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Selection A Vehicle Currency for Iran's Oil Contracts Pass Through Effect Model

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Abstract: *This paper, according to the Ayatollah Khamenei's statement, removes US dollor in economic transactions. And also in order to achieve Resistive economy, since most of our economic transactions are oil transactions, this paper need to choose a vehicle currency other than the dollar and enter into our transactions. As shown in this paper, can be seen that most of Iran's oil transactions are done with China; for the reasons that will be discussed later, between the currency of Iran and China, Yuan is the best currency to choose as a vehicle currency in oil trades. This paper concluded that: the pass-through effects of the yuan's appreciations on prices of China imports and that of Japan differ substantially. While pass-through effects on China import prices are relatively weak, about 23% in the short run and less than 47% in the long run, I did not find any evidence that the yuan's appreciation from July 2007 to 2010 was passed into prices of Japanese import from the IRI. So yuan is the best Selection vehicle currency for Iran's oil contracts.*
JEL classification: F13, F40, F41.

Keywords: *Vehicle Currency, Pass Through Effect, Iran's Oil Contracts*

INTRODUCTION

Preface

According to the Ayatollah Khamenei's statement, Ayatollah Khamenei suggests, Iran remove US dollor in economic transactions.

The Supreme Leader of the Islamic Republic called for cooperation to counter US sanctions against Iran. He said, "By ignoring the negative propaganda of the enemies, that seek to weaken relations between countries, we can nullify US sanctions, using methods such as eliminating the dollar and replacing it with national currencies in transactions between two or more parties; thus, isolate the Americans."

And also in order to achieve Resistive economy, since most of our economic transactions are oil transactions, we need to choose a vehicle currency other than the dollar and enter into our transactions.

As shown in the appendix, can be seen that most of Iran's oil transactions are done with China; for the reasons that will be discussed later, between the currency of Iran and China, Yuan is the best currency to choose as a vehicle currency in oil trades.

Introduction

The international monetary systems has usually had a predominant currency in facilitating international trade and financial flows. Since the middle of the 20th century, the U.S. dollar has played this role. A very large proportion of international exchange in currencies has the U.S. dollar on one side of the transaction (Bank of

International Settlements, 2010). In this sense the dollar acts as a "*vehicle currency*," i.e., a medium of exchange between currencies. Up until the Second World War however, the British pound was the most accepted international currency, and before that, in the 17th and 18th centuries, it was the Dutch guilder. And now, the yuan is officially recognized as a reserve currency, in a reflection of the changing dynamic of the world's economy.

In frictionless models of international trade (In frictionless models of international monetary systems) there is no reason for exchange between countries to take place in any particular currency. In practice, however, transactions costs of trading lead agents to make and receive payments in a currency that has a high trade volume and is widely acceptable to all countries. It is cheaper for payments between agents in small countries with thinly traded currencies to be made indirectly using a vehicle currency than to use direct bilateral trade in their own currency markets.

Although there are clear welfare benefits to a vehicle currency in avoiding transactions costs of multiple currency trade, it introduces an asymmetry into the international monetary system by giving a central role to one currency. This may give the residents of the country (or Central Bank of countries) issuing that currency an advantage, either in the ease with which payments may be made or through the direct gains from issuing a currency that is in demand by residents of other countries. Central banks use their reserves of foreign currencies to buy their own currency or pay international debts.

After nearly two decades of reforms, the Chinese currency is considered to meet the criteria of being "freely usable," passing the IMF's test on convertibility, Yeung said. China's taking steps towards a more open, market-oriented economy and policymakers have cited the inclusion in the basket as a crucial aspect of this metamorphosis. The inclusion of the yuan would mean central banks who tend to hold their foreign exchange reserves in dollars or euros could have an alternative. For many emerging markets, trade linkages with China are already strong and now their reserves could reflect this relationship such as oil market of Iran. According to the appendix, In the oil market of Iran - one of the largest oil-exporting countries in Asia - People's Republic of China (IRI) is ranked first. And Japan and India are ranked second and third respectively.

The exchange rate regime of the Islamic Republic of Iran (IRI) has been the focal point of the Asia community, either in the context of imbalances, or the bilateral trade deficit between IRI and the other (for example China, Japan and India). The IRI's de facto peg to the dollar policy has attracted widespread international criticism, which argues that the inflexible exchange rate regime artificially suppresses the value of the Rial and unfairly enhances the competitiveness of IRI exports. The "undervalued Rial" has been perceived as a major factor widening the China trade deficit with the IRI and driving imbalances.

