The Rise and Fall of Paper Money in Yuan China, 1260-1355

Hanhui Guan

(Peking University)

Nuno Palma

(University of Manchester)

Meng Wu

(Manchester Metropolitan University)

The Mongols are often considered barbarians…

Snow Adopted After the Tune of Chin Yuan Chun

By Mao Zedong

"Genghis Khan, Proud Son of Heaven for his day,

Knew only shooting eagles, bow outstretched.
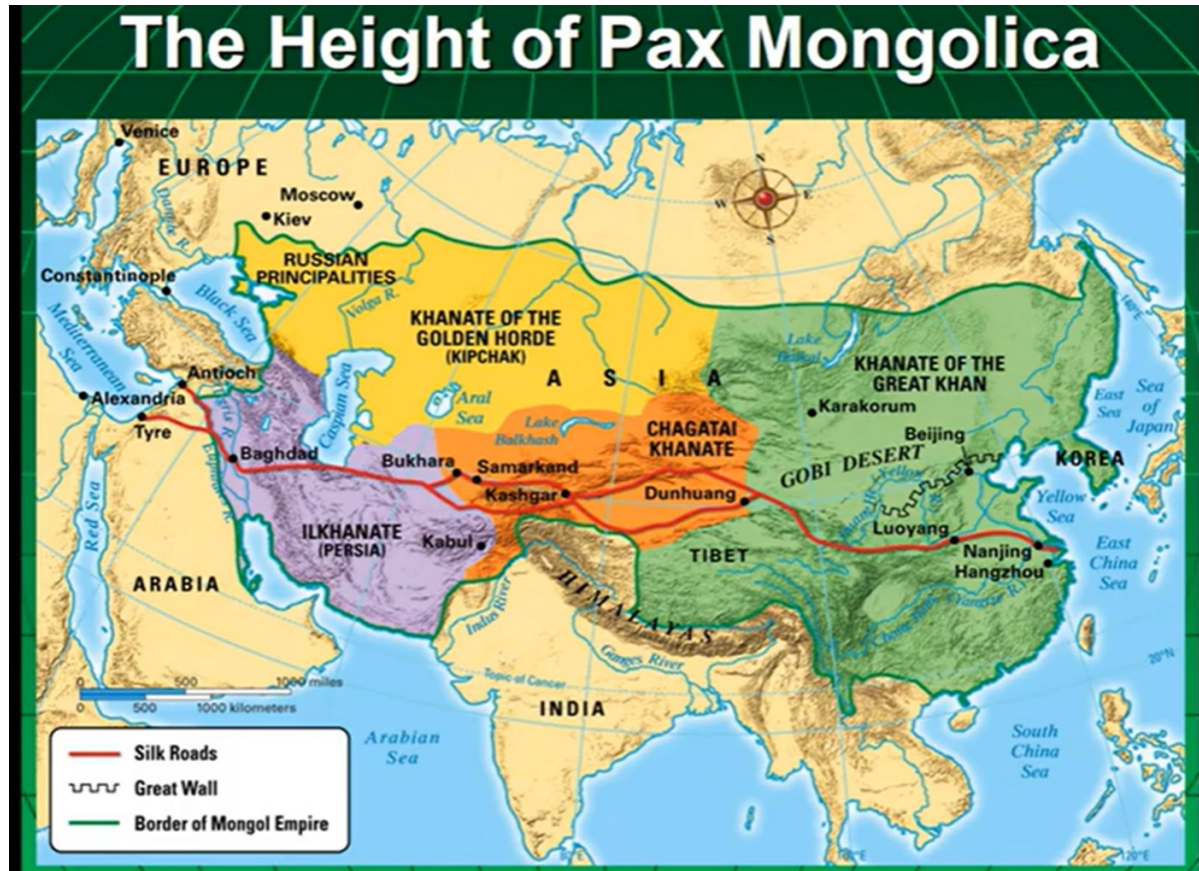
All are past and gone!

For truly great men,

Look to our age alone."

Genghis Khan (c. 1162-1227)

But in fact, the Mongols (Yuan)…

The Height of Pax Mongolica

Brought territorial unification of China after a split lasting two centuries.

Developed the sciences of medicine, geography, and astronomy; improved the social status of merchants and artisans

Relied on their long traditions of using silver as a medium of exchange, the Mongols:

- Introduced silver-convertible paper money.
- Declared paper money as the sole legal tender.
- It was six centuries ahead of the gold standard introduced in Europe.

Road map of the presentation

1. Significance of the work

2. Main findings

3. Data and sources

4. Historical narratives of Yuan's paper money

5. Empirical analysis

6. Conclusion

Significance of the study

1. It provides scholarship with insights into how paper money operated under an imperial regime (von Glahn, 2003, 2016).

2. It echoes the studies of the classical gold standard (Bordo and Kydland, 1995; Eichengreen, 1987; Obstfeld and Taylor, 2003).

3. It explores the relationship between money supply and inflation (Sargent and Wallace, 1975) by constructing a new and comprehensive dataset of Yuan China.

4. It suggests factors correlating with money issuance under different monetary standards.

Our study shows that…

1. The silver standard proved successful when measured by price level, and its impact on price stability lasted into the first half of the fiat standard period.

2. The fiscal pressure from civil wars was the most important factor driving the government to issue more paper money.

3. Similarly to the classical gold standard, the full silver standard (1260-1276) in Mongol Yuan China proved a successful commitment mechanism –a rule of the game that constrained the over-issuance of paper money.

4. However, in the long run, fiscal constraints compelled the Yuan government to leave the silver standard, and the government could not efficiently manage the issuance and circulation of fiat money due to a low level of institutional development.

Data and sources

To construct the money issues, taxation, and imperial grants datasets:

Historiographical sources:

- *Yuanshi* 元史 (History of the Yuan), is one of the official Chinese historical works known as Twenty-Four Histories of China.

- *Yuandianzhang* 元典章 (The Collection of Laws of the Yuan Dynasty)

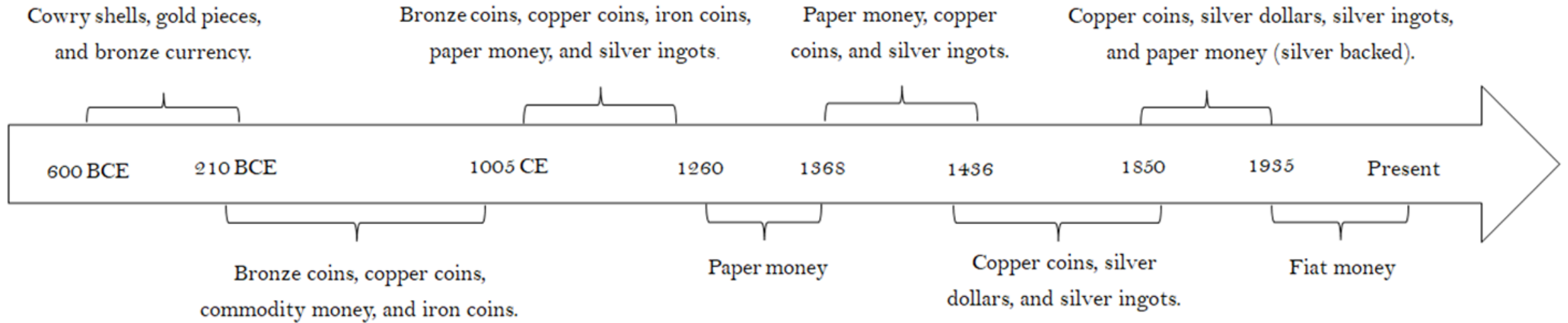To construct price, population, warfare, and natural disaster datasets:

Secondary Sources include:

- Li (2014) 元代的物價和財稅製度 *(The prices, taxation, and fiscal system in Yuan China)*

- Wu (2000) 中國人口史,第三捲: 遼宋金元史集 *(Chinese Demographic History, Volume III)*

- Chen et al (1986) 中國曆代天災人禍年表 *(A chronicle of natural and man-made disasters in China)*

Road map of the presentation

1. Significance of the work

2. Main findings

3. Data and sources

4. Historical narratives of Yuan's paper money

5. Empirical analysis

6. Conclusion

Evolution of Currency Formats from pre-Qin (600 BCE) to Present

Cowry shells, gold pieces, and bronze currency.

Bronze coins, copper coins, iron coins, paper money, and silver ingots.

Paper money, copper coins, and silver ingots.

Copper coins, silver dollars, silver ingots, and paper money (silver backed).

600 BCE 210 BCE 1005 CE 1260 1368 1436 1850 1935 Present

Bronze coins, copper coins, commodity money, and iron coins.

Paper money

Copper coins, silver dollars, and silver ingots.

Fiat money

Source: von Glahn (2016, pp.1–294).

Copper coins
Unit of account: wen
1000 *wen* = 1 *guan/string*

Dimensions: Diameter: 3.10 cm; Length: 19.50 cm; Weight: 370g
Source: The British Museum

Zhongtong Yuanbao Jiaochao

Denomination: 1 *Guan*
1 *guan = 1,000 copper coins*

Size: 34x20cm
Source: China Numismatic Museum in Beijing.

# Yuan's paper monies and their exchange rates

① *First Zhongtongchao* 中统钞 (1260-1287)

Silver convertible (1260-76)
Nominal convertible (1276-87)
Unit: *guan* 贯

② *First Zhiyuanchao* 至元钞 (1287-1309)

Nominal convertible
Unit: *guan* 贯

③ *Zhidachao* 至大银钞 (1309-11)

Non-convertible
Unit: *tael* 两

④ *Second Zhiyuanchao* 至元钞 *And Second Zhongtongchao* 中统钞 (1311-52)

Non-convertible
Unit: *guan* 贯

⑤ *Zhizhengchao* 至正钞 (1352-68)

Non-convertible
Unit: *guan* 贯

	①	②	③	④ (Second *Zhiyuanchao*)	⑤
①	1	-	-	-	-
②	5	1	-	-	-
③	25	5	1	-	-
④	5	1	-	1	-
⑤	10	2	-	2	1

Location of Silver Exchange Bureaus around the 1290s

The Number of Silver
Exchange Bureaus

- 1
- 3
- 6
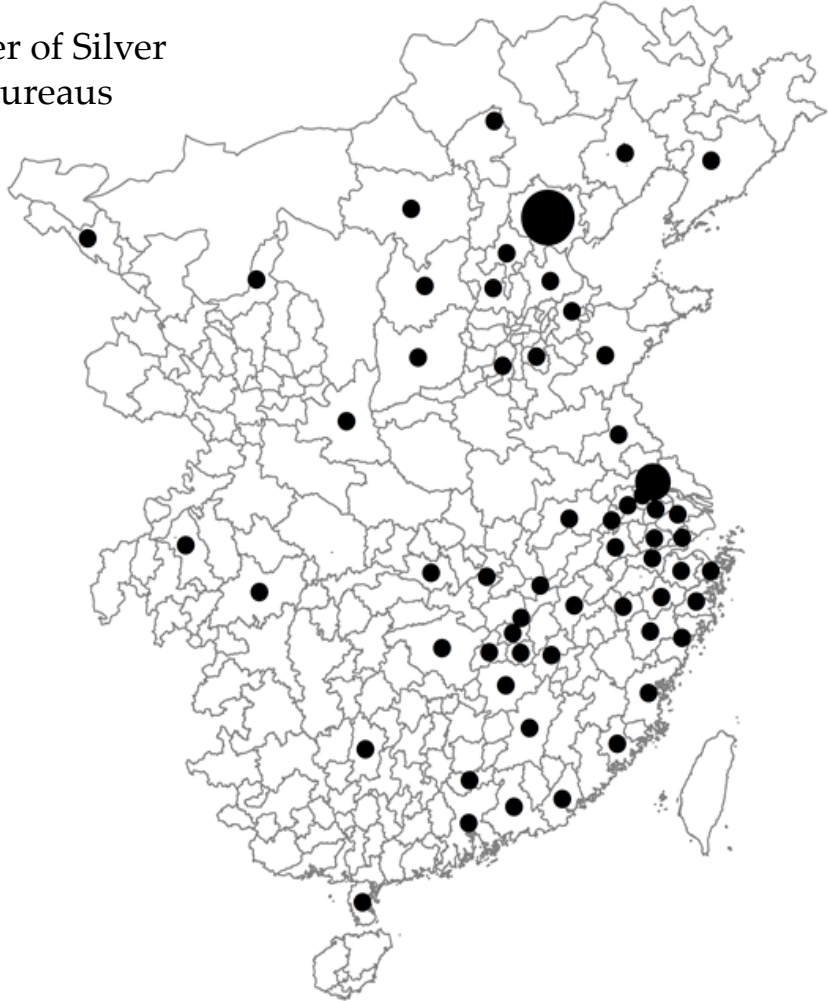
Sources: *Yuandianzhang* 元典章 (The Collection of Laws of the Yuan Dynasty)

# Exchange rates between silver and *zhongtongchao, the first paper money* (tael/guan)

Year	Government		Private
	Buy	Sell	
1260	2	2	-
1267	-	-	1.50
1273	1.95	2	
1282	2	2.05	6.32
1287	10	10.25	-
1306	-	-	20
1309	25	25	52.70
1346	-	-	27

Sources: Li (2014, p.61) and Yuzo (1936)

