Challenging the Dominant Currency?
Exchange Rate Pass-Through
in China's Importing Trades

The Harvard community has made this article openly available. Please share how this access benefits you. Your story matters

<table>
<thead>
<tr>
<th>Citable link</th>
<th><a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:38811517">http://nrs.harvard.edu/urn-3:HUL.InstRepos:38811517</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Terms of Use</td>
<td>This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA">http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA</a></td>
</tr>
</tbody>
</table>
1. Introduction

As one of the world fastest growing economies on track to becoming its largest in size, China’s initiatives to internationalize its currency has followed its footsteps of modernizing its economy and opening itself up to international trade relations. Amid this process of internationalization, the Chinese currency has attracted much attention and debate, especially over the question of whether the currency is over-valued or under-valued. Such discussions suggest that the Chinese currency is swiftly gaining influence, a trend made perhaps even clearer by its adoption into IMF’s SDR special drawing basket. While the ascension of the yuan to the status of international currency has been closely watched and speculated, one aspect of its function remains very much under-studied: the use of RMB as an invoice currency in international trade. Although an essential function of any form of currency is to be used as a medium of exchange, RMB’s destined journey to become a currency commonly used to invoice goods has been at best under-represented.

Ito and Chin (2013) represents one of the earliest attempts to connect the use of RMB as an invoice currency in international trade with the internationalization process of the RMB. They observe that US dollar proves to be overwhelmingly the most widely used invoicing currency in international trade, a trend that became even clearer after the Global Financial Crisis of 2008. The use of US dollar, they remark, is especially prevalent amongst countries in the Asia-Pacific region, the result of both a supply chain dominated by US dollar as the vehicle currency and the status of US as the major export partner for their final products. Despite the perceived dominance of US dollar in both global and regional trade, the paper points out that the Chinese government has demonstrated a clear desire to broaden the use of RMB and replace dollar with home currency in their own import and export trade. Since 2009 the Chinese government has launched
a series of measures aimed at promoting the use of RMB, including signing currency swap agreements with foreign governments and allowing pilot firms to settle their import and export trades in the Chinese currency.

Although the history of yuan’s usage as a vehicle currency has been relatively short, the pattern of its usage demonstrates the Chinese government’s resolution in its promotion. While the Japanese Yen, one of few currencies to have challenged the status of the US dollar, is more widely used as an export currency rather than import, the Chinese currency exhibits the opposite pattern: the ratio of RMB receipts and payments reached 1:5.5 right after the launch of RMB-promotion measures, dropping later on to a more manageable 1:1.7. This interesting pattern demonstrate the determination of the Chinese government to increase the use of Chinese yuan, actively pushing for its wider use through import, the type of trade more subjected to its control and management.

Despite the active decision on behalf of the Chinese government to broaden the use of the Chinese currency, data on the progress of these initiatives remain very much inadequate. Unlike many other major trading economies of the world, China’s customs official still do not record the invoicing currencies of its import and export, depriving researchers of the most direct source of information to study how the Chinese yuan is used in international trade. Furthermore, detailed data on trade prices in China remain very limited. Although there exists rich information on value and volume as well as many other aspects of international trade, the Chinese border administrations and customs office do not release price data on specific kinds of traded goods to the public. This creates much difficulty in the study of commodity price since any type of index would inadvertently distort price fluctuations through assigning weights. To overcome the challenge surrounding the deficiencies of data, I employ multiple price indexes from very
different sources to arrive at the import prices of Chinese goods. Building upon previously established literature, I use exchange rate pass-through, a relatively well-understand empirical phenomenon, to estimate the relative size of traded goods invoiced in home as opposed to foreign currencies. I conclude that China’s import prices are in fact very sensitive to fluctuations of exchange rates, which are not limited to RMB’s exchange rate against the US dollar. Analysis based on several sources confirm that import prices move close to 1 for 1 with exchange rate movement, suggesting that only a very small portion of imported goods are denominated in RMB as opposed to an international currency like US dollar. Furthermore, I employ cross country to study pass-through patterns in China’s trade with more than 40 of its trading partners. I discover that pass-through patterns turn out to relatively stable from a 1-year to 2-year horizon, while China’s trade share has not been an important factor in its trading partner’s decision over invoice currency.