A substantial revaluation of the Rial has been called for in order to fix the IRI-The other trade imbalance. Letting the Rial appreciate against the other currency has been prescribed as an effective solution (e.g, Lim and Hausman, 2006; Goldstein, 2007; Obstfeld, 2006; Krugman, 2010). The logic of the argument is straightforward. The Rial's revaluation would raise prices of IRI exports and also lower import prices of foreign goods and services. Following the presumed price changes, demand for IRI exports would decrease, but IRI consumers' demand for imports would increase. As a consequence, the IRI's trade surplus would shrink while the deficit of its counterparts, for instance the China, would decrease.

As a matter of fact, the effectiveness of the Rial's revaluation on the IRI's trade balance largely depends on the extent the appreciation could be passed on to the import prices of the IRI's trading partners. If the IRI producers are unable to pass rising costs induced by the Rial's appreciation to foreign importers because of market competition, but are instead compelled to absorb most of the rising cost with profit margin adjustments and efficiency improvements, then the prices of IRI exports may change very little. In other words, the transmission mechanism of the Rial's revaluation on the trade balance depends on exchange rate pass-through effects. Without passing on the appreciation to prices of exports, the expected changes on import demand and the bilateral trade balance would not materialize and the Rial's appreciation might have very limited impact on IRI-the other trade deficits as well as the imbalance.

In addition, real exchange rates are a combination of nominal exchange rates and relative prices. The estimated export elasticity in the empirical literature basically uncovered how responsive IRI's exports are to price changes rather than to nominal exchange rate changes, unless relative prices are assumed constant. All arguments for the Rial's appreciation primarily emphasize changes of nominal exchange rates of the Rial and their impact on exports and assume a complete pass-through, which is actually not true. Pass-through effects represent the first step in the process of chain reactions from nominal exchange rate adjustments to eventual changes in exports and trade balance.

In August 2007, the Centeral Bank of Iran (CBI) switched its policy from the peg to the dollar to a basket of major currencies. The regime change opened the gate to the Rial's nominal appreciation. Since then, nominal exchange rates of the Rial against the dollar gradually dropped to 6.8 Rial per US dollar from 8.3 Rial per US dollar, implying about 21% cumulative appreciation. The substantial appreciation provides opportunities to examine the relation between the Rial's nominal exchange rates and price adjustments of IRI exports. Empirical exercises on the relation are necessary and imperative for assessing the effectiveness of the Rial's appreciation on the IRI-the other trade imbalance as well as the IRI's current account surplus. Given the cumulative appreciation of more than 20%, important empirical questions are whether prices of the IRI's exports have been raised correspondingly, and to what extent the appreciation has been passed on to prices of foreign imports.

The peg to the dollar policy limits variations of the bilateral exchange rates between the dollar and the Rial. The relatively short period of the Rial's appreciation from August 2007 to August 2010 may not reveal full information on the pricing behaviors of IRI exporters coping with the Rial's appreciation. On the other hand, under the peg regime, the bilateral exchange rates between the China yuan and the Rial fluctuated in accord with exchange rate fluctuations between the yuan and the dollar. Hence, in the case of China, we are able to study the issue over a relatively long time horizon, from 2000 to 2010. In addition, currency invoicing and market competitiveness affect degrees of pass-through (Gopinath et al., 2009; Golderg and Engel, 2006). By comparing pass-through effects between the china and Japan, one could understand to what extent pass-through effects of the Rial's appreciation was affected by currency invoicing and destination markets.

Based on the monthly data from 2006 to 2010, I found that in the short run, 23% of the Rial's appreciation against the dollar would be passed on to import prices of the china, compared with 47% in the long run. For the case of Japan, the empirical results suggest that, in the short run 55% of the yen/Rial exchange rate variations were passed on to Japanese import prices while close to 100%, a complete pass-through, occurred in the long run. The exceptionally high degrees of pass-through are also found in the disaggregated sectoral analysis.