Road map of the presentation

1. Significance of the work

2. Main findings

3. Data and sources

4. Historical narratives of Yuan's paper money

5. Empirical analysis

6. Conclusion

Annual nominal money issuing, 1260 to 1355
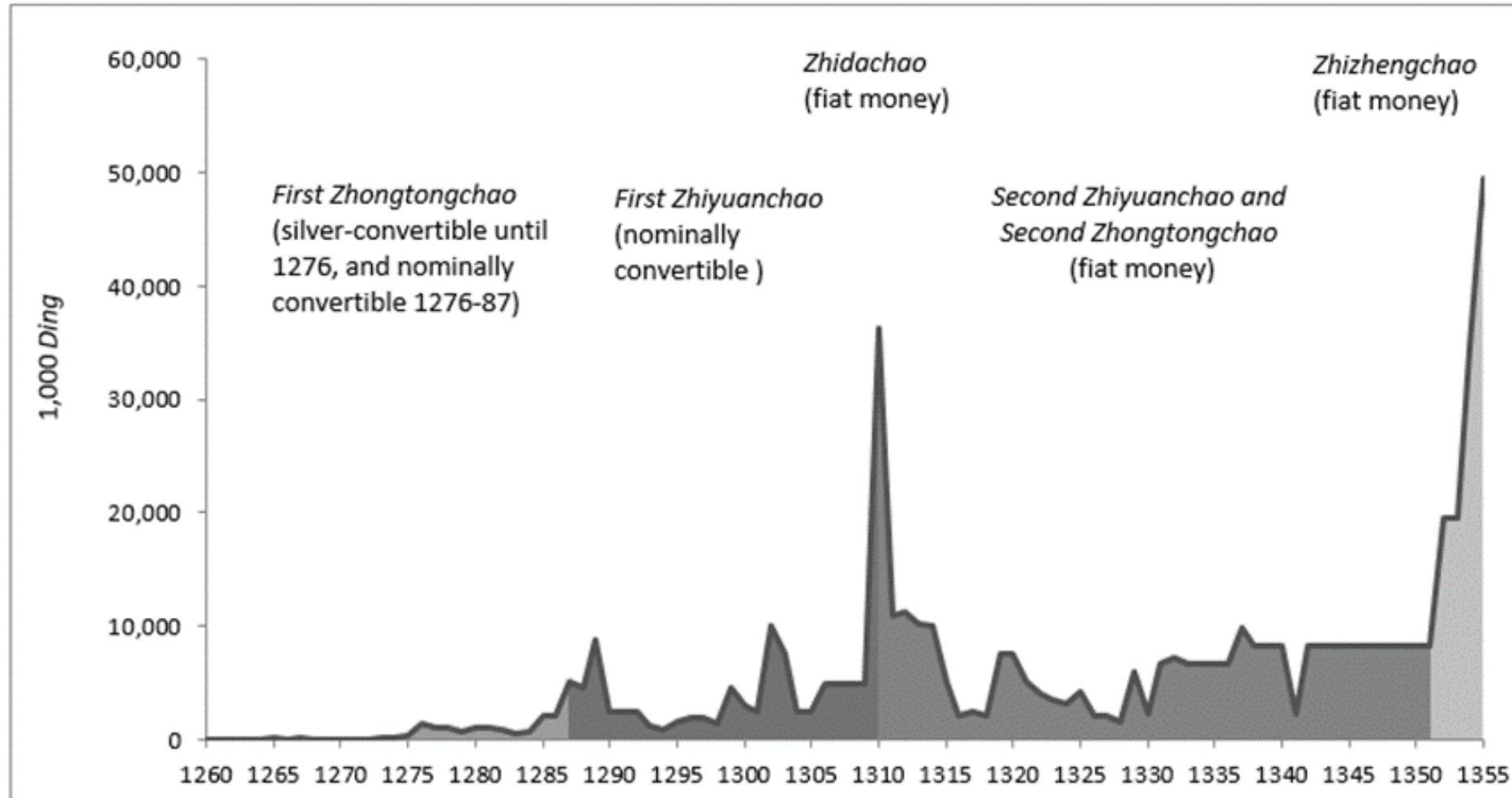
Notes: *ding* (錠) is the unit of account of silver. The Yuan government used *ding* as the unit of account to record fiscal revenue and expenditure and regulated that 1 *ding* was equal to 50 guan *zhongtongchao*.
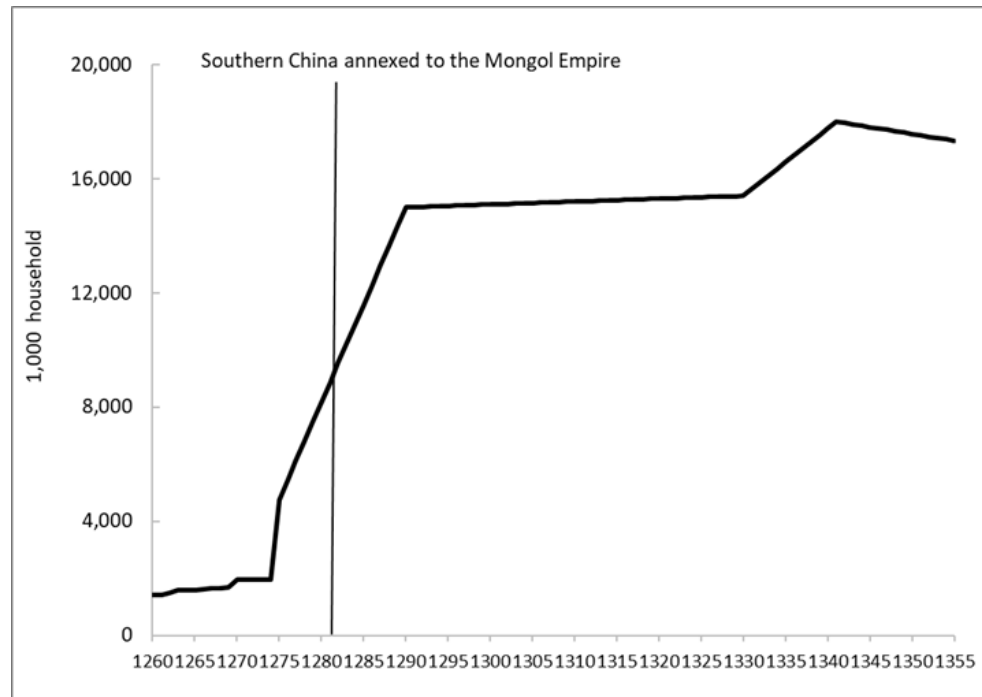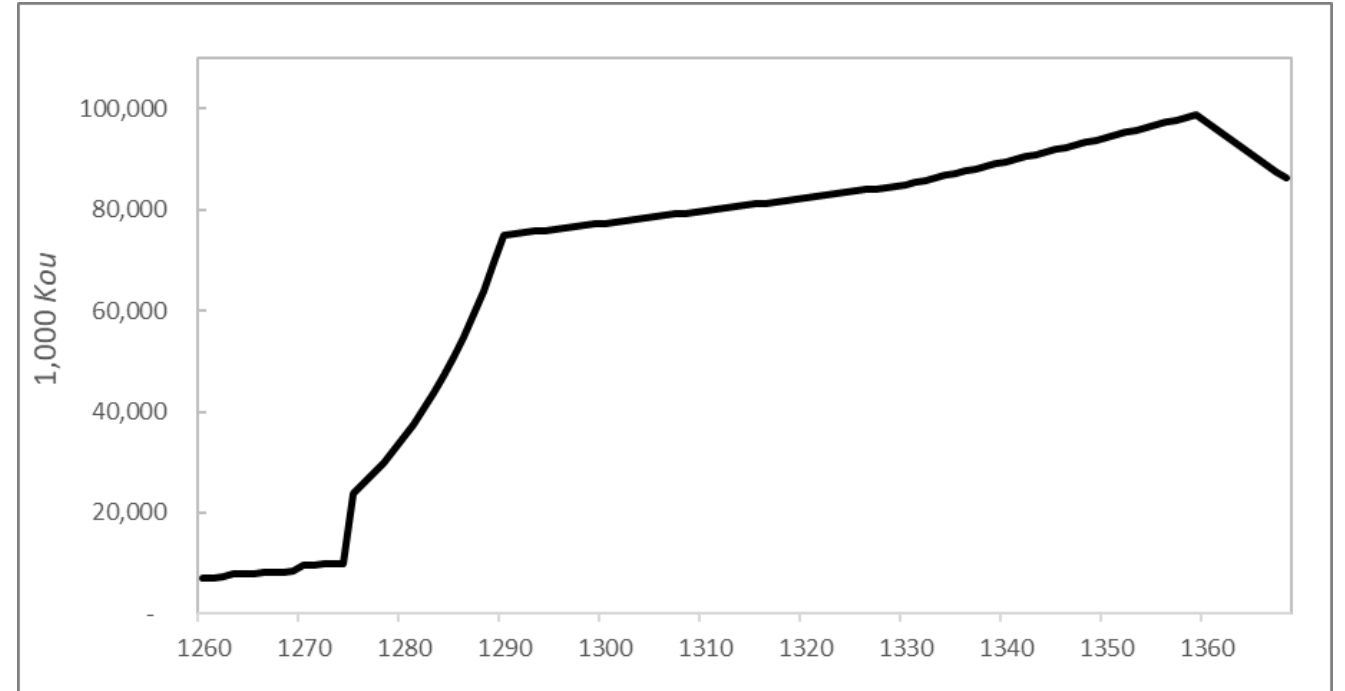
Nominal money stock, 1260-1355
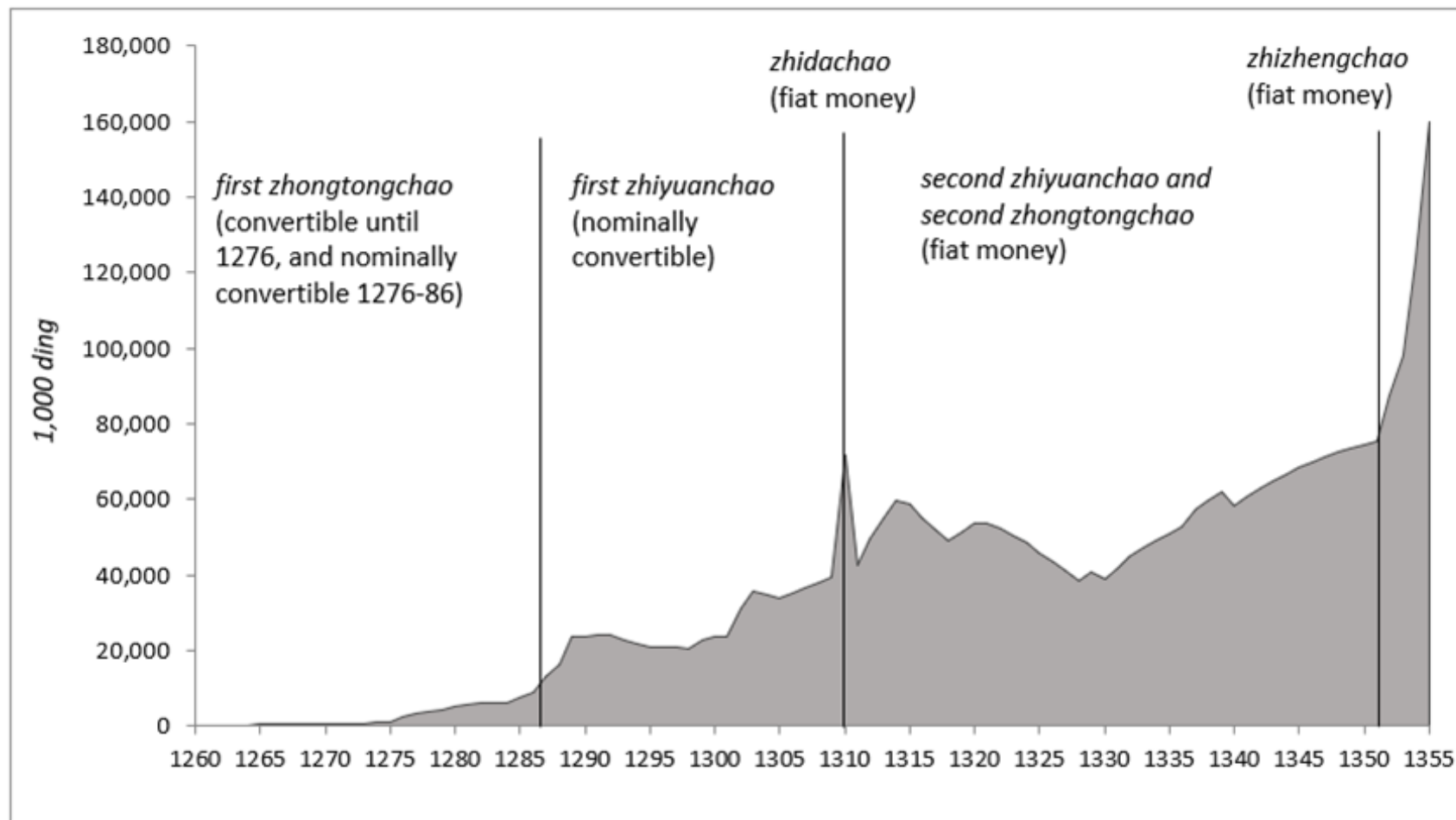
Notes: Each year's money stock corresponds to annual new issues plus ninety-five per cent of the previous year's stock.

Population

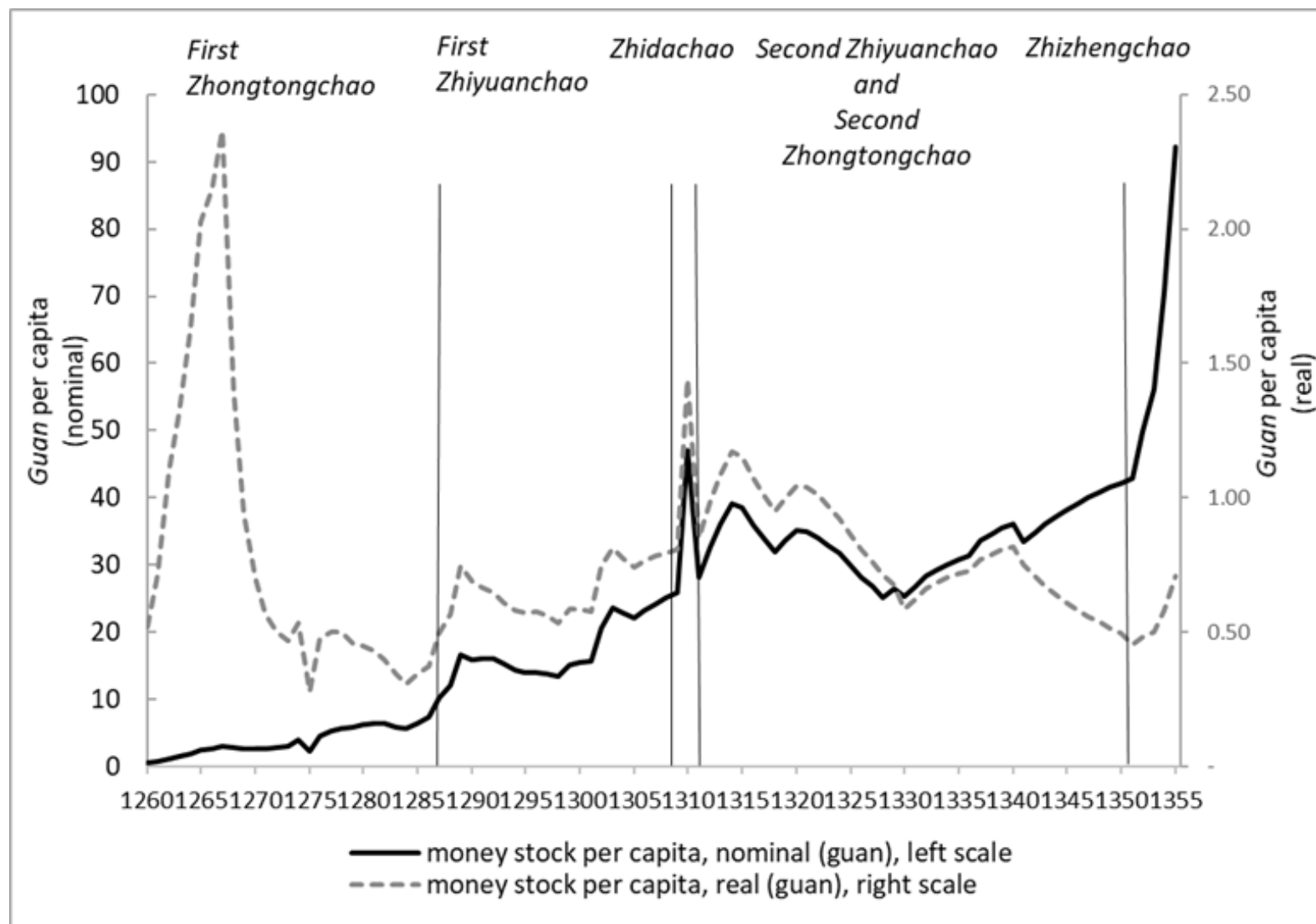**Population Growth, measured by the number of household (*Hu 户*), 1260-1368**

Population Growth, measured by the number of population (*Kou 口*), 1260-1368
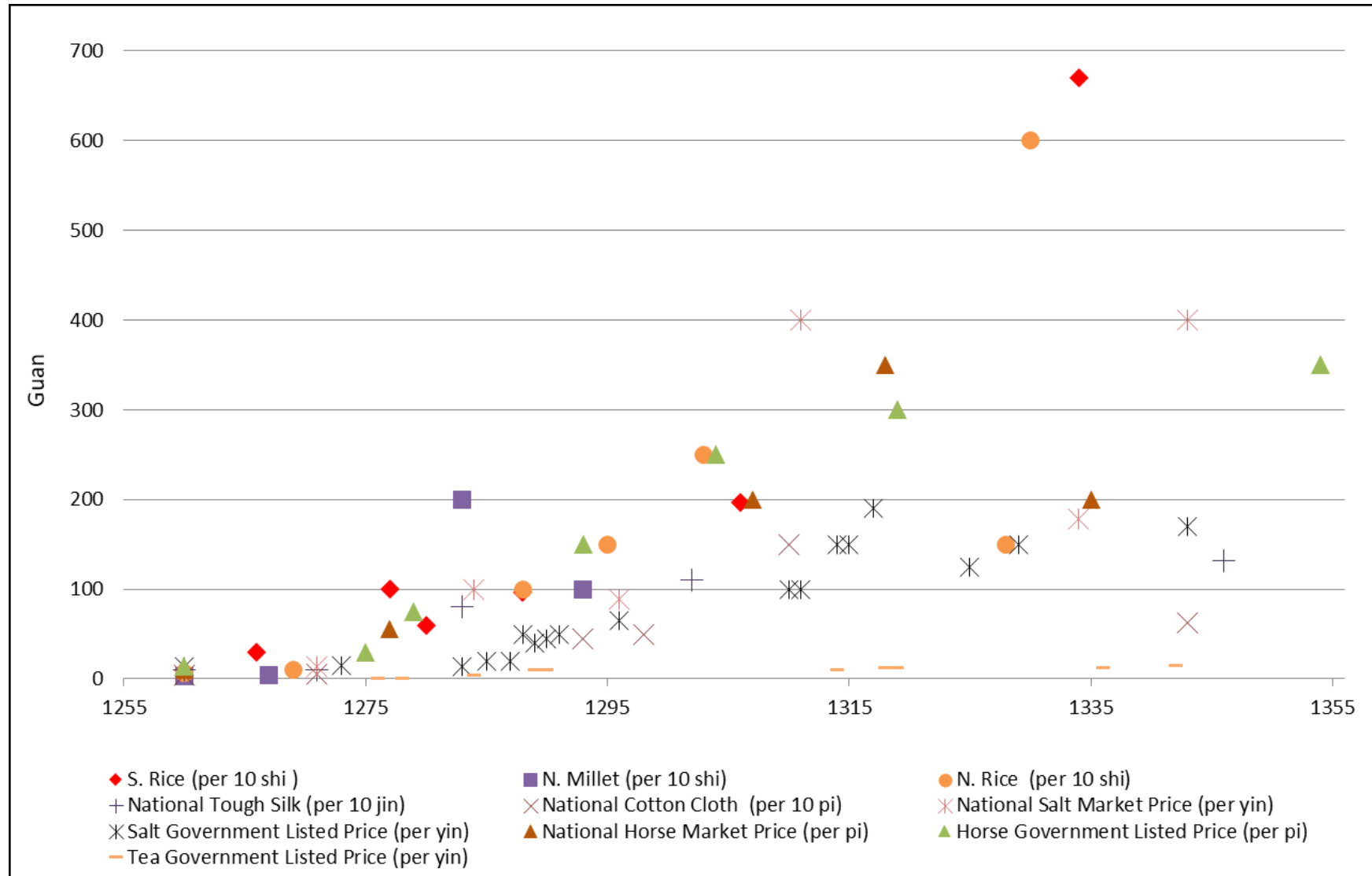

Notes: According to Wu (2000), 1 *hu* equals to 5 *kou*.

# Money stock per capita in nominal and real terms, 1260-1355.

Notes: Real money stock is in constant prices of 1260.

Price data

Note: *shi* 石 is a unit of volume with 1 shi =100 litre; *Jin* 斤 is a unit of weight with 1 jin=0.6 kg; Pi 匹 is a) a unit of length with 1 pi=33 meters, b) quantifier of horse; *yin* 引 means certificates for government monopolies, with *1 yin salt = 240 kg and 1 yin tea = 60 kg*. The base year is 1260.
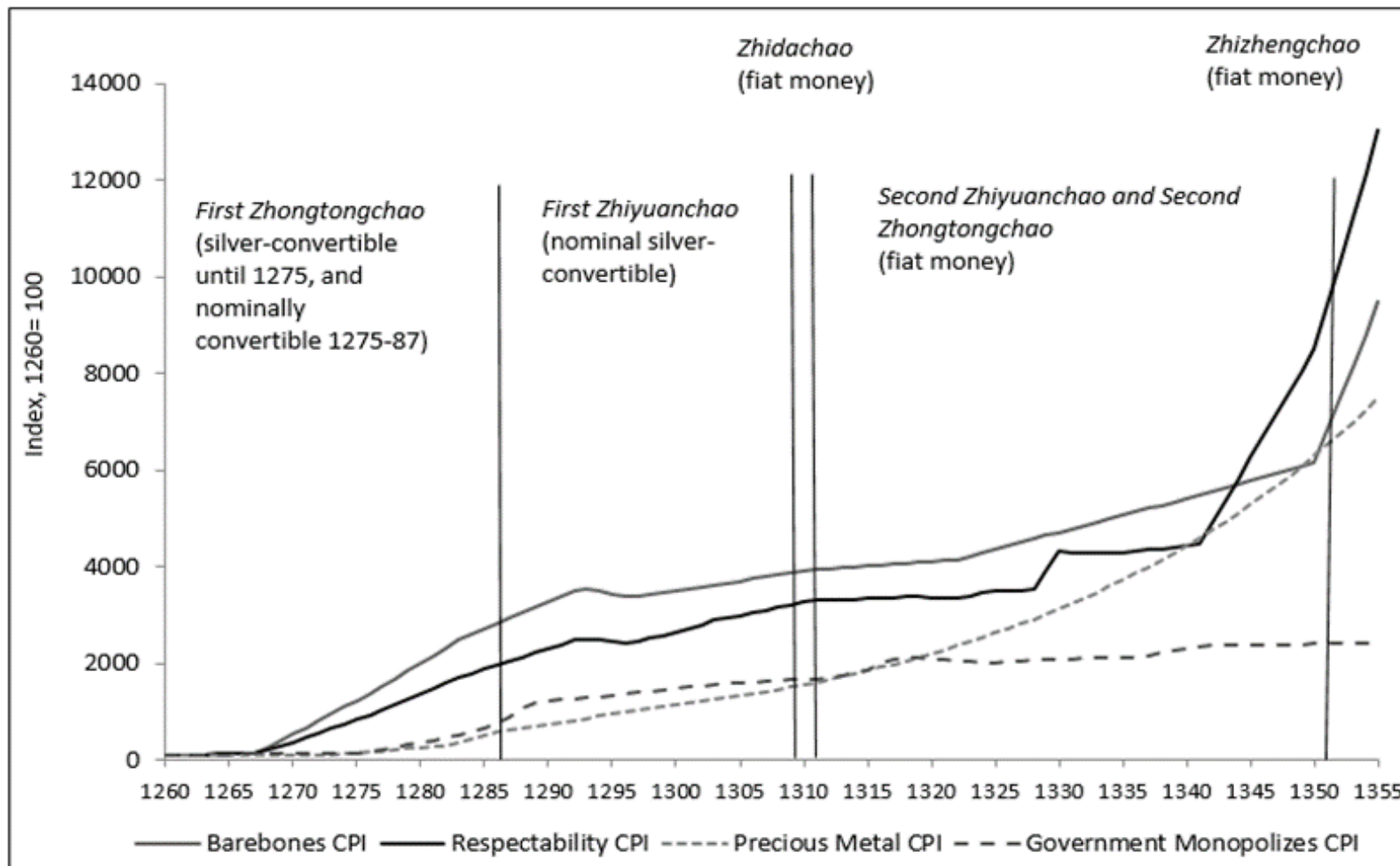
Notes: **The barebones CPI** consists of three commodities: Rice in South China (45%), millet in North China (45%) and cotton (10%). **The respectability CPI** has seven products: Rice in south China (35%), rice in north China (10%), millet in north China (25%), salt (10%), cotton (10%), tough silk (juan 绢) (5%) and horses (5%). **The precious metals CPI** consists of gold (50%) and silver (50%). **The government monopolies CPI** consists of certificates for horses (1/3), salt (1/3) and tea (1/3). The base year is 1260 and the CPI of the base year is 100. As horse and salt are government monopolies, prices for horse and salt in the government monopolies CPI are government listed prices, while the prices for horse and salt in the respectability CPI are market prices.

