The Silver Standard, Warfare and Inflation: The Mechanism of Paper Money in Yuan China

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Abstract: The Yuan dynasty was the only dynasty to use paper money as its sole medium of circulation, which also marked a turning point in the measure of value from copper coin to silver ingot in medieval China. The Yuan dynasty was also the first national government in world history to use paper money nationwide and established the earliest silver standard monetary system. This paper explores the mechanism of paper money in Yuan China and finds the following. (1) At the beginning of its regime, due to the strict constraints of the silver standard on money issuance, the value of paper money was stable. (2) After the middle stage, the central government had to finance fiscal deficits by issuing more paper money, and inflation was thus unavoidable. Empirical research also finds that the fiscal pressure from multiple provincial rebellions was the most important factor driving the government to issue more paper money; however, contrary to the view of most traditional historians, the emperor's largesse had no significant effect on the over-insurance of paper money. (3) When the monetary standard switched from silver to paper money, the impact of fiscal deficits, which were driving more paper money issuances, became more severe. Metal standards could restrict money over-issuances, but since there was ever-increasing fiscal pressure caused by warfare, a stable metal standard was unsustainable. Notably, paper money in Yuan China experienced three stages, beginning with stable monetary value to inflation and then to hyperinflation; moreover, this pattern can be generalized to other dynasties.

Key Words: Silver Standard; Paper Money; Yuan Dynasty; Warfare; Inflation
JEL Classification: H11, F69, N70

I. INTRODUCTION

China was the first country to use paper money as a medium of circulation. The earliest paper money, referred to as *jiaozi*, emerged in the Northern Song dynasty (960-1127), Sichuan Province.[1] Throughout most of the Yuan dynasty (1271-1368), the central government abolished metal coins for transactions, and thus the Yuan was the first dynasty both in Chinese and world history to use paper money as its sole medium of circulation.[2] Since the issuance of paper money

[1] Kuang (1979) has noted the time of paper money's issuance in some Western countries: America in 1692, France in 1716, Britain during Wars against Napoleon, and Russia in the age of Catherine II.
[2] Through most of the dynasty, the Yuan government prohibited the usage of metal coins in transactions to

in Yuan China was initially under strict constraints based on the silver reserve – and because a convertibility policy was implemented at an early stage – the Yuan government also established the earliest silver standard in world monetary history.

When exploring the monetary regime of Yuan China from the perspective of long-term history, its relative standing should become much clearer. From the Spring and Autumn Eras (770-476 BC) to the Western and Eastern Han dynasties (202 BC-220 AD), metal coins had been used and continued to circulate as the main forms of currency in an increasingly wide range. Thereafter, China's economy then retreated to barter transactions with the dominating role of the natural economy in the Wei (220-266), Jin (266-420), and Southern and Northern (420-589) dynasties. During the Tang (618-907) and Song (960-1279) dynasties, metal coins played an important role once again, and paper money appeared first in the Northern Song dynasty. Then, in the Yuan dynasty, paper money became the sole legal tender whose authority was guaranteed by government and administrative law. However, due to its over-issuance, governments from the Southern Song to the Ming dynasties experienced a severe depreciation of the value of paper money and damage to government's credibility, which resulted in hyperinflation and the collapse of both the Jin and Southern Song dynasties. For this reason, the central governments of the Ming and Qing abandoned the right to issue paper money most of the time, and metals thus became the primary currency once again, which lasted until currency reform in 1935, when paper money was adopted as fiat money (Wang 1995).

The Yuan dynasty also marked the turning point of the measure of value from copper to silver in medieval China. Since the Qin dynasty, round copper coins with an inner square hole (*Yuanxing Fangkong Qian*) had acted as the major currency and measure of value (the *min* or *wen* units) and formed the basic standard of the monetary scheme that persisted until the Song dynasty when paper money, both the *jiaozi* of the Northern Song and the *huizi* of the Southern Song, was used and could be converted into copper or iron coins easily. However, from the Yuan dynasty on, silver became the main reserve metal for issuing paper money, and this tendency was inherited by subsequent dynasties, eventually making silver the leading exchange medium (Peng 2007).[3] Additionally, before the Yuan dynasty, metal coins, including copper and iron coins, were the leading currency, and paper money only played a subsidiary role. However, by the late Yuan dynasty, paper money had become the chief currency used in bulk commodity transactions, and metal coins had declined to a subsidiary currency used only in small or retail transactions. This monetary structure is similar to contemporary monetary systems in most modern countries. Figure 1 shows the evolution of currency forms in Chinese monetary history since the Warring States Era.

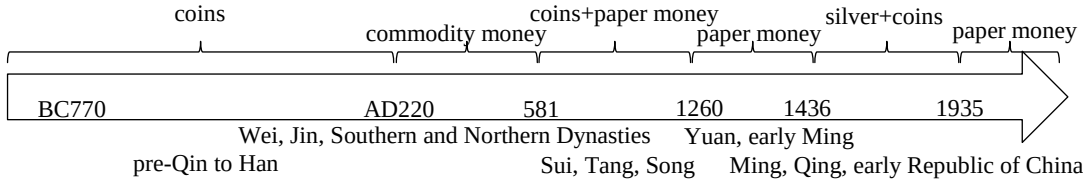

FIGURE 1: The Evolution of Currency Forms in Chinese Monetary History since the Spring

maintain the purchasing power of paper money. While every emperor issued a few types of copper coins, the quantity of copper coins in circulation was negligible compared to paper money during the entire dynastic period.

[3] Peng (1937) claimed that the name of *yuanbao* referred to the silver tael that originated in Yuan, as its shape is different from foreign silver coins. In 1266, Yang Shi, the administrator of local paper money affairs, suggested casting silver stored in warehouses into the silver tael's shape, each of which weighing 50 liang, which were named *yuanbao*.

and Autumn Era

As discussed above, European countries and the U.S. began to issue paper money in the eighteenth century, while it had already been used as the main currency in thirteenth century Yuan China. Therefore, exploring how this monetary system originated, worked, and failed is of great significance to both Chinese and world monetary history. This paper studies the mechanism of paper money in the Yuan dynasty and analyzes how paper money originated, how government policies maintained its stability, and how severe inflation occurred in the late period with a special focus on the relationship between inflation and fiscal pressure. The data mainly come from original annual records of money issuance in *Shihuozhi* of *Yuanshi*, which are quite convincing; related warfare information is found in *A Chronology on Warfare in Chinese All Dynasties* (*Lidai Zhanzheng Nianbiao)*. The findings of this paper are as follows. In the first stage of the Yuan monetary regime (1260-1276), the value of paper money was stable due to the constraints of the silver standard, but after the middle stage (1277-1341), the central government had to finance fiscal deficits by issuing more paper money, and inflation was thus unavoidable. Empirical research also finds that the fiscal pressure from multiple provincial rebellions was the most important factor driving the government to issue more paper money; contrary to the view of most of traditional historians, the largesse of the emperor had no significant impact on the over-issuance of paper money. However, a strict silver standard could alleviate the over-issuance of paper money resulting from the fiscal pressure of military expenditures. The paper money in Yuan China experienced three stages: the stability of monetary value, inflation, and then hyperinflation. This experience can also be generalized to other dynasties.

The rest of this paper proceeds as follows. Section 2 reviews historical studies related to our study. Section 3 presents stylized facts about the issuance of paper money in Yuan China, and section 4 analyzes the mechanism of fiscal pressure resulting in the over-issuance of paper money. Section 5 empirically explores the influence of warfare and largesse on paper money issuance, and section 6 studies the restriction of the silver standard on warfare's impact on issuance of paper money. Section 7 concludes.

II. LITERATURE REVIEW

Up to this point, most studies involving paper money in Yuan China have been conducted by historians, and the previous abundant literature mainly consists of three parts. First, some researchers provide a historical narrative on the basic facts of money circulation with a special focus on evaluating its historical standing. Second, some papers aim to study concrete topics, such as monetary reform in the age of Kublai Khan or role of paper money in economic development. The last branch of the literature attempts to analyze the essence of the monetary regime in Yuan China.