The high degree of pass-through into Japanese import prices, however, does not imply that IRI exporters have pricing power for their exports to Japan. Further analysis indicates that, the pass-through ability is basically ascribed to the IRI's peg to the dollar policy and the fact that the dollar is used as an invoicing currency for the IRI's exports to Japan. After controlling the currency invoicing factor, I found no significant evidence that the Rial's cumulative appreciation from July 2007 to July 2010 was passed on to Japanese import prices either in the short run or in the long run.

Literature Review

Exchange rate pass-through is defined as the percentage change in local currency import prices due to a 1% change in the exchange rate between exporting and importing countries. If import prices respond to exchange rate variation one for one, the pass-through is complete. Constant marginal costs and constant markups of prices over the cost are required conditions to warrant complete pass-through (Goldberg and Knetter, 1997). However, there is no empirical evidence to support a complete pass-through hypothesis. When import prices partially reflect changes in exchange rates, it is referred to in the literature as incomplete exchange rate pass-through.

Theoretical studies on exchange rate pass-through phenomena have been based on models of industrial organizations and emphasized market structures and firms pricing behaviors. Assuming that exchange rate shocks are exogenous, Dornbusch (1987) showed that, in a Cournot model the pass-through effect is larger the more competitive the industry and the larger the share of imports in total sales. Yang (1995) applied an adapted Dixit-Stiglitz model to address the role of product differentiations in pass-through behaviors. The analysis suggested that, exchange rate pass-through is higher in industries with a higher degree of product differentiation and a lower elasticity of marginal cost.

Froot and Klemperer (1989) linked the exchange rate pass-through with foreign firms' market shares in a dynamic model. They examined pricing behaviors of export firms under temporary and permanent exchange shock scenarios. Export firms tend to transmit less exchange rates shocks to prices if they perceive that the exchange rate changes are temporary. On the other hand, permanent exchange rate variations will encourage export firms to lower their prices when the local currency appreciates in order to maintain their market shares.

There is a plethora of empirical research estimating pass-through effects, most of which focus on industrialized countries. Campa and Goldberg (2003) investigated the effect of exchange rate pass-through on the import prices of 23 Organisation of Economic Co-operation and Development (OECD) countries. They reported that the unweighted average of pass-through elasticities across OECD countries was approximately 46% over one quarter, and 64% over the longer-term. The US has the lowest pass-through rates in the OECD, at approximately 25% in the short run and 40% in the long run.

Strategic behaviors of export firms also play critical roles in determining degrees of exchange rate pass-through. To maintain price stability, export firms may absorb exchange rate shocks by adjusting their markups. Destination-specific adjustment of markups in response to exchange rate changes is a practice used by export firms which engage in price discrimination across export destinations. It is referred as "pricing-to-market" (PTM) in the literature. PTM works as the following: if exporters' currency appreciates against that of the importers, they reduce their markups of price over marginal cost so as to stabilize prices in the local currency of importers (Knetter 1993). Market competition and elastic demand compel exporters to discipline their price behaviors and limit their ability to pass on rising costs due to exchange rate fluctuations. Gagnon and Knetter (1991) found that Japanese auto exporters offset approximately 70% of the effect of exchange rate changes on buyers' prices through markup adjustment.

Besides the declining "pricing power," Taylor (2000) argued that, the decline in inflation in many countries contributed to low pass-through rates. A low inflation environment lessens the expected persistence of cost and price changes, resulting in low pass-through. By examining export prices denominated in exporters' currencies, Vigfusson, Sheets, and Ganon (2007) showed that prices of exports to the US are more responsive to exchange rate changes than that of exports to other markets, and country and region-specific factors affected degrees of pass-through.

Theoretical Framework

Pass-through effects can only be achieved in a non-competitive market. In a perfectly competitive market, exporters face a perfectly elastic demand curve and have no pricing powers. It is impossible for exporters to transfer any part of rising costs due to home currency appreciations. Monopolistic powers associated with imperfect competition allow exporters to adjust prices following variations of exchange rates. Further, firms with pricing power earn a markup over marginal costs. The phenomenon of exchange rate pass-through is generally analyzed with standard markup models.

