CESifo WORKING PAPERS

8727
2020

Original Version: November 2020
This Version: October 2022

The Effect of the Dollar on Trade Prices

Sai Ma, Tim Schmidt-Eisenlohr, Shaojun Zhang

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: https://www.cesifo.org/en/wp

CESifo *Working Paper No. 8727*

The Effect of the Dollar on Trade Prices

Abstract

This paper provides evidence on the effect of the dollar exchange rate on international trade prices, employing a new instrument for the U.S. dollar based on U.S. domestic housing activity (Ma and Zhang (2019)). In line with the dominant currency paradigm (Gopinath et al. (2020)), when instrumenting the dollar, we find evidence for a perfect pass-through of the dollar exchange rate to import prices that are invoiced in dollars.

JEL-Codes: F140, F310, G150.

Keywords: dominant currency, dollar invoicing, international trade.

Sai Ma
Division of International Finance
Federal Reserve Bank of Governors
Washington DC / USA
sai.ma@frb.org

Tim Schmidt-Eisenlohr
Division of International Finance
Federal Reserve Bank of Governors
Washington DC / USA
t.schmidteisenlohr@gmail.com

Shaojun Zhang
Fisher College of Business
The Ohio State University
Columbus / Ohio / USA
zhang.7805@osu.edu

October 2022
We would like to thank Emine Boz and Georgios Georgiadis for discussing our paper and participants at the Federal Reserve Board, the 2021 ASSA meetings, the 2021 CEBRA Annual Meetings, the 2022 CEA Annual Meetings, the ECB International Policy Analysis Division, and CESifo Conference on Global Economy for comments. The opinions expressed are those of the authors and do not necessarily reflect the view of the Board of Governors or the staff of the Federal Reserve System. Declarations of interest: none.

1 Introduction

In an influential paper, Gopinath et al. (2020) show that the dominant role of the U.S. dollar in trade invoicing has important implications for price pass-through when prices are sticky.[1] Predictions under the dominant currency paradigm (DCP) differ strikingly from those obtained under its alternatives, producer currency pricing (PCP) and local currency pricing (LCP). The DCP predicts that changes to a country's exchange rate against the dollar should be fully passed through to import prices. In contrast, controlling for the exchange rate against the dominant currency, the bilateral exchange rate with the trading partner should not affect import prices.

Gopinath et al. (2020) provide extensive evidence for the key predictions of their model, using both aggregate data at the country-pair year level and looking at detailed trade data from Colombia. A key challenge in testing for the effect of the dollar on trade prices is the endogeneity of the U.S. dollar. As macroeconomic variables, trade flows, and the dollar are codetermined, it is difficult to provide evidence in favor of these models that goes beyond correlations.

To tackle this issue, this paper employs a new variable to instrument the dollar, building on recent research by Ma and Zhang (2019), who show that domestic housing activity in the United States can predict the dollar one year ahead. U.S. housing represents a particularly well-suited instrument for the question we are studying, as we are focusing our analysis on trade between third countries, whose trade flows are unlikely to be directly affected by

[1] Earlier work on the role of the dollar includes Corsetti and Pesenti (2005), Cook and Devereux (2006), Devereux et al. (2007), Goldberg and Tille (2008), Goldberg and Tille (2009), Canzoneri et al. (2013), and Gopinath (2015). The earlier literature, in particular the influential paper by Goldberg and Tille (2008), discussed dollar invoicing by third countries as vehicle currency trade.

changes to the domestic demand and supply for U.S. housing.

When we instrument the U.S. dollar with a one year lag of new housing permits in the United States, the estimated relationship between the dollar exchange rate and import prices strengthens substantially relative to the OLS results in Gopinath et al. (2020) and Boz et al. (2020).[2] In particular, we find highly significant effects for the interaction between the dollar invoicing share of imports and the dollar exchange rate for import prices. Moreover, the estimated interaction term coefficient is much larger when using our two-stage least squares (2SLS) approach. The coefficient is very close to one (the value predicted by the DCP). Results are robust to dropping countries with the largest direct U.S. trade exposures, controlling for macro, financial, and risk variables, using alternative proxies for U.S. housing activity, and splitting the data into subsamples.

The paper adds to the growing literature on dominant currency pricing, vehicle currency invoicing, and its implications. Recent contributions include Amiti et al. (2020) who study the invoicing choices of Belgian firms, Corsetti et al. (2020) who look at the implications of a dominant currency for the transmission of shocks across borders and optimal monetary policy, and Goldberg and Tille (2016) who analyze vehicle currency invoicing with Canadian transaction-level import data.