The pioneering research in the first branch of the literature was performed by a distinguished historian, Wu (1956), whose article written in the 1940s laid a good foundation for later scholars. Wu described changes of the form of each paper note, from *jiaochao* and *zhongtong chao* in early Yuan to *zhiyuan chao* and *zhida yinchao* and finally to *zhizheng jiaochao*. He also checked the unit of paper money, *ding*, and calculated the quantity of paper money issuance in each year for the reign of every emperor. Chen (1992) and Quan (1996) explored the same problem as Wu, but their studies were more comprehensive. Xiao (1984) noted that there were several monetary

policies implemented in the Yuan dynasty that contemporary governments typically followed, such as abolishing gold and silver bullion in payments, prohibiting gold and silver bullion in transactions and exports, gathering all gold and silver bullion in national warehouses as reserves for paper money, using paper money as the only legal tender, maintaining the purchasing power of paper money by selling and buying silver in the monetary market, and so on. He also recognized that some arrangements with regard to the circulation of *Zhiyuan* paper money made in the reign of Kublai Khan (recorded in the book, *Zhiyuan Baochao Tongxing Tiaohua*) were the earliest and most complete monetary laws in the world. Takahashi (2010) has mainly explored the formation of the Yuan dynasty's monetary policy, especially considering its relationship with the Song as well as with the Jin. Yang (1952) stated that the mechanism of paper money in Yuan China was obviously more mature than its predecessors in Song and Jin China, and its evolution actually marked the peak of Chinese monetary history. Afterwards, such importance was no longer attached to paper money, and it was finally abandoned after the nineteenth century only to be revived in the modern era due to the influence of Western countries. Von Glahn (1996) suggested that fiat money was first introduced into circulation under the Yuan, which was a momentous and unprecedented attempt, although it brought about hyperinflation in the later part of the dynasty.

In the second branch of the literature, Mu (1986) in particular noticed that the unification of currency under Kublai Khan's monetary reform promoted economic development in Yuan China, and the wide acceptance of paper money across many Asian and European countries benefited their economies significantly, making the reform noteworthy in both Chinese and world history. Li (1985) stated that paper money in Yuan China was the earliest currency used on a nationwide basis, also deeply influencing foreign countries through international trade. Kuang (1980) thought that although paper money in the Yuan dynasty had apparently stimulated domestic trade and economic development and that the government had taken systematic measures to make paper money circulate stably, it also must be noted that inappropriate policies in the late period induced chaos with the money in circulation and led to the collapse of the dynasty. Traditionally, it has been claimed that paper money stimulated commodity transactions, agricultural and manufacturing production, and the prosperity of the urban economy because coins could play the same role as paper money; therefore, issuance of paper money only aimed to gain more seigniorage revenue. However, contrary to these opinions, Guo (1983) noted that there was no obvious evidence of any positive influence of paper money. Some Japanese scholars also have studied the paper money of Yuan China. For instance, Takahashi (2010) explored the process of the formation of monetary policy in Yuan China by placing the monetary history of the Song, Jin and Yuan dynasties into a unified framework. Based on analyses of the prices of gold, silver, salt, tea, and grain, Naonori (1993) studied the change of the value of paper money in Yuan China. Miyazawa (2012) analyzed carefully the connection between public finance and the issuance of paper money in the Yuan dynasty.

In the third branch of the literature, there is no consensus among different researchers. Qiao (1984) stated that paper money in the Yuan dynasty was the earliest fiat money in the world, and its policy was inherited by the following dynasty; therefore, the progress of the money regime in Yuan China could not be ignored in analyzing the failure of fiscal policy during the later stages of the dynasty (Qiao, 1984, p. 8). Contrary to Qiao's view, most researchers believed that the paper money of Yuan China was backed by silver reserves (Ye, 1984; Tian, 1985). Ye (1997) also mentioned that the money regime in Yuan China achieved much greater success than the Song and

Jin dynasties because only paper money circulated in the market across the whole country through most of the Yuan dynasty. Liu (2007) claimed that metal reserves were a central issue in studying the characteristics of paper money in the Yuan dynasty.

In sum, studies conducted by historians have mainly focused on certain aspects of paper money in Yuan China, including its origins, the relationship between its issuance and hyperinflation at the end of the dynasty, and so on. There is some consensus on the evolution of the monetary system and its historical standing, as well as major disputes over the essence of the monetary regime. Additionally, although the existing literature has investigated a few concrete issues, coherent and deep explorations have been rare up to this point. Admittedly, these works provide ample historical facts necessary for this paper's research, and the annual data about the issuance of paper money recorded in *Shihuozhi* of *Yuanshi* have not been fully exploited by economists. Based on the foregoing, we intend to study the mechanism of paper money in Yuan China and attempt to perform a more comprehensive study than previous scholars.

III. HISTORICAL BACKGROUND: STYLIZED FACTS

This section provides some stylized facts about the currency history of Yuan China, which may help in understanding the mechanism of paper money in this dynasty. Table 1 lists the name, unit, time span of circulation, and exchange rate of each type of paper money that was issued in sequence from the early to late Yuan period.

TABLE 1: Issuances of Paper Money in Yuan

Name	Reserve	Unit	Exchange Rate (with silver/copper coin)	Exchange Rate (with previous paper money)	Circulation Period
Zhongtong Yuanbao Jiaochao	silk	tael	0.05 tael (silver)		Jul-Oct, 1260
Zhongtong Yuanbao Chao	silver	guan	0.5 tael (silver)		Oct, 1260-1273
Zhiyuan Tongxing Baochao	silver	guan	0.5 tael (silver)	5 *Zhongtong Yuanbao Chao*	1287-1356
Zhida Yinchao	silver	tael	1 tael (silver)	5 *Zhiyuan Tongxing Baochao*	Sept, 1309-Apr, 1311
Zhizheng Zhongtong Jiaochao	silver	guan	1000 wen (copper coin)	2 *Zhiyuan Tongxing Baochao*	1350-1356

Sources: Wu (1956), p.293; Li (1985), p.49.

A. Money in the Early Mongol Empire and Currency Unification after the Issuance of *Zhongtong Chao*

Silver had been used as the leading currency since the establishment of the Mongol Empire in Northern Mongolia, especially when paper money issued by the government of the previous Jin dynasty was abolished due to its severe depreciation. It is believed to be relevant to frequent trade with Western Asian countries because silver flowed into China from these countries.[4] In 1253, during the reign of Mangou Khan, Kublai made an attempt at issuing a type of local paper money called *jiaochao*, which was confined to circulation within his feudatory. At the same time, many

[4] Akinobu (2007, pp. 58-61) discussed the transregional flow of currency from the Mongol Empire.

other **seignior**s also issued their own local paper money, which was also allowed to circulate in their own territory and was redeemed regularly. These various types of paper money only circulated in restricted regions and times, which seriously hindered commercial development and domestic trade through the whole country. In Northern China, following the unification of the Mongol Empire, the circulation of both silver and paper money were authorized by the government, but sometimes other goods such as silk could also be used as a numeraire in transaction.

In 1260, the first emperor of the Yuan dynasty, Kublai Khan, came to power and issued *zhongtong yuanbao jiaochao* (*zhongtong chao* in general) in July with 10 par values.[5] Although this paper money was measured by the *wen* or *guan* units used for copper coins, it was not based on the reserve of copper coins but on the reserve of silver, and the exchange rate was 2 *guan zhongtong chao* to 1 *tael* silver. Based on the lessons of the collapse of paper money in the previous Jin dynasty, the Yuan government took the following measures to maintain monetary stability. (1) There was no limit to the region or timeframe for the circulation of *zhongtong chao*, i.e., it could be used nationwide over a long period of time. (2) All old local paper monies were forbidden in circulation and had to be redeemed by newly issued *zhongtong chao*. (3) All taxes had to be paid in *zhongtong chao*, and thus it replaced silver and other commodity money to become the sole legal tender. In other words, *zhongtong chao* had to be accepted. (4) Silver served as reserves for money issuance and *zhongtong chao* could be converted into silver freely at a fixed exchange rate. (5) Paper money was only permitted in commercial transactions but forbidden to be used for other purposes. All of these policies guaranteed the improved credibility of the new paper money, and *zhongtong chao* circulated smoothly and was accepted by many people because of its stable value and convenience to carry in trade.