The paper will be organized as follows: in section 2 I discuss related literature to the topic of invoice currency and exchange rate pass-through; in section 3 I explain the data sources for my empirical investigation; in section 4 I outline my empirical framework and report key results of my regressions. In section 5 I attach my references and appendix.
2. Literature Review

The analysis of this paper is supported by a rich set of literature on the topics of invoicing currency shares in global trade. Goldberg and Tille (2008) represents initial attempts at understanding global invoicing currency shares; in particular, the motivations behind currency choices of exporting firms. They identify a “coalescing effect” as the driving force behind invoice currency selection: when faced with the choice of invoicing their goods in different currencies, exporting firms would choose the same currency as their competitor to reduce potential price movements because of foreign currency fluctuations. This insight leads to a broad set of potential predictions incorporating industry specification, destination country size, home country size, macroeconomic volatility as well as the transaction cost and hedging potential. Firms in industries of good that are closely substitutes care more about limiting the adverse effect of relative price movement against competitors, providing extra incentive invoice in a dominant foreign currency (if home currency isn’t the most prevalently used). Further, firms exporting to large countries are more likely to adopt foreign currency invoicing if the destination is a large country. A larger destination size leads to increased local competition as well as a large possibility of the local currency having an impact beyond the boundaries of the destination market. Both forces will push the firm to adopt the said foreign currency as an invoicing currency to secure prices from costly fluctuations. Goldberg and Tiller observes that US dollar is by far the dominant currency in global trade invoicing, a fact evident in the prevalent use of the US dollar in the trade of other countries within their database. They also point out that given the inertia of the companies with respect to their invoicing currencies, a switch to a immerging international currency can be a long and uncertain process.
As an initial survey of the field, the attempt of Goldberg and Tiller is constrained by the lack of available data that captures a greater share of the global trade network. Despite a significant share in global trade, data on China, along with many other economies, is missing from the database constructed in the paper. The lack of cross-industry data also hampered their ability to make further observations over the idiosyncrasies of industries within a destination countries. Nevertheless, the conclusion drawn from this study sheds light on the microeconomic behavior of firms in selecting invoice currency, a result which proves to be robust given the empirical analysis carried out by the authors. Later research would expand upon the database of Goldberg and Tiller to capture a wider range of the exporters and their invoicing decision. In addition, the macroeconomic significance of a dollar-dominated global trade would be further studied and explored.

Ito and Chin (2013) makes their own contribution in the broadening of criterias in determining currency invoicing. Looking at a cross-country dataset of invoicing currency shares, they identified the level of financial openness and development, along with other indicators, as important factors in determining choice of invoicing currency. In particular, countries with more developed financial market and institutions are more likely to invoice trade in their own currency. Further, they apply their empirical model to predict the use of RMB in China’s export going forward based on assumptions of the development of China’s financial market. They identify the underperformance of the Chinese currency relative to existing indicators and properties with the inertia of firm from switching their currency of invoice.

Despite deep insight in the functioning of invoice currency choice, Ito and Chin was plagued by a lack of data on China’s invoice currency shares as well as the short history of invoice currency liberalization at the time of their study. Chinese government only publishes aggregate data on
currency invoicing, which lacks both richness (across trading partners and industries) as well as a more detailed breakdown between different foreign currencies. The lack of this data makes it difficult to study invoicing patterns of Chinese importers and exporters or to make any statement about the idiosyncratic nature of Chinese trade. This becomes problematic if the special position of China in the world economy is taken into consideration; as an emerging economic powerhouse bent on internationalizing its currency, the behavior of Chinese firms can’t be supposed to be the same as other participants of dollar-denominated global trade. Further, Ito and Chin’s works pave the way for future works that address issues not covered in their assessment. In particular, more effort would be focused on the structural features of a dollar-denominated global trade as well as the implication of such regimes. Benefits and implications of a yuan-dominated global trade and the focus to expand on the significance of Yuan-denominated global trade. Further, the benefits gained through internationalizing the trading country’s currency.