The paper contributes to the sizable literature on exchange rate pass-through, which has shown that pass-through depends on factors such as the frequency of price adjustments (Gopinath and Itskhoki (2010)), the strength of competition in final product markets (Amiti et al. (2016)), firms' export or import market shares (Feenstra et al. (1996), Berman et

[2]Boz et al. (2020) adopt the same empirical strategy as Gopinath et al. (2020), using a new data set for invoicing currency shares. The more refined data improves the statistical significance of the estimated interaction term coefficients, but the point estimate for import prices remains significantly smaller than one, indicating a downward bias in the OLS estimate.

al. (2012), Amiti et al. (2014), Garetto (2016), Auer and Schoenle (2016), Devereux et al. (2017)), and the source of exchange rate shocks (Forbes et al. (2018)). The global nature of our exercise, which aims to capture most world trade between third countries, does not allow us to directly account for these factors at the micro level. We therefore see our main contribution to this literature as providing an estimate of the average dollar pass-through at the global level and documenting the way that this pass-through depends on the dollar invoicing share in trade.

The paper proceeds as follows. Section 2 discusses the conceptional framework. Section 3 presents the instrumental variable approach. Section 4 explains the data. Section 5 shows our main results, and Section 6 concludes.

2 Conceptional Framework

We start by outlining the key elements of the model in Gopinath et al. (2020) that are relevant for our empirical analysis. We then provide a brief discussion of the financial channel of the exchange rate.

DCP: baseline model and predictions. Suppose there are three countries: the United States, country i, and country j. Denote the share of currency k in the invoicing of exports from country i to j as θ_{ij}^{k}. Let $e_{ij,t}$ denote the price of currency i in units of currency j and $e_{\$j,t}$ the price of the dollar in units of currency j — that is, an increase in $e_{\$j,t}$ reflects an appreciation of the dollar. Assume that firms set prices one period in advance and sell to consumers with a constant elasticity of demand. It is then easy to show that the following relationship holds (in log-linear approximation):

$$\Delta p_{ij,t} \quad = \quad \theta^{i}_{ij}\Delta e_{ij,t} + \theta^{\$}_{ij}\Delta e_{\$j,t}, \tag{1}$$

where θ^i_{ij} is the share of currency i in imports of country i from country j. As pointed out in Gopinath et al. (2020), looking at the three corner cases for currency invoicing is helpful. First, consider *local currency pricing* — that is, firms price their goods only in the destination country currency, $\theta^j_{ij} = 1$. Then, $\Delta p_{ij,t} = \Delta y_{ij,t} = 0$, and there is no pass-through into import prices. In contrast, under *producer currency pricing*, when $\theta^i_{ij} = 1$, import prices should react only to the bilateral exchange rate between i and j. Finally, if all firms follow dominant currency pricing with $\theta^{\$}_{ij} = 1$, then only the exchange rate between destination country j and the dollar, $e_{\$j}$, should matter for pass-through. The effect of the dollar exchange rate should be proportional to the share of imports that is invoiced in dollars.

3 Empirical Approach

The key challenge in testing for the effect of the dollar on trade prices is that the exchange rates are co-determined with other macroeconomic factors that also move trade prices. To test for the causal relationship of the dollar on trade prices hence requires a shock that moves the exchange rate but does not directly affect trade prices between two countries other than through the exchange rate. In the following, we show that U.S. domestic housing activity represents such a shock. U.S. housing activity is able to forecast moves in the dollar one year ahead while being plausibly exogenous to the bilateral trade prices between two countries other than the United States.

U.S. housing cycles and the dollar. Ma and Zhang (2019) uncover that U.S. housing activity, such as residential investment and building permits, is a strong in-sample and out-of-sample predictor for the dollar up to three years. Table 1 reflects this central finding from Ma and Zhang (2019), showing regressions of the one-year-ahead dollar on different measures of U.S. housing activity. The coefficient in column (1) implies that a one standard deviation increase in building permits is associated with a three percent decline in the value of the dollar the next year. This result is robust to the inclusion of variables that capture financial conditions and U.S. monetary and housing starts in columns (4) and (5), respectively.

Figure 1 illustrates this result graphically. It shows the time series of the total number of building permits authorized in the United States and the one-year-ahead log change in an average dollar index. The two series exhibit a negative 33 percent correlation, confirming that stronger U.S. housing activity predicts persistent future dollar depreciation. Ma and Zhang (2019) show that U.S. housing variables also predict the dollar out of sample and outperform the random walk model.

One plausible explanation for why U.S. housing activity affects the future price of the dollar is through its effect on the relative supply of traded and non-traded goods, as housing is one of the most important non-traded goods. Ma and Zhang (2019) propose a model where the price of the traded good is determined globally, but the domestic price of the non-traded good is mostly determined by domestic supply and demand. In that setting, output fluctuations in the domestic non-traded good can generate strong adjustments in the relative price between the non-traded and the traded good, and, hence, affect the value of the dollar. This mechanism is known as the relative price adjustment channel. Ma and Zhang (2019) show empirically that increases in U.S. domestic housing investment indeed predict persistent declines in the relative price of the non-traded price measure from Betts and Kehoe (2008).