In 1275, when the war against the Song dynasty reached its climax, the Yuan government decided to redeem *huizi* in Southern Song China using *zhongtong chao* at the exchange rate of 50 *guan huizi* to 1 *guan zhongtong chao*. In 1277, which was the second year occupying the Lower Yangtze, copper coins were abolished in the area and were ordered to be exchanged for *zhongtong chao* at the exchange rate of 3 *guan* copper coins to 1 *guan zhongtong chao*. Therefore, the redemption promoted national monetary unification and market integration, and *zhongtong chao* became the sole currency in circulation over a huge territory. In addition, Kublai Khan also established some institutions to introduce *zhongtong chao* to frontier areas such as Karakorum and Turpan, though an exception was made for Yunnan Province where the shell was used as currency due to specific geographical and historical considerations (the exchange rate of shell coins to *zhongtong chao* was 20 *suo* to 1.5 *guan*). Based on these policies, *zhongtong chao* had become widely accepted as the only currency in the whole country. Money unification promoted political expansion, and the chaotic situation that had persisted since the Song and Jin dynasties dissipated.

Other factors contributed to monetary stability. First, unlike the late Song and Jin dynasties, there were abundant reserves, such as metals and other valuables, stored in warehouses to back the issuance of the paper money.[6] Among these, silver was the most important; people could convert

[5] 10 wen, 20 wen, 30 wen, 50 wen, 100 wen, 200 wen, 300 wen, 500 wen, 1 guan, 2 guan.

[6] According to *Yuandianzhang*, there were 65 warehouses used to store reserves in the whole country. In light of *Xu Wenxiantongkao*, the function of the warehouses was to be "responsible for transactions between paper money and silver; if people exchange paper money for silver, the exchange rate is 1 tael silver equal to 2 *guan zhiyuan chao*, and if exchanging silver for paper money, the exchange rate is 1 tael silver to 2.5 *guan zhiyuan chao*."

paper money to silver only by paying a 5% commission on the exchange. Second, to increase the demand for paper money, all taxes were required to be paid using *zhongtong chao.* Third, the government paid much more attention to price variations that caused fluctuations in money value. To achieve this, government set up numerous granaries to store grain. If rice prices rose during a famine, they would lower the price by selling their rice on the market. Fourth, the Yuan government was very prudent in expanding the quantity of money, especially when the miserable memories of hyperinflation from the end of the Jin dynasty were still fresh. These measures made *zhongtong chao* circulate quite well in early Yuan China, and it was said in historical records that "paper monies are more popular than gold and silver" among the people (Quan, 1996, p. 383).

B. Depreciation of *Zhongtong Chao* and Issuance of *Zhiyuan Chao*

Once the war against the Song dynasty was fully engaged, ever-increasing military expenditures became a large burden on the Yuan government's fiscal budget. Silver stored in local warehouses was first ordered to "be transported to the capital" in 1276 and was used directly for military purposes, which meant that paper money would no longer be based on silver reserves. From that point on, there were no additional silver reserves for newly issued paper money, and the silver standard was not as strict as it had been in the early stage; thus, the deprecation of paper money was unavoidable.

To prevent ongoing deprecation, the Yuan government issued a new regulation in 1287 to fix the exchange rate of paper money and silver at the original level and to achieve the goal of price stability. However, in actual transactions, people would not exchange gold and silver for depreciated paper money, and as noted above, there was also not enough gold and silver in government warehouses to use for transactions at the fixed exchange rate. Because of this situation, the Kublai government issued new paper money two years later called *zhiyuan chao*, which could be exchange for *Zhongtong chao* at the rate of 1 guan *zhiyuan chao* to 5 guan *Zhongtong chao*. Both forms of paper currency could be used in transactions and tax payments. The value of *zhiyuan chao* was also anchored to silver at the rate of 1 tael guan of silver to *zhiyuan chao*, and private transactions of gold and silver were still forbidden. However, after the issuance of new paper money, fiscal expenditures on wars and largesse increased synchronously. In 1292, the total fiscal revenue was 2,978,305 taels of silver, but by October, fiscal expenditures had already reached 3,638,543 taels, creating a deficit of 660,238 taels. After the passing of Kublai in 1294, the new emperor's largesse toward royal families and ministers for the purpose of regime stability was substantial, and the fiscal deficit thus increased notably, and the convertibility between paper money and silver was unsustainable. Without the discipline of silver standard, the Yuan government began to issue more paper money to obtain seigniorage revenue, and the quantity of money issuance gradually grew out of control. Compared to the early Yuan economy, commodity prices had already increased tenfold.

C. Monetary Reform in *Zhida* Period, the Issuance of *Zhizheng Chao* and the Collapse of the Monetary System

In 1309, the Yuan government issued the fourth edition of its paper money, which was called *zhida yinchao*, and the exchange rate between the new paper money and the old was 1 guan *zhida yinchao* to 5 guan *zhiyuan chao*. The value of *zhida yinchao* was also anchored to silver with the price of 1 tael guan of silver to 1 tael *zhida yinchao*. This was the first time in China that a unit of

paper money was equal to a unit of silver. Monetary reform in *Zhida* Period also aimed at gaining more seigniorage revenue. For example, in 1311, two years after the beginning of the reform, fiscal expenditures amounted to 6 million *ding*, while only 0.11 million taels remained in treasury; thus, it was necessary to issue more paper money to finance the deficit. The actual quantity of paper money issued reached 10 million *ding* in that year. Therefore, commodity prices rose correspondingly. When measured in gold, market prices reached 20 times that of the early Yuan dynasty, and when measured in silver, the price increase reached 15 times. In 1350, the Yuan government implemented its last monetary reform and issued the new *zhizheng jiaochao*, which could coexist with the *zhiyuan chao* at the price of 1 guan *zhizheng jiaochao* to 2 guan *zhiyuan yinchao*, with a circulation rate of two to one.

The motivation for issuing new paper money was also to obtain more seigniorage revenue, and the literature demonstrates that in 1352 and 1353, the issuance of *zhizheng chao* amounted to 19.5 million *ding* if measured in *zhongtong chao*. In 1355, the quantity of paper money issued reached the highest level in Yuan history, 60 million *ding*. As a result, price levels soared to 267 times that of the early Yuan period when measured in gold, and 250, 400, or 800 times if measured by grained rice, silver or copper coins, respectively. According to the records in *Shihuozhi Chaofa* of *Yuanshi*, commodity prices rose by 50,000 (Ye 1997). After 1356, paper money was actually rejected by the people and driven out of circulation. According to *Yuanshi*, "in all prefectures and counties, commodities are used as an exchange medium in all transactions, and accumulated paper monies cannot circulate any more since people treat them as scrap paper."[7] Therefore, because of hyperinflation, a barter economy had partially returned under the Yuan dynasty. The relationship between the issuance of paper money and inflation can easily be observed from their common trends, indicated in Figure 2.

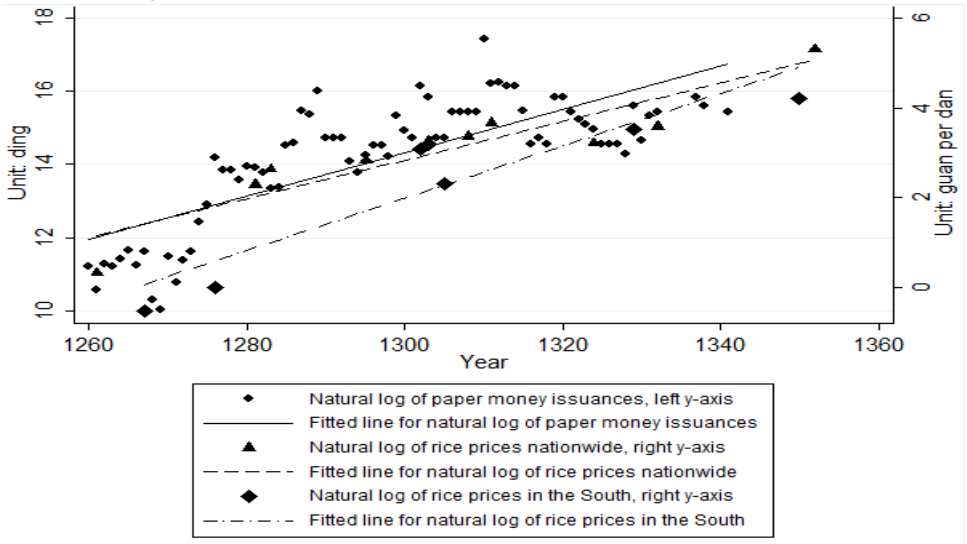

FIGURE 2: Issuances of Paper Money (Counted by *zhongtong chao*), Rice Prices in the Whole Country and in Southern China

Sources: Data of paper money (1260-1356) come from *Shihuozhi Chaofa* of *Yuanshi*. Data of Rice Prices come from Huang (2008).