Comparing paper money issuance: nominal *vs.* real terms

Annual nominal paper money issues, 1260 to 1355
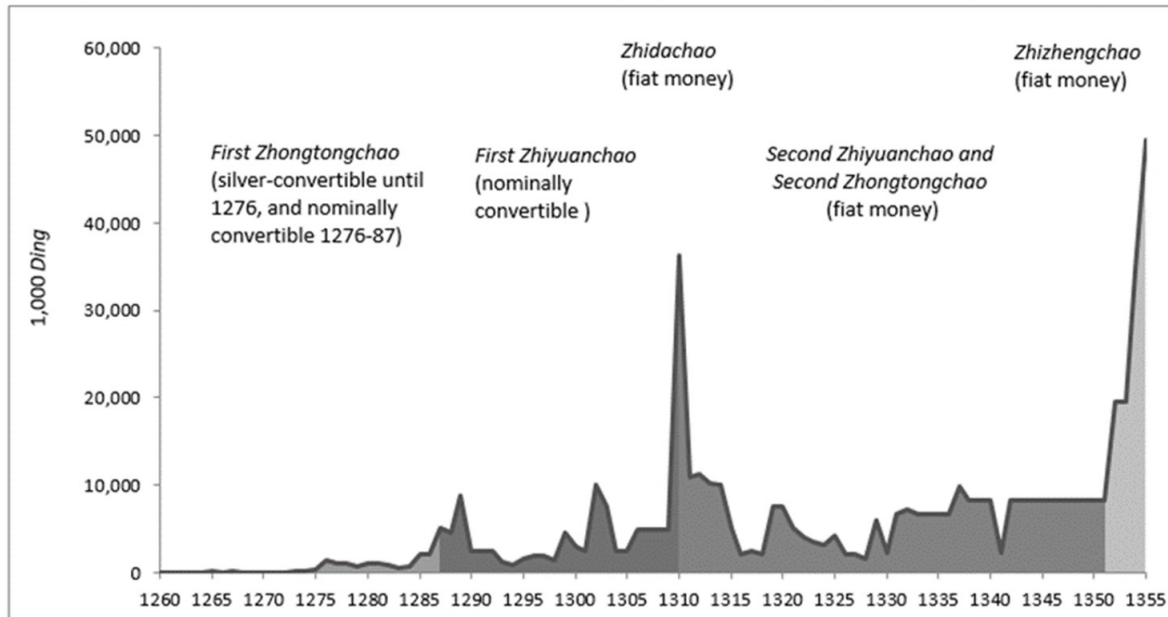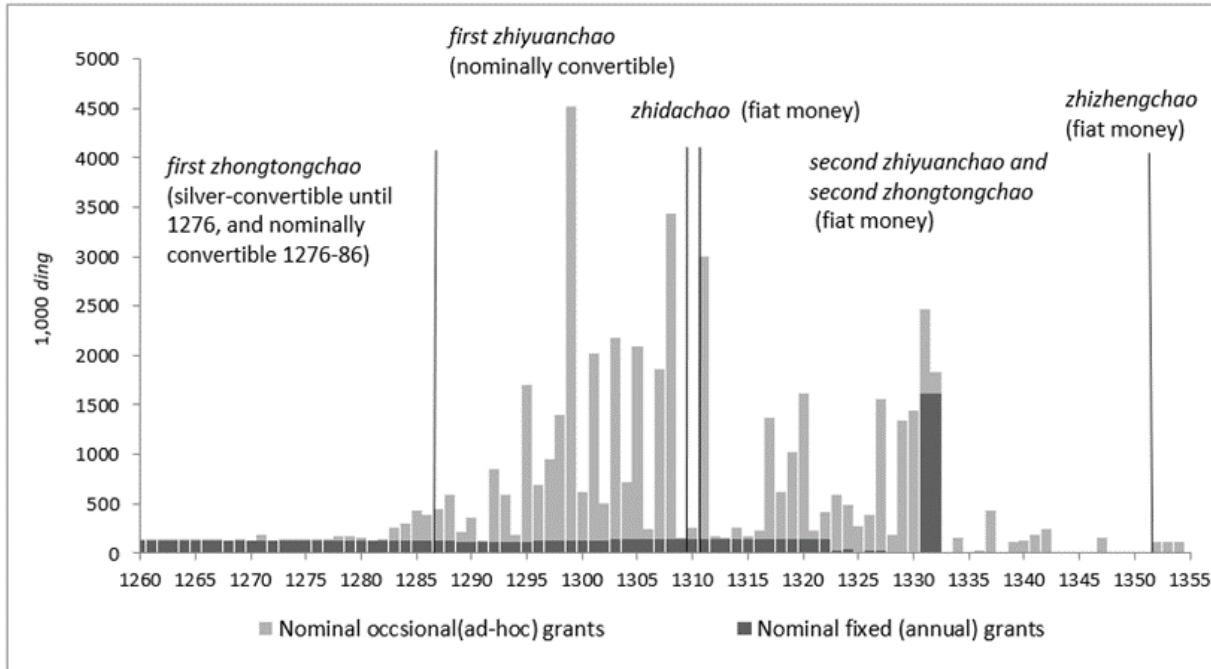
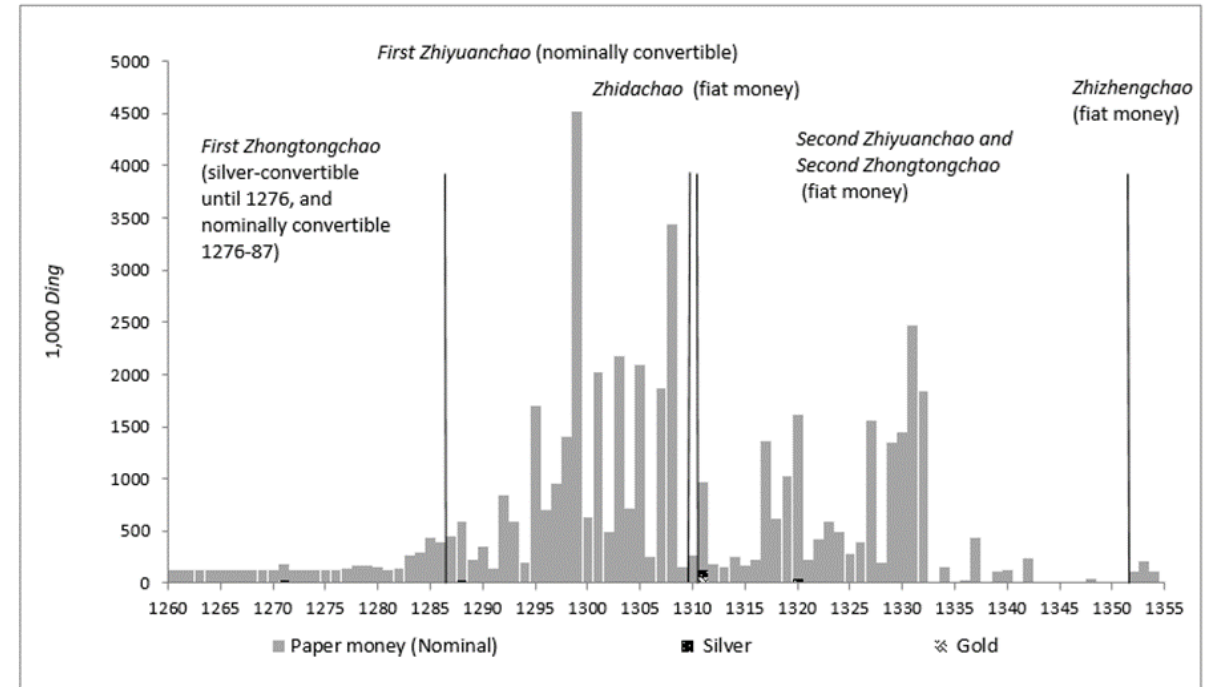**Annual real paper money issues, 1260 to 1355, Deflated by Respectability CPI**
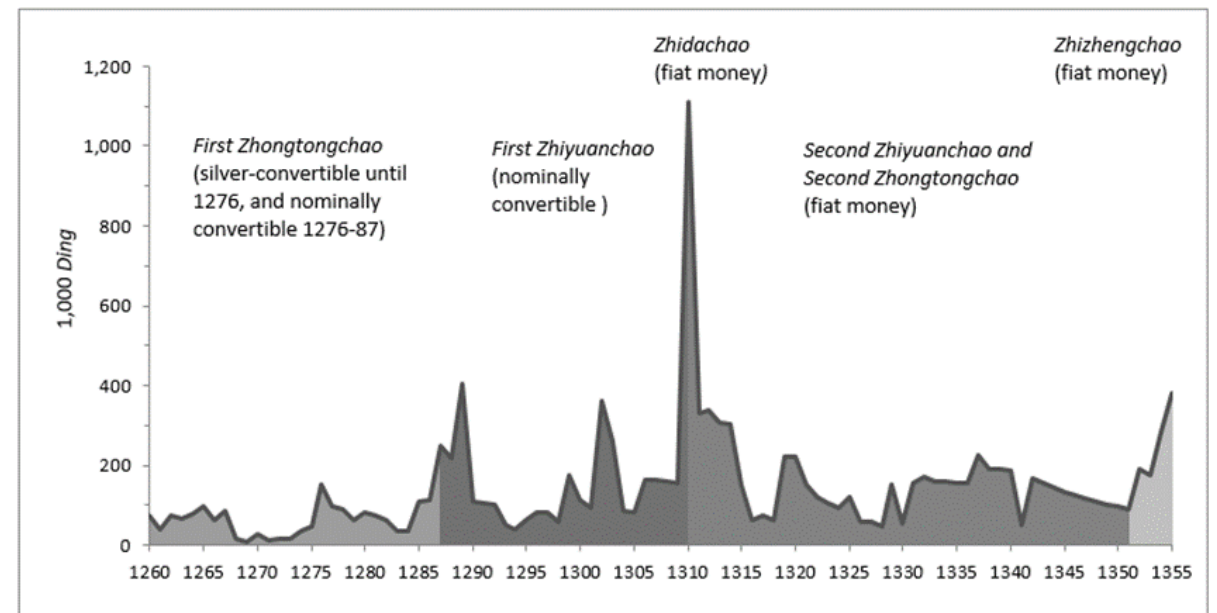
- Much money was issued in the last two decades, but less in real terms due to inflation.

Imperial grants

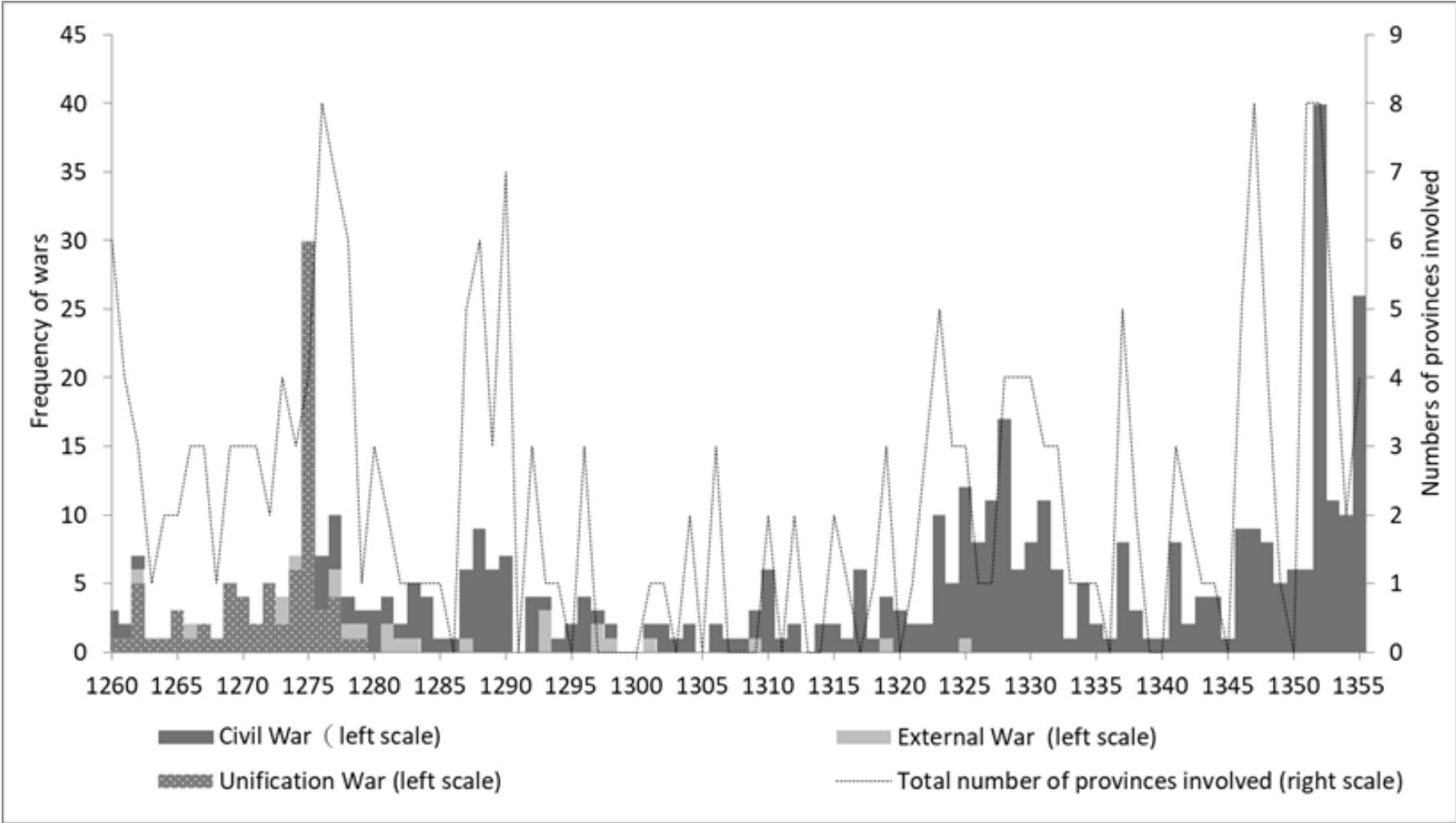**Fixed (annual) and occasional (ad-hoc) nominal imperial grants, 1260 to 1355**

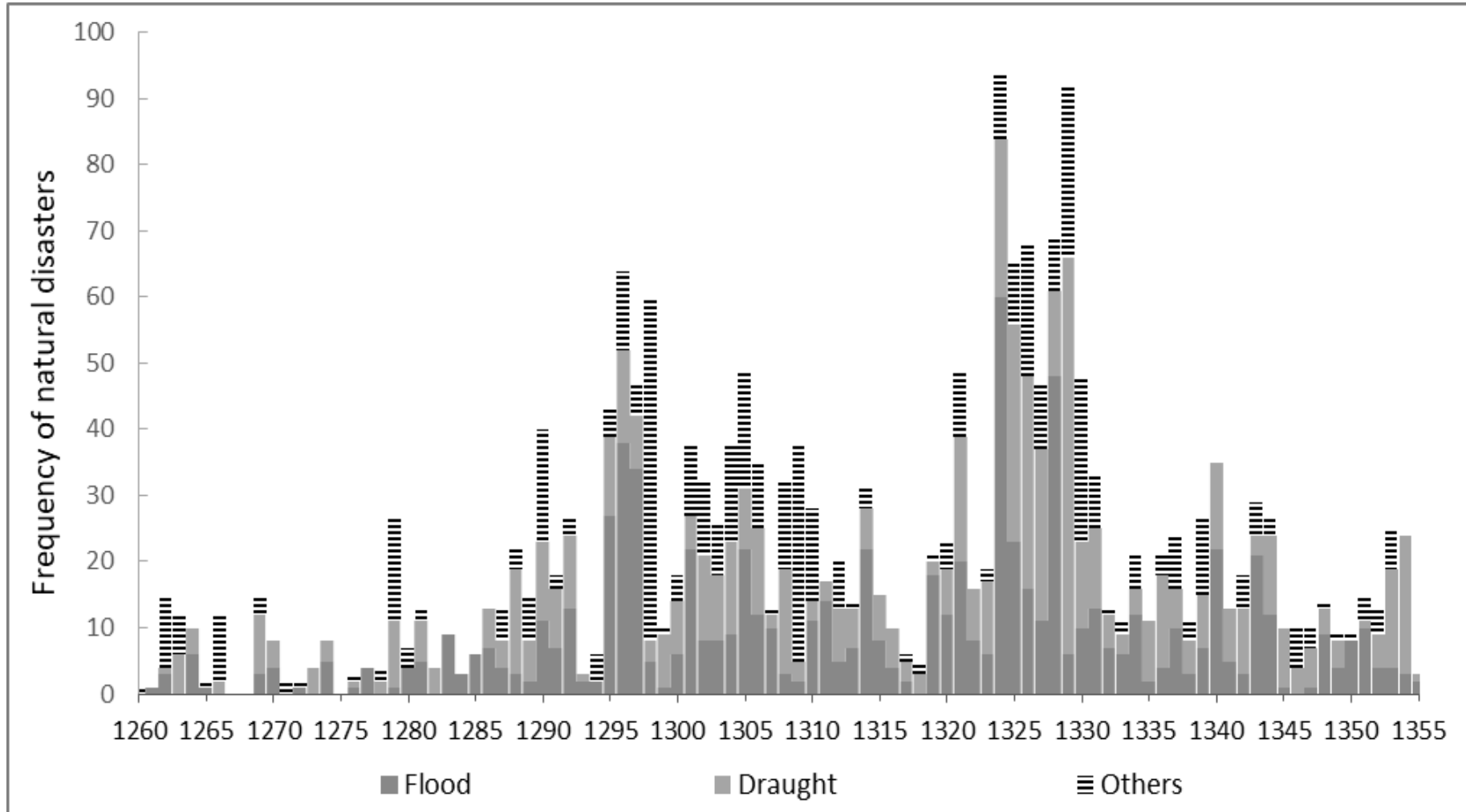**Composition of the nominal value of imperial grants, 1260-1355**

Warfare

Frequency of warfare

Natural disasters

Frequency of natural disasters

Taxation

Fiscal structure of the Yuan government (1,000 *ding*)

	Revenue	Expenditure	Tax Surplus	Annual Money Issuance
1292	2979	3638	–659	2500
1308	4000	13400	–9400	5000
1311	4000	18000	–14000	11212

Unit: *Zhongtongchao, 1 ding= 50 guan.*

- Historical records:
  "Imperial grants have exhausted our fiscal revenue, and I urge your majesty to reduce them."
  Yuanshi, Beiji 28, Emperor *Yingzong* 英宗
  "The war with the Southern Song in 1273 caused the annual issues to soar to 1.4 million *ding*. For fear of depreciation, the government prohibited the usage of copper coins."
  The Monetary History of China, Peng (1976 p.514.)