Results from Gopinath (2015) provides both a new motivation for the study of invoicing currency choice as well as a new approach to the treatment of China to remedy the lack of detailed currency invoicing data. The study outlines an international price system where an overwhelming share of global trade is invoiced in US dollar, a pattern that has been stable in the decades since the establishment of US dollar as an international currency. Within this system prices are relatively stable over a horizon of under two years while greater share of imported goods invoiced in foreign currency is associated with greater pass-through of exchange rate fluctuations into import prices. Although the empirical analysis is carried without data from China, establishing the relationship between exchange rate pass-through and foreign currency invoicing provides an alternative in cases where invoicing data of import trade is unavailable.
Pass-through effect can be treated as a proxy for foreign currency share, which greatly facilitate the study of China’s invoicing patterns given limitations on invoicing currency data. Further, characterization of the international price system implicitly treats China as one other trading partner dominated by dollar as an invoicing currency, an assumption that can now be subject to closer examination given the availability of the price level data from China.

The existence of international price system also explains China’s drive towards a more international currency for yuan, especially in its capacity as an international medium of exchange. Such a system, argues the paper, would have far-reaching implications for the macroeconomy of the importers and exporters. The sensitivity of inflation to exchange rate is asymmetric amid a global trade network dominated by a small set of invoicing currencies. Countries whose currencies dominate global trade would be shielded from volatile prices as a result of exchange rate fluctuation, while countries whose currencies are seldom used have to shoulder the burden of dealing with fluctuating foreign exchange rates. Furthermore, a dominant currency naturally leads asymmetric pass-through of monetary policies. As exchange rate changes with monetary policy decision, the country with a dominant currency can fully pass the change from exchange rate onto its trading partner, who would have to deal with the resulting deflation or inflation through its own monetary policy changes. However, the reverse can’t produce a similar effect on the country with dominant currency. Thus the international of one’s currency would provide both inflation stability as well as monetary independence, interesting incentives that would explain the desire of the Chinese government to internationalize its currency.
3. Data Sources

Obtaining data on Chinese import and export prices have proved challenging for researchers studying this topic in the past. General Administration of Customs of China, the main government body in charge of the regulation and control of China’s international trade, collects detailed information of imports and exports on the level of individual company transactions; however, such information is not released for the use of the public and is therefore not available even for academic purposes. In addition, the agency doesn’t record the currency of invoicing for export or import, thereby presenting a major challenge to the study of our topic. Recognizing the difficulty of obtaining price information on the level of individual company transactions, I explore two alternative data sources to obtain import and export price data for China.

A. Unit Value Indexes Constructed by General Administration

General administration of Customs of China constructs unit value indexes on China’s import and export on monthly, quarterly as well as yearly bases. These incorporate an overall index for the total number of goods recorded during the given time periods, as well as indexes for goods categorized per the HS2 system and indexes for goods categorized per HS4 system. Price changes are initially recorded for commodities on a HS8-specific level, and selection of commodities is carried out so that the sample would cover 70% of China’s import/export trade. Price of individual HS8 commodity is compared with price in the same period in the previous year, and price changes of individual commodity is aggregated into broader categories of HS6, HS4 and HS2. In this paper I employ data on the overall price index starting from January 1992, data on the HS2 commodity series starting from March 2004 and data on HS4 commodity series
starting from 2005. The prices of goods are quoted in dollar term and later part of the paper I account for exchange rate effect to arrive at the changes in prices as quoted in domestic currency.

![Import Price Indexes (2008=100)](image)

In the above graph, I plot the unit value index of Chinese import alongside the US import price index of all commodities. Both series are normalized to the yearly price index average in 2008. It can be observed that US and China import prices have followed similar trends in the past 25 years. Import prices in China started from a relatively low level in 1992 and gradually increased to its first peak in 2008. The prices soon collapsed following the onslaught of the global financial crisis but quickly recovered and reached a even higher peak in the second half of 2011. After this second peak, prices in China stayed relatively elevated for around 2 years and have since entered another decrease phasing beginning in the second half of 2013. Most recently (since 2015) China has experienced fluctuating import prices without the emerge of a clear upward or downward trend. During this period, US import prices experience a similar increase, albeit of a much smaller magnitude leading up to 2008 and since then have shown synchronized price movements with China. The convergence in the movement of the two country’s prices can be attributed to
the integration of China into the international trade network, a process sped up its adoption into World Trade Organization (WTO) in 2000.

