Evidence from cointegration analysis. *Journal of Economic History*, pages 1010–1026.

Rogers, J. H. (2007). Monetary union, price level convergence, and inflation: How close is europe to the usa? *Journal of Monetary economics*, 54(3):785–796.

Rogoff, K. (1996). The purchasing power parity puzzle. *Journal of Economic literature*, 34(2):647–668.

Shiue, C. H. (2002). Transport costs and the geography of arbitrage in eighteenth-century china. *American Economic Review*, 92(5):1406–1419.

Wu, M. (2016). *Traditions and innovations: an exploration of the governance structure, business strategy and historical development of the Chinese Shanxi piaohao, 1820s to 1930s*. PhD thesis, The London School of Economics and Political Science (LSE).

Zhao, L. and Zhao, Y. (2018). Purchasing power parity and price fluctuations in china before july 1937. *Frontiers of Economics in China*, 13(3).

Appendices

A1. Details in Inflation Rate Construction

For most of the leading cities, the daily inflation rate of city i at date t is constructed via the weighted average method in Equation 1 with the price information of 5 kinds of commodities:

$$\begin{aligned}\pi_{i,t} \quad = \quad & \frac{0.386}{0.628} \cdot \frac{p_{i,t}^{rice} - p_{i,t-1}^{rice}}{p_{i,t-1}^{rice}} + \frac{0.137}{0.628} \cdot \frac{p_{i,t}^{wheat} - p_{i,t-1}^{wheat}}{p_{i,t-1}^{wheat}} \\ & + \frac{0.053}{0.628} \cdot \frac{p_{i,t}^{\text{cotton}} - p_{i,t-1}^{\text{cotton}}}{p_{i,t-1}^{\text{cotton}}} + \frac{0.036}{0.628} \cdot \frac{p_{i,t}^{coal} - p_{i,t-1}^{coal}}{p_{i,t-1}^{coal}} + \frac{0.016}{0.628} \cdot \frac{p_{i,t}^{oil} - p_{i,t-1}^{oil}}{p_{i,t-1}^{oil}} \end{aligned} \tag{15}$$

for Ningpo city and Foochow city, coal price data are not available, with a reduced sum of weights 0.592 their inflation rates are thereby constructed as:

$$\begin{aligned}\pi_{i,t} \quad = \quad & \frac{0.386}{0.592} \cdot \frac{p_{i,t}^{rice} - p_{i,t-1}^{rice}}{p_{i,t-1}^{rice}} + \frac{0.137}{0.592} \cdot \frac{p_{i,t}^{wheat} - p_{i,t-1}^{wheat}}{p_{i,t-1}^{wheat}} \\ & + \frac{0.053}{0.592} \cdot \frac{p_{i,t}^{\text{cotton}} - p_{i,t-1}^{\text{cotton}}}{p_{i,t-1}^{\text{cotton}}} + \frac{0.016}{0.592} \cdot \frac{p_{i,t}^{oil} - p_{i,t-1}^{oil}}{p_{i,t-1}^{oil}} \end{aligned} \tag{16}$$

for Nanchang city, cotton price data are not available, with a reduced sum of weights 0.575 their inflation rates are thereby constructed as:

$$\begin{aligned}\pi_{i,t} \quad = \quad & \frac{0.386}{0.575} \cdot \frac{p_{i,t}^{rice} - p_{i,t-1}^{rice}}{p_{i,t-1}^{rice}} + \frac{0.137}{0.575} \cdot \frac{p_{i,t}^{wheat} - p_{i,t-1}^{wheat}}{p_{i,t-1}^{wheat}} \\ & + \frac{0.036}{0.575} \cdot \frac{p_{i,t}^{coal} - p_{i,t-1}^{coal}}{p_{i,t-1}^{coal}} + \frac{0.016}{0.575} \cdot \frac{p_{i,t}^{oil} - p_{i,t-1}^{oil}}{p_{i,t-1}^{oil}} \end{aligned} \tag{17}$$

A2. Convergence Rate

For a stationary time series $\{P_t\}$, if at $t = t_0$, $P_{t_0} = \widehat{P} > 0$, and at $t = t_0 + T$, $P_{t_0+T} = \frac{1}{2}\widehat{P}$, then T is termed as the half-life of Y_t.

In a simple $AR(1)$ model with a convergence rate δ: $P_t = \delta P_{t-1} + \varepsilon_t$, for $|\delta| < 1$. If $P_{t+T} = \frac{1}{2}P_t$, since $P_{t+T} \approx \delta^T P_t$, $T = -\ln(2)/\ln(\delta)$. Alternatively, since $P_t - P_{t-1} = \Delta P_t = (\delta - 1)P_{t-1} + \varepsilon_t$, let $\beta = \delta - 1$, then the half-life is $-\ln(2)/\ln(\beta + 1)$.

Tables

Table 1: Weights Assigned to 22 Categories of Commodities

Rice	38.6%	Wheat	13.7%	Glutinous Rice	4.4%
Soybean	4.0%	Beef	1.6%	Pork	6.4%
Egg	1.9%	Salt	4.3%	Cooking Oil	1.6%
Sugar	2.4%	Cotton	5.3%	Raw Silk	1.6%
Wool	0.3%	Iron	1.2%	Copper	0.1%
Coal	3.6%	Kerosene	1.4%	Timber&Cement	5.0%
Cowhide	0.2%	Bristles	0.5%	Tung Oil	1.1%
Tea	0.8%				

Notes: This table shows the weights of 22 commodities used by the Central Bank of Republic of China to calculate a city-level price index. In this paper, the data of only 5 commodities marked in red are available for calculating cross-clity daily inflation rates. Source: *The Financial Monthly of the Central Bank*.

Table 2: Summary Statistics of Cross-City Commodity Prices, Inflation Rates, and Domestic Exchange Rates

	Mean			Standard Deviation			# of Observations		
	Pre	Post	All	Pre	Post	All	Pre	Post	All
$\mid \ln p_i^{coal} - \ln p_j^{coal} \mid$	.927	1.109	.942	.667	.773	.678	56,946	5,049	61,995
$\mid \ln p_i^{rice} - \ln p_j^{rice} \mid$	.670	.921	.694	.472	.651	.498	68,329	7,298	75,627
$\mid \ln p_i^{wheat} - \ln p_j^{wheat} \mid$	.569	.724	.581	.426	.532	.437	67,044	5,651	72,695
$\mid \ln p_i^{oil} - \ln p_j^{oil} \mid$	.387	.827	.425	.307	.633	.369	67,737	6,390	74,127
$\mid \ln p_i^{cotton} - \ln p_j^{cotton} \mid$	.319	.666	.343	.249	.499	.288	64,019	4,807	68,826
$\mid \ln p_i^{yarn} - \ln p_j^{yarn} \mid$	.150	.321	.162	.133	.235	.150	49,897	3,910	53,807
π_i	1.0%	7.1%	1.6%	5.9%	15.6%	7.6%	8,568	883	9,451
$\mid \pi_i - \pi_j \mid$	4.0%	11.6%	4.4%	6.6%	15.2%	7.5%	51,781	2,801	54,582
$DR_{i,j}$	3.5%	0.5%	3.0%	7.7%	14.1%	9.1%	14,656	2,895	17,551
$\mid DR_{i,j} \mid$	5.2%	9.1%	5.9%	6.7%	10.7%	7.6%	14,656	2,895	17,551

Notes: "All", "Pre", and "Post" indicate the data samples of the whole Civil War period, the pre-reform period, and the post-reform period. $\ln p_i^k$: log price of commodity k in city i. $\ln p_i^k - \ln p_j^k$: absolute relative price or cross-city price differential in commodity k. π_i: daily inflation rate in city i. $\pi_i - \pi_j$: absolute daily inflation rate differential across cities. $DR_{i,j}$: premium/discount percentage in domestic exchange rate in i on j, $(rate - 1000)/1000 \times 100\%$. $|DR|$: absolute premium/discount percentage, a measure of capital flow/currency shipping cost. Data marked in red indicate that post-reform values were usually much greater than those in pre-reform period.

Table 3: Summary Statistics of Major Battles

	Mean			Standard Deviation		
	Pre	Post	All	Pre	Post	All
Duration	22.49	22.71	22.52	23.54	25.69	23.71
Size	20,409	136,538	36,042	23,741	209,620	87,288
Casualty	6,970	24,302	9,303	7,615	45,452	18,606
# of Obs.	90	14	104	90	14	104
Distance	936	941	937	485	469	483
# of Obs.	1,890	294	2,184	1,890	294	2,184

Notes: "All", "Pre", and "Post" indicate the data samples of the whole Civil War period, the pre-reform period, and the post-reform period. Duration, size, casualty, distance are in unit of days, soldier numbers, the number of the deaths and the wounded, and kilometers, respectively. Distance means the distance between the centering location of each battle and each city. Data marked in red indicate that though with a comparable average duration, a post-reform battle was usually much more severe than one in pre-reform period.

Table 4: OLS Results: the Effect of Direct Links of Domestic Exchange on Commodity Price Convergence

Dependent Variable: $\Delta p_{k,c,t}$						
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.030***	-.044***	-.030***	-.044***	-.031***	-.045***
	(.001)	(.003)	(.001)	(.003)	(.001)	(.003)
$DL_c \times p_{k,c,t-1}$	-.004*	-.004*	-.005*	-.004*	-.005*	-.004*
	(.002)	(.002)	(.002)	(.002)	(.003)	(.002)
$DIS_c \times p_{k,c,t-1}$		.012***		.011***		.012***
		(.002)		(.002)		(.003)
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$week$ FE	N	N	Y	Y	N	N
$k \times week$ FE	N	N	N	N	Y	Y
Obs.	352,576	352,576	352,576	352,576	352,576	352,576
$Adj.R^2$	0.015	0.015	0.020	0.020	0.025	0.026

Notes: This table reports OLS regression results of the specification in Equation 7. DLc = 1 if a direct link existed between city pair c during 1945-1949; DISc: the distance between city pair c in unit of 1,000 km. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 5: OLS results: the Effect of Indirect Links of Domestic Exchange on Commodity Price Convergence

Dependent Variable: $\Delta p_{k,c,t}$						
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.039***	-.051***	-.039***	-.051***	-.040***	-.052***
	(.004)	(.005)	(.004)	(.005)	(.004)	(.005)
$NL_c \times p_{k,c,t-1}$	.004**	.004*	.004**	.004*	.004**	.004*
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
$DIS_c \times p_{k,c,t-1}$		.012***		.011***		.012***
		(.003)		(.003)		(.003)
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$week$ FE	N	N	Y	Y	N	N
$k \times week$ FE	N	N	N	N	Y	Y
Obs.	331,246	331,246	331,246	331,246	331,246	331,246
$Adj.R^2$	0.014	0.015	0.019	0.020	0.025	0.026

Notes: NLc: the number of links/financial hubs needed to connect city pair c in the domestic exchange network of the 1920s-1930s; DISc: the distance between city pair c in unit of 1,000 km. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 6: IV Results: the Effect of Direct Links of Domestic Exchange on Commodity Price Convergence

Dependent Variable: $\Delta p_{k,c,t}$						
	IV Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.026***	-.040***	-.026***	-.039***	-.026***	-.040***
	(.002)	(.004)	(.003)	(.005)	(.003)	(.005)
$DL_c \times p_{k,c,t-1}$	-.013**	-.012*	-.015**	-.013*	-.015**	-.013*
	(.006)	(.007)	(.007)	(.008)	(.007)	(.008)
$DIS_c \times p_{k,c,t-1}$		.011***		.011***		.011***
		(.003)		(.003)		(.003)
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$week$ FE	N	N	Y	Y	N	N
$k \times week$ FE	N	N	N	N	Y	Y
Obs.	331,246	331,246	331,246	331,246	331,246	331,246

Notes: This table reports IV regression results of the specification in Equation 7. DLc = 1 if a direct link existed between city pair c during 1945-1949; The number of links/financial hubs needed to connect city pair c in the domestic exchange network of the 1920s-1930s is used as an instrumental variable for DLc in IV regressions; DISc: the distance between city pair c in unit of 1,000 km. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 7: The Effect of Domestic Exchange Rates

	Dependent Variable: $\Delta p_{k,c,t}$					
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.031***	-.030***	-.035***	-.049***	-.048***	-.048***
	(.003)	(.003)	(.003)	(.006)	(.006)	(.006)
$\lvert DR_{c,t-1}\rvert$	-.013	-.012	-.014	-.015	-.014	-.014
	(.012)	(.012)	(.015)	(.012)	(.012)	(.015)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1}$	.040***	.040***	.041***	.041***	.040***	.041***
	(.013)	(.012)	(.014)	(.012)	(.012)	(.014)
$DIS_c \times p_{k,c,t-1}$				.016***	.016***	.012**
				(.005)	(.004)	(.005)
$Lags(6days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	42,038	41,926	41,925	42,038	41,926	41,925
$Adj.R^2$	0.098	0.223	0.226	0.099	0.224	0.226

Notes: This table reports OLS regression results of the specification in Equation 8 without battle exclusions. $|DR|$ is absolute premium/discount pecentage, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 8: OLS Results: the Effect of Domestic Exchange Rates without Battle Exclusions

Dependent Variable: $\Delta p_{k,c,t}$						
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.030***	-.029***	-.033***	-.045***	-.043***	-.043***
	(.003)	(.003)	(.002)	(.006)	(.006)	(.006)
$\|DR_{c,t-1}\|$	.008	.010	.005	.007	.008	.005
	(.012)	(.012)	(.014)	(.011)	(.011)	(.014)
$\|DR_{c,t-1}\| \times p_{k,c,t-1}$	.040***	.040***	.028**	.041***	.040***	.028**
	(.012)	(.011)	(.014)	(.012)	(.011)	(.013)
$DIS_c \times p_{k,c,t-1}$				.013**	.012***	.009**
				(.005)	(.004)	(.004)
$Lags(3days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769
$Adj.R^2$	0.114	0.244	0.246	0.115	0.245	0.247

Notes: This table reports OLS regression results of the specification in Equation 8 without battle exclusions. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is the distance between city pair c in unit of 1,000 km. Lags: Δp lagged for 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 9: OLS Results: The Effect of Domestic Exchange Rates with Battle Exclusions

	Dependent Variable: $\Delta p_{k,c,t}$					
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.029***	-.029***	-.032***	-.044***	-.043***	-.043***
	(.003)	(.003)	(.003)	(.006)	(.006)	(.006)
$\lvert DR_{c,t-1}\rvert$	.008	.009	.005	.007	.008	.005
	(.012)	(.012)	(.014)	(.011)	(.011)	(.014)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1}$	.040***	.040***	.028**	.041***	.040***	.028**
	(.012)	(.011)	(.014)	(.012)	(.011)	(.013)
$DIS_c \times p_{k,c,t-1}$				.013**	.012***	.009**
				(.005)	(.004)	(.004)
$DW_{c,t-1}$	-4.8e-6	-2.6e-5	-2.4e-5	-1.1e-5	-3.2e-5	-2.7e-5
	(9.4e-5)	(7.9e-5)	(8.3e-5)	(9.4e-5)	(7.9e-5)	(8.3e-5)
$DW_{c,t-1} \times p_{k,c,t-1}$	-9.6e-5*	-2.4e-5	-2.3e-5	-8.6e-5	-1.6e-5	-1.8e-5
	(5.3e-5)	(5.6e-5)	(5.5e-5)	(5.3e-5)	(5.7e-5)	(5.5e-5)
$Lags(3days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769
$Adj.R^2$	0.114	0.244	0.246	0.115	0.245	0.247

Notes: This table reports OLS regression results of the specification in Equation 8 with battle exclusions. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. DWc is the measure of war risk directly to city pair c. Lags: Δp lagged for 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 10: IV Results: The Effect of Domestic Exchange Rates without Battle Exclusions

	Dependent Variable: $\Delta p_{k,c,t}$					
	IV Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.033***	-.037***	-.040***	-.051***	-.053***	-.051***
	(.006)	(.006)	(.006)	(.008)	(.008)	(.008)
$\lvert DR_{c,t-1}\rvert$	-.116	-.080	-.116	-.140	-.102	-.120
	(.116)	(.115)	(.140)	(.120)	(.118)	(.140)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1}$	.093	.151**	.136*	.114*	.169**	.146**
	(.064)	(.071)	(.074)	(.062)	(.068)	(.073)
$DIS_c \times p_{k,c,t-1}$				.015**	.013**	.010**
				(.006)	(.006)	(.005)
$Lags(3days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769

Notes: This table reports IV regression results of the specification in Equation 8 without battle exclusions. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. Lags: Δp lagged for 3 days. The indirect war risk to city pair c, IWc, is used as an instrumental variable for $|DR|$. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 11: IV Results: The Effect of Domestic Exchange Rates with Battle Exclusions

	Dependent Variable: $\Delta p_{k,c,t}$					
	IV Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.039***	-.039***	-.042***	-.056***	-.054***	-.053***
	(.005)	(.005)	(.005)	(.008)	(.007)	(.007)
$\lvert DR_{c,t-1}\rvert$	-.060	-.045	-.063	-.081	-.065	-.070
	(.102)	(.093)	(.108)	(.103)	(.094)	(.109)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1}$	.180***	.177***	.172***	.192***	.187***	.177***
	(.054)	(.054)	(.063)	(.053)	(.053)	(.062)
$DIS_c \times p_{k,c,t-1}$				.015**	.013**	.010**
				(.007)	(.006)	(.005)
$DW_{c,t-1}$	-2.6e-5	-4.9e-5	-3.5e-5	-4e-5	-6.2e-5	-4e-5
	(9.3e-5)	(8.3e-5)	(9.1e-5)	(9.3e-5)	(8.3e-5)	(9.1e-5)
$DW_{c,t-1} \times p_{k,c,t-1}$	-1.0e-4*	-1.8e-5	-2.5e-5	-8.7e-5	-5.4e-6	-1.9e-5
	(5.4e-5)	(5.6e-5)	(5.5e-5)	(5.4e-5)	(5.7e-5)	(5.5e-5)
$Lags(3days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769

Notes: This table reports IV regression results of the specification in Equation 8 with battle exclusions. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. DWc is the measure of war risk directly to city pair c. The indirect war risk to city pair c, IWc, is used as an instrumental variable for $|DR|$. Lags: the dependent variable is lagged 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 12: The Effect of Domestic Exchange Rates

	Dependent Variable: $\Delta p_{k,c,t}$					
	OLS Regression		IV Regression			
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.043***	-.043***	-.054***	-.053***	-.053***	-.051***
	(.006)	(.006)	(.007)	(.007)	(.008)	(.008)
$\|DR_{c,t-1}\|$	.008	.005	-.065	-.070	-.102	-.120
	(.011)	(.014)	(.094)	(.109)	(.118)	(.140)
$\|DR_{c,t-1}\| \times p_{k,c,t-1}$	.040***	.028**	.187***	.177***	.169**	.146**
	(.011)	(.013)	(.053)	(.062)	(.068)	(.073)
$DIS_c \times p_{k,c,t-1}$	.012***	.009**	.013**	.010**	.013**	.010**
	(.004)	(.004)	(.006)	(.005)	(.006)	(.005)
$DW_{c,t-1}$	-3.2e-5	-2.7e-5	-6.2e-5	-4e-5		
	(7.9e-5)	(8.3e-5)	(8.3e-5)	(9.1e-5)		
$DW_{c,t-1} \times p_{k,c,t-1}$	-1.6e-5	-1.8e-5	-5.4e-6	-1.9e-5		
	(5.7e-5)	(5.5e-5)	(5.7e-5)	(5.5e-5)		
Lags	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
$k \times day$ FE	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
$c \times year$ FE	*N*	*Y*	*N*	*Y*	*N*	*Y*
$c \times k$ FE	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Obs.	54,769	54,769	54,769	54,769	54,769	54,769
$Adj.R^2$	0.245	0.247				

Notes: Specifications (1) and (2) are OLS regressions, and (3)-(6) are IV regressions. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. DWc is the direct war risk to city pair c. The indirect war risk to city pair c, IWc, is used as an instrumental variable for $|DR|$. Lags: the dependent variable is lagged 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 13: The Purchasing Power Parity: the Relationship between the Change Rates of Domestic Exchange Rate and Cross-City Inflation Rate Differentials

Dependent Variable: $\Pi_{c,t}$	(1)	(2)	(3)	(4)
$\%\Delta$ in $DR_{c,t}$	.224***	.292***	.245***	.302***
	(.039)	(.042)	(.038)	(.043)
$\%\Delta$ in $DR_{c,t-1}$		.170***		.177***
		(.053)		(.052)
$\Pi_{c,t-1}$			.017	.001
			(.018)	(.019)
Constant	-.344***	-.347***	-.341***	-.341***
	(.001)	(.001)	(.004)	(.004)
Obs.	10,222	9,084	9,162	8,565
Adj.R^2	.317	.313	.317	.321

Notes: This table reports OLS regression results of specification in Equation 12. Π_c: inflation rate differential between city pair c. $\%\Delta$ in DR_c: percentage change in domestic exchange rate between city pair c. All specifications include city-pair and day FEs. Standard errors are in parentheses and clustered at the city-pairl level. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$.

Table 14: The Effect of the Currency Reform

Dependent Variable: $\Delta p_{k,c,t}$						
	OLS Regression					
	(1)	(2)	(3)	(4)	(5)	(6)
$p_{k,c,t-1}$	-.045***	-.043***	-.043***	-.045***	-.043***	-.043***
	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)
$\lvert DR_{c,t-1}\rvert$	.007	.008	.005	.008	.008	.006
	(.011)	(.011)	(.014)	(.011)	(.011)	(.014)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1}$	.031**	.027*	.033**	.030*	.029*	.030*
	(.015)	(.016)	(.016)	(.012)	(.016)	(.017)
$\lvert DR_{c,t-1}\rvert \times p_{k,c,t-1} \times \mathrm{Re}\,form$	.014	.019	-.009	.020	.009	.002
	(.017)	(.018)	(.021)	(.028)	(.025)	(.029)
$DIS_c \times p_{k,c,t-1}$	.013**	.013***	.009**	.014***	.012***	.010**
	(.005)	(.004)	(.004)	(.005)	(.004)	(.004)
$DIS_c \times p_{k,c,t-1} \times \mathrm{Re}\,form$				-.001	.002	-.003
				(.004)	(.003)	(.004)
$Lags$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769
$Adj.R^2$	0.115	0.245	0.247	0.115	0.245	0.247

Notes: This table reports OLS regression results of the effect of the currency reform. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. Reform=1 if after Aug.19, 1948 (the currency reform was implemented), Lags: Δp lagged for 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

Table 15: The Effect of Alternative Measures of Capital Flow Costs

	OLS Regression: Dependent Variable $\Delta p_{k,c,t}$								
	$Cost_{c,t} = \underset{\hat{t}\in[t,t-5]}{mean} \lvert DR_{c,\hat{t}} \rvert$			$Cost_{c,t} = \underset{\hat{t}\in[t,t-5]}{\max} \lvert DR_{c,\hat{t}} \rvert$			$Cost_{c,t} = \underset{\hat{t}\in[t,t-5]}{std.} (DR_{c,\hat{t}})$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$p_{k,c,t-1}$	-.028***	-.040***	-.040***	-.028***	-.040***	-.040***	-.027***	-.039***	-.039***
	(.002)	(.006)	(.006)	(.002)	(.006)	(.006)	(.002)	(.006)	(.006)
$Cost_{c,t-1}$	.018*	.017	.017*	.009	.009	.009	.012	.010	.010
	(.011)	(.010)	(.010)	(.010)	(.010)	(.010)	(.035)	(.034)	(.034)
$Cost_{c,t-1} \times p_{k,c,t-1}$	.041***	.040***	.040***	.028***	.028***	.028***	.066	.069*	.070*
	(.011)	(.011)	(.011)	(.009)	(.009)	(.009)	(.042)	(.042)	(.041)
$DIS_c \times p_{k,c,t-1}$		.011**	.010**		.011**	.011**		.011***	.011***
		(.004)	(.004)		(.004)	(.004)		(.004)	(.004)
$DW_{c,t-1}$			2.1e-6			1.3e-6			-1.7e-5
			(8.3e-5)			(8.4e-5)			(8.5e-5)
$DW_{c,t-1} \times p_{k,c,t-1}$			-3.2e-5			-3.2e-5			-2.0e-5
			(6.7e-5)			(6.6e-5)			(6.9e-5)
$Lags(3days)$	Y	Y	Y	Y	Y	Y	Y	Y	Y
$k \times day$ FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
$Obs.$	63,840	63,840	63,840	63,840	63,840	63,840	60,964	60,964	60,964
$Adj.R^2$	0.220	0.220	0.220	0.220	0.220	0.220	0.222	0.223	0.223

;

Notes: $Cost_{c,t}$ is some measure of the capital flow cost between city pair c at time t: it is a moving average of the absolute premium percentage in domestic exchange rates over past 6 days from t in specifications (1)-(3); or the max value of the absolute premium percentage over the past 6 days from t; or the standard deviation of the absolute premium percentage over the past 6 days from t. DISc is distance between city pair c in 1,000 km. DWc is the measure of war risk directly to city pair c. Lags: Δp lagged for 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$.

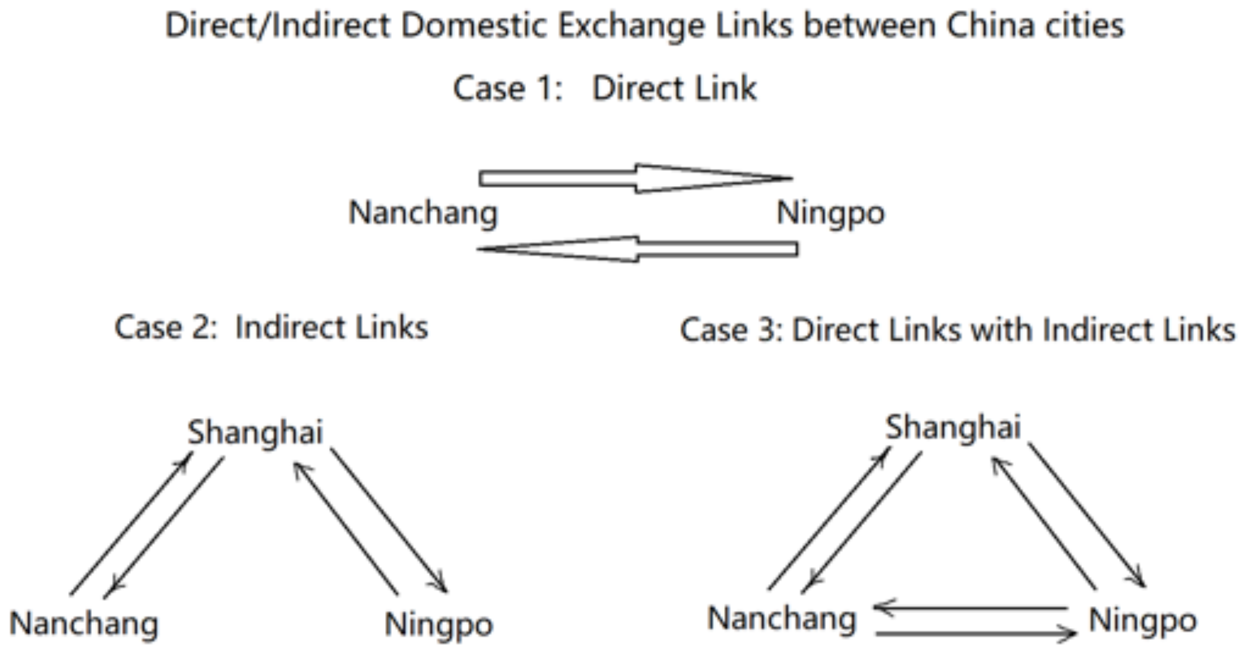
Table 16: OLS Results: The Effect of Domestic Exchange Rates with Heterogeneous Auto Convergence Trends

Dependent Variable: $\Delta p_{k,c,t}$						
	OLS Regression: $\beta_c \cdot p_{k,c,t-1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\|DR_{c,t-1}\|$	.002	.006	.006	.002	.006	.006
	(.012)	(.012)	(.015)	(.012)	(.012)	(.015)
$\|DR_{c,t-1}\| \times p_{k,c,t-1}$	.047***	.051***	.038***	.047***	.051***	.038***
	(.013)	(.013)	(.014)	(.013)	(.013)	(.014)
$DW_{c,t-1}$				-2.0e-5	-4.8e-5	-4.2e-5
				(9.0e-5)	(7.6e-5)	(7.9e-5)
$DW_{c,t-1} \times p_{k,c,t-1}$				-8.4e-5	-1.9e-5	-2.6e-5
				(5.3e-5)	(5.6e-5)	(5.4e-5)
$Lags(3days)$	Y	Y	Y	Y	Y	Y
day FE	Y	N	N	Y	N	N
$k \times day$ FE	N	Y	Y	N	Y	Y
$c \times year$ FE	N	N	Y	N	N	Y
$c \times k$ FE	Y	Y	Y	Y	Y	Y
$Obs.$	54,865	54,769	54,769	54,865	54,769	54,769
$Adj.R^2$	0.117	0.247	0.249	0.118	0.247	0.249

Notes: This table reports OLS regression results of specification in Equation 14. $|DR|$ is absolute premium/discount pecentage in the domestic exchange rate, representing the capital flow cost. DISc is distance between city pair c in 1,000 km. DWc is the measure of war risk directly to city pair c. Lags: Δp lagged for 3 days. Standard errors are in parentheses and clustered at the city-pair×commodity level. * p <0.10 ** p < 0.05 *** p < 0.01.

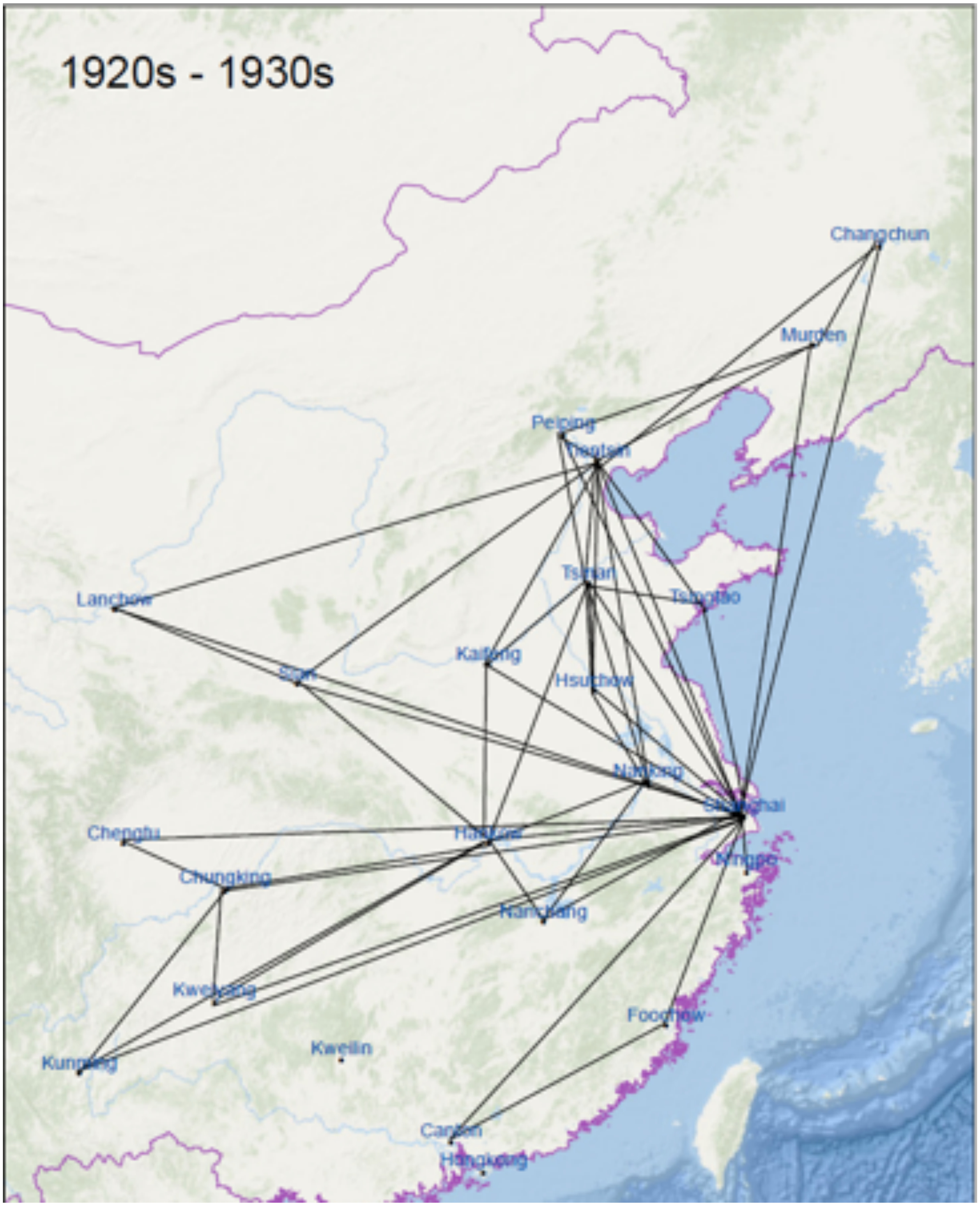
Figures

Figure 1: Illustrative Examples of links in a Domestic Exchange Network



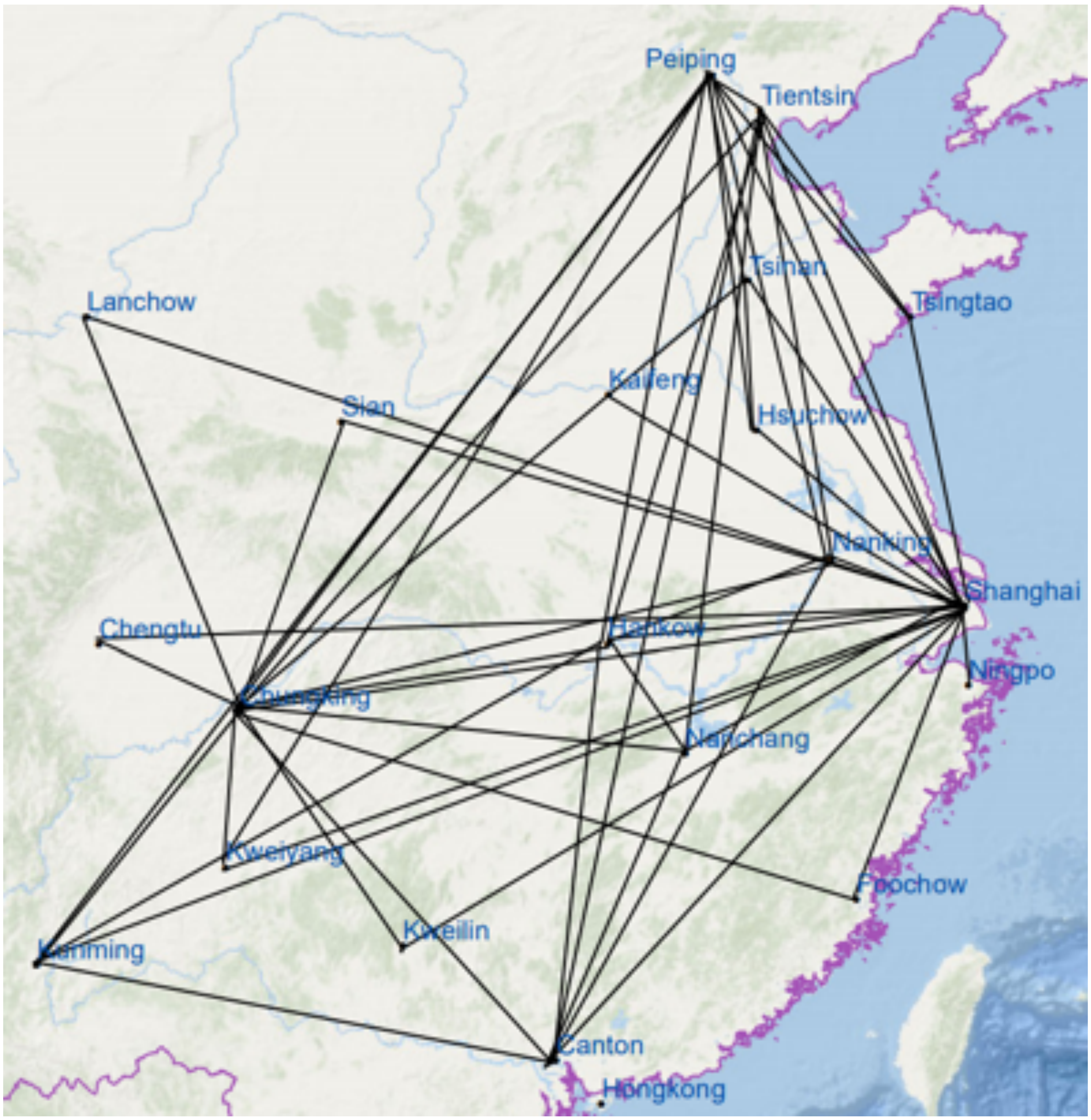
Notes: Case 1 shows a direct domestic exchange link between Nanchang and Ningpo represented by an exchange rate in Nanchang (Ningpo) on Ningpo (Nanchang). Case 2 shows that only an indirect link existed between Nanchang and Ningpo cities; there was no direct trading in exchanges between them; in-between payments had to flow via the hub city, Shanghai. Case 3 shows that both direct and indirect links existed between any city pair; for example, Nanchang's payment to Ningpo could be fulfilled directly by in-between domestic exchange or indirectly via the hub city, Shanghai.

Figure 2: The Domestic Exchange Network in China: 1920s-1930s



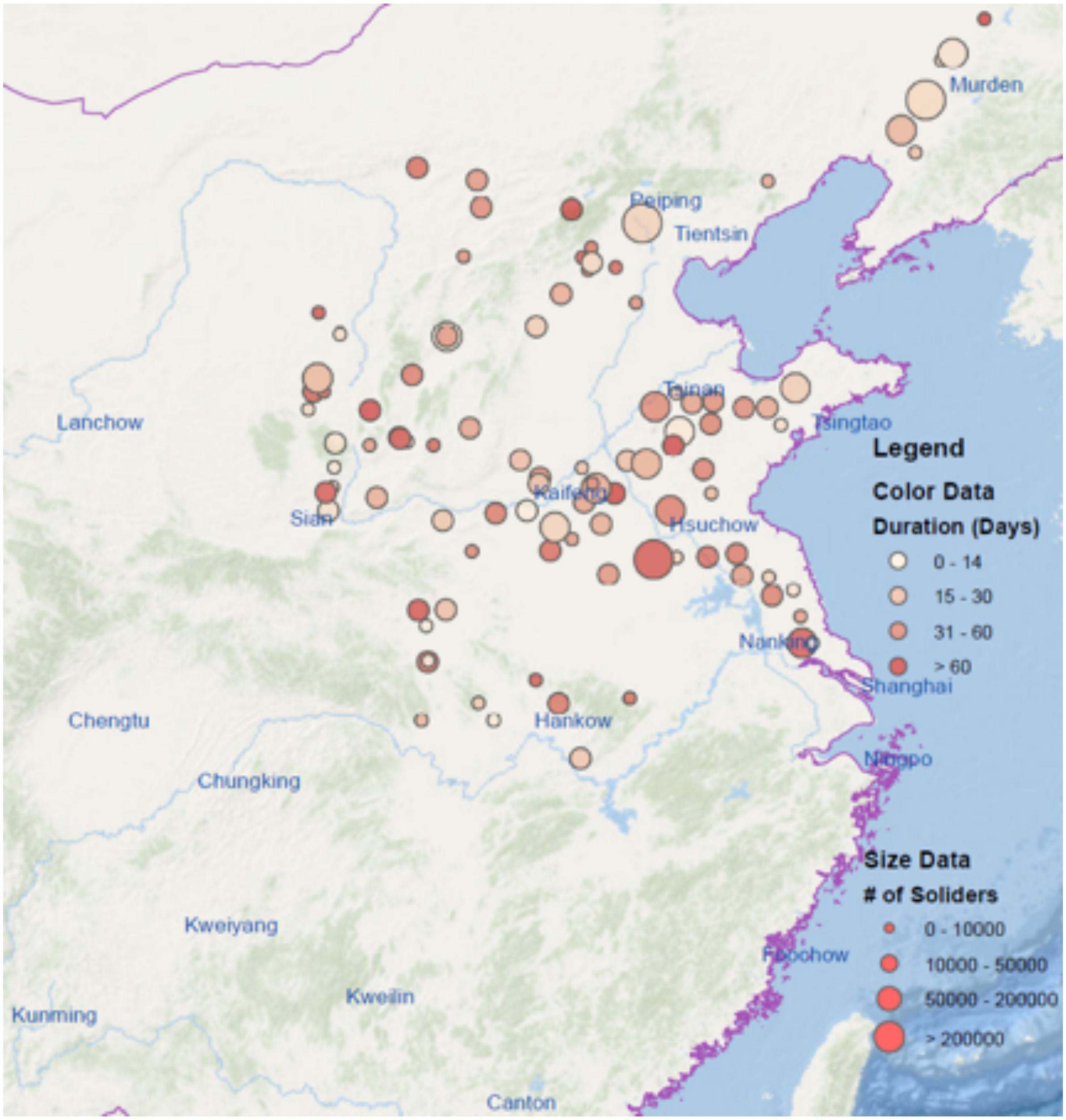
Notes: A black edge indicates that a direct domestic exchange link existed between a city pair. A city with more than two direct links was a hub city. In the 1920s-1930s. Shanghai, Tientsin, and Hankow were the largest hub cities in the domestic exchange network. GIS mapping of the domestic exchange network is based on Ma (2013) and Ma (2016).

Figure 3: The Domestic Exchange Network in China:1945-1949



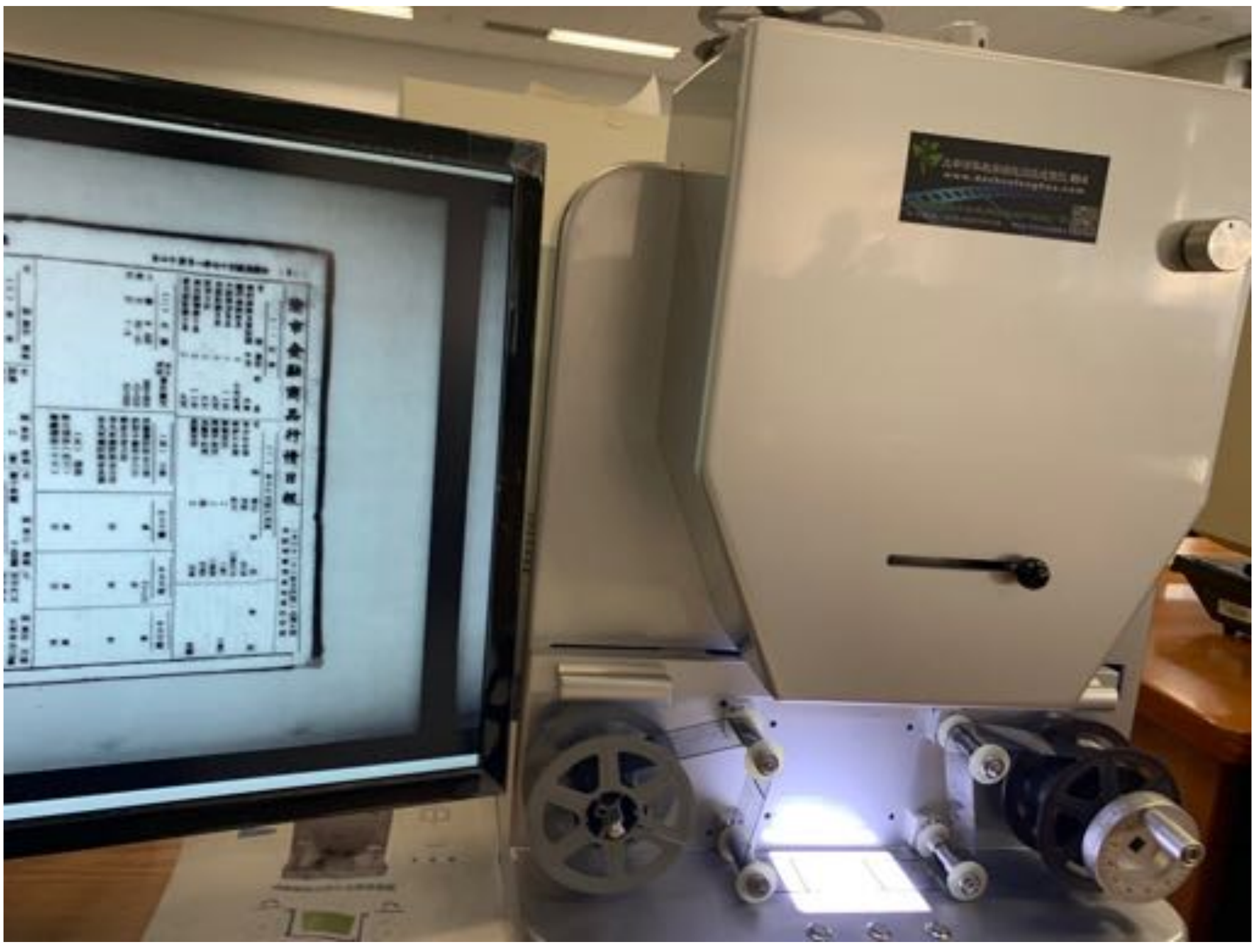
Notes: A black edge indicates that a direct domestic exchange link existed between a city pair. A city with more than two direct links was a hub city. From 1945 to 1949, Shanghai, Chungking, Tientsin, Peiping, and Hankow were the largest hub cities in the domestic exchange network. GIS mapping of the domestic exchange network is based on contemporary newspapers: a direct link is assumed between two cities if a domestic exchange rate was reported in some newspapers.

Figure 4: Major Battles in the Chinese Civil War (1945.10-1949.4)



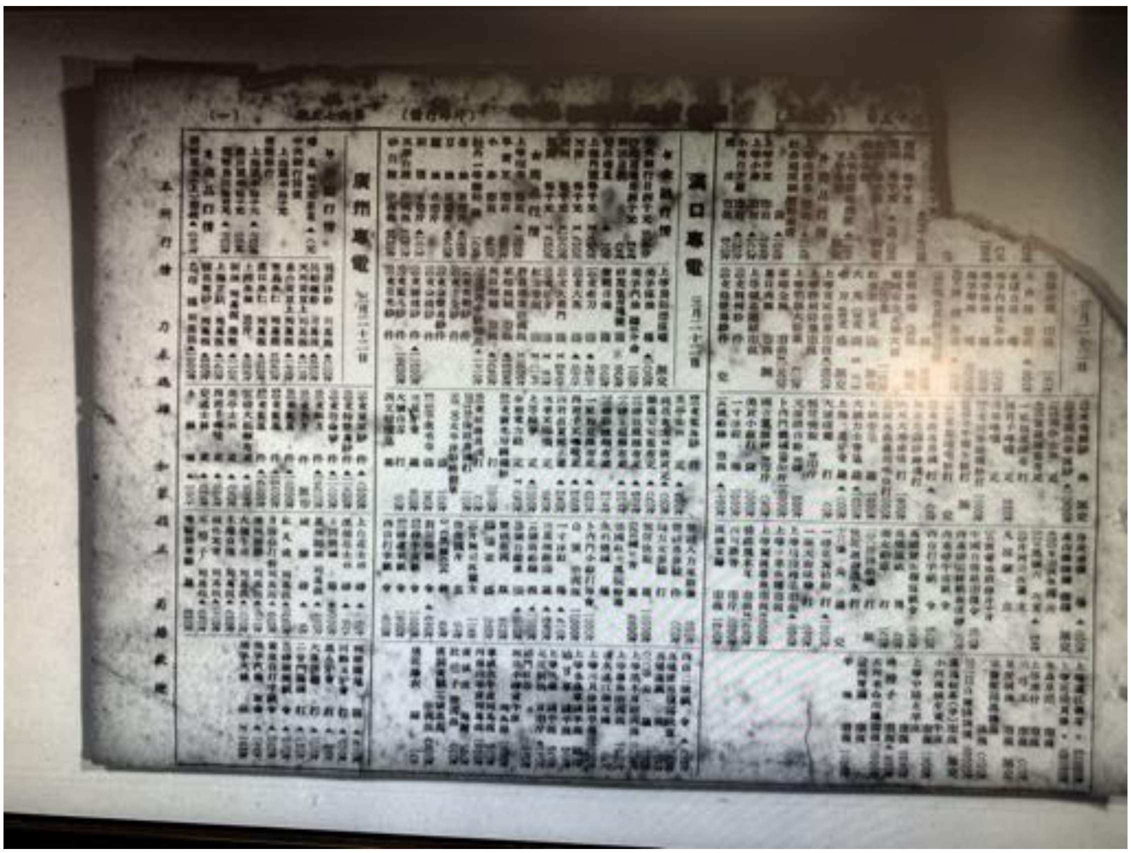
Notes: Each circle represents a major battle occurred in the Chinese Civil War period: the circle size means the battle size measured by soldier number; the circle's color depth indicates the battle duration. GIS mapping relies on the battle information documented in *The History of the Chinese People's Liberation Army (1945-1949)*.