One concern for the documented predictability is that because the U.S. housing cycle is often considered to be co-moved with macro and financial conditions, it hence reflects general business and credit cycles. Panel B of Table 1 reports results from the dollar forecasting regression with additional macro and financial controls. We first include two business cycle predictors: the excess bond premium from Gilchrist and Zakrajšek (2012), which is based on credit spreads, and the slope of the Treasury yield curve, measured by the term spread. Second, we include the credit-to-GDP ratio and the broker-dealer leverage to capture credit cycles. We further follow Dahlquist and Pénasse (2022) and control for the level of real exchange rate to capture its potential mean reversion. We finally conduct a "kitchen sink" specification that includes all control variables considered. Consisten with Ma and Zhang (2019), results in Table 1 shows that the dollar predictability remains strong after controlling these variables over our sample.

Another concern is that international capital flows might jointly affect the U.S. current account balance and the U.S. housing cycle, as remarked in Bernanke (2005). As a result, U.S. housing activity could be a proxy for international capital flows into the United States. However, Lilley et al. (2019) find that international capital flows were disconnected from exchange rate fluctuations in the period before 2007. Our sample starts in 1988, and the housing-dollar relationship also holds in the pre-crisis sample. In addition, Ma and Zhang (2019) find that various measures of international capital flows cannot explain the ability of housing investments to predict the dollar.

While we use U.S. building permits as the main measure of housing investment, we also consider two alternative measures. The first one is housing starts obtained from the Survey of Construction (SOC). Housing construction is a long process, and obtaining a building permit is the first step in this process.[3] Building permits are a measure of potential home construction starts, as not every permit leads to a construction start. Housing starts, in contrast, directly count new home constructions that are started in a given period. The second alternative measure is private residential fixed investment (PRFI). In contrast to permits and housing starts, which are count variables, PRFI measures investment expenditures in dollar terms. While the advantage of count measures is that they are insulated from the housing price fluctuations, they cannot capture quality improvements in real estate. To normalize the variable over time, we further scale PRFI by concurrent gross domestic private investment (GDPI). Ma and Zhang (2019) show that both alternative measures, housing starts and PRFI/GDPI, can robustly predict the dollar in sample and out of sample for up to 12 quarters (see also columns (4) and (5) of Table 1).

While U.S. *domestic* housing capital investment is highly correlated with future dollar movement, one would not expect domestic U.S. housing activity to directly affect trade prices between other countries. The two-country model proposed by Ma and Zhang (2019) implies that a change in the relative price between the traded and the non-traded goods in the United States affects U.S. trade prices with the other country. If a third country is added to this framework, changes in U.S. trade prices could indirectly affect bilateral trade

[3] According to the 2016 Survey of Construction, the average time for the construction of a new single-family home is six months.

prices between the other two countries. Importantly, this indirect effect should be stronger for countries that have stronger trade links with the United States. To address this concern, the robustness analysis repeats the main analysis, restricting the sample to countries with the weakest trade links to the United States, and finds virtually identical results.

4 Data

The data for bilateral trade prices are from Gopinath et al. (2020). They construct annual panel data on bilateral trade price indices from UN Comtrade. UN Comtrade provides detailed customs data for a large set of countries at the Harmonized System (HS) six-digit product level, with information about the destination country, dollar value, quantity, and weight of imports and exports. Gopinath et al. (2020) exclude commodities that are broadly defined as HS chapters 1 to 27 and 72 to 83, which comprise animal, vegetable, food, mineral, and metal products, when constructing the price indices. Time-varying dollar invoicing shares for each importer are from the updated data set in Boz et al. (2020). The data on U.S. housing activity, including building permits, are from the Building Permits Survey conducted by the Census Bureau. We further supplement the housing activity data with U.S. private residential fixed investment from the national income and product accounts Table 1.1.5 (line 13). Housing starts are obtained from the Survey of Construction conducted by the Census Bureau.

Our final sample includes 44 countries and over 2100 dyads that cover more than 75 percent of world trade. The sample is annual and spans the years 1990 to 2015.

5 Empirical Analysis

This section presents our main results and discusses their robustness.

5.1 Main Specifications and Results

Specification. We investigate the relationship between the dollar and import prices, following the specification in Gopinath et al. (2020):

$$\begin{aligned}\Delta p_{ij,t} &= \lambda_{ij} + \delta_t + \sum_{k=0}^{2} \beta_k \Delta e_{ij,t-k} + \sum_{k=0}^{2} \beta_k^{\$} \Delta e_{\$j,t-k} \\ &\quad + \sum_{k=0}^{2} \eta_k \Delta e_{ij,t-k} \times S_{j,t} + \sum_{k=0}^{2} \eta_k^{\$} \Delta e_{\$j,t-k}^{IV} \times S_{j,t} + \theta' X_{j,t} + \varepsilon_{ij,t}, \end{aligned} \tag{2}$$

where $\Delta p_{ij,t}$ is the log difference of the price of goods exported from country i to country j measured in importer currency j. To address the concern that the dollar is endogenous, we then estimate a 2SLS specification, where we instrument the exchange rate, $\Delta e_{\$j,t}$, by a one-year lag of the number of U.S. housing permits issued. Following Gopinath et al. (2020), we include dyadic and time fixed effects λ_{ij} and δ_t for all specifications, and controls $X_{j,t}$ include changes in the (log) producer price index in the exporting country i and two lