Can the Northeast Asian Currencies Identify Themselves without Dollar?

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Abstract: Although the Northeast Asian economies with the size similar to that of the US, they have long adopted USD as a vehicle for the transaction among them. The paper studies the history (1910-2012) of the currencies (Japanese yen, Chinese currencies and Korean won) and finds that the currencies have never served as the standard of value unlike that of Pound Sterling and USD. Not being a numeraire, the currencies are indirectly evaluated for more than century. After 1973 when demonetization of gold was officially fixed in international monetary system, it would be even difficult for these currencies to gain the network effect which requires to this function as a prerequisite. The dollar maintains its quoting and invoicing status internationally for many staple commodities after the Jamaican Conference. It still functions as a numeraire in peoples' memory nowadays even without redemption to gold. This helps the United States inflate its currency. The Northeast Asian currencies incur not only heavy loss originated from the dollar's volatility but also the cost if their currencies deviate from the dollar (switching cost). The empirical estimation of the currencies (JPY, CNY, KRW, HKD TWD) and other staple commodities (oil and gold) is done via Diagonal vech Multivariate GARCH models. The result proves the above phenomenon. None of the Northeast Asian currencies has endowed with auto momentum in comparison with that of the staple commodities (strong) and USD (weak). This also implies their identities have not been found yet.

Key Words: Northeast Asian currencies, numeraire, network externality, MGARCH DVECH

JEL classification: F31, F36, G15

1. Introduction

To be a currency for international transaction, the country has to endow its currency with value. An agreed-upon value for a transaction in a country's medium of exchange, such as the dollar or yuan. A standard of value (or numeraire) allows all merchants and economic entities to set uniform prices for goods and services. This numeraire is necessary in order to maintain a stable economy. In the history of exchange rates, gold is the ultimate standard, although today most Western currencies no longer are backed by gold, i.e., exchangeable for gold coins or bullion equal to the face value of paper currency. The United States abandoned the gold standard domestically with the Gold Reserve Act of 1934, and internationally in 1971 when it signed the Smithsonian Agreement which initiated Floating Exchange Rates between the major Western countries. However, the vehicle currency (USD) still dominates most of international transaction with the memory of its value engraved in peoples' mind. This is the memory of the two-tier system which identifies the dollar with value of gold among all the rest of other currencies. Although the USD has been in downturn path, no currency can challenge its position. The attempts made

by those emerging Japanese yen and Euro are ended by adding only some nominal share in Special Drawing Rights (SDR) and circulation in special regions.

How can the dollar deflate itself while still holding the position? This will contribute to effect of network externality which benefits a user of a product or service of other using the same or compatible products or services. With an increasing function of the number of other users, the network externality arises whenever the value of a product to consumers is positively related to the number of people using the product. The typical example is those accessories and software for iPad and iPhone extending their users in large scale. Many internationally traded staple commodities (oil, wheat and so on) are quoted or invoiced in dollar. Moreover the financial derivatives and indexes are also quoted similarly. This will exert a great impact on those competing currencies, like Euro, Japanese yen and Chinese yuan. These currencies are born without direct linkage to the gold or its substitutes. Their identification is set via USD which bridges gap between the gold and their values. Therefore they are not independent and subject to changes and volatility of USD. Once pegging on USD, it is difficult to get rid of it. Edgar L. Feige, *et al*. (2002) investigate the north American countries and find: "Argentina appears to represent an economy in which unofficial dollarization reached a threshold, after which, network externalities in the use of the foreign currency made the process of unofficial dollarization irreversible". No direct long memory between these currencies and many internationally traded commodities. In the rest of the paper, we will explore the dilemma for the Northeast Asian currencies followed historical paths as depicted by Figure 1 and 2.

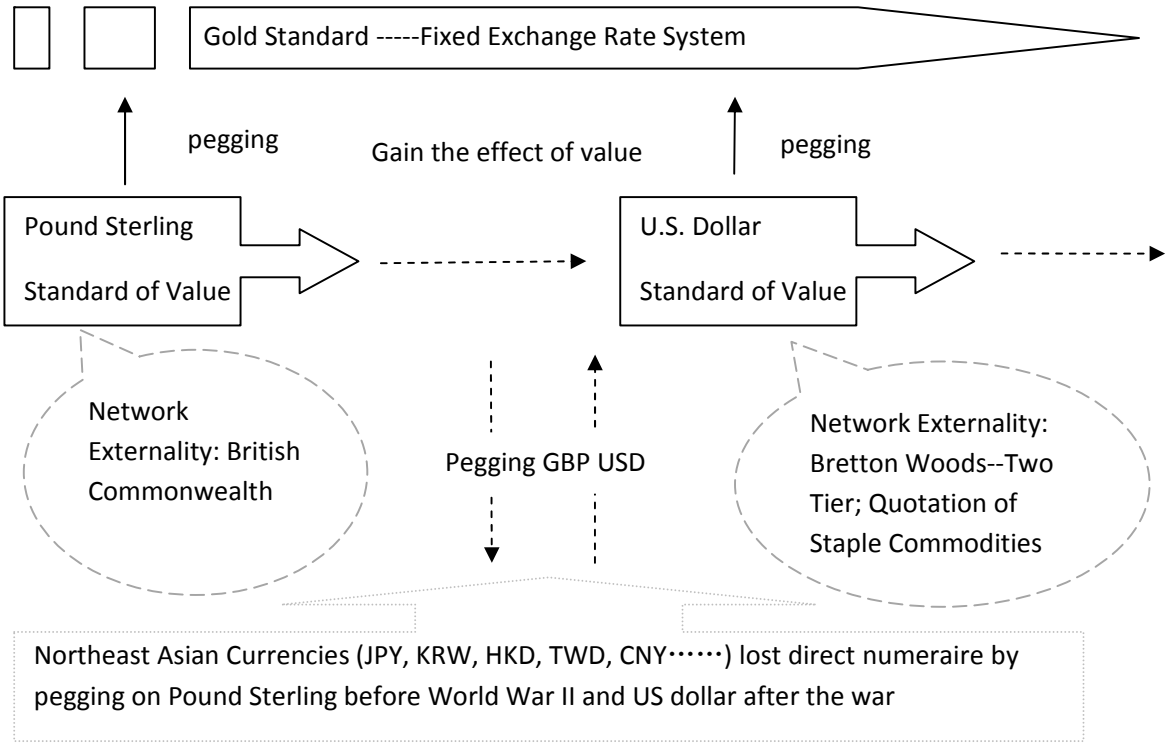


Figure 1. No Chance in History for Northeast Asian Currencies to Gain Standard of Value

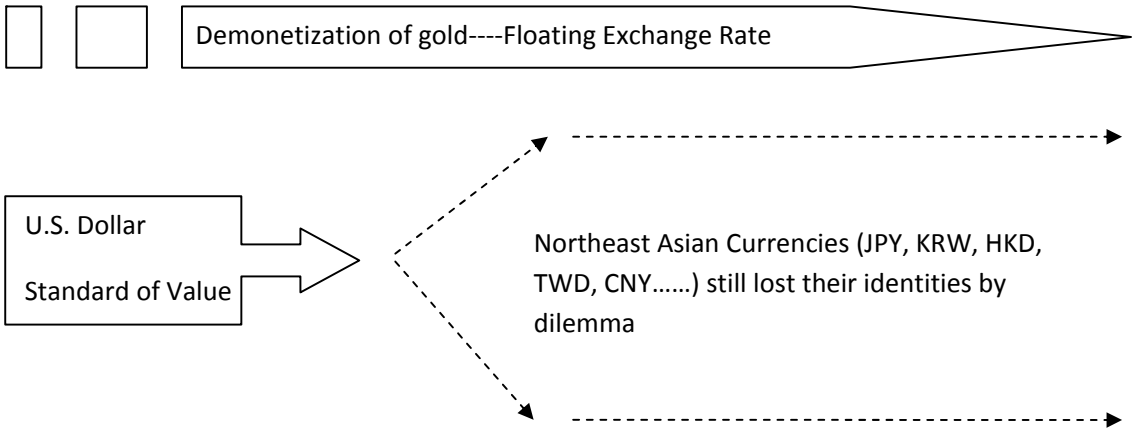


Figure 2. The Dilemma for Northeast Asian Currencies in the Demonetization of Gold

The structure of the paper goes as follows. In the second part of the paper, the literature survey is made on the standard of value as well as the network externality; in the third part of paper, the historical evidence of the Northeast Asian currencies; part four starts with introduction of methodology of Diagonal vech Multivariate GARCH models (MGARCH DVECH) supported by the empirical results and its application in the era of demonetization of gold. However the paper ends without the solution to the dilemma.

2. Literature Survey on Numeraire and Network Externality

The main functions of money are distinguished as: a medium of exchange; a unit of account; a store of value; and, occasionally in the past, a standard of deferred payment. However the first two functions entail the standard of value (numeraire). The rest of other functions are subject to changes with time. Nearly all contemporary money systems are based on fiat money. Fiat money is without intrinsic use value as a physical commodity, and derives its value by being declared by a government to be legal tender; that is, it must be accepted as a form of payment within the boundaries of the country. Introduction of gold and silver coins as a money is around 650–600 BC. The gold standard, a monetary system where the medium of exchange are paper notes that are convertible into pre-set, fixed quantities of gold, replaced the use of gold coins as currency in the 17th-19th centuries in Europe. These gold standard notes were

made legal tender, and redemption into gold coins was discouraged. By the beginning of the 20th century almost all countries had adopted the gold standard, backing their legal tender notes with fixed amounts of gold. After World War II, at the Bretton Woods Conference, most countries adopted fiat currencies that were fixed to the US dollar. The US dollar was in turn fixed to gold. USD replaced GBP as the anchor for other currencies to peg through the Bretton Woods System. In order to have a dominate currency power, there witnessed the fierce debates between two financial ministers (Keynes and White) focused on the gold as currency denominator. The country with less gold reserve advocated Bancor (Unita) which has no commitment to redemption into gold. However the country with more gold reserve did otherwise. Eventually the countries preferred the long memory of gold to Bancor (paper money). Now the history seems to repeat the same to USD when the US gold reserve has been far less than its obligation (trade deficit and external debt). In 1971 the US government suspended the convertibility of the US dollar to gold. After this many countries de-pegged their currencies from the US dollar. As a matter of fact most countries still regard the US dollar as their tender (or anchor) although the dollar floats like duckweed. No pegging but quoting (invoicing) is the best strategy for the dominant currency in the era of demonetization of gold.

This paper mainly explores the "no pegging but quoting" strategy and the dilemma faced by the Northeast Asian economies. Money, essentially acts as a standard measure and common denomination of trade. It is thus a basis for quoting and bargaining of prices. It has a significant impact on developing efficient accounting systems. But the most important usage is that it provides a method to compare the values of dissimilar objects. A history of exchange rate of pound sterling against US dollar sets a good example for a standard of value. The rate has been kept between GBP1=USD2~USD4 margin for a century because both set their value on gold. Therefore people will find it easier to recall the prices. International comparison of the prices for staple commodities also became speedy. The key to the stable exchange rates is the gold standard or its derivatives. Barry Eichengreen (2005) explains the reason why the GBP is replaced by USD. "This is a lesson of British history in the sense that an inflation rate that ran at roughly 3 times U.S. rates over the first three quarters of the 20th century, in conjunction with repeated devaluations against the dollar, played a major role in sterling's loss of reserve currency status." He denies that it is not network externality that makes GBP lose its power. "But is not the persistence of sterling's reserve-currency role into the second half of the 20th century, long after the United Kingdom's international commercial and financial preeminence passed, evidence that reserve currency status, once gained, is hard to lose? I am not convinced. After World War II, sterling reserves were held not because of any lingering incentives conferred by network externalities but mainly as a matter of loyalty by members of the Commonwealth and by colonies with limited choice in the matter."

The time comes to the era when the redemption into gold became an obstacle for the dominant-currency country. The demonetization of gold gives way to the dominant currency with larger network externality. Therefore the network externality in international currency competition has still been frequently discussed by many economists. Among them Barry Eichengreen (2005) refuses the network externality by saying: "The network-externalities argument that competition for reserve currency status is a winner-take-all game holds little water either analytically or historically. Looking forward, financial innovation will continue to reduce the costs of converting currencies, further reducing the incentive to hold reserves in the same form that other countries hold reserves simply in order to minimize transactions costs. Thus, there is no reason why, several decades from now, two or three reserve currencies cannot

share the market, not unlike the situation before 1914." He goes on with confirmation that "Changes in financial technologies and market structures, which weaken network effects, make it even more likely that this will be true in the future than the past. At the same time, mistaken policies can quickly knock a currency out of contention. Time will tell whether this fate befalls the dollar".

The debates whether the network externality adds value to the currencies or not do shed light to the understanding of the dominant currency. Kevin Dowd and David Greenaw (1993) strongly advocate the new value of network effect in currencies. They wrote: "Existing models fail in two important respects. First, they ignore network effects whereby the value of a particular currency to a user depends on how many others use it as well. I might think that the yen is the best currency available, but my decision whether to use yen will depend, in part, on how many other people I also expect to use yen. Secondly, we must also take account of switching costs. Changing currencies is costly - we must learn to reckon in the new currency, we must change the units in which we quote prices, we might have to change our records, and so on." To make thing simpler, they compare the network externality to common languages by saying: "The choice of language is similar in many respects to the choice of currency, and the same sort of analytical tools can be applied to it. The utility of a language to a user depends, in part, on how many others also use it, and we observe the same economies of standardization in that area as we do in the choice of currency. … We also observe similar switching costs problems, and the same trade-off between the gains of using a common language and the costs of switching over to it. In addition, we observe much the same problems over which language to adopt, if we decide to adopt a common language, and the same argument that implies the Mark dominates the ecu also suggests that English or Mandarin Chinese would make a better world language than, say, Esperanto."

We take both views from Barry Eichengreen and Kevin Dowd *et al* with grain of salt. First, Esperanto, like fiat money, if without intrinsic use value as an exchange tool between peoples, will not last long. Second, it is the status quo that determines the peoples' behavior in their future choices. This helps to explain why English overwhelms Esperanto and other languages. English is closely linked to the standard international commerce and commodity-invoicing. It is unimaginable to replace English by other languages like Japanese or Chinese since the switching cost is too high. More people use it, more ideas will add into it. This will endow the language with new life, so the dominant currency. Network externality has a self-reinforcing effect. Finally, although financial technologies and market structures are important to the currency, the intrinsic value for the currency still lies at people's desire for the value supported by technology, commodity and service.

Since the network externality has the "self-reinforcing" effect, there are many supplementary explanations for it. Varian (2003) summarizes three features. First, network externalities are efficiencies from the demand side. Varian calls them demand-side economies of scale, because they increase average revenue (or demand) with scale, in contrast to the technical or supply-side economies, which decrease average cost with scale. Demand-side economies reflect positive feedback. If more people use Windows, the value of the Windows network to users increases, inducing even more people to adopt Windows. Second, many network goods (like software) also exhibit supply-side returns to scale, making the positive feedback very strong. That is, more sales lead to lower unit costs (supply side) and greater appeal to customers (demand side). Third, strong positive feedback is likely to drive the network good to market dominance; and once dominance has been achieved, it becomes extremely difficult to unseat it. For instance, firms that have adopted Windows will find it costly to switch to a new operating system,

because of the "sunk costs" invested, new retraining costs, and coordination costs resulting from technical compatibility problems with firms that remain in the Windows network. Network externalities thus contribute to "lock-in." History is important—whichever good is first to dominate the market will likely continue to do so. The equilibrium is path-dependent.

Those dominant currencies are born endowed with standard of values (backed by gold) in history. Although the British intended to sever its tie to gold by "Bancor", it was too late before the American reinforced its tie to gold to replace the Sterling status. In order not to follow suit, the American timely started demonetization of gold and successfully maintains its status by network externality. Originated by the standard of value, USD has kept its status by "lock-in" and "self-reinforce" effect.

3. History Tells the Dilemma for the Northeast Asian Currencies

The available data for the Northeast Asian currencies traces back to May 31, 1910, therefore we study the history of the currencies from then up to February 17, 2012. The data originated from following websites.

(1) https://www.globalfinancialdata.com/index_tabs.php3?action=user_homepage&message=true[1]. Global Financial Data，784 Fremont Villas，Los Angeles, CA 90042，tel(323) 258-9409,fax(323) 258-9409,(877) Data-999 [(877) 328-2999],Webmaster@GlobalFinancialdata.com//Stock and index updates provided by Commodity Systems, Inc. (CSI).//

(2) http://research.stlouisfed.org/fred2/categories/276

(3) http://tonto.eia.doe.gov/dnav/pet/xls/pet_pri_spt_s1_d.xls

(4) http://www.kitco.cn/cn/lf/londonfix.html

The currencies and commodities under the study are listed in the Table 1

Table 1. The Variables Used in the Study

Abbreviation for this paper	Full name of the currency and commodity
CHF / chf	Swiss Franc
CNY / cny	Mainland China Yuan (Renminbi)
EUR / eur	Euro
GBP / gbp	United Kingdom Pound Sterling
HKD /hkd	Hong Kong Dollar
JPY / jpy	Japanese yen
KRW / krw	South Korean Won
TWD /twd	Taiwan Dollar
USD / usd	US Dollar
oil	Price of the WTI Crude Oil

[1] The author downloaded the data when he was a visiting scholar at MIT during the year 2007 and 2008.

gold	Gold spot price, London fix pm
wheat	No.02 Wheat, US

The data description and correlation tests are listed in the Appendix (Table 1-Table 4).

In order to get a bird's- eye view of what happened to the Northeast Asian currencies, we depict the graphs via USD standard, CHF standard (which has been widely applied by scholars) and gold standard. Since the original data is quoted in USD, we convert it to CHF and gold standards which are regarded as relatively neutral or without country's stigma. The history of the exchange rates for a century tell us that British Pound Sterling and US dollar did a successful job by pegging their currencies on gold and all the other currencies including the Northeast Asian currencies did the same by pegging on GBP and USD during the whole period except for World War I and II (short intervals with some abnormal values or outliers deleted in the graphs). After 1973, most of the Northeast Asian currencies floated together with USD except JPY. The Japan embarked on internationalization of yen which floated differently against other currencies. With accumulation of large international reserve, Japan intends to challenge USD position but ended by "hollowing out" of manufacture industry and investment at home. Barry Eichengreen (2005) describes the case in Asia "… the countries of Asia are similarly unlikely to be able to subordinate their individual interest to the collective interest. It may be in their collective interest to hold dollars to keep their currencies down and the dollar up, but it is in their individual interest to get out before the bottom falls out of the U.S. currency." He concludes "The other popular candidates are not likely to be major rivals. Japan is a much smaller country with a serious demographic problem and a resistance to immigration. Nor has it displayed a record of policy stability in recent years. Everyone's favorite heir to the throne, China, will have to solve some very serious problems before its currency begins to become attractive as a repository for other countries' foreign exchange reserves. Removing capital controls is the least of its problems, in my view. Its financial markets are not very liquid or transparent; indeed, most of the institutional infrastructure needed for Shanghai to become a true international financial center will take decades to install. The security of property rights is uncertain, and making investors feel secure will ultimately require a transition to democracy, the creation of credible political checks and balances, and the development of a creditor class with political sway. While the renminbi is everyone's favorite candidate for the new reserve currency champion four or five decades from now, such hopes are, in my opinion, still highly premature."

Figure 3-1 Price of Northeast Asian Currencies and Staple Commodities in USD

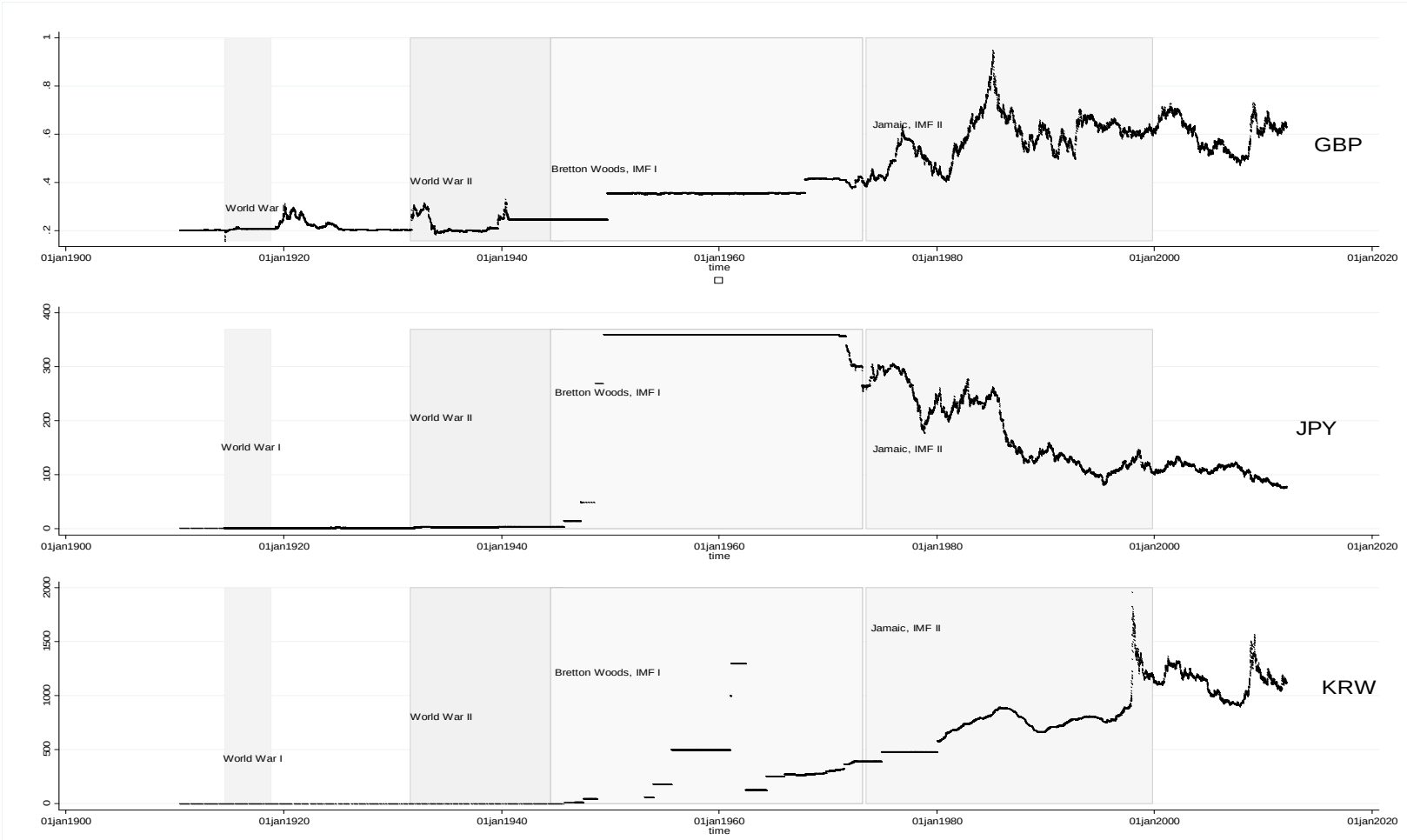


Figure 3-2 Price of Northeast Asian Currencies and Staple Commodities in USD

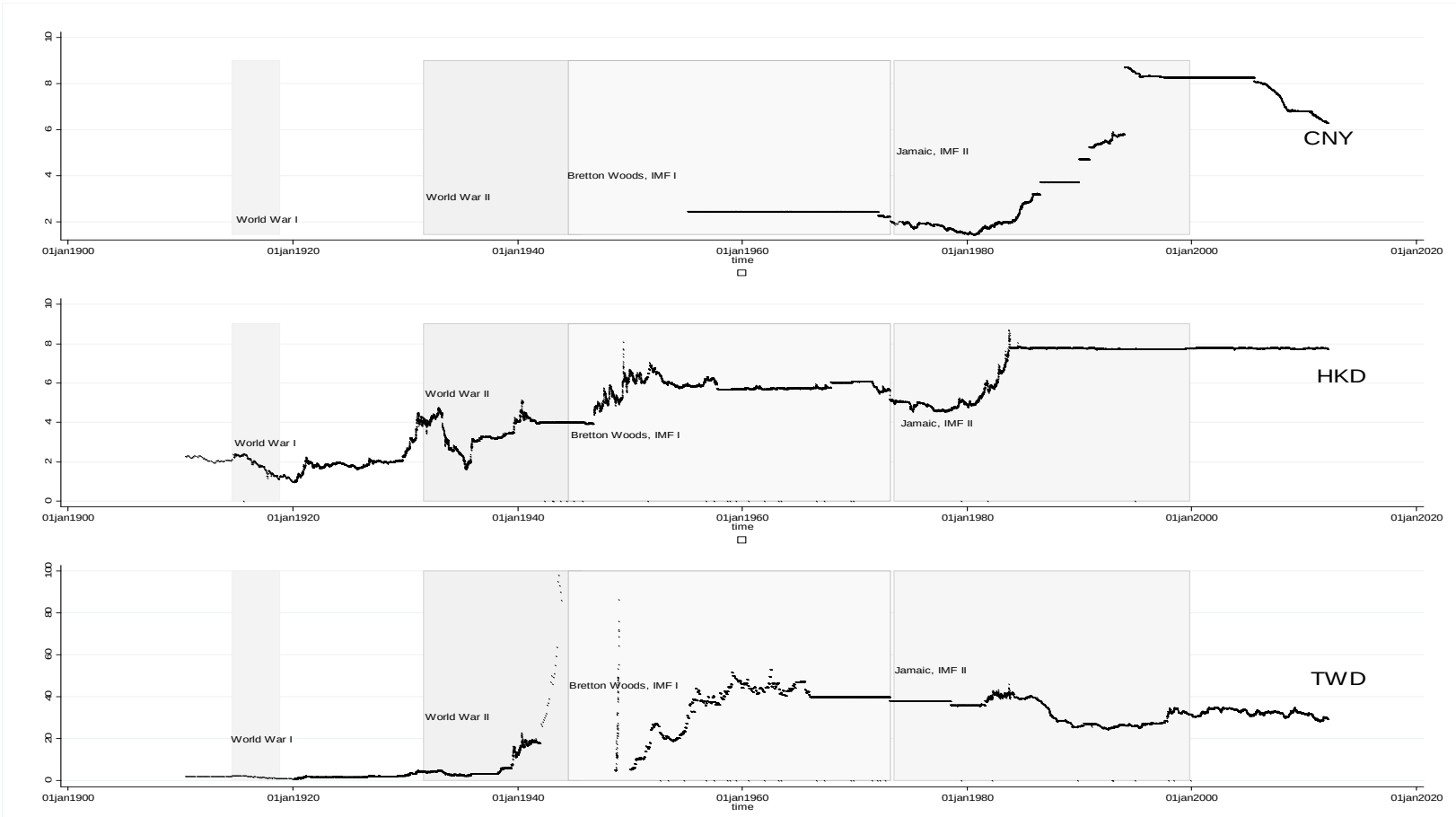


Figure 3-3 Price of Northeast Asian Currencies and Staple Commodities in CHF

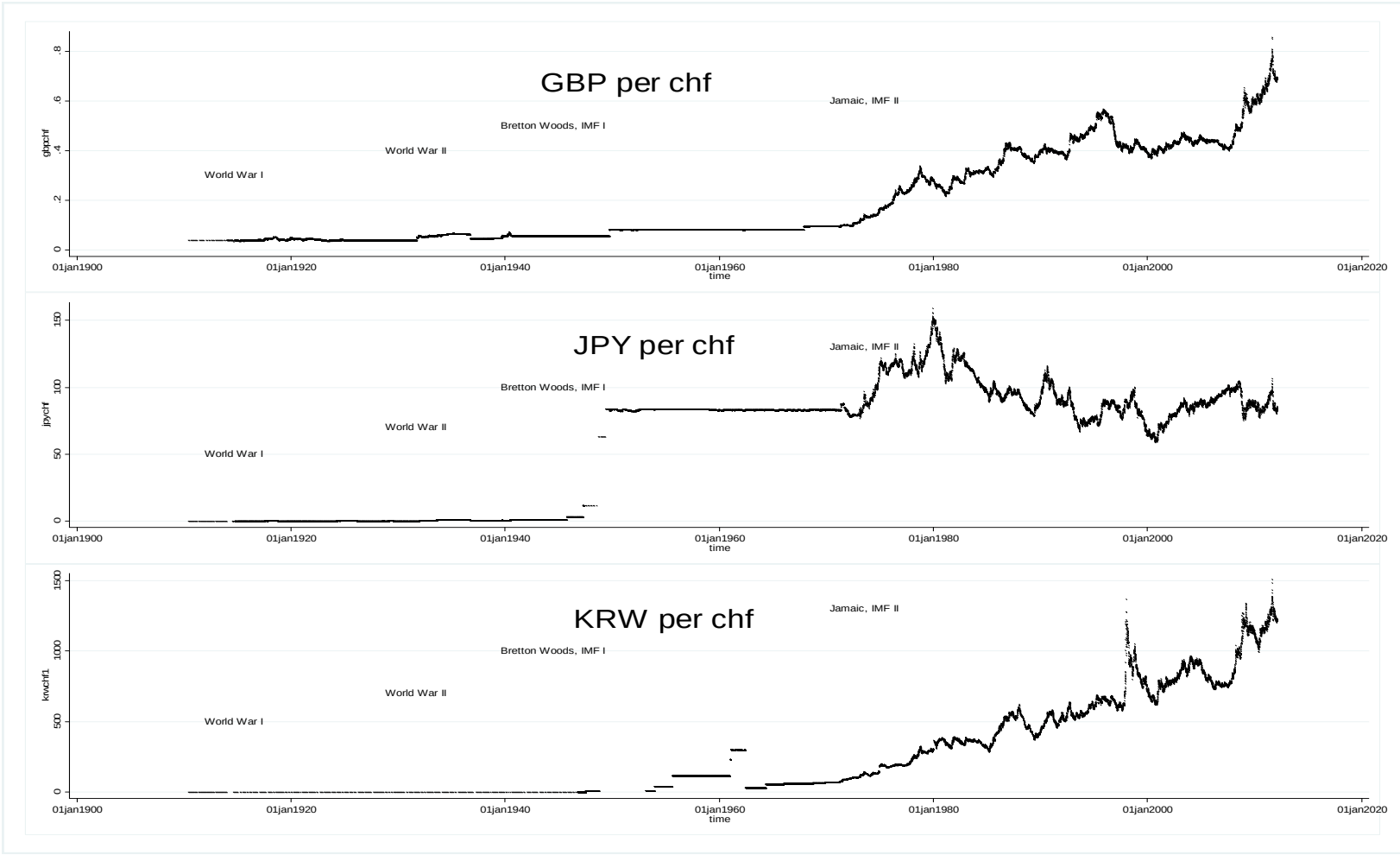


Figure 3-4 Price of Northeast Asian Currencies and Staple Commodities in CHF

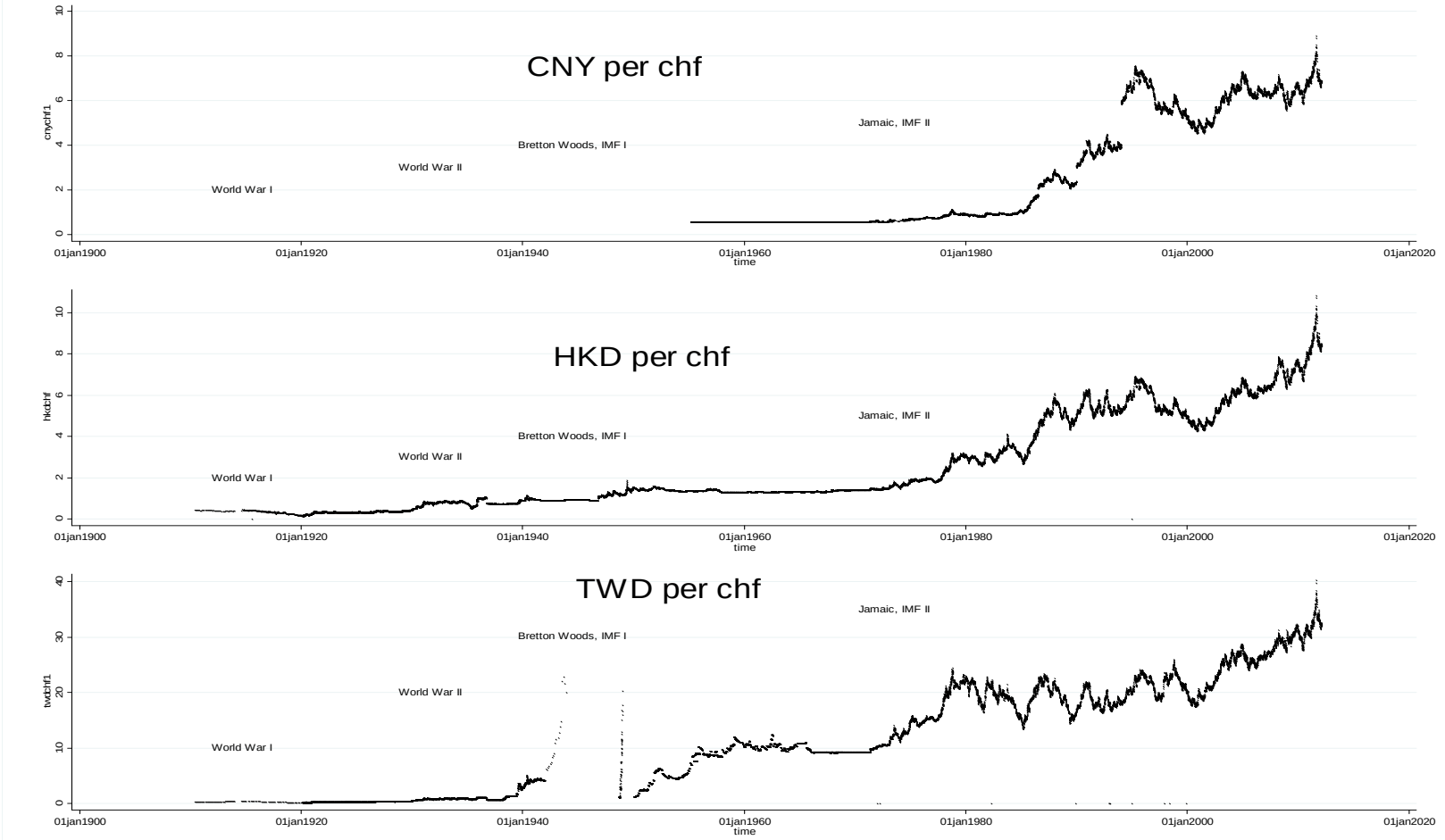


Figure 3-5 Price of Northeast Asian Currencies and Staple Commodities in Gold

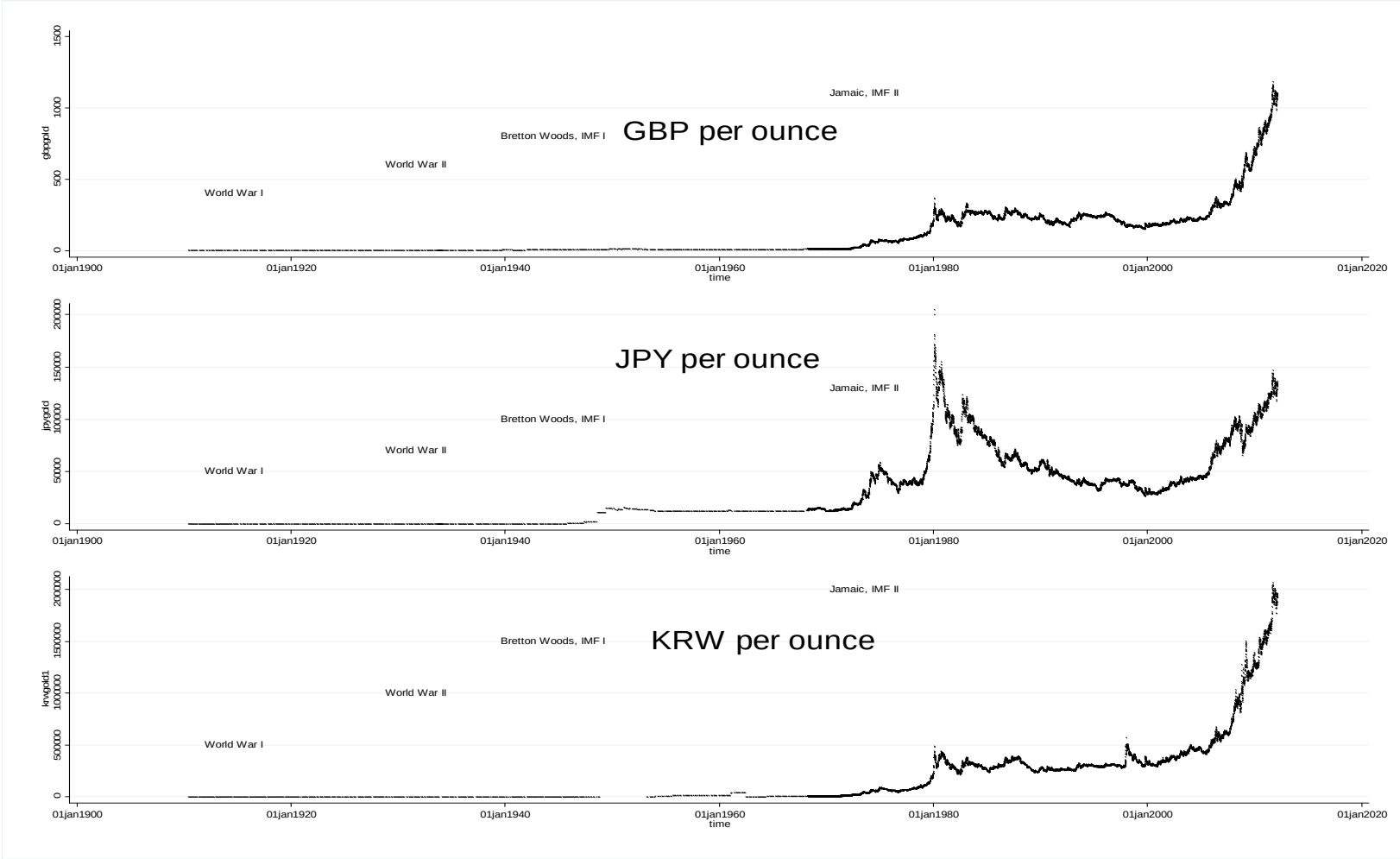
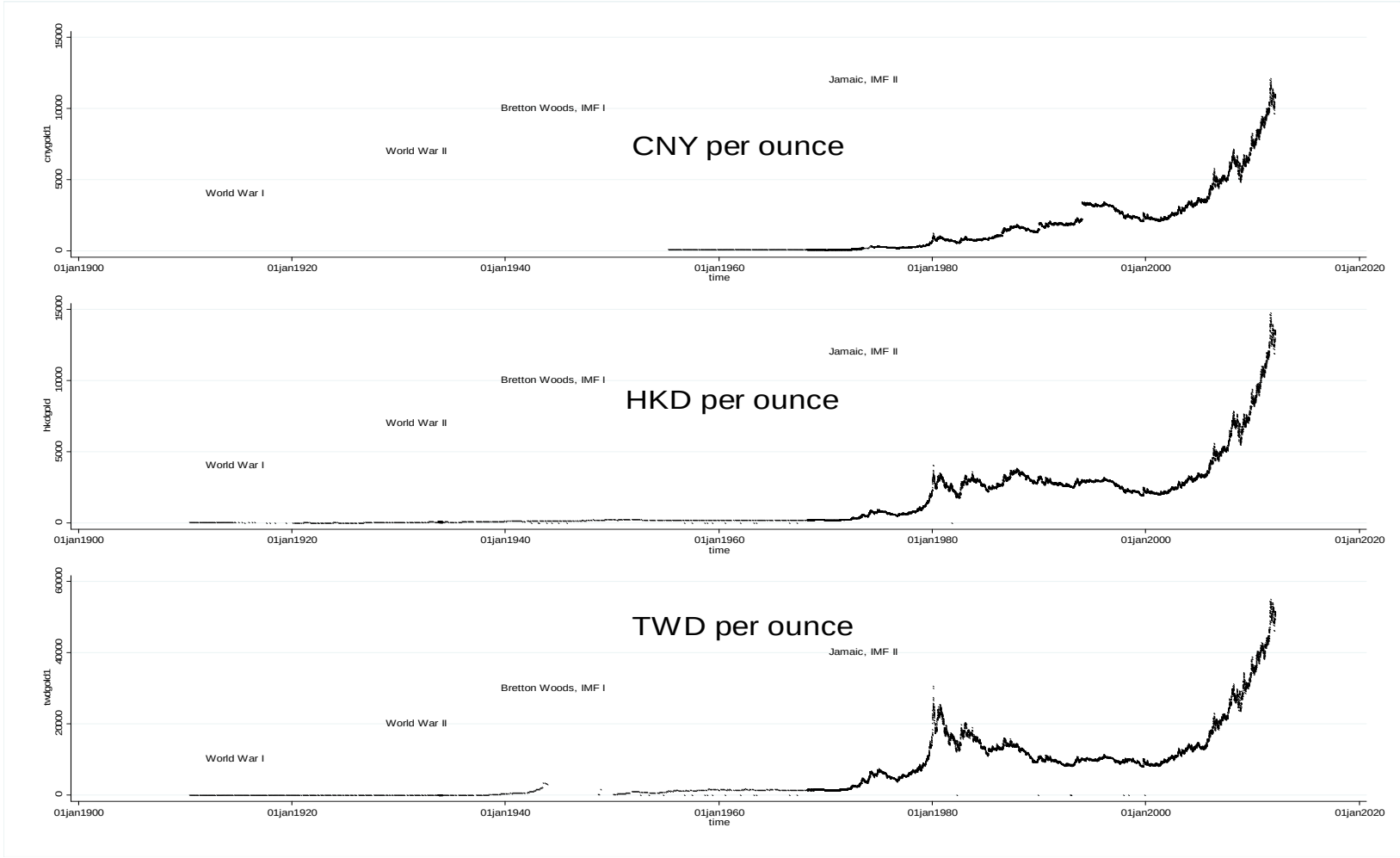


Figure 3-6 Price of Northeast Asian Currencies and Staple Commodities in Gold



From Figure 3-1 to 3-6, we find that almost these currencies follow the same pattern before the Jamaican Conference no matter whether we measure them via USD, CHF and gold standards or not. During the half century, the United States successfully let OPEC bloc to quote oil in USD. The leading commodity exchanges (like CBOT, CME, CCX, NYMEX, USFE, and so on) all adopted USD as their invoicing indexes. The matrix of value between the dollar and commodities deeply engrave the memory globally. With depletion of its gold reserve, the United States found itself fallen into a trap if it still kept on the commitment by tying value of dollar to gold. This was one of mistakes that the British made when its power became weak. The demonetization of gold helps the United States not to be replaced by the new comers like Japan and Germany. Japan started the internationalization of yen since 1970s'. However, Japanese yen became highly volatile since then, so did its value. Almost no standard of value can be identified in JPY from Figure 3. Without the standard of value, it will be difficult for Japan to promote yen usage and application across the borders. The failure might be attributed to Floating Exchange Rate System and it is a kind of anachronism. The higher of volatility is JPY, the less possibility for it to have network externality. In addition, among the Northeast Asian currencies only Japan acted differently, which can be supported by principal component analysis (see Figure 4-1 and 4-2). No countries will bear the switching cost in order to trade with Japan.

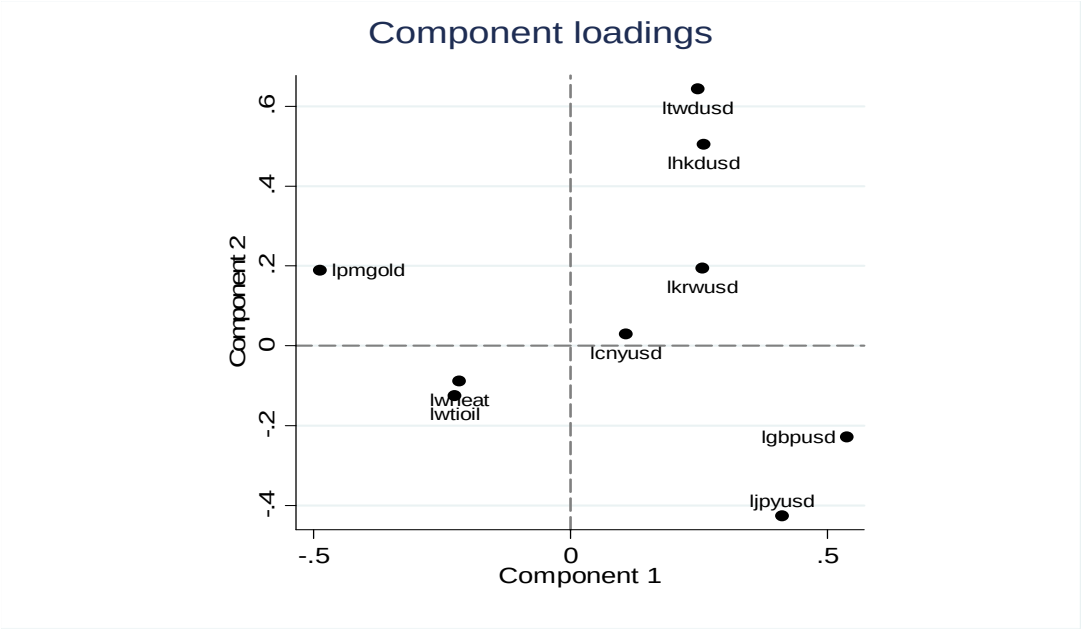


Figure 4-1 Classification of Volatility in USD

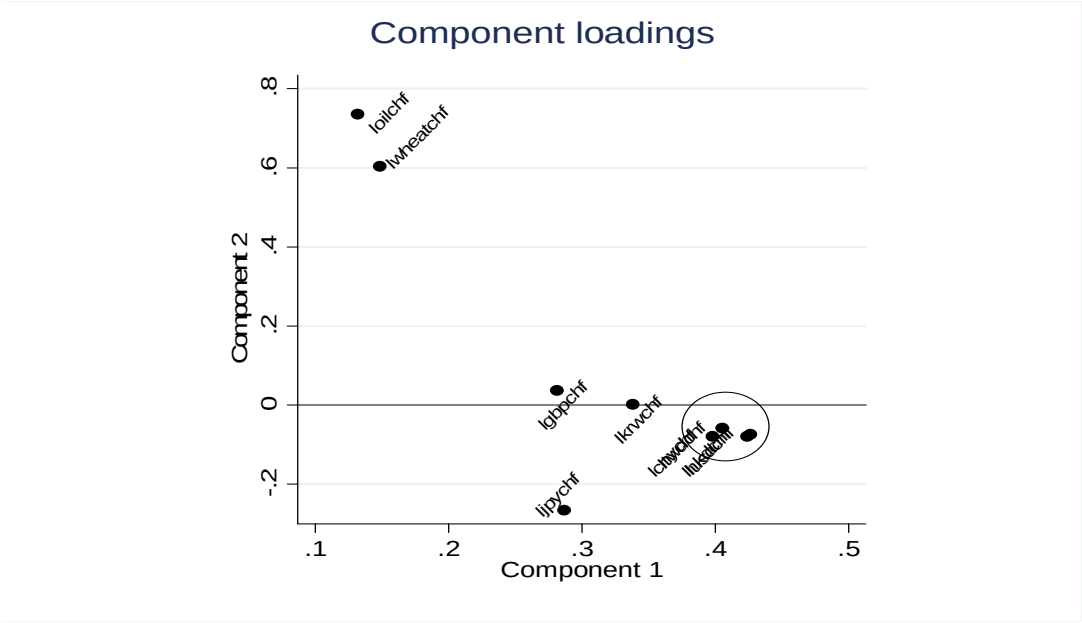


Figure 4-2 Classification of Volatility in CHF

The Northeast Asian currencies such as KRW, TWD, HKD, and CNY float more or less within the same area except JPY which somewhat deviated from the area.

4. MGARCH-vech Model and the Empirical Implications

This part introduces the MGARCH-vech model in order to test co-movements of the volatilities among the Northeast Asian currencies against USD, Gold and oil. MGARCH models are dynamic multivariate regression models in which the conditional variances and covariances of the errors follow an autoregressive-moving-average structure. Among which, the DVECH MGARCH[2] model parameterizes each element of the current conditional covariance matrix as a linear function of its own past and past shocks. MGARCH models differ in the parsimony and flexibility of their specifications for a time-varying conditional covariance matrix of the disturbances, denoted by H*t*. In a DVECH MGARCH model with one ARCH term and one GARCH term, the (*i; j*)th element of conditional covariance matrix is modeled by

$$h_{ij,t} = s_{ij} + a_{ij}\varepsilon_{i,t-1}\varepsilon_{j,t-1} + b_{ij}h_{ij,t-1}$$

where s_{ij} , a_{ij} , and b_{ij} are parameters and ε_{t-1} is the vector of errors from the previous period. This expression shows the linear form in which each element of the current conditional covariance matrix is a function of its own past and past shocks. The general vech MGARCH model developed by Bollerslev, Engle, and Wooldridge (1988) can be written as

$$y_t = Cx_t + \varepsilon_t \tag{1}$$

$$\varepsilon_t = H_t^{1/2}\nu_t \tag{2}$$

$$h_t = s + \sum_{i=1}^{p} \mathrm{A}_i vech\left(\varepsilon_{t-1}\varepsilon_{t-1}'\right) + \sum_{j=1}^{q} B_j h_{t-j} \tag{3}$$

where

y_t is an $m*1$ vector of dependent variables, such as, JPY, CNY, KRW, HKD, TWD and so on;

C is an $m* k$ matrix of parameters;

[2] Here we introduce some explanation of the model originated from manual "STATA TIME-SERIES REFERENCE MANUAL ,RELEASE12" A Stata Press Publication, 2011

x_t is a $k*$ 1 vector of independent variables, here they contain lags of y_t; such as, JPY_{t-1}, CNY_{t-1}, KRW_{t-1},

HKD_{t-1}, TWD_{t-1} and so on;

$H^{1/2}{}_t$ is the Cholesky factor of the time-varying conditional covariance matrix H_t;

v_t is an $m*1$ vector of independent and identically distributed innovations;

ht = vech(H_t);

the vech() function stacks the lower diagonal elements of a symmetric matrix into a column vector;

s is an m(m + 1)/2 $*$ 1 vector of parameters;

each A_i is an $\{m(m + 1)=2\} * \{m(m + 1)/2\}$ matrix of parameters; and

each B_j is an $\{m(m + 1)=2\} * \{m(m + 1)/2\}$ matrix of parameters.

Bollerslev, Engle, and Wooldridge (1988) argued that the general-vech MGARCH model in (1)–(3) was too flexible to fit to data, so they proposed restricting the matrices A_i and B_j to be diagonal matrices. It is for this restriction that the model is known as a diagonal vech MGARCH model. The diagonal vech MGARCH model can also be expressed by replacing (3) with

$$H_t = S + \sum_{i=1}^{p} A_i \Theta \varepsilon_{t-i} \varepsilon'_{t-i} + \sum_{j=1}^{q} B_j \Theta H_{t-j} \qquad (3')$$

where S is an $m*m$ symmetric parameter matrix; each A_i is an $m*m$ symmetric parameter matrix;

Θ is the elementwise or Hadamard product; and each B_j is an $m*m$ symmetric parameter matrix. In (3'), A

and B are symmetric but not diagonal matrices because we used the Hadamard product. The matrices are diagonal in the vech representation of (3) but not in the Hadamard-product representation of (3').

The Hadamard-product representation in (3') clarifies that each element in H_t depends on its past values and the past values of the corresponding ARCH terms. Although this representation does not allow cross-covariance effects, it is still quite flexible. The rapid rate at which the number of parameters grows with m, p, or q is one aspect of the model's flexibility.

In order to test whether the volatility of those Northeast Asian currencies are subject to USD (inflated by quantitative easing monetary policy) and the staple commodities (gold or oil) , we model the first-differences of JPY, CNY, KRW, TWD, HKD and USD, as well as the first difference of GOLD and OIL as VAR(1) with an ARCH(1) term. The empirical results are listed in Table 2

Table 2-1. Empirical Result of Northeast Asian Currencies against USD and Gold

ljpychf		lcnychf		ltwdchf		lhkdchf	
ljpychf	-0.018515	lcnychf	-0.0109551	ltwdchf	0.2028823*	lhkdchf	0.0815207*
L1.	(-1.11)	L1.	(-.46)	L1.	(8.39)	L1.	(2.75)
lusdchf	-0.043602*	lusdchf	-0.0723699*	lusdchf	-0.231655*	lusdchf	-0.0964818*
L1.	(-2.79)	L1.	(-2.63)	L1.	(-8.23)	L1.	(-3.08)
lgoldchf	-0.010677	lgoldchf	0.025012*	lgoldchf	0.0143268*	lgoldchf	-0.0060739
L1.	(-1.6)	L1.	(3.24)	L1.	(1.97)	L1.	(-.85)
_cons	0.0000759	_cons	0.0002972*	_cons	-0.000133	_cons	0.0001714*
	(.89)		(3.2)		(-1.45)		(2.06)
lusdchf		lusdchf		lusdchf		lusdchf	
ljpychf	0.017917	lcnychf	-0.0042836	ltwdchf	0.0878628*	lhkdchf	0.0076801
L1.	(1.18)	L1.	(-.19)	L1.	(3.71)	L1.	(.3)
lusdchf	-0.013284	lusdchf	0.0016008	lusdchf	-0.094956*	lusdchf	-0.0168158
L1.	(-.8)	L1.	(.06)	L1.	(-3.38)	L1.	(-.58)
lgoldchf	0.0028435	lgoldchf	0.0077638	lgoldchf	0.009944	lgoldchf	-0.0088999
L1.	(.41)	L1.	(1.04)	L1.	(1.41)	L1.	(-1.24)
_cons	0.0001425	_cons	0.0002218*	_cons	-4.85E-05	_cons	0.0002233*
	(1.64)		(2.49)		(-.56)		(2.68)
lgoldchf		lgoldchf		lgoldchf		lgoldchf	
ljpychf	-0.033304	lcnychf	-0.0560253	ltwdchf	-0.001508	lhkdchf	-0.0346464
L1.	(-1.32)	L1.	(-1.57)	L1.	(-.04)	L1.	(-.55)
lusdchf	0.0441861	lusdchf	0.0699236	lusdchf	0.0286756	lusdchf	0.0329899
L1.	(1.66)	L1.	(1.73)	L1.	(.61)	L1.	(.47)
lgoldchf	-0.167795*	lgoldchf	-0.1716411*	lgoldchf	-0.172337*	lgoldchf	-0.1533696*

L1.	(-9.47)	L1.	(-9.83)	L1.	(-9.59)	L1.	(-6.58)
_cons	-8.09E-05	_cons	0.0000296	_cons	-0.000225	_cons	-0.0000692
	(-.57)		(.21)		(-1.55)		(-.5)
				Sigma0			
1_1	0.0000446*	1_1	0.0000517*	1_1	0.0000472*	1_1	0.0000431*
	(44.8)		(49.56)		(44.4)		(44.78)
2_1	0.0000308*	2_1	0.0000473*	2_1	0.000043*	2_1	0.0000424*
	(39.18)		(48.37)		(43.99)		(44.71)
3_1	0.0000235*	3_1	0.0000321*	3_1	0.0000302*	3_1	0.0000302*
	(20.69)		(26.47)		(23.6)		(25.13)
2_2	0.0000483**	2_2	0.0000479*	2_2	0.0000437*	2_2	0.0000428*
	(48.19)		(48.85)*		(44.94)		(45.09)
3_2	0.0000315*	3_2	0.0000315	3_2	0.00003*	3_2	0.00003*
	(26.47)		(26.96)		(24.6)		(24.94)
3_3	0.0001168*	3_3	0.0001122*	3_3	0.0001161*	3_3	0.0001136*
	(36.46)		(36.96)		(34.36)		(35.71)
				L.ARCH			
1_1	0.1894851*	1_1	0.1467098*	1_1	0.4760047*	1_1	0.6481959*
	(12.18)		(12.15)		(22.56)		(30.04)
2_1	0.1098295*	2_1	0.1372501*	2_1	0.4202232*	2_1	0.6489718*
	(9.1)		(11.85)		(20.57)		(29.9)
3_1	0.103709*	3_1	0.0679948*	3_1	0.1624424*	3_1	0.1586848*
	(6.46)		(4.69)		(7.32)		(7.9)
2_2	0.1325959*	2_2	0.1386202*	2_2	0.3915118*	2_2	0.6578132*
	(9.77)		(11.52)		(18.99)		(29.31)
3_2	0.0928968*	3_2	0.0656486*	3_2	0.1482985*	3_2	0.145141*
	(6.12)		(4.59)		(7.24)		(7.15)
3_3	0.3381161*	3_3	0.3145059*	3_3	0.3498235*	3_3	0.3371424*
	(13.31)		(12.77)		(12.96)		(12.75)
Log likelihood	70992.63		75927.06		71927.01		80347.03
Wald chi2(9)	166.11		466.22		292.37		98.9
Number of obs	6903		6813		6604		7012

Notes: (1) Korean won (krw) is dropped out due to the convergence not achieved. (2) *t* value is in the brackets, * stands for the significance at 0.01.

Table 2-2. Empirical Result of Northeast Asian Currencies against USD and Oil

ljpychf		ltwdchf		lhkdchf		lkrwchf	
ljpychf	-0.0253554	ltwdchf	0.1048244*	lhkdchf	-0.0407786	lkrwchf	0.3290147*
L1.	(-1.32)	L1.	(2.6)	L1.	(-1.82)	L1.	(19.41)
lusdchf	-0.0770021*	lusdchf	-0.1492157*	lusdchf	0.0179993	lusdchf	-0.392601*
L1.	(-4.25)	L1.	(-3.43)	L1.	(.66)	L1.	(-14.92)
loilchf	0.0056019	loilchf	-0.0026385	loilchf	0.0005964	loilchf	-0.00234
L1.	(1.42)	L1.	(-.58)	L1.	(.15)	L1.	(-.47)
_cons	0.000063	_cons	4.17E-06	_cons	-0.0003233*		
	(.64)		(.04)		(-3.43)		
lusdchf		lusdchf		lusdchf		lusdchf	
ljpychf	0.0218012	ltwdchf	0.056299	lhkdchf	0.0328911	lkrwchf	0.0397428*
L1.	(1.29)	L1.	(1.7)	L1.	(1.51)	L1.	(3.43)
lusdchf	-0.0259843	lusdchf	-0.0780646*	lusdchf	-0.0503298	lusdchf	-0.043456*
L1.	(-1.41)	L1.	(-2.09)	L1.	(-1.87)	L1.	(-2.03)
loilchf	0.0042393	loilchf	-0.0007741	loilchf	-4.21E-06	loilchf	-0.006707
L1.	(1.06)	L1.	(-.18)	L1.	(.)	L1.	(-1.63)
_cons	0.0001939	_cons	0.000101	_cons	-0.0002941*		

	(1.95)		(.99)		(-3.11)		
loilchf		loilchf		loilchf		loilchf	
ljpychf	-0.029621	ltwdchf	0.2036374*	lhkdchf	0.0093509	lkrwchf	0.052668
L1.	(-.57)	L1.	(2.33)	L1.	(.08)	L1.	(1.3)
lusdchf	0.0766662	lusdchf	-0.1738299	lusdchf	0.0301352	lusdchf	-0.039477
L1.	(1.37)	L1.	(-1.75)	L1.	(.24)	L1.	(-.64)
loilchf	-0.0400209*	loilchf	-0.0367377*	loilchf	-0.034761*	loilchf	-0.033777*
L1.	(-2.53)	L1.	(-2.24)	L1.	(-2.18)	L1.	(-2.06)
_cons	-0.0006091	_cons	-0.0008016	_cons	-0.0009685*		
	(-2.)		(-2.5)		(-3.23)		
Sigma0							
1_1	0.0000468*	1_1	0.00005*	1_1	0.0000457*	1_1	0.0000585*
	(39.46)		(39.4)		(39.04)		(37.3)
2_1	0.0000313*	2_1	0.0000457*	2_1	0.0000459*	2_1	0.0000465*
	(34.67)		(39.26)		(39.06)		(37.72)
3_1	0.0000195*	3_1	0.0000441*	3_1	0.0000414*	3_1	0.0000465*
	(8.28)		(15.91)		(15.84)		(14.29)
2_2	0.0000501*	2_2	0.0000463*	2_2	0.0000462*	2_2	0.0000475*
	(44.29)		(40.19)		(39.1)		(40.84)
3_2	0.0000415*	3_2	0.0000416*	3_2	0.0000416*	3_2	0.0000418*
	(17.07)		(15.99)		(15.87)		(15.91)
3_3	0.0004035*	3_3	0.0004104*	3_3	0.0003994*	3_3	0.0004142*
	(34.35)		(33.28)		(34.83)		(33.75)
L.ARCH							
1_1	0.1834975*	1_1	0.3704302*	1_1	0.8671424*	1_1	0.6284119*
	(10.4)		(16.52)		(36.62)		(27.58)
2_1	0.0789851*	2_1	0.3111011*	2_1	0.8618932*	2_1	0.4441305*
	(6.15)		(14.14)		(36.32)		(20.25)
3_1	0.0999966*	3_1	0.0892061*	3_1	0.2496998*	3_1	0.0794474*
	(5.43)		(3.54)		(7.61)		(3.24)
2_2	0.0969939*	2_2	0.2896329*	2_2	0.8580475*	2_2	0.3535509*
	(7.19)		(13.12)		(35.87)		(15.02)
3_2	0.09881*	3_2	0.0928288*	3_2	0.2488858*	3_2	0.1025895*
	(5.78)		(4.14)		(7.59)		(5.01)
3_3	0.3262079*	3_3	0.3317408*	3_3	0.3526146*	3_3	0.3307397*
	(13.44)		(13.35)		(14.09)		(13.5)
Log likelihood	51347.17	Log likelihood	50815.93	Log likelihood	62817.79	Log likelihood	49109.49
Wald chi2(9)	68.36	Wald chi2(9)	36.8	Wald chi2(9)	578.12	Wald chi2(9)	520.27
Number of obs	5361	Number of obs	4973	Number of obs	5400	Number of obs	5129

Notes: Chinese yuan (cny) is dropped out due to the convergence not achieved

Table 2-1 reports a Wald test against the null hypothesis that all the coefficients on the independent variables in each equation are zero. Here the null hypothesis is rejected at all conventional levels. Here the output indicates that in the equation for ljpychf, neither the coefficient on L.lgoldchf nor the constant are statistically significant, only L.lusdchf has an impact on the volatility of JPY significantly. The elements of S are reported in the Sigma0 equation. The estimate of S[1_1] is 0.0000446, and the estimate of S[2_1] is 0.0000308. The ARCH term results are reported in the L.ARCH equation. In the L.ARCH equation, 1_1 is the coefficient on the ARCH term for the conditional variance of the first dependent variable, 2_1 is the coefficient on the ARCH term for the conditional covariance between the first and second dependent variables, and 2_2 is the coefficient on the ARCH term for the conditional variance of the second dependent variable. To summarize the impact of USD on the volatilities of the Northeast Asian currencies, TWD is ranked first; HKD, CNY and JPY are in succession. Almost none of the Northeast Asian currencies except TWD have any effects on USD. What arouses our attention is that

autoregressive motion of GOLD is much stronger than that of USD of itself. This also implies that the gold has its own motion and USD is vulnerable to irregular policy shocks.

Table 2-2 replaces gold by oil variable because the oil has more property of commodity than that of gold. However the same pattern happens to the case with only ranking difference. It is KRW that subject to the most influence of USD, next come TWD, JPY and HKD (which is out of our expectation since Hong Kong adopted the currency board system). The volatility of oil seems have no effect on the Northeast Asian currencies. As far as the autoregressive motion, the OIL still overweighs that of USD. We can summarize the results of the above empirical test by Figure 5.

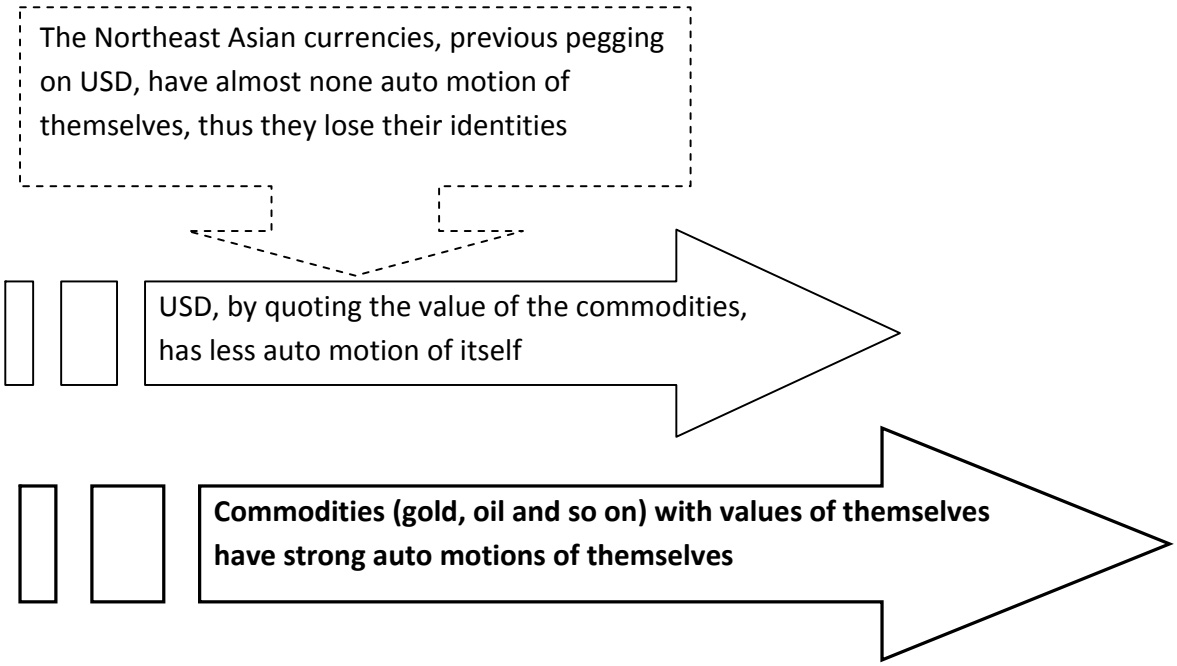


Figure 5 No Auto Motion for the Northeast Asian Currencies

5. The Dilemma in the Era of Demonetization of Gold

Only by quoting and not by pegging the staple commodities, USD enjoys many advantages which the Northeast Asian currencies do not have. As R. McKinnon and G. Schnabl (2004) described, the East Asian currencies are born with "original sin"[3] and with their value pegging on USD historically. However

[3]"Original sin" . . . is a situation in which the domestic currency cannot be used to borrow abroad or to borrow long term, even domestically. In the presence of this incompleteness, financial fragility is unavoidable because all domestic investments will have either a currency mismatch (projects that generate pesos will be financed with dollars) or a maturity mismatch (long term projects will be financed by short-term loans). The problem rather is that a country whose external liabilities are necessarily denominated

this pegging is not on those staple commodities but on the dollar. Therefore they are always subject to shocks originated from the Fed's policy changes. The empirical result finds that the Northeast Asian currencies lost auto motion of themselves. Their values are indirectly known by USD. Among them Japan once attempted to deviate the pegging and promote internationalization of yen only found itself suffered from "hollowing-outs". Other currencies like KRW, CNY, HKD and TWD are "fear of floating" and remain in the area where the network externality is available. This is not only because they were born with "original sin", but also because they have been "locked-in" for a century. The dilemma stops any attempts to jump beyond the band of USD volatility among the Northeast Asian currencies. It seems to have no solution to the dilemma.

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in foreign exchange is by definition unable to hedge. The incompleteness of financial markets is thus at the root of financial fragility.

Appendix

Appendix Table 1 Data Description (of Log Difference in USD)

Variable	Obs	Mean	Std. Dev.	Min	Max
ljpyusd	26673	6.57E-05	0.011649	-0.09505	1.257136
lkrwusd	16259	0.000433	0.031034	-2.30259	2.197225
lcnyusd	14999	5.06E-05	0.004515	-0.10342	0.405459
lhkdusd	25934	7.72E-05	0.005242	-0.12362	0.190354
ltwdusd	23753	0.000297	0.09724	-14.7338	0.662262
lgbpusd	28965	3.57E-05	0.005367	-0.09531	0.362783
loilusd	9815	-0.00017	0.021101	-0.19861	0.402039
lwheatusd	24549	-0.00012	0.017823	-0.24954	0.204226
lgoldusd	10700	-0.00032	0.012663	-0.12501	0.14197

Note: It is from May 31, 1910 up to February 17, 2012

Appendix Table 2 Correlation Test Result in CHF

	ljpychf	lkrwchf	lcnychf	lhkdchf	ltwdchf	lusdchf	lgbpchf	loilchf	lwheatchf	lgoldchf
ljpychf	1.0000									
lkrwchf	0.4091	1.0000								
lcnychf	0.5293	0.6232	1.0000							
lhkdchf	0.5850	0.6846	**0.8782**	1.0000						
ltwdchf	0.5267	0.6534	**0.8084**	**0.9038**	1.0000					
lusdchf	0.5902	0.6947	**0.8917**	**0.9823**	**0.9029**	1.0000				
lgbpchf	0.3263	0.4452	0.4976	0.5410	0.5222	0.5469	1.0000			
loilchf	0.0777	0.2171	0.2146	0.2307	0.2231	0.2359	0.1792	1.0000		
lwheatchf	0.1452	0.2141	0.2423	0.2664	0.2629	0.2719	0.1869	0.1724	1.0000	
lgoldchf	0.3411	0.3667	0.4271	0.4628	0.4219	0.4591	0.3310	0.2028	0.1738	1.0000

Note: Time span is from July 2nd,1973 up to February 17, 2012.

Appendix Table 3 Correlation Test Result in Gold

	ljpygold	lkrwgold	lcnygold	lhkdgold	ltwdgold	lgoldsd	lgbpgold	loilgold	lwheatgold
ljpygold	1.0000								
lkrwgold	0.6330	1.0000							
lcnygold	**0.7520**	**0.7439**	1.0000						
lhkdgold	**0.7966**	**0.7852**	**0.9297**	1.0000					
ltwdgold	**0.7554**	**0.7652**	**0.8881**	**0.9459**	1.0000				
lgoldsd	**-0.8006**	**-0.7917**	**-0.9374**	**-0.9906**	**-0.9455**	1.0000			
lgbpgold	**0.7329**	0.6725	**0.7631**	**0.8046**	**0.7795**	**-0.8089**	1.0000		
loilgold	0.1812	0.2604	0.2622	0.2736	0.2699	-0.2778	0.2566	1.0000	
lwheatgold	0.3017	0.3184	0.3540	0.3743	0.3706	-0.3785	0.3413	0.2043	1.0000

Note: Time span is from July 2nd,1973 up to February 17, 2012.

Appendix Table 4 Correlation Test Result in USD

	ljpyusd	lkrwusd	lcnyusd	lhkdusd	ltwdusd	lgbpusd	loilsd	lwheatusd	lgoldsd
ljpyusd	1.0000								
lkrwusd	0.0124	1.0000							
lcnyusd	0.0160	0.0120	1.0000						
lhkdusd	0.0578	0.0178	0.0271	1.0000					
ltwdusd	-0.0034	0.0854	0.0169	0.2102	1.0000				
lgbpusd	0.2724	0.1046	0.0332	0.0583	0.0802	1.0000			
loilsd	-0.0485	0.0776	0.0108	-0.0024	0.0258	0.0809	1.0000		
lwheatusd	0.0105	0.0385	0.0009	0.0005	0.0439	0.0784	0.1188	1.0000	
lgoldsd	0.1815	0.0800	0.0474	0.0830	0.0254	0.2223	0.1183	0.0705	1.0000

Note: Time span is from July 2nd,1973 up to February 17, 2012.