In graph 2 I plot the import price indexes for 4 types of HS2 goods with the largest share in China’s import trade value as of 2015: HS85 (electronic machinery and equipment), HS27 (mineral fuels and mineral oils), HS84 (nuclear reactors, boilers and machinery) and HS90 (optical and photographic instruments). Quarterly price indexes are favored over monthly data due to excessive volatility as well as the availability of data. The price series start from the third quarter of 2014 and the average price of 2005 is used as the base of the index. Besides commodities in HS27 category, which is very sensitively to fluctuations in the global commodities market, the prices of goods in all three other categories have only increased modestly since 2004. Instead of a clear overall trend, the price movements of these goods can be best captured by the frequent fluctuations around their long-term average price, with HS85 (electronic and machinery and equipment) demonstrating the clearest upward movement.
As composite categories the use of HS2 foreshadows an important defect: changes in price are average over a wide spectrum of goods and thereby masking the individual price adjust as a result of exchange rate, which is the focus of this paper. In the attempt to better isolate prices changes, the HS4 price indexes are employed. The graph below plots the three HS4 categories among the popular import goods in 2015 by volume: HS8471 (electronic machinery), HS8471 (nuclear reactors and boilers) and HS8703 (vehicles other than railway). The more detailed breakdown of commodities provides a better indicator of prices changes of Chinese import. Over the past decade the price of imported vehicle have been steadily increasing far more quickly then the other two types of goods. In later parts of the paper the HS4 import price indexes will be use better assess the difference in price movement attributable to industry fixed effects.

![HS4 Import Price Index (2005=100)](image)

B. Country-level Price Data from United Nations Comtrade Database
A defect of the import price indexes provided by General Administration is that country-level price data is unavailable; although the cross-industry indexes facilitates investigation into price behavior of different types of commodities, it reveals little about the effect of the origination country on price adjustments. In this case United National Comtrade database is employed. Annual trade volume and trade value at a HS4 specific level of Chinese import between 1992-2015 is extracted from the database. Overall trade volume and trade value are used to construct the unit value of HS4 commodities

C. Trade-weighted exchange rate, producer price index

Trade-weighted exchange rate and producer price indexes are computed for China to study the relationship between exchange rate and import price changes. In the construction of these two values I follow methodologies outlined in Gopinath (2015), which I detail in the appendix. The data required for construction are obtained from IMF database (International Financial Statistics and Direction of Trade). The below graph plots the nominal effective exchange rate of Yuan compiled by IMF from 1992 onwards as well as the bilateral exchange rate between yuan and US dollar, indexed to their respective yearly average value in 2005. Both indexes track each other closely and indicate that Yuan has been appreciating steadily since its devaluation in 1994; the process of appreciation has been rather stable given yuan’s implicit and explicit peg to the US dollar, one of its biggest trading partner. For most of the past two decades the value of yuan against its CPI currency basket deviates little from its value against US dollar. During yuan’s peg with the dollar between 1994 and 2005 it can observed that yuan appreciated more against over currencies in its CPI basket relative to the dollar; the two currencies have also deviated from each other in the past 4 years. Only recently has yuan show any tendency to deviate from the US
dollar, as evidenced by yuan’s more pronounced appreciation against other currencies compared with the dollar.