IV. FISCAL PRESSURES AND THE CAUSES OF PAPER MONEY

[7] See *Shihuozhi Chaofa* of *Yuanshi*, volume 97.

OVER-ISSUANCE

Paper money in Yuan China led to hyperinflation due to over-issuances because the government financed fiscal deficits by using seigniorage revenue from those issuances after the middle stage of the dynasty. This method of raising revenue had been recognized by the rulers of Mongol Empire since governments of preceding dynasties, such as the Northern Song and the Jin, had been known to take similar measures. Throughout the Yuan dynasty's history, different types of wars had been common, including unification wars, foreign wars, and wars to suppress rebellions in different regions since the Yuan ruler belonged to an ethnic minority, owned more territory than previous dynasties, and had adopted an ethnic differentiation policy. Additionally, following the death of Kublai Khan, subsequent emperors lost the power needed to keep their political regime sustainable; therefore, they usually achieved the goal of political stability through substantial largesse to seigniors and royal families, which also increased their fiscal burden. The largesse consisted of gold, silver, coins and silk; sometimes paper monies were also included. Available data recorded in first-hand historical literature fully support these facts, and Figure 3 presents two apparent facts. First, after 1276, the quantity of paper money in circulation obviously climbed with the increase of the wars' intensity and the number of involved provinces. Second, after 1294, although the frequency and involved area of warfare grew smaller, the amount of largesse increased significantly, and the quantity of issuances of paper money was thus also maintained at a very high level.

In Yuan China, the maker of monetary policy was also the maker of fiscal policy and was even the direct beneficiary of that policy. Based on the experiences of paper money under the Song and Jin dynasties, they clearly knew that the issuance of fiat money could reverse revenue brought from both silver directly and seigniorage indirectly, and monetary policy thus only served as a subsidiary tool of fiscal expenditure. In early Yuan China, the initial stability of the value of paper money was undoubtedly due to the government's self-discipline in maintaining abundant reserves and convertibility between silver and paper money, but over-issuance of paper money was inevitable if the government financed its fiscal deficit simply by issuing paper money more frequently. As shown in the history of the Yuan dynasty, this process can be decomposed into two steps. First, the government misappropriated metal reserves for the purpose of funding deficits. Second, it issued more paper monies than could be supported by reserves to obtain seigniorage revenue. Once the first step began, the ease of constraint from the reserve might have resulted in the second step happening automatically. Once paper money was over-issued, the monetary system would enter into inflation, and even hyperinflation, and collapse was inevitable in the end.

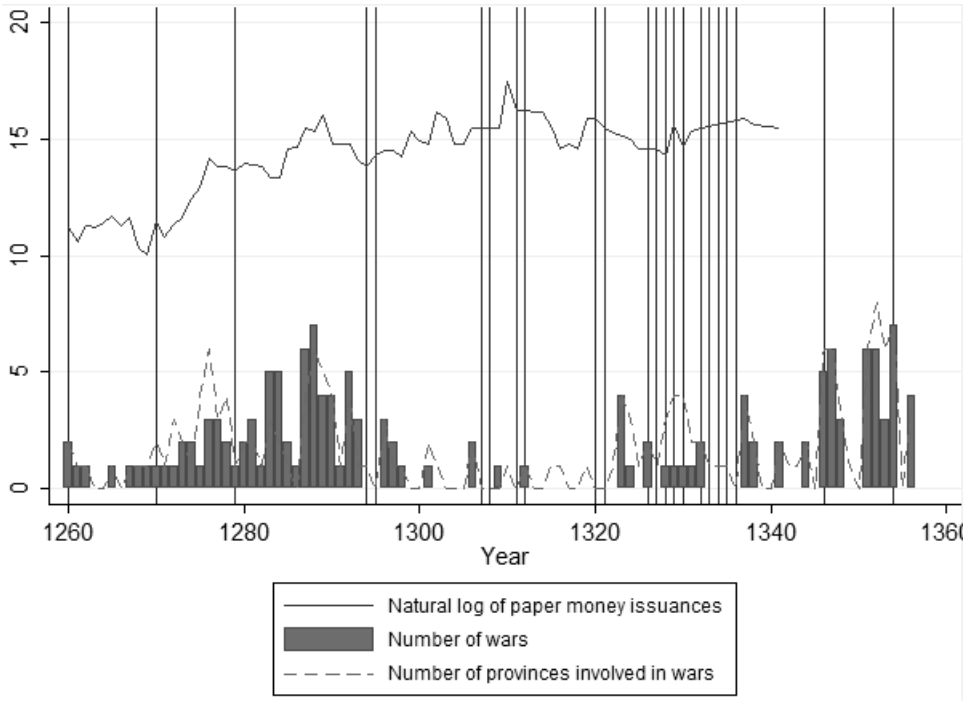

FIGURE 3: Issuances of Paper Money, Warfare Intensity and Largesse

Note: The vertical lines on horizontal axis denote whether there was substantial largesse in that year.

Sources: Data on paper money are from the same source as Figure 2. Data on warfare are from Writing Group of Chinese Military History (2003). Data on largesse are from Zhao (1990).

V. ECONOMETRIC ANALYSIS OF THE IMPACT OF WARFARE AND LARGESSE ON PAPER MONEY ISSUANCE

This section continues to empirically study the causes of over-issuances of paper money in Yuan China. First, we establish a time-series dataset with a sample that includes 76 observations (after dropping missing observations), which covers the years from 1260 to 1341. The main variables are the annual quantity of the issuance of paper money (in silver taels), the number of internal military conflicts and involved provinces, the number of unification wars and involved provinces, the number of external wars, the number of single-province uprisings and involved provinces, the number of multi-province uprisings and involved provinces, the annual aggregated number of wars and involved provinces, the emperors' largesse toward seigniors and Buddhists (dummy), and the total population of each year. In addition, we set the sequence number of emperors to control the fixed effect of emperors (9 emperors in total).[8] Table 2 reports summary statistics of these variables.

TABLE 2: Summary Statistics of Main Variables

Variables	Observations	Mean	Standard Error	Minimum	Maximum
year	76	1297.684	22.410	1260	1341
number of emperor	76	2.789	2.351	1	9
quantity of issued paper	76	3524833	4817218	22896	36259200

[8] The sequence number of emperors is not *nianhao*; in our setting, each emperor only has one number but may have two or more *nianhao.*

money (in silver taels)					
single-provincial uprisings and involved provinces	76	0.842	1.071	0	4
multi-provincial uprisings	76	0.053	0.225	0	1
involved provinces of multi-provincial uprisings	76	0.105	0.450	0	2
internal military conflicts	76	0.289	0.585	0	2
involved provinces of internal military conflicts	76	0.316	0.677	0	3
unification wars	76	0.211	0.410	0	1
involved provinces of unification wars	76	0.342	0.825	0	4
external wars	76	0.25	0.592	0	3
wars (dummy)	76	0.763	0.428	0	1
aggregated wars	76	1.645	1.555	0	7
involved provinces of wars	76	1.605	1.533	0	6
largesse (dummy)	76	0.224	0.419	0	1
population (10 thousand)	76	5941.363	2935.692	776.478	9000

Source: See Figure 2.

A. Warfare and the Issuance of Paper Money

First, the aggregate impacts of wars on the issuance of money are presented in Table 3. Columns 1-2 show the results when viewing all types of wars as wars (the antithesis of which is no war happening in that year). Columns 3 and 4 view only internal military conflicts and uprisings (excluding unification wars and external wars) as wars (the antithesis of which is no war, unification wars or external wars happening in that year). In columns 5-6, only uprisings (single-province or multi-province rebellion) are regarded as wars (the antithesis of which is no war happening or wars other than uprisings happening). All regressions control for heteroskedasticity, serial correlations, and fixed effects of emperors and employ an ARCH test on residuals to avoid interference from autocorrelation.

Table 3 indicates that as the definition of wars becomes narrower and narrower, the positive correlation between wars (especially involved region) and the quantity of money issued clearly increases. In addition, the coefficient of the emperor fixed effect is significantly positive, which is consistent with the historical fact that emperors succeeding Kublai Khan frequently appropriated metal reserves and issued much more paper money. The positive coefficient of population can be perfectly explained by the theory of monetary economics, i.e., a larger market scale leads to a higher level of demand for currency.

TABLE 3: Impacts of Warfare on Issuances of Paper Money

	Dependent variable：ln (quantity of money's issuance)					
	（1）	（2）	（3）	（4）	（5）	（6）
war (dummy)	-0.1347		0.1697		0.3057	
	(0.2272)		(0.2101)		(0.2019)	
L1.war (dummy)	-0.1254		-0.1375		0.0339	
	(0.1857)		(0.1944)		(0.2162)	
L2. war (dummy)	-0.2116		-0.1258		-0.1380	
	(0.2121)		(0.1837)		(0.1965)	
L3. war (dummy)	-0.2310		-0.2182		-0.2050	
	(0.2145)		(0.1851)		(0.2100)	
involved provinces		0.1043		0.1013*		0.1424*

		(0.0574)		(0.0625)		(0.0752)
L1. involved provinces		0.0441		0.0284		0.0281
		(0.0607)		(0.0674)		(0.0700)
L2. involved provinces		-0.0057		-0.0428		-0.0751
		(0.0667)		(0.0718)		(0.0670)
L3. involved provinces		-0.0365		-0.0800		-0.0527
		(0.0610)		(0.0651)		(0.0808)
ln(population)	1.9468***	1.7420***	1.9939***	1.8175***	1.8451***	1.8051***
	(0.1911)	(0.2108)	(0.2687)	(0.2677)	(0.2924)	(0.3028)
constant	-1.6394	-0.8850	-2.4393	-1.2735	-1.4864	-1.2092
	(1.3176)	(1.5020)	(1.9671)	(1.9670)	(2.1135)	(2.2025)
fixed effect of emperors	controlled	controlled	controlled	controlled	controlled	controlled
observations	73	73	73	73	73	73
R2	0.8719	0.8776	0.8789	0.8798	0.8783	0.8820
ARCH test (chi2)	1.504	0.437	1.146	0.075	0.630	0.961

Notes: ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively. Numbers in parentheses are robust standard errors. L1.-L3. denote a lag of 1 year to 3 years, respectively. The value of chi2 is reported in ARCH test, and its insignificance means accepting the null hypothesis (i.e., ARCH effect does not exist).

Based on the results reported above, we can assume that different types of wars brought about different influences on fiscal pressure and then exerted differential impacts on money issuances and changes in the money standard. We further subdivide the definitions of wars to test this assumption. In Table 4, columns 1-2 present results viewing single-province uprisings as wars (the antithesis of which is no war or other types of wars happening in that year). In columns 3-4, multi-province uprisings are regarded as wars (the antithesis of which is no war or other types of wars happening in that year). Finally, in columns 5-6, internal military conflicts are viewed as wars (the antithesis of which is no war or other types of wars happening in that year). Table 4 indicates that the positive correlation between multi-provincial uprisings and issuances of money is quite significant. According to columns 3-4, the coefficients of wars (dummy) and involved provinces are significantly positive (0.8406 and 0.4203, and both are significant under significance level of 1%), which means that the issuance of paper money would rise substantially if there were multi-province uprisings breaking out in that year.[9] Furthermore, the larger the areas involved in the uprisings (or the more provinces involved), the more money was issued.[10] However, the positive correlation between single-province uprisings and the issuance of money is not significant. These results provide empirical evidence for the assumptions noted above, i.e., **compared with single-province uprisings and internal military conflicts, multi-province uprisings will affect larger areas, and thus the government will need to draft more people and expropriate more military recourses (arms, horses, and grains, etc.) across different regions, and impose more pressure on public finance, thus creating a stronger impetus for the over-issuance of paper money.**

TABLE 4: Impacts of Domestic Wars on Issuances of Paper Money

	Dependent variable：ln (quantity of money's issuance)					
	(1)	(2)	(3)	(4)	(5)	(6)
war (dummy)	0.3057		0.8406***		-0.0888	
	(0.2019)		(0.2031)		(0.2372)	
L1.war (dummy)	0.0339		0.2498		0.1457	
	(0.2162)		(0.1867)		(0.2706)	
L2. war (dummy)	-0.1380		0.0979		0.0587	
	(0.1965)		(0.2236)		(0.2029)	

[9] Compared with no multi-provincial uprisings when the quantity of monetary issuance would increase by 0.84%.
[10] One additional involved province will lead to a 0.42% increase of monetary issuance.

L3. war (dummy)	-0.2050		0.1199		-0.2951	
	(0.2100)		(0.2196)		(0.1939)	
involved provinces		0.1025		0.4203***		-0.1045
		(0.0947)		(0.1015)		(0.1605)
L1. involved provinces		0.0006		0.1249		-0.0178
		(0.0917)		(0.0934)		(0.2180)
L2. involved provinces		-0.1317		0.0489		0.1048
		(0.0843)		(0.1118)		(0.2331)
L3. involved provinces		-0.1377		0.0599		-0.2270
		(0.1107)		(0.1098)		(0.1391)
ln(population)	1.8451***	2.0027***	1.7067***	1.7067***	1.8334***	1.8814***
	(0.2924)	(0.3436)	(0.1878)	(0.1878)	(0.1797)	(0.1696)
constant	-1.4864	-2.5843	-0.5003	-0.5002	-1.3401	-1.6975
	(2.1135)	(2.4857)	(1.4291)	(1.4293)	(1.4029)	(1.3273)
fixed effect of emperors	controlled	controlled	controlled	controlled	controlled	controlled
observations	73	73	73	73	73	73
R2	0.8783	0.8802	0.8808	0.8808	0.8729	0.8718
ARCH test (chi2)	0.630	0.565	1.032	1.302	0.324	0.544

Note: See Table 3.

TABLE 5: Impacts of Domestic Wars on Issuance of Paper Money (after 1280)

	Dependent variable：ln (quantity of money's issuance)					
	(1)	(2)	(3)	(4)	(5)	(6)
war (dummy)	0.0795		1.0303***		-0.0987	
	(0.2617)		(0.2382)		(0.2859)	
L1.war (dummy)	-0.1160		0.3721*		0.1951	
	(0.2583)		(0.1950)		(0.3260)	
L2. war (dummy)	-0.2746		0.1494		0.0926	
	(0.2323)		(0.1669)		(0.2384)	
L3. war (dummy)	-0.3036		0.2335		-0.3910	
	(0.2256)		(0.2011)		(0.2383)	
involved provinces		0.0591		0.5152***		-0.1102
		(0.0998)		(0.1191)		(0.1850)
L1. involved provinces		-0.0208		0.1861*		-0.0161
		(0.1054)		(0.0975)		(0.2517)
L2. involved provinces		-0.1488		0.0747		0.1555
		(0.0996)		(0.0834)		(0.2591)
L3. involved provinces		-0.1438		0.1167		-0.2774
		(0.1336)		(0.1005)		(0.1823)
ln(population)	1.4444**	1.8703**	0.9636**	0.9636**	1.4411*	1.6306**
	(0.5793)	(0.7971)	(0.4110)	(0.4109)	(0.8050)	(0.6493)
constant	2.4172	-1.3357	5.8253*	5.8253*	2.0222	0.4293
	(4.7560)	(6.3498)	(3.4350)	(3.4351)	(6.7986)	(5.5027)
fixed effect of emperors	controlled	controlled	controlled	controlled	controlled	controlled
observations	56	56	56	56	56	56
R2	0.5349	0.5443	0.5760	0.5760	0.5381	0.5254
ARCH test (chi2)	1.184	0.717	0.799	0.799	0.218	0.576

Note: See Table 3.