Empirical hypotheses

We will test if:
1. Warfare, imperial grants, and natural disasters are positively correlated with paper money issues.
2. The silver standard, while it lasted, effectively restrained paper money issues.

Strategy 1: Paper money issuance and its correlates

$$\ln(Issues)_t = \alpha + \beta_1 \ln\left(\sum_{h=0}^{2} TotalWar_{t-h}\right) + \beta_2 \ln\left(\sum_{h=0}^{2} Grants_{t-h}\right) + \beta_3 \ln\left(\sum_{h=0}^{2} Disaster_{t-h}\right) + \beta_4 Pop_t + \beta_5 t$$

$$+ \sum_{j=1}^{10} \emptyset_j \, Emperor_{t,j} + \varepsilon_t \tag{1}$$

$$\ln(Issues)_t = \alpha + \delta_1 \ln\left(\sum_{h=0}^{2} ExternalWar_{t-h}\right) + \delta_2 \ln\left(\sum_{h=0}^{2} UnificationWar_{t-h}\right) + \delta_3 \ln\left(\sum_{h=0}^{2} CivilWar_{t-h}\right)$$

$$+ \delta_4 \ln\left(\sum_{h=0}^{2} Grants_{t-h}\right) + \delta_5 \ln\left(\sum_{h=0}^{2} Disaster_{t-h}\right) + \delta_6 Pop_t + \delta_7 t + \sum_{j=1}^{10} \emptyset_j \, Emperor_{t,j} + \varepsilon_t \tag{2}$$

	(1) ln(nominal)	(2) ln(real)	(3) ln(nominal)	(4) ln(real)
ln(total war)×full silver standard	0.120	–0.123		
(sum of the current year and previous two)	(0.189)	(0.230)		
ln(total war)×nominal silver standard	0.261	0.0919		
(sum of the current year and previous two)	(0.203)	(0.209)		
ln(total war)×fiat standard	0.608***	0.497***		
(sum of the current year and previous two)	(0.179)	(0.167)		
ln(civil war)×full silver standard			0.166	0.482*
(sum of the current year and previous two)			(0.188)	(0.270)
ln(civil war)×nominal silver standard			0.133	0.105
(sum of the current year and previous two)			(0.171)	(0.172)
ln(civil war)×fiat standard			0.579***	0.496***
(sum of the current year and previous two)			(0.176)	(0.176)
ln(nominal grants)	–0.0113		–0.0106	
(sum of the current year and previous two)	(0.0208)		(0.0213)	
ln(real grants)		0.00464		–0.000825
(sum of the current year and previous two)		(0.0356)		(0.0339)
ln(natural disasters)	0.152	0.321*	0.0575	0.222
(sum of the current year and previous two)	(0.162)	(0.171)	(0.202)	(0.205)
ln(population)	1.073***	0.300	1.228***	0.566
	(0.389)	(0.433)	(0.391)	(0.409)
Year trend	0.0261	-0.0231	0.0220	-0.0200
	(0.0251)	(0.0267)	(0.0258)	(0.0259)
Constant	-39.67	34.63	-36.49	26.21
	(27.26)	(29.19)	(29.85)	(30.68)
Emperor FE	Yes	Yes	Yes	Yes
Observations	94	94	94	94

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. To avoid ln(0), we use an inverse hyperbolic sine transformation, $IHS(x) = \ln(x + \sqrt{(x^2 + 1)}$.

Strategy 2: Money Issuing under Three Different Monetary Standards, the Full Silver Standard as baseline

$$\ln(Issuing)_t = \alpha + \lambda_1 \, nominalcovertible_t + \lambda_2 \, FiatStandard_t + \lambda_3 Pop_t + \lambda_4 t + \sum_{j=1}^{10} \emptyset_j \, Emperor_{t,j} + \varepsilon_t$$

(3)

	(1) ln(nominal issues)	(2) ln(real issues)
Nominal silver standard	1.100*	0.965*
(1276-1309)	(0.580)	(0.536)
Fiat standard	3.009***	2.931***
(1310-1355)	(0.564)	(0.528)
ln(population)	0.586	0.0612
	(0.567)	(0.551)
Year trend	0.0479	-0.00733
	(0.0302)	(0.0308)
Constant	-58.48*	19.46
	(31.49)	(32.44)
Emperor FE	Yes	Yes
Observations	96	96

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Strategy 3: Warfare and money issues under three monetary standards

$$
\begin{aligned}
\ln(Issuing)_t &= \varphi_1\, FullSilverStandard_t \times \ln\left(\sum_{h=0}^{2} TotalWar_{t-h}\right) \\
&+ \varphi_2\, NominalSilverStandard_t \times \ln\left(\sum_{h=0}^{2} TotalWar_{t-h}\right) \\
&+ \varphi_3\, FiatStandard_t \times \ln\left(\sum_{h=0}^{2} TotalWar_{t-h}\right) + \varphi_4 \ln\left(\sum_{h=0}^{2} Grants\right) + \varphi_5 \ln\left(\sum_{h=0}^{2} Disaster\right) + \varphi_6 Pop_t + \varphi_7 t \\
&+ \sum_{j=1}^{10} \emptyset_j\, Emperor_{t,j} + \varepsilon_t
\end{aligned}
\tag{4}
$$

$$
\begin{aligned}
\ln(Issuing)_t &= \kappa_1\, FullSilverStandard_t \times \ln\left(\sum_{h=0}^{2} CivilWar_{t-h}\right) \\
&+ \kappa_2\, NominalSilverStandard_t \times \ln\left(\sum_{h=0}^{2} CivilWar_{t-h}\right) \\
&+ \kappa_3\, FiatStandard_t \times \ln\left(\sum_{h=0}^{2} CivilWar_{t-h}\right) + \kappa_4 \ln\left(\sum_{h=0}^{2} Grants\right) + \kappa_5 \ln\left(\sum_{h=0}^{2} Disaster\right) + \kappa_6 Pop_t + \kappa_7 t \\
&+ \sum_{j=1}^{10} \emptyset_j\, Emperor_{t,j} + \varepsilon_t
\end{aligned}
\tag{5}
$$

	(1) In(Nominal)	(2) In(Real)	(3) In(Nominal)	(4) In(Real)
In(Total War)×Full Silver Standard	0.121	–0.158		
(sum of current year and previous two)	(0.188)	(0.227)		
In(Total War)×Nominal Silver Standard	0.263	0.0513		
(sum of current year and previous two)	(0.202)	(0.214)		
In(Total War)×Fiat Standard	0.618***	0.450***		
(sum of current year and previous two)	(0.176)	(0.167)		
In(Civil War)×Full Silver Standard			0.168	0.428
(sum of current year and previous two)			(0.188)	(0.259)
In(Civil War)×Nominal Silver Standard			0.136	0.0725
(sum of current year and previous two)			(0.170)	(0.173)
In(Civil War)×Fiat Standard			0.589***	0.450**
(sum of current year and previous two)			(0.173)	(0.178)
Year Trend	0.0266	–0.0401	0.0226	–0.0369
	(0.0248)	(0.0253)	(0.0255)	(0.0249)
In(Nominal Grants)	–0.0181		–0.0176	
(sum of current year and previous two)	(0.0191)		(0.0196)	
In(Real Grants)		0.0258		0.0207
(sum of current year and previous two)		(0.0297)		(0.0287)
In(Natural Disasters)	0.151	0.309*	0.0562	0.229
(sum of current year and previous two)	(0.162)	(0.172)	(0.202)	(0.201)
In(Population)	1.070***	0.530	1.223***	0.782**
	(0.387)	(0.409)	(0.389)	(0.389)
Constant	–40.14	51.74*	–36.84	43.50
	(27.13)	(27.94)	(29.63)	(29.79)
Emperor FE	Yes	Yes	Yes	Yes
Observations	94	94	94	94

Standard errors in parentheses
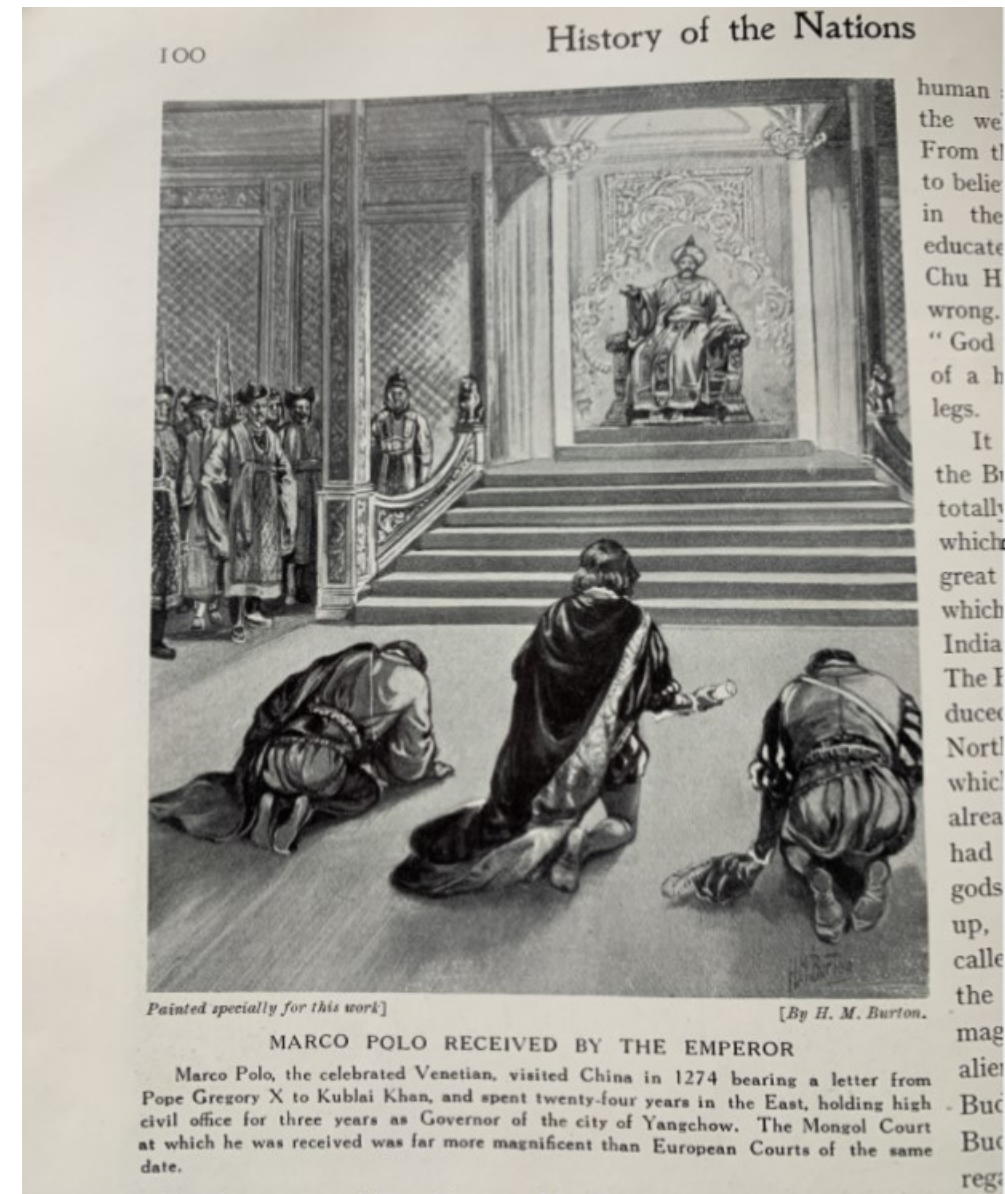
*** p<0.01, ** p<0.05, * p<0.1

Conclusion

- The Yuan's paper money regime was stable and successful for nearly half of the century.

- Prices in Yuan China followed a trend from stability to mild inflation to hyperinflation, driven by fiscally-motivated money issues caused by military expenditures.

- Full silver standard (1260-1275) in Mongol Yuan China proved a commitment mechanism that constrained the over-issuance of paper money – but only while it lasted.

- Despite remarkable decades of comparative success, in the long run, the Yuan government could not manage the issuance and circulation of fiat money efficiently.

Thank you!

guanhh@pku.edu.cn

nuno.palma@manchester.ac.uk

m.wu@mmu.ac.uk

Hutchinson (1922) History of the Nations

Appendix

Sources of Government Revenue

Item	Description
Shuiliang (Grain Taxes)	Each household needed to submit one to four *shi* goods in-kind, including millet, rice, or cotton. Households in the large and rich Jiangnan area (lower Yangtze basin area) could pay in paper money as a replacement.
Kechai (Household Taxes)	Every two to five households needed to submit 1 *jin* silk yarn plus silver or paper money.
Suike (Gold, Silver, Cinnabar, Jade, Copper, Iron, Lead, Tin, Alum, Sodium, Carbonate, Bamboo and Wood Taxes)	Depending on its natural endowments, each province needed to submit a quantity of metals such as gold or silver, or chemicals such as lead or mercury, to the central government every year.
Jiucuke (Liquor and Vinegar)	Liquor and vinegar were government monopolies. Merchants needed to buy these two products from the government.
Yanfa (Salt-Monopoly System)	Salt was a government monopoly. Merchants needed buy salt certificates (known as *yanyin*) from the government, and collected salt from salt fields.
Chafa (Tea-Monopoly System)	Tea was a government monopoly. Merchants needed to buy tea certificates (known as *chayin*) from the government and collected tea from tea fields.
Shangshui (Commercial Tax)	Tax on trade and commerce with a rate of 2 to 3 per cent.
Shibosi (Maritime Trade)	Tax on imported goods, with varying tax rates.
Ewaike (Other)	Tax on livestock, property rents, business charters and others.

Philips-Perron Test for Stationarity

		Test statistic	1% Critical value	5% Critical value	10% Critical value	Result	Model
ln (nominal issues)	Z(ρ)	-4.808	-19.710	-13.660	-10.970	Nonstationary	1
	Z(τ)	-1.622	-3.517	-2.894	-2.582	Nonstationary	1
	Z(ρ)	-17.387	-27.230	-20.610	-17.430	Stationary	2
	Z(τ)	-3.088	-4.051	-3.455	-3.153	Stationary	2
ln (real issues)	Z(ρ)	-28.400	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-3.923	-3.517	-2.894	-2.582	Stationary	1
	Z(ρ)	-39.198	-27.230	-20.610	-17.430	Stationary	2
	Z(τ)	-4.784	-4.051	-3.455	-3.153	Stationary	2
ln (total war)	Z(ρ)	-63.415	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-6.313	-3.517	-2.894	-2.582	Stationary	1
ln (external war)	Z(ρ)	-85.272	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-8.314	-3.517	-2.894	-2.582	Stationary	1
ln (unification war)	Z(ρ)	-14.589	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-2.867	-3.517	-2.894	-2.582	Stationary	1
ln (civil war)	Z(ρ)	-35.879	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-4.450	-3.517	-2.894	-2.582	Stationary	1
ln (nominal grants)	Z(ρ)	-27.696	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-4.026	-3.517	-2.894	-2.582	Stationary	1
ln (real grants)	Z(ρ)	-18.676	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-3.129	-3.517	-2.894	-2.582	Stationary	1
ln (natural disasters)	Z(ρ)	-40.233	-19.710	-13.660	-10.970	Stationary	1
	Z(τ)	-5.141	-3.517	-2.894	-2.582	Stationary	1
ln (population)	Z(ρ)	-3.564	-19.710	-13.660	-10.970	Nonstationary	1
	Z(τ)	-2.851	-3.517	-2.894	-2.582	Stationary	1

Notes: Trend is excluded in Model 1; Trend is included Model 2. The default of the number of the lags is to use $int\{4\left(\frac{T}{100}\right)^{\frac{2}{9}}\}$ lags (Stata Corp LP, 2007 p.183). Based on this equation we use 4 lags for the test.

Robustness Result 1:

	(1) ln(nominal)	(2) ln(real)	(3) ln(nominal)	(4) ln(real)
ln(total war)	0.258*	0.136		
(sum of the current and previous year)	(0.137)	(0.132)		
ln(external war)			–0.0648	–0.122
(sum of the current and previous year)			(0.120)	(0.131)
ln(unification war)			0.265***	0.0994
(sum of the current and previous year)			(0.0862)	(0.136)
ln(civil war)			0.277**	0.293**
(sum of the current and previous year)			(0.111)	(0.118)
ln(nominal grants)	3.76e-06		–0.00269	
(sum of the current and previous year)	(0.0231)		(0.0214)	
ln(real grants)		0.0175		–0.00163
(sum of the current and previous year)		(0.0379)		(0.0318)
ln(natural disasters)	0.204*	0.267**	0.247**	0.289**
(sum of the current and previous year)	(0.109)	(0.122)	(0.0953)	(0.113)
ln(population)	1.146***	0.497	1.053***	0.256
	(0.335)	(0.434)	(0.321)	(0.363)
Year trend	0.0358	–0.0130	0.0455*	–0.00825
	(0.0277)	(0.0301)	(0.0254)	(0.0260)
Constant	–53.75*	18.08	–64.57**	16.29
	(30.33)	(32.07)	(27.74)	(28.66)
Emperor FE	Yes	Yes	Yes	Yes
Observations	95	95	95	95

Robustness Result 2:

	(1) ln(nominal)	(2) ln(real)	(3) ln(nominal)	(4) ln(real)
ln(total war)	0.340*	0.178		
(sum of the current year and previous two)	(0.173)	(0.177)		
ln(external war)			0.0104	−0.0310
(sum of the current year and previous two)			(0.143)	(0.149)
ln(unification war)			0.271***	0.159
(sum of the current year and previous two)			(0.0889)	(0.117)
ln(civil war)			0.221*	0.258*
(sum of the current year and previous two)			(0.124)	(0.134)
ln(nominal grants)	0.0255		0.0368	
(sum of the current year and previous two)	(0.0317)		(0.0342)	
ln(real grants)		0.0730		0.0593
(sum of the current year and previous two)		(0.0550)		(0.0533)
ln(natural disasters)	0.199	0.357*	0.270	0.364**
(sum of the current year and previous two)	(0.176)	(0.188)	(0.183)	(0.172)
ln(population)	1.295***	0.709*	1.258***	0.491
	(0.325)	(0.405)	(0.381)	(0.364)
Late Yuan	0.659	0.840	0.754	0.662
	(0.479)	(0.506)	(0.505)	(0.471)
Year trend	0.0198	−0.0305	0.0300	−0.0204
	(0.0282)	(0.0301)	(0.0299)	(0.0261)
Constant	−36.70	35.30	−49.28	26.25
	(31.06)	(32.63)	(32.36)	(29.14)
Emperor FE	Yes	Yes	Yes	Yes
Observations	94	94	94	94