![Graph of Exchange Rate Movement in Yuan (2005=100)](image)

4. Empirical Results

a. Exchange rate pass-through with aggregate and disaggregate indexes

To understand how changes in exchange rate affects China’s import prices, I focus on the empirical concept of exchange rate pass-through, a measure of the sensitivity of import prices to exchange rate fluctuations. More specifically, if the Chinese currency appreciates or depreciates against the currencies of its trading partners, to what extent does that affect domestic prices of goods imported from those partners? In my empirical framework changes in import prices are captured by changes in the unit value of China’s import price index and changes in the value of Chinese currency is reflected by change in the trade-weighted exchange rate of RMB. I begin my examination with monthly aggregate import price index available from January 1992, and
employ a dynamic lag specification that incorporates both long-term and short-term pass-through, as in Burstein and Gopinath (2014):

\[ \Delta ipi_t = \sum_{k=0}^{T} \beta_k \Delta e_{t-k} + \gamma X_t + \epsilon_t \]

Where $\Delta ipi_t$ represents log change in monthly import price index in China. $\Delta e_{t-k}$ represents log change in trade-weighted nominal exchange rate, the construction of which I attach to the appendix of the paper. $k > 0$ allows for lags in the pass-through of exchange rate into import price indexes and exchange rates are expressed as home currency per foreign currency. Therefore a positive value of $\Delta e_{t-k}$ denotes a deprecation of home currency while a negative value denotes an appreciation. $X_t$ controls for price fluctuations in China and its group of trading partner. More specifically, I employ monthly log changes in trade weighted change in trading partner’s producer price index as well as the consumer price index of China (due to limitations on the availability of Chinese producer price index data). Based on previous empirical literature, I employ 24 month lags for log change in trade-weighted exchange rate, log change in trade-weighted producer price index and log change in Chinese consumer price index. As per specification in Gopinath (2016), I plot the cumulative estimate $\sum_{s=0}^{k} \beta_s$ and two standard error bands in solid blue line and dotted red line:
In addition to regression using aggregate price index, I apply similar exercise to disaggregated price indexes over HS2 and HS4 commodity categories, with similar specifications:

\[ \Delta ipi_{n,t} = \alpha_n + \sum_{k=0}^{T} \beta_{n,k} \Delta e_{t-k} + \gamma_n X_t + \epsilon_{n,t} \]

\( \Delta ipi_{n,t} \) represents log change in quarterly import price index for commodity \( n \), categorized per HS2 and HS4 systems respectively. For HS2 data is available starting from Q2 2004 while for HS4 data is available from Q1 2005. Quarterly averages are adopted here instead of monthly value to avoid greater fluctuations in the price of individual commodities. \( \alpha_n \) is added to the regression for industry fixed effect, and \( \Delta e_{t-k} \) represents quarterly change in trade-weighted exchange rate. To keep consistency with a 2-year pass-through horizon I assign 8 lags to exchange rate. \( X_t \) incorporates quarterly changes in trade-weighted producer price index and Chinese producer price index, which is available after January 1996. For both indexes I assign 8-lags, and cumulative pass-through effects are graphed below:
All three measures of pass-through demonstrate that Chinese import prices are very sensitive to fluctuations in Chinese bilateral exchange rates, especially within the horizon of a quarter. For the monthly aggregate import price index, close to 90% of exchange rate fluctuations are passed into domestic import prices in the first month, while cumulative pass-through in the first three month reaches around 95%. This observation remains robust through our examination of disaggregate price indexes. First quarter total pass-through for HS2 disaggregate price index is around 86%, which is similar to our estimation using aggregate price index; first quarter total pass-through for HS4 disaggregate price index is slightly lower at around at 67%, with deviation possibility rising from the noise produced by price fluctuations in individual commodities. This discovery is consistent with existing empirical research on the dominant role of US dollar in international trade invoicing, and implies that the majority of Chinese import are denoted in foreign currency, very possibly US dollars. At the same time it is important to point out the limitations of our results. While short-run pass-through effects as represented by the three indexes are consistent, long-run pass-through effects indicated deviates rather significantly from the conclusion of previous studies. In this long-run pass-through effect is found to deviate
noticeable from that of short-run. The reason for this deviation could be two-fold: Chinese data on producer price index as well as consumer price index could be faulty given their that they were obtained from government source; at the same time the use of disaggregate index very likely created excessive noise due to the changes in assigned weightings for commodities. For later parts of the paper I will restrict the use of price indexes to the assessment of short-run instead of long-run pass-through effects given the defects in our analysis.

The second set of regression I apply to determine the role of international currencies, in particular US dollar and euro, in affecting exchange rate pass-through of Chinese import prices. Given the lack of data in China on invoice currency share, these tests provide insights on the invoice currency choices of China’s trading partners. I will follow the specifications detailed in Gopinath (2016) and apply the following regression to aggregate monthly price index and HS2 disaggregate quarterly price index:

$$\Delta x_{n,t} = \alpha_n + \beta_{TW}\Delta e_{TW,t} + \beta_{US}\Delta e_{US,t} + \beta_{Euro}\Delta e_{Euro,t} + Z_t + \varepsilon_t$$

Where $\Delta x_{n,t}$ represents monthly/quarterly log change in import prices. $\alpha_n$ represents industry fixed effect used in the regression on disaggregate price index. $\Delta e_{TW,t}$, $\Delta e_{US,t}$ and $\Delta e_{Euro,t}$ represent China’s contemporaneous trade-weighted exchange rate, bilateral exchange rate against the US dollar and bilateral exchange rate against Euro. The control vector $Z_t$ represents trade-weighted producer price index and China’s domestic producer price index. For regressions involving the euro exchange rate I restrict observations to period after the introduction of the euro in January 1999. For other regressions I restrict the time series start from January 1992.
The above table details results from the regression on the aggregate price index. After including US dollar exchange rate and Euro exchange the coefficient size on trade-weighted exchange rate was reduced; however, the coefficient also lost their statistical significant. This can perhaps be attributed to yuan’s pegged value to the dollar and its inadequacy to serve as a predictor of fluctuating import prices. For a better indication of dollar’s role in Chinese import price I examine the HS2 disaggregate price index with a richer set of data after 2000, when China began to allow greater movement in its currency.
Regression on HS2 disaggregate price index provides a better picture to assess the role of dollar and euro. Both dollar and euro, when included in the pass-through regression, reduced the pass-through coefficient on trade-weighted exchange rate, with the dollar having a much greater effect. Although coefficients on the dollar and the euro weren’t significant, this regression still indicates that dollar and euro are important invoice currency in China’s import trade, with the US dollar playing a significant role. The dollar’s dominant status as an invoice currency is once again confirmed.

B. Country-level variation of exchange rate pass-through

To better assess the composition of China’s foreign invoice currencies I obtain country level data from United Nation Comtrade Database. As detailed above, unit value data is obtained by through take the ratio of total trade value over trade volume, and prices indexed to their annual
average in 1992, the first year of our observation. I employ annual data broken down at the HS6 level for 44 of China’s largest trade partners, comprising more than 70% of China’s 2015 trade volume. The regressions are similar the empirical frameworks employed above:

$$\Delta x_t = \alpha_t + \beta_{US,s} \Delta e_{US} + \beta_{B,s} \Delta e_B + Z_t + \epsilon_t$$