Figure 5: Collecting Sheets from a Archive Microfilm with a Film Projector



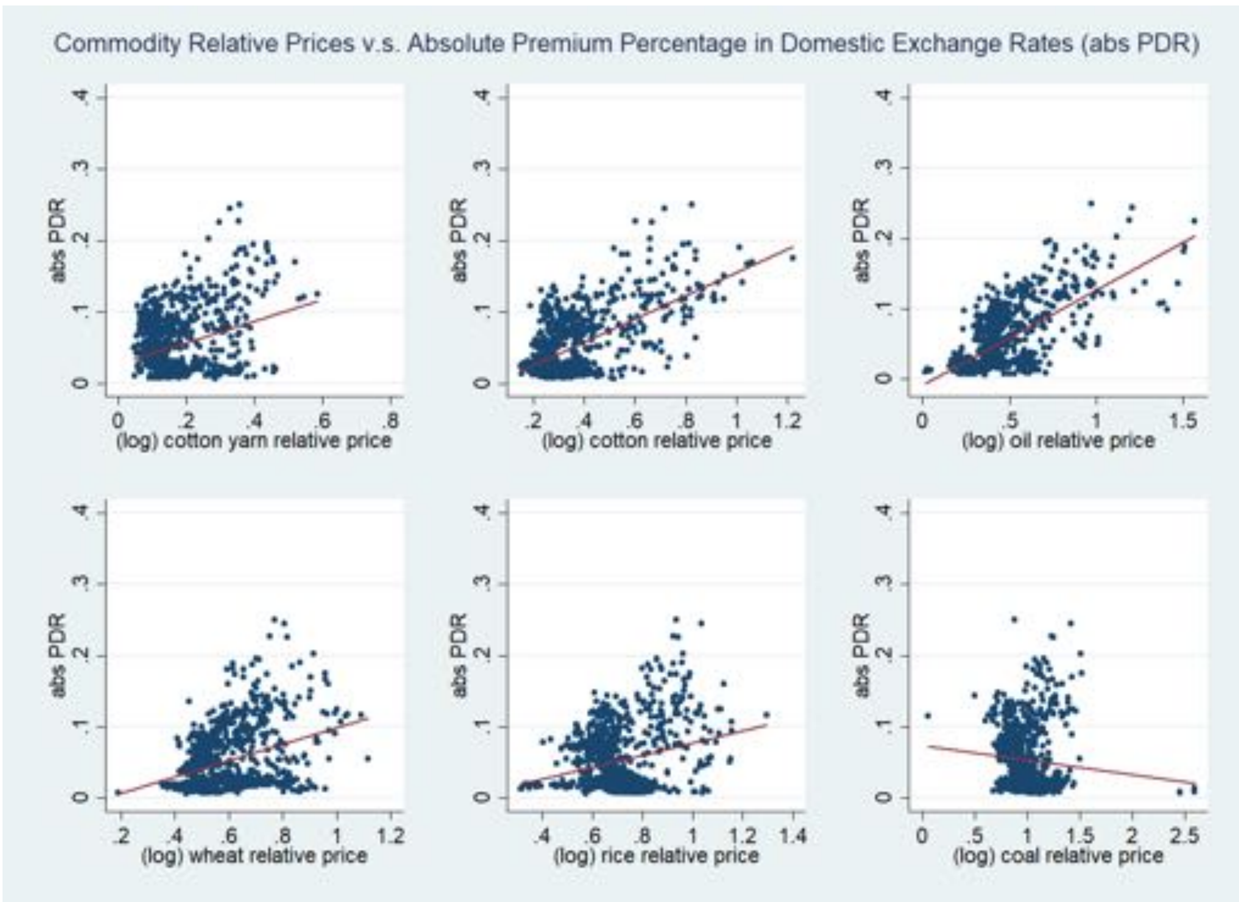
Notes: I collected thousands of sheets of commodity price data from archive microfilms with a film projector in the National Library of China in Beijing in December 2019.

Figure 6: A Sample Sheet from a Microfilm Archive



Notes: This was a sample datasheet from a microfilm archive projected on a monitor screen with a microfilm projector.

Figure 7: Capital Flow Costs v.s. Commodity Relative Prices



Notes: This set of 6 diagrams shows the corelation between commodity relative prices and capital flow costs. From the left top diagram to the right bottom diagram, scattered plots are arranged for cotton yarn, cotton, oil, wheat, rice, and coal, respectively. A fitted line is also added for each plot. The capital flow cost is measured by premium percentage in domestic exchange rates. For a given commodity, the relative price is calculated as the log difference of prices between two cities. Except for the case of coal, a higher capital flow cost is generally associated with a greater cross-city gap in commodity price.

Figure 8: Capital Flows in Bilateral and Multilateral Domestic Exchanges

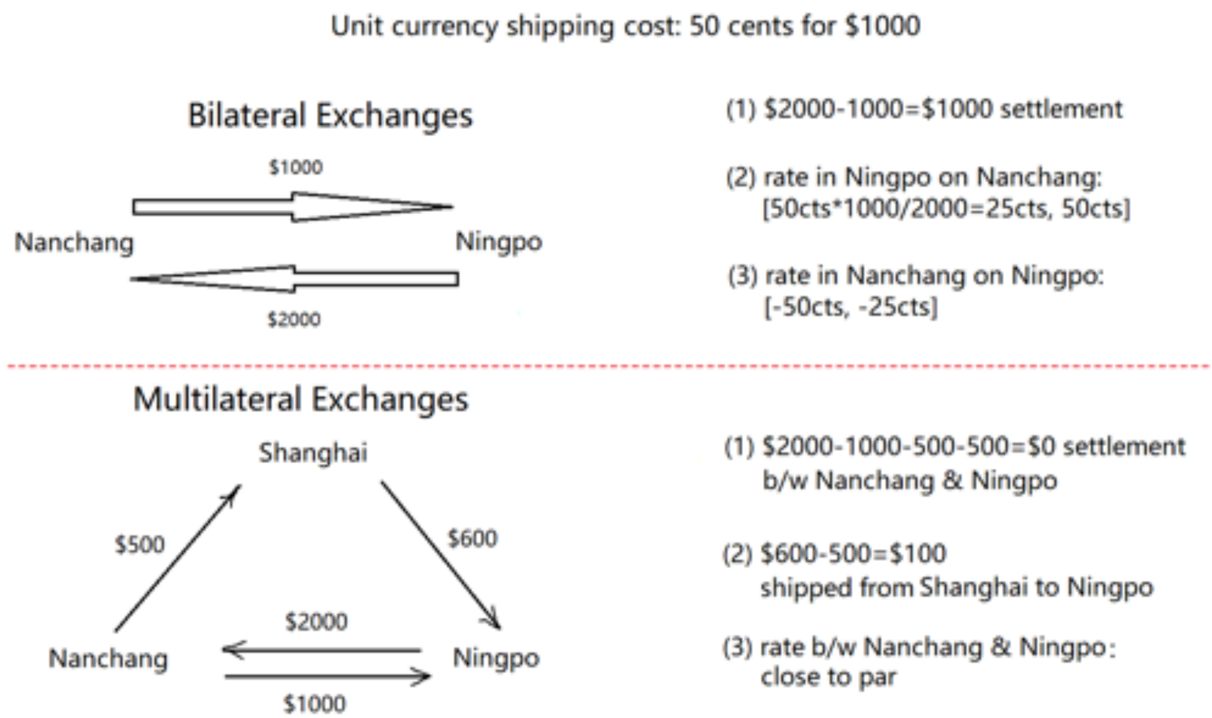


Figure 9: How Battle Shocks to a Financial Hub Altered Capital Flows Between a City Pair