To confirm our aforementioned hypothesis, we further employed the sample after 1280, and the results are reported in Table 5. During this period, the unification wars had ended, but uprisings and internal military conflicts erupted more frequently, and the positive correlation between domestic wars and issuance of paper money thus should be stronger. The results in Table 5 are consistent with this conjecture. Comparing columns 3-4 in Table 5 with those in Table 4, we note that the positive correlation between multi-province uprisings and money issuance becomes even more significant for both current and one-year lagged independent variables. These results indicate that the effect of fiscal pressure from domestic wars on the over-issuance of paper money may be sustained for some time.

TABLE 6: Impacts of Expansive Wars on Issuances of Paper Money

	Dependent variable：ln (quantity of money's issuance)					
	(1)	(2)	(3)	(4)	(5)	(6)
war (dummy)	-0.2210	-0.2224			-0.2726	-0.0814
	(0.2629)	(0.2617)			(0.2615)	(0.2842)
L1.war (dummy)	-0.3554	-0.3565			0.3791	0.1341
	(0.3110)	(0.3093)			(0.2774)	(0.3120)
L2. war (dummy)	0.2759	0.2759			-0.2052	-0.0200
	(0.2573)	(0.2563)			(0.2812)	(0.2831)
L3. war (dummy)	0.3679	0.3680			0.5680**	0.8257***
	(0.3231)	(0.3221)			(0.2782)	(0.2746)
involved provinces			-0.0265	-0.0269		
			(0.1218)	(0.1215)		
L1. involved provinces			0.0330	0.0329		
			(0.1582)	(0.1578)		
L2. involved provinces			0.0588	0.0587		
			(0.1312)	(0.1309)		
L3. involved provinces			0.0730	0.0731		
			(0.0954)	(0.0951)		
ln(population)	1.8057***	1.8035***	1.8754***	1.8738***	1.6679***	1.5477***
	(0.1597)	(0.1590)	(0.1801)	(0.1795)	(0.2094)	(0.2019)
constant	-1.2106	-1.1920	-1.8228	-1.8101	-0.2337	0.5814
	(1.2950)	(1.2892)	(1.4565)	(1.4519)	(1.5361)	(1.4744)
fixed effect of emperors	controlled	controlled	not necessary	not necessary	controlled	controlled
observations	73	32	73	32	73	32
R2	0.8722	0.8553	0.8701	0.8507	0.8818	0.8845
ARCH test (chi2)	0.992	1.059	0.899	0.031	2.197	0.487

Notes: Involved provinces are not taken into consideration in the analysis of external wars, and thus only results of wars (dummy) are reported here. For other notes, see Table 3.

Obviously, unification and external wars are very different from uprisings and internal military conflicts, as the former will expand territory and subsequently result in a larger population and fiscal revenue. Therefore, these wars may not bring about an over-issuance of paper money. We view unification and external wars as wars and run the regressions again, and Table 6 reports the results. Columns 1-4 present results of unification wars and columns 5-6 report those of external wars, whereas columns 2, 4, and 6 use samples between 1260 and 1294 because these two types of wars almost entirely ended after 1294.

The results may partially meet the expectations. **First, the unification wars do not have a significant impact on monetary issuance because on the one hand, unification wars will enhance the fiscal burden of the government, while on the other hand, the unification of territory and monetary systems will raise the efficiency of monetary circulation, then restrict the over-issuance of paper money. These two types of opposing effects may lead to an insignificant relationship between unification wars and monetary issuance. Second, there are no negative correlations between external wars and money issuance, but there are significant positive correlations between external wars lagged three years and money issuance. This finding may be explained by the fact that external wars cannot bring about cultural and currency unification, although they can lead to the appropriation of more economic resources. Military expenditures cannot be offset by revenue from appropriations if the war did not end within a short period of time.**

The results above show that different types of wars have heterogeneous impacts on money issuance, but these results are not comparable because the antithesis of key variables always

changes in regression. Here, we set a new dummy for war, which equals zero if no war happened in that year and one if any type of war happened. Table 7 reports the results. Columns 1 and 4 use the full sample, and columns 2 and 5 use the subsample after 1280 (at which point the unification wars were almost completely ended), while columns 3 and 6 use the data between 1260 and 1294 (no successions to the throne occurred in this period, thus there is no need to control fixed effects of emperors). We find that the baseline results also hold, and the correlation between multi-province uprisings and money issuance is significantly positive, while other sorts of wars cannot exert obvious influence on the over-issuance of paper money.

TABLE 7: Impacts of Wars on Issuances of Paper Money (only one antithesis)

	Dependent variable：ln (quantity of money's issuance)					
	(1)	(2)	(3)	(4)	(5)	(6)
single-province uprisings (dummy)	0.3117	0.1585	0.4699			
	(0.2088)	(0.2464)	(0.3051)			
multi-province uprisings (dummy)	0.7136***	0.9389***	0.7627**			
	(0.2302)	(0.2658)	(0.3394)			
internal military conflicts (dummy)	-0.0122	-0.0179	0.1717			
	(0.1763)	(0.2576)	(0.2133)			
unification wars (dummy)	0.0120	-	0.0477			
	(0.2078)		(0.2170)			
external wars (dummy)	-0.1224	-0.1852	-0.0494			
	(0.2389)	(0.2677)	(0.2503)			
involved provinces of single-province uprisings				0.1071	0.0459	0.1729
				(0.0835)	(0.0790)	(0.1315)
involved provinces of multi-province uprisings				0.3735***	0.4687***	0.3972***
				(0.0957)	(0.1371)	(0.1388)
involved provinces of internal military conflicts				-0.0075	-0.0088	0.1870
				(0.1235)	(0.1584)	(0.1867)
involved provinces of unification wars				0.0726	-	0.0958
				(0.1049)		(0.1001)
ln(population)	1.6658***	1.1981**	1.5558***	1.6886***	1.2350**	1.5886***
	(0.1616)	(0.5943)	(0.1751)	(0.1425)	(0.5156)	(0.1579)
constant	-0.2104	3.9411	0.4852	-0.4405	3.5463	0.2024
	(1.1684)	(5.0248)	(1.2673)	(1.0936)	(4.3709)	(1.1729)
fixed effect of emperors	controlled	controlled	not necessary	controlled	controlled	not necessary
observations	76	56	35	76	56	35
R2	0.9006	0.5724	0.8941	0.8988	0.5642	0.8958
ARCH test (chi2)	1.074	0.587	0.135	1.575	0.949	0.863

Notes: As results are similar after adding the lags of main variables, they are not reported here due to limited space. The others are the same as Table 3.

B. Largesse of Emperors and Issuance of Paper Money

As explained in studies by traditional historians, most emperors in Yuan China often achieved the goal of regime stability by offering their largesse to seigniors and Buddhists, which may also have enhanced the fiscal burden, resulting in the over-issuance of paper money. However, we find that there were no significant correlations between these expenditures and money issuances. Table 8 presents the results using largesse as a key variable. Columns 3 and 6 use the subsample after 1294 (i.e., the years after Kublai Khan's reign). The outcomes demonstrate that largesse did not significantly affect money issuances in both situations, including lagged variables or taking wars and largesse into consideration together. In addition, according to columns 4-6, the wars' effects on money issuances does not change even when largesse is accounted for, and multi-province uprisings still have a significantly positive effect on the over-issuance of paper money.

TABLE 8: Impacts of Largesse on Issuances of Paper Money

	Dependent variable：ln (quantity of money's issuance)					
	(1)	(2)	(3)	(4)	(5)	(6)
largesse (dummy)	-0.0657	-0.0485	0.0799	0.0050	0.0728	0.0219
	(0.1933)	(0.2117)	(0.2103)	(0.1886)	(0.2076)	(0.3049)
L1. largesse (dummy)		-0.1891	-0.0132			
		(0.2126)	(0.2510)			
L2. largesse (dummy)		0.0722	0.1757			
		(0.2095)	(0.2998)			
L3. largesse (dummy)		0.0090	0.2502			
		(0.1932)	(0.2823)			
single-province uprisings (dummy)					0.3287	0.1599
					(0.2137)	(0.3337)
multi-province uprisings (dummy)				0.8227***	0.7344**	0.5131**
				(0.2033)	(0.2287)	(0.2465)
internal military conflicts (dummy)					-0.0149	-0.1943
					(0.1752)	(0.2946)
unification wars (dummy)					0.0015	-
					(0.2177)	
external wars (dummy)					-0.1016	-0.8338
					(0.2343)	(0.6036)
ln(population)	1.8105***	1.8304***	17.3052	1.7380***	1.6498***	8.8781
	(0.1388)	(0.1625)	(12.1512)	(0.1266)	(0.1520)	(11.4671)
constant	-1.1795	-1.3447	-140.9217	-0.7003	-0.1046	-65.7261
	(1.0754)	(1.2858)	(108.5079)	(0.9894)	(1.1066)	(102.2379)
fixed effect of emperors	controlled	controlled	controlled	controlled	controlled	controlled
observations	76	73	42	76	76	42
R2	0.8851	0.8693	0.4942	0.8955	0.9008	0.5209
ARCH test (chi2)	1.503	1.038	0.835	1.229	1.001	0.646

Note: See Table 3.