Where $\Delta x_t$ represents annual log change in the price of certain import from a specific trading partner. $\alpha_t$ is a vector that captures both country and commodity fixed effect. $\Delta e_{US}$ and $\Delta e_B$ represent Yuan’s dollar exchange rate and bilateral exchange rate of yuan’s trading partner respectively. To be consistent with previous frameworks I maintain a 2-year pass-through horizon and assign 1 lag to each exchange rate value. $Z_t$ incorporates producer price index ( in the case of missing data I employ consumer price index) and China’s domestic consumer price index, each with 1 lag. I first examine import price changes for commodities traded by all 44 countries and then restrict my observation to the price changes of the republic of Korea, China’s biggest trading partner by value in 2015, to provide a illustrative example. The table below details the result from my regressions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>W</th>
<th>W</th>
<th>W</th>
<th>K</th>
<th>K</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral Rate</td>
<td>0.300</td>
<td>0.202</td>
<td>0.700</td>
<td>0.575</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.008)**</td>
<td>(0.009)**</td>
<td>(0.034)**</td>
<td>(0.040)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPI</td>
<td>0.361</td>
<td>0.125</td>
<td>0.286</td>
<td>1.194</td>
<td>0.159</td>
<td>1.086</td>
</tr>
<tr>
<td></td>
<td>(0.014)**</td>
<td>(0.012)**</td>
<td>(0.014)**</td>
<td>(0.138)**</td>
<td>(0.124)</td>
<td>(0.139)**</td>
</tr>
<tr>
<td>Domestic CPI</td>
<td>0.109</td>
<td>-0.430</td>
<td>-0.431</td>
<td>-0.273</td>
<td>-0.440</td>
<td>-0.538</td>
</tr>
<tr>
<td></td>
<td>(0.023)**</td>
<td>(0.027)**</td>
<td>(0.027)**</td>
<td>(0.076)**</td>
<td>(0.089)**</td>
<td>(0.088)**</td>
</tr>
<tr>
<td>Yuan-USD rate</td>
<td>0.930</td>
<td>0.774</td>
<td>0.965</td>
<td>0.432</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)**</td>
<td>(0.021)**</td>
<td>(0.062)**</td>
<td>(0.072)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>$N$</td>
<td>105,890</td>
<td>105,890</td>
<td>105,890</td>
<td>9,430</td>
<td>9,430</td>
<td>9,430</td>
</tr>
</tbody>
</table>

* $p<0.05$; ** $p<0.01$
Regressions on China’s trade with all trading partners indicate that import prices aren’t very sensitive to exchange rates fluctuations between Chinese yuan and the currency of China’s trading partner; however, this can’t be attributed to import being denominated in yuan. In fact, China’s import prices, regardless of trading partners, are very sensitive the exchange rate fluctuation between yuan and dollar, as evidenced by the large coefficient on yuan-dollar exchange rate change once the term is brought into our regression alongside bilateral exchange rate; consequently, the power of the bilateral exchange rate change drops further once yuan-dollar exchange rate is included. Results from country-level data confirm our observations in the previous section. More specifically, Chinese imports are largely denoted in foreign currencies, and in most cases that currency is US dollar rather than the currency of China’s direct trading partner. This is consistent with empirical literature on dollar’s role as an effective international medium of exchange.

Regression restricted to China’s import from Republic of Korea provides an illustration of this pricing dynamics. Although on the initial examination import prices seem to be rather sensitive to bilateral exchange rate movement, once yuan-dollar exchange is included a reduced effect on the bilateral exchange rate can be observed. In the case of Korea, bilateral exchange rate and yuan-dollar exchange rate seem to enjoy relatively similar power in influencing import prices, as indicated by the last regression presented.

With cross country variations I verify two properties discussed by previous scholars regarding currency invoicing patterns. First, I run regression to determine if prices for Chinese import remains stable before 1-year and 2-year horizon through exploring the relationship between 1-year exchange rate pass-through and 2-year exchange rate pass-through. As documented in
Gopinath (2015), prices are sticky in the currencies that they are invoiced in, thereby inducing a relatively stable transition from short-run pass-through to that of the long-run. Due to constraints with cross-industry data this behavior of pass-through wasn’t able to be verified in earlier part of the paper, and here I run a adjusted version of the framework employed in Gopinath (2015):

\[
\Delta x_{n,t} = \alpha_n + \sum_{s=0}^{1} \beta_{US,s} \Delta e_{US,t-s} + \sum_{s=0}^{1} \beta_{BU,s} \Delta e_{BU,t-s} + Z_t + \epsilon_t
\]

\[
PT_{n,2} = \gamma_T + \beta_T PT_{n,1} + \epsilon_{n,2}
\]

First I repeat the framework employed earlier in the paper to calculate cumulative path-through both dollar-yuan exchange rate and bilateral exchange rate into import prices. With variation on the country-level, I further explores how 2-year cumulative path-through reacts to 1-year pass-through. In the above regression \( PT_{n,2} \) represents 2-year cumulative pass-through for country \( n \), and \( PT_{n,1} \) represents the corresponding 1-year pass-through. I apply this framework for the 44 countries in my country sample and include regression results in the following table:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yuan-dollar Rate</th>
<th>Bilateral Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-year Pass-through</td>
<td>0.950</td>
<td>0.948</td>
</tr>
<tr>
<td></td>
<td>(0.005)**</td>
<td>(0.004)**</td>
</tr>
<tr>
<td>Constant</td>
<td>0.140</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>(0.182)</td>
<td>(0.146)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>( N )</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