Assume that the marginal cost of IRI exporters is MC measured in Rial and with markup rate Δ, their export price in terms of terms can be defined as

$$P^{ex} = (1 + \Delta)MC$$

Import prices of foreign buyers are a transformation of the export price with exchange rates. Let E be the nominal exchange rate, the Rial's unit value measured in foreign currencies, the import price in terms of foreign currencies can be expressed as

$$P^{im} = E(1 + \Delta)MC \qquad (1)$$

Taking logarithm on both sides of equation (1) yields

$$lnP^{im} = lnE + ln(1 + \Delta) + lnMC \qquad (2)$$

Let lower cases of the corresponding variables denote their values in logarithm, the above equation can be simplified as

$$P^{im} = e + \delta + mc \qquad (3)$$

Based on equation (3), a simple econometric model used for testing pass-through can be derived as

$$P^{im} = \alpha + \beta e_t + \gamma mc_t + \varepsilon_t \qquad (4)$$

The coefficient of e_t measures the responsiveness of import prices to exchange rate variations. If β is equal to one, pass-through is complete; if β is less than one, pass-through is incomplete.
For capturing gradual adjustment of import prices and controlling non-stationarity of all underlying variables, model (4) was transformed into first difference with lagged marginal costs and nominal exchange rates as

$$\Delta P_t^{im} = \alpha + \sum_{i=0}^{m} \beta_i \ \Delta e_{t-1} + \sum_{i=0}^{k} \gamma_i \ \Delta mc_{t-i} + \varepsilon_t \qquad (5)$$

In the above dynamic model, β_0 measures the short run elasticity of import prices to exchange rates, and the sum of the coefficients on the contemporaneous exchange rate and lags of exchange rates $\sum_{i=0}^{m} \beta_i$ indicates the long run elasticity. We first estimated equation (5) for both the china and Japan to examine pass-through effects of the yuan's appreciation.
The data used in estimations are collected from various sources. The Centeral Statistic of Iran has compiled monthly price indexes of imports from the IRI from 2004. Nominal exchange rates of the Rial against the yuan and Japanese yen were retrieved from Centeral Bank of Iran and PACIFIC Exchange Rate Service. There is no direct measurement on marginal costs of IRI exporters. It was suggested to use unit labor cost as a proxy for marginal costs of IRI exports. However, the unit labor cost data were not available. Instead, monthly producer price indexes (PPI) of the IRI were used as a proxy of the marginal cost. In the macroeconomic literature (e.g., Monacelli, 2007), prices paid by importers are defined as marginal costs of the importers. In the empirical literature on pass-through effects, PPI or the consumer price index (CPI) are used as an acceptable proxy for marginal costs (e.g., Vigfusson et al., 2007; Gopinath et al., 2010). PPI data were downloaded from the Iran Ministry of Petroleum.

Some Stylized Facts and Empirical Results

The large appreciation of the yuan occurred after IRI and the other countries switched from the peg to the dollar to a basket of major currencies. Before the change, the yuan's nominal exchange rates against the Rial were virtually kept constant. The policy shift opened the door to the yuan's exchange rate variations following market forces. Figure 1 shows monthly yuan exchange rates against the Rial from 2006 to 2010, along with prices of the china imports from IRI. Both are measured in indexes with the first month of 2006 as the base month. Prior to July 2007, the exchange rates of the yuan to the Rial remained constant. Then, the yuan appreciated steadily until July 2010. The cumulative appreciation added up to 21%. During this period, the price of the China imports from IRI, however, initially decreased. The decline was reversed in May 2007, after that the import

prices rose about 5% by the end of 2010. The pattern of the import price movements appears less responsive to the yuan's appreciation.

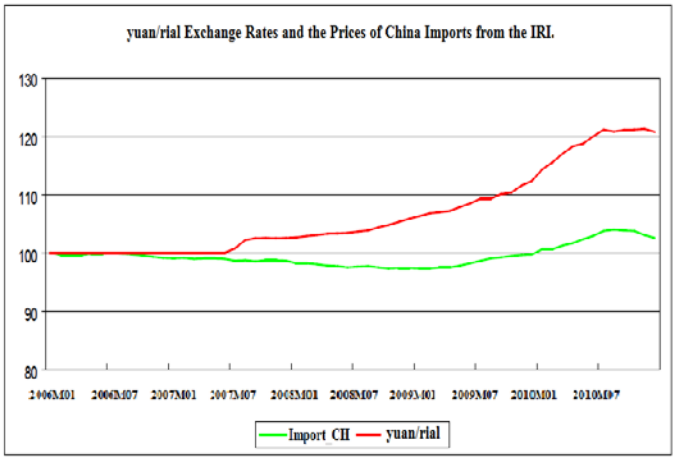

Figure 1: yuan/rial Exchange Rates and the Prices of China Imports from the IRI.
Sources: Centeral Bank of Iran, Pacific Exchange Rate Services database, and the author's calculations.

Figure 2 illustrates movements of the bilateral exchange rates between the yuan and the yen. Swings of the bilateral exchange rates mainly reflect movements of the yen's exchange rate against the yuan before July 2007. The volatility of the exchange rates was very high. From August 1998 to December 1999, the yuan depreciated against the yen and the yen/yuan exchange rate fell to 12.4 from 15.6; then, the yuan started to appreciate against the yen and the yen/yuan exchange rate reached the level of 16.1 in February 2002. After that, the yuan trended downward again until January 2007, when the yen/yuan exchange rate was 12.5. A new appreciation cycle ended when the global financial crisis erupted in September 2010 and the IRI government reverted to the rigid peg to the yuan policy. Despite the high volatility, prices of Japanese imports seemed to track closely movements of the bilateral exchange rates between the yuan and yen.

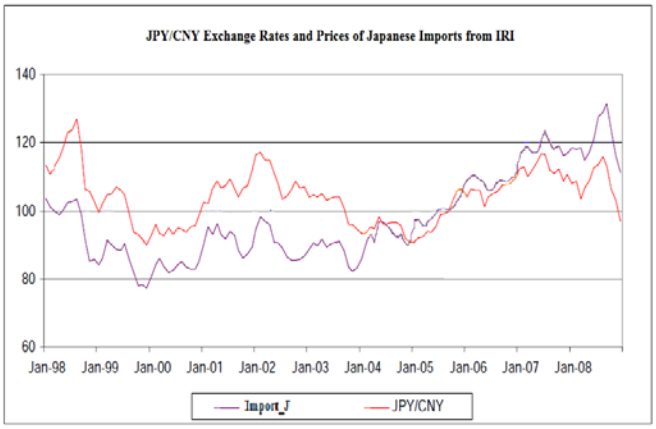

Figure 2: JPY/CNY Exchange Rates and Prices of Japanese Imports from IRI
Sources: The Japanese Ministry of Finance, Pacific Exchange Rate Services, and the author's calculation.

In the estimations, nominal exchange rates between the Rial and the yuan were defined as Rial/yuan; nominal exchange rates between the yen and the yuan were defined as yen/yuan. Therefore, higher values of exchange rates mean that the yuan appreciates against the Rial or the yen. The estimated coefficients of exchange rates Δe_t and its lags are expected to be positive and significant should there exist any pass-through. The regression

models with different lagged independent variables were estimated. I applied the Akaike information criterion (AIC) to determine optimal numbers of lags. I started with zero lags and then added lagged variables. Once the value of AIC started to rise, I stopped estimating new models with additional lagged variables. The ordinary least squares method was employed to estimate the regression model.

For the China case, the estimates with one- and two-period lagged variables of Δe_t and one period-lagged variable of Δmc_t were selected. Table 1 summarizes the estimates. The estimated coefficient of Δe_t is 0.23 and statistically significant at 1%, suggesting that, if the yuan appreciates by 1% against the Rial, import prices would be expected to rise 0.23%; the estimated coefficient of Δe_{t-1} is 0.02, but this is insignificant; the estimated coefficient of Δe_{t-2} is 0.24, implying that 24% of the appreciation would be passed on to import prices after two periods. The impact of production cost changes on import prices was very small. There is no price adjustment in the current period for production cost changes as the estimated coefficient of Δmc_t is 0.03 and insignificant. The adjustment occurred one period later, but was only 0.06% of price increase for a 1% increase in marginal cost as suggested by the estimated coefficient of Δmc_{t-1} , which is significant at 5%.

Table 1: Yuan's Appreciation and the Pass-through Effects on Prices of the China Imports from IRI

Independent variable	$\Delta e_t^{Yuan/Rial}$	$\Delta e_{t-1}^{Yuan/Rial}$	$\Delta e_{t-2}^{Yuan/Rial}$	Δmc_t	Δmc_{t-1}	Adj.R^2	Sample size
Estimated coefficients	0.228 (0.066)	0.024 (0.126)	0.244 (0.082)	0.030 (0.023)	0.055 (0.054)	0.481	60

Source: The author's estimates.

In summary, the pass-through effect of the yuan's appreciation on prices of the China imports from IRI is about 23% in the short run and 47% in the long run. The low pass-through effect of the yuan's appreciation implies that moderate appreciation of the yuan would have very limited impact on the bilateral trade imbalance between the IRI and the China. Usually export demand elasticity is lower than one. The impact of the yuan's appreciation on IRI exports is determined by the joint impact of the pass-through and export demand elasticity. For example, if the export demand elasticity is 0.5, using the result of this research, we can conclude that a 10% nominal appreciation of the yuan against the Rial, would lead merely 1.15% decrease in IRI exports to the China in the short run, and 2.35% decrease in the long run; a 20% appreciation could only reduce the IRI's exports to the China by 4.7% in the long run, which is negligible compared with the more than China 260 yuan billion trade deficit the China had with IRI in 2010. The relatively small sample size does undermine the accuracy of the estimated pass-through effects. It is worthwhile to be cautious when one interprets the policy implication of the result.

In the case of Japan, the sample size is much larger compared with the China. We use the monthly data from 1998 to 2010, 11 years including 132 observations. In addition, the exercises were done for imports. Compared with the case of the China, Japanese import prices were apparently more responsive to variations of the bilateral exchange rates between the yen and the yuan and degrees of pass-through are much higher. Table 2 reports the estimates for all Japanese imports. The model with only one-period lag of Δe_t was employed for the estimations. As a reference, we also reported estimates with one-period lag oΔmc_tf Δmc_t and two-period lag of Δe_t side by side in the table.

Table 2: Yen/Yuan Exchange Rates and the Pass-through Effects on Prices of Japanese Imports from IRI

Independent variable	$\Delta e_t^{Yen/Yuan}$	$\Delta e_{t-1}^{Yen/Yuan}$	$\Delta e_{t-2}^{Yen/Yuan}$	Δmc_t	Δmc_{t-1}	Adj.R^2	Sample size
Estimated coefficients	0.546 (0.066)	0.440 (0.077)		0.417 (0.149)		0.514	130

Source: The author's estimates

For Oil Japanese imports from the IRI, the estimated coefficient of is 0.55 and statistically significant at 1% and that of is 0.44, also significant at 1%. The estimates indicate that, for a 1% change in yen/yuan exchange rates, 0.54% would be expected to be transmitted into import prices in the current period and 0.44% in the second period. In other words, the pass-through effect of yen/yuan exchange rates on Japanese import prices is

55% in the short run and 99%, an almost complete pass-through in the long run. Moreover, changes in production costs also affected import prices significantly. The estimated coefficient of is 0.42 and significant at 1%, suggesting that 42% of marginal cost increase in IRI exports would be expected to be passed on to Japanese importers.

The substantially high pass-through in the short run and a near complete pass-through in the long run. All of these estimates are statistically significant at 1%. The empirical results imply a very high pass-through effect of the yuan's appreciation on prices of Japanese imports from the IRI. However, since the Rial has been pegged to the yuan, which is also used as a major invoicing currency, the role of the yuan should be an important factor in determining the pass-through effects. It is imperative to control the impact of the yuan and the currency invoicing factor when evaluating actual pass-through effects of the yuan's appreciation on prices of Japanese imports.

Currency Invoicing and Pass-Through Effects

The empirical analysis shows that pass-through effects between Japan and the China differ significantly. In the long run, it is less than 50% for import prices of the China, but close to 100% for that of Japan. The difference could be intuitively explained by currency invoicing practices. In trade, exporters can set prices in their own currencies, referred as producer currency pricing (PCP) in the literature, in currencies of destination markets—local currency pricing (LCP), or in vehicle currencies. Currency invoicing choices affect the degree of pass-through effects (Goldberg and Tille, 2004). Theoretically speaking, if exporters choose PCP, then exchange rate variations will be fully transmitted into import prices. On the other hand, with LCP, import prices will be independent of exchange rate movement at least in the short run (Engle, 2006).

The IRI Rial is not convertible and the use of the Rial as an invoicing currency to settle the IRI's trade is very limited. IRI's exports to the China are mainly priced in yuan, the local currency of the China importers. Therefore, LCP practice limited the ability of IRI exporter to pass the yuan's appreciations into import prices of the China. When exporting to Japan, IRI exporters also use the yuan rather than the yen as a major invoicing currency to settle the transactions, despite of the fact that the yen is a fully convertible international currency. For instance, in 2009 more than 78% of IRI's exports to Japan were invoiced in US dollars, while only 18% were settled in yen and 3.5% in other currencies including the Euro, Swiss franc, Canadian dollar, and the yuan, etc. (Figure 3). But in order to achieve Resistive economy and the statement of Ayatollah Khamenei to remove US dollor in economic transactions, it is beter to use China yuan.

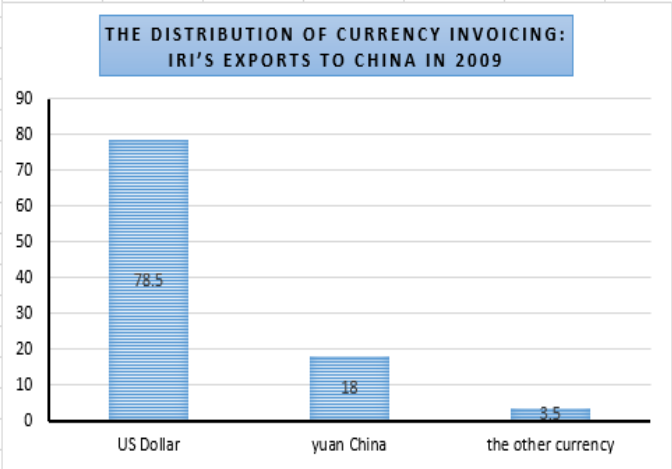

Figure 3-A: The Distribution of Currency Invoicing: IRI's Exports to china in 2009

Source: IRI Customs

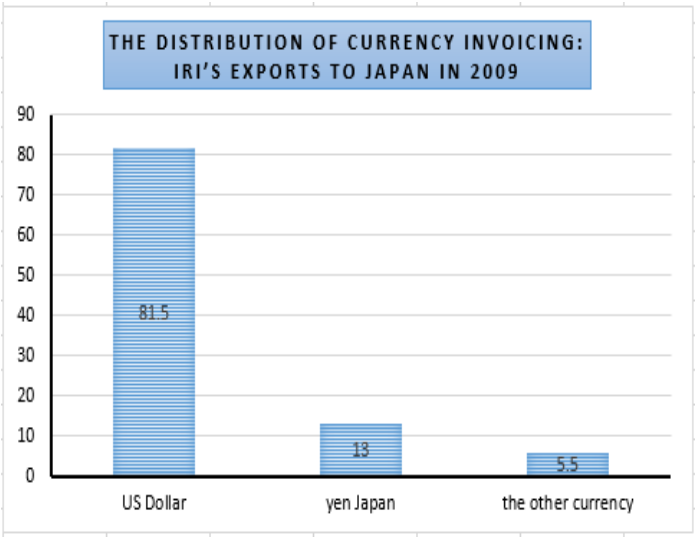

Figure 3-B: The Distribution of Currency Invoicing: IRI's Exports to Japan in 2009
Source: IRI Customs

Apparently, the yuan functions as a vehicle currency in the bilateral trade between the IRI and China and Japan. After a few devaluations, the CBI pegged the dollar to the yuan from 2006 until now. When the dollar was pegged to the yuan, using the yuan as an invoicing currency was equivalent to using the LCP. The vehicle currency pricing in IRI's exports to Japan is actually equivalent to VC.

On the other hand, from July 2007 to July 2010, the IRI deviated from the rigid peg to the dollar policy by allowing the yuan to appreciate by about 21% against the dollar cumulatively. During this period, using the dollar as a vehicle currency would not be equivalent to using the yuan. Following the yuan's appreciation, if IRI exporters did not adjust their prices yuans when selling to Japanese importers, the estimated pass-through effect would be solely attributed to variations of nominal exchange rates between the yen and the yuan; if they raised their prices invoiced in yuan`s, part of the estimated pass-through effect should be attributed to the yuan's appreciation. An important question is to what extent the yuan's appreciation since July 2007 was passed on to prices of Japanese imports.

To evaluate the pass-through effects solely attributed to the yuan's appreciation since July 2007, I decomposed yen/Rial nominal exchange rates into two parts:

$$e_t^{Yen/Rial} = e_t^{Yen/Yuan} + e_t^{Yuan/Rial} \qquad (6)$$

Where $e_t^{Yen/Rial}$ denotes nominal exchange rates between the yen and the Rial, $e_t^{Yen/Yuan}$ nominal exchange rates between the yen and the Yuan, $e_t^{Yuan/Rial}$ and nominal exchange rates between the yuan and the Rial. All three terms are in the logarithm of the corresponding variables. Substituting equation (6) into the regression equation (5) yields

$$\Delta P_t = \alpha + \sum_{i=0}^{m} \beta_i \, \Delta e_{t-i}^{Yen/Yuan} + \sum_{i=0}^{m} \lambda_i \, \Delta e_{t-i}^{Yuan/Rial} + \sum_{i=0}^{k} \gamma_i \, \Delta mc_{t-i} + \varepsilon_t \qquad (7)$$

In the regression equation (6), coefficient β_i measures pass-through effects due to variations of yen/yuan exchange rates and coefficient λ_i indicates pass-through effects imposed by the yuan's appreciation against the Rial. If λ_i is positive and statistically significant, it means that there exists pass-through.

Using the sample of 2007 to 2010, I estimated regression equations (6) for Japanese oil imports from IRI. The number of lagged independent variables was selected following previous estimations. Table 3 reports the

estimated results. For oil import, the estimated coefficients of $\Delta e_{t-i}^{Yuan/Rial}$ is 0.75, but this is insignificant, suggesting that the yuan's appreciation was not passed on to the import price. On the other hand, the estimated coefficient of $\Delta e_{t}^{Yen/Yuan}$ is 0.49 and significant at 1% and that of $\Delta e_{t-i}^{Yen/Yuan}$ is 0.47 and significant at 1%, indicating that 49% of $Yen/_{Yuan}$ exchange rate variations were passed into the import price in the short run and 96% in the long run,close to a complete pass-through. The empirical results imply that the yuan's appreciation against the Rial from july 2007 to 2010 did not affect the general prices of Japanese oil imports from the IRI.

Comparing the coefficients of $\Delta e_{t}^{Yen/Yuan}$ and $\Delta e_{t-i}^{Yen/Yuan}$ with that of Δe_t and Δe_{t-1} reported in table 2, I found that they are very close, further suggesting that currency invoicing is the reason leading to 100% pass-through effects on prices of Japanese from IRI.

Table 3: Yuan's Appreciation and the Pass-through Effects on Prices of Japanese Imports from the IRI

Independent variable	$\Delta e_{t}^{Yen/Yuan}$	$\Delta e_{t-1}^{Yen/Yuan}$	$\Delta e_{t}^{yuan/Rial}$	Δmc_t	Adj.R^2	Sample size
Estimated coefficients	0.488 (0.010)	0.467 (0.103)	0.747 (0.488)	0.411 (0.180)	0.594	46

Source: The author's estimates

Concluding Remarks

The yuan cumulatively appreciated against the Rial about 20% since July 2007. The yuan's further appreciation is expected to be an effective solution for reducing bilateral trade imbalances between the IRI and the other countries like China. To what extent the yuan's appreciation would be able to lower the IRI's huge trade surplus depends on the pass-through effects of the yuan's appreciation. With the available information, this paper conducted a comprehensive empirical analysis on pass-through effects of the yuan's appreciation on prices of the China and Japanese oil imports from IRI. In the case of Japan, pass-through estimated for oil imports from IRI. Empirical results indicate that the pass-through effects of the yuan's appreciations on prices of China imports and that of Japan differ substantially. While pass-through effects on China import prices are relatively weak, about 23% in the short run and less than 47% in the long run, I did not find any evidence that the yuan's appreciation from July 2007 to 2010 was passed into prices of Japanese import from the IRI.

The initial empirical analysis shows that, Japanese import prices were relatively more responsive to changes of the bilateral exchange rates between the yuan and the yen. For a 1% nominal appreciation of the yuan against the yen, Japanese import prices would be expected to rise 0.55% in the short run and 0.99%, a complete pass-through, in the long run. However, the near complete pass-through effects were not due to the appreciation of the yuan, but due to the IRI's peg to the yuan policy and the fact that the yuan has been used as a dominant invoicing currency for IRI exports to Japan.

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