VI. THE IMPACT OF THE SILVER STANDARD ON ISSUANCES OF PAPER MONEY

As verified in the last section, warfare is one of the essential factors leading to over-issuances of paper money. This section deepens the empirical analysis above by investigating whether the silver standard may restrict over-issuances of paper money due to fiscal pressure from the government as a result of multi-province uprisings. Based on historical data, the evolution of monetary standards in Yuan China is composed of three stages, and Table 9 provides related evidence.

The literature also illustrates that the central government once issued a formal decree to switch the reserves for paper money from gold and silver to paper money in 1310. Therefore, 1260-1276 can be regarded as the first stage, 1277-1310 as the second stage, and 1311-1341 as the third stage.[11] Using a binary dummy to denote each period, the results in Table 10 clearly show that compared with the first period under the strict silver standard, money issuances in the second and third periods expanded on an accelerated basis.

TABLE 9: Three Stages of Evolution of Monetary Standards in Yuan China

[11] "In 1310, the Yuan government began to print paper money to replace silver as the reserve, which meant that silver did not play the role of reserve in the issuance of paper money, and thus the monetary system changed to fiat money, and ultimately, it became the central reason for hyperinflation in the late Yuan dynasty." (Liu, 2007)

Stage	Standard	Historical Evidence
1260-1276	strict silver standard	"At first, people did not accept paper money, so its circulation experienced severe difficulty. Because of this, officials of the central government and local government took measures as follows: warehouses of precious metals, including gold and silver, were established in every province, and newly issued paper money had to be backed by silver and could be converted to silver conveniently …The total quantity of silver in warehouses had to always be equal to the total quantity of paper money in a fixed exchange rate."[12] Ye (1997) noted that according to the last sentence, the reserve ratio for paper money should have been 100% in the early Yuan dynasty.
1277-1294	weak silver standard	In 1282, an outstanding scholar in Yuan dynasty, Wang Yun, listed four reasons for the depreciation of *zhongtong chao*, the first of which was that "since 1276, metal reserves for paper money such as gold and silver have been gradually moved out of local warehouses and used for other purposes, which broke the rules for the reserves and therefore led to a depreciation of paper money."
1295-1341	paper money standard or fiat money	In 1282 and 1287, the government intended to rebuild the mechanism of money reserves. However, in 1294, the government "ordered that silver reserves stored in local metal warehouses amounting to 93.695 thousand taels, should be transported to the capital with 19.245 thousand taels remaining for reserves."[13] This indicated that for the second time, most of metal reserves had been appropriated,[14] and from then on, the monetary system of the Yuan dynasty almost fully switched to a paper money standard or fiat money.

TABLE 10: Impacts of the Monetary Standard on Issuances of Paper Money

	Dependent variable：ln (quantity of money's issuance)			
	(1)	(2)	(3)	(4)
first stage (dummy)		-2.8229***		-3.2363***
		(0.2930)		(0.2798)
second stage (dummy)	2.8229***		3.2363***	
	(0.2930)		(0.2798)	
third stage (dummy)	3.7622***	0.9394***	3.8011***	0.5648***
	(0.2579)	(0.2066)	(0.2639)	(0.1957)
constant	11.4845***	14.3074***	11.4845***	14.7208***
	(0.2341)	(0.1761)	(0.2341)	(0.1532)
observations	76	76	76	76
R2	0.7958	0.7958	0.7658	0.7658
ARCH test (chi2)	1.641	1.641	1.892	1.892

Notes: The cut-off year of the second stage is 1294 in columns 1 and 2 and 1310 in columns 3 and 4. For other notes, see Table 3.

In this subsection, we run regressions employing interactions between the second stage (dummy), the third stage (dummy), and wars, as well as largesse. Table 11 reports the results.. In columns 1 and 2, 1294 is the cut off time between the second stage and the third stage, while in columns 3 and 4, it is 1310. When constructing the interactions, columns 1 and 3 multiply stage (dummy) by wars (dummy), while columns 2 and 4 multiply stage dummy by involved provinces in wars. Obviously, no matter which method is used, positive impacts of multi-provincial uprisings on money issuances in the second and third stages are always statistically stronger than those in the first stage. That can be interpreted as follows. When **the strict silver standard was gradually**

[12] Wang, Yun. 1987. *Zhongtang Shiji*, the first part, in *Qiujian Ji*, Volume 80.
[13] *Chengzong Benji* of *Yuanshi*, Volume 18.
[14] Liu (2007) thinks that since most of silver reserves stored in local warehouses was moved to the treasury of the central government, there were no more reserves for paper money in circulation. After that, newly issued paper money depreciated quickly due to failure to keep convertibility between it and silver, and thus the money regime almost collapsed.

weakening and finally degenerated to the paper money standard, the influence of fiscal pressures from military expenditures on over-issuances of paper money increased. In particular, when the monetary standard switched from silver to paper money in 1310, the results in columns 3 and 4 indicate that the interactions of multi-provincial uprisings (dummy) with the third stage (dummy) became much more significant than those with the second stage, and their coefficients are close to or larger than those of the interactions with the second stage. These results illustrate that the **degradation of the money standard amplifies the positive impact of wars on money issuances.**

TABLE 11: Impacts of Wars and Largesse on Issuances of Paper Money (with interactions)

	Dependent variable: ln (quantity of money's issuance)			
	(1)	(2)	(3)	(4)
single-province uprisings (dummy) or involved provinces × the second stage (dummy)	0.0988	0.0452	0.2968	0.0757
	(0.3174)	(0.1455)	(0.2456)	(0.1224)
single-province uprisings (dummy) or involved provinces × the third stage (dummy)	0.1781	0.0296	-0.2457	-0.0285
	(0.3113)	(0.0975)	(0.4363)	(0.0819)
multi-province uprisings (dummy) or involved provinces × the second stage (dummy)	0.6576**	0.3490*	0.5730*	0.3206*
	(0.3065)	(0.1850)	(0.3563)	(0.1763)
multi-province uprisings (dummy) or involved provinces × the third stage (dummy)	0.4519*	0.2225**	0.6060**	0.3029***
	(0.2501)	(0.1050)	(0.2391)	(0.1070)
internal military conflicts (dummy) or involved provinces × the second stage (dummy)	0.0270	0.1225	-0.2126	-0.0600
	(0.3217)	(0.2446)	(0.2397)	(0.2315)
internal military conflicts (dummy) or involved provinces × the third stage (dummy)	-0.2478	-0.2159*	0.0315	-0.1645*
	(0.2772)	(0.1113)	(0.2939)	(0.0958)
unification wars (dummy) or involved provinces × the second stage (dummy)	0.5063	0.4983*	0.4539	0.4905*
	(0.3787)	(0.3014)	(0.3749)	(0.2981)
unification wars (dummy) or involved provinces × the third stage (dummy)	-	-	-	-
external wars (dummy) × the second stage (dummy)	-0.0573		-0.1733	
	(0.2521)		(0.2634)	
external wars (dummy) × the third stage (dummy)	-0.8355		-	
	(0.5780)			
largesse (dummy) × the second stage (dummy)	-0.7119	-0.5877	-0.5452	-0.4756
	(0.5285)	(0.4260)	(0.3890)	(0.3323)
largesse (dummy) × the third stage (dummy)	0.0325	0.0753	0.1446	0.2746
	(0.2902)	(0.2539)	(0.2462)	(0.2162)
ln(population)	1.7530***	1.6908***	1.7737***	1.7267***
	(0.2244)	(0.1928)	(0.1783)	(0.1655)
constant	-0.8251	-0.3887	-0.9785	-0.6467
	(1.6084)	(1.4054)	(1.3067)	(1.2302)
fixed effect of emperors	controlled	controlled	controlled	controlled
observations	76	76	76	76
R2	0.9056	0.9036	0.9082	0.9046
ARCH test (chi2)	0.005	0.142	0.075	0.111

Notes: Only the results of primary variables and their interactions are reported here due to limited space. For other notes, see Tables 3 and 10.

In sum, it can be concluded from the empirical analysis above that **from 1260 to 1341, the fiscal burden from multi-province uprisings was the main reason for continuous over-issuances of paper money, but a strict silver standard could alleviate this effect.**

VII. CONCLUSIONS

The monetary regime of Yuan China is a milestone in China's currency history. In China's monetary history, the Yuan is the only dynasty to use paper money as a medium of circulation throughout the whole country. It is also a turning point of the measure of value that shifted from the copper coin of the Qin and Han dynasties to the silver standard of the Ming and Qing dynasties.

In the late Yuan dynasty, China entered into the age of fiat money, and paper money was the main exchange medium with copper coins only acting as supplements in transactions, which is similar to the contemporary monetary system. To take its place in world monetary history, the Yuan government initiated a monetary system using paper money as the sole exchange medium and established the most advanced institutions and laws at the time to manage money's issuance and circulation. The Yuan dynasty used silver as reserves for the issuance of paper money, and it maintained the convertibility between silver and paper money, indicating that Yuan government also established the earliest silver standard in the early stage of *zhongtong chao*'s period.

Using the stylized facts in Yuan history and the annual data recorded in *Shihuozhi* of *Yuanshi*, this paper aims to explore the mechanism of paper money in Yuan China. The findings of the paper are as follows. At the beginning of its regime (1260-1276), due to the strict constraints of the silver standard, **the** value of paper money was very stable. After the middle stage (1277-1341), the central government had to finance its fiscal deficit by issuing paper money, and thus inflation was unavoidable. Empirical research further demonstrates that the fiscal pressure from multiple-province rebellions was the most important factor driving the government to issue more paper money. However, contrary to the traditional view held by some Chinese historians, the impact of the emperor's largesse was relatively insignificant. Additionally, a strict silver standard could alleviate the over-issuance of paper money resulting from fiscal pressure of warfare. The experience of paper money in Yuan China can be generalized to other dynasties, as the value of paper money followed the same trend of from stability to mild inflation and then to hyperinflation with reasons related to fiscal pressures caused by military expenditures. These findings indicate that unlike modern England, the government of traditional China could not manage the issuance and circulation of paper money competently with its administrative power unconstrained.

As noted by Wang (1995), it is regrettable that the Chinese monetary regime degenerated from paper money in the Song, Jin, Yuan and early Ming dynasties to silver in the late Ming and Qing dynasties, as the general trend of world monetary history is that the usage of paper money should become more and more popular due to its lower transaction cost over coin (Wang, 1996, p. 8). Chen et al. (1977) also mentioned that because the overthrow of the political regime and hyperinflation from the over-issuance of paper money happened almost simultaneously in the Song, Jin, and Yuan dynasties, the governments in the Ming and Qing dynasties abandoned the right of paper money issuance due to the fear of hyperinflation and adopted silver bullion as the main currency (and without minting silver coins), which undoubtedly raised transaction costs (Chen et al., 1977, p. 458). Essentially, China once had made a great contribution to human civilization through the invention of paper money, but the governments of most dynasties could not fully exploit its benefits, and the Chinese monetary system lagged behind the world, further giving rise to economic stagnation in modern times.

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Appendix

TABLE A1: Issuances of Paper Money in Yuan Dynasty

Year	Total (tael)	Weighted Accumulation (tael)	Amount per capita (wen)	Year	Total (tael)	Weighted Accumulation (tael)	Amount per capita (wen)
1260	73352	73252	488	1298	2000000	30693763	26100
1261	39139	108823	726	1299	1499550	30658625	26070
1262	80000	183382	1220	1300	4500375	33626069	28593
1263	74000	248213	1654	1301	3000000	33944765	28865
1264	89208	345010	2300	1302	2500000	34747527	29547
1265	116208	443967	2960	1303	10000000	43010150	36573
1266	77252	499021	3330	1304	7500000	48359642	41122
1267	109488	583558	3890	1305	2500000	48451600	41200
1268	29880	584250	3894	1306	2500000	48529077	41266
1269	22896	577933	3852	1307	5000000	51102623	43625
1270	96768	645804	3229	1308	5000000	53547492	45533
1271	47000	660514	3303	1309	5000000	55870117	47509
1272	86256	713744	3569	1310	5000000	58076611	49385
1273	110192	788249	3941	1311	36259200	91431980	77765
1274	247440	996276	4981	1312	10900000	63314162	53838
1275	398194	1344656	2822	1313	11211680	71360134	60681
1276	1419665	2697088	2293	1314	10200000	78092127	66405
1277	1021645	3583879	3047	1315	10100000	84287521	71673
1278	1023400	4428085	3765	1316	5100000	85173145	72426
1279	788320	4795000	4077	1317	2100000	83014488	70590
1280	1135800	5391325	4584	1318	2500000	81363764	69187
1281	1094800	6216559	5286	1319	2100000	79395576	67513
1282	969444	6876175	5847	1320	7500000	82925697	70515
1283	610620	7142986	6074	1321	7500000	86279141	73367
1284	629904	7415741	6306	1322	5050000	87015184	73992
1285	2043080	9088034	7728	1323	4050000	86714425	73736
1286	2181600	10185232	9196	1324	3550000	85918704	73060
1287	83200	10357671	8807	1325	3150000	84772769	72086
1287	5088285	15445956	13134	1326	2100000	82634130	70265
1288	0	15445956	13134	1327	2100000	80602423	68539
1289	4608060	19281718	16396	1328	2100000	78672302	66898
1290	8900465	27217097	23144	1329	1585110	76323797	64901
1291	2501250	28357492	24113	1330	6000000	80507607	68459
1292	2500000	29439617	25033	1331	2300000	78782227	66991
1293	2500000	30377636	25831	1332	4455250	79298365	67430
1294	1300000	30158755	25645	1337	4984000	80317447	68297
1295	968530	29619347	25186	1338	7500000		
1296	1550000	29688380	25245	1341	6000000		
1297	2000000	30203961	25684				

Notes: Total issuances are counted in *zhongtong chao* (taels), and all amounts of *zhiyuan chao* as well as *zhida yinchao* in 1310 have been recalculated to *zhongtong chao* by a certain ratio. Figures after 1329 are recorded in *Benji* of *Yuanshi*, and figures in 1330 are from the second part of *Wenzong Ji* of *Yuanshi*, but other missing figures cannot be found, either due to a vacancy in newly issued money or an omission in the records. According to the third part of *Shundi Ji*, the printing of paper monies was ordered end in 1340, and reserves were not printed in 1341, as there were still two years' stock (*zhiyuan chao* and *zhongtong chao*) in warehouses. To calculate weighted accumulations, we use the sum of newly issued paper monies with the old ones and then multiply by 95%. As *zhida yinchao* was soon recalled and destroyed after its issuance in 1310, this part of the amount was subtracted in the weighted accumulation in 1311 (Peng, 2007, p445).

Sources: Wu (1956, p293-297), and Peng (2007, p434-440).

TABLE A2: Commodity Prices of Yuan

Year	Rice (Whole Nation) (guan/dan)	Rice (the Lower Yangtze) (guan/dan)	Silver (guan/liang)	Salt (guan/yin)	Ocean Freight (guan/dan)
1260			2		
1261	1.4				
1267		0.6			
1276		1		9	
1281	10				8.5
1283	14				
1287			10		
1289				50	
1295	17				
1296				65	
1302		22			
1303	26	24	20		
1305		10			
1308	29				6.75
1309				100	
1310					8.25
1311	39		25		13
1312			20		
1313					14
1315				150	
1324	25				
1329		34	30		
1332	36				
1346			30		
1350		67			
1352	200				

Sources: Huang (2008), Peng (2007), and Quan (1996).

Figure A1: The Photograph of *zhongtong chao,* Unit: 1 Guan.