\* \( p<0.05 \); \** \( p<0.01 \)

For both dollar-yuan exchange rate and yuan’s bilateral exchange rate against China’s other trading partners, 1-year pass-through effect is very closely related to 2-year cumulative pass-through and prices seems stable between 1-year and 2-year horizons.

Next we turn to a study of the determinants behind cross country variable of exchange rate path-through. Following the work of Goldberg and Tille (2008), which established a robust
relationship between the share of importer’s trade volume as a percentage of exporter’s overall trade and the use of US dollars in invoicing import commodities. Accepting the relationship between dollar invoicing of commodities and sensitivity of import prices to exchange rate fluctuations, I apply the following framework to determine if a relationship exist between China’s import share in the total export volume of its trading partners and the pass-through effect of dollar-yuan / yuan’s bilateral exchange rates into import price. Applying the following framework as an adjusted version of Goldberg and Tille (2008):

$$\beta_{n,T} = \theta_T + X_{n,T} + \epsilon_T$$

Where $$\beta_{n,T}$$ represents cumulative path-through per specification of the model and $$X_{n,T}$$ represents China’s share of import as a percentage of the total volume of export for country $$n$$.

The results of this set of regression is, however, inconclusive. China’s trading partners don’t seem to factor China’s trade into their decision to invoice in either US dollar, Chinese yuan or their own currency of choice. As can be seen from the model trade share doesn’t appear as a statistically significant predictor for pass-throughs of dollar-yuan exchange rate or yuan’s bilateral exchange rate.

<table>
<thead>
<tr>
<th>Vble</th>
<th>1-Year Dollar</th>
<th>2-Year Dollar</th>
<th>1-Year Bilateral</th>
<th>2-Year Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Share</td>
<td>9.915</td>
<td>10.504</td>
<td>-4.981</td>
<td>-6.282</td>
</tr>
<tr>
<td></td>
<td>(86.243)</td>
<td>(81.995)</td>
<td>(86.251)</td>
<td>(81.832)</td>
</tr>
<tr>
<td>Constant</td>
<td>-6.162</td>
<td>-5.878</td>
<td>6.538</td>
<td>6.386</td>
</tr>
<tr>
<td>$$R^2$$</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>$$N$$</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
</tbody>
</table>

* $$p<0.05$$; ** $$p<0.01$$
5. Conclusion

By investigating the relationship between changes in the price of Chinese import and movements in RMB’s exchange rate against international currencies and currencies of its trading partners, I conclude that Chinese import prices are very sensitive to the exchange rate movements, suggesting that very little of China’s imports are invoiced in RMB. Instead, an overwhelming share of Chinese imports are denominated in US dollars, consistent with existing literature on the dominant role of US dollar as an international medium of exchange. Furthermore, through investigation into cross-country dataset I confirm that pass-through pattern into China’s import prices are stable from the 1-year to 2-year horizon, while China’s status as a large importer doesn’t seem to have factored into the decision of its trading partners in selecting invoice currency beyond US dollar.
6. References


7. Appendix

In the appendix I attach construction methodologies for key independent as well as control variables of my empirical analysis. Most of the materials are built upon the empirical frameworks employed in Gopinath (2015) with some simplifying adjustments.

Log change in import price indexes:

$$\Delta p_{i,t} = \log p_{i,t} - \log p_{i,t-1}$$

Trade-weighted Exchange Rate of the currency of country $i$ per currency of country $j$

$$\Delta e_{i,t} = \Delta e_{i,USA,t} - \sum_{j} w_{ij,t-1} \Delta e_{j,USA,t}$$

Where the weights are derived from trade shares according to IMF Direction of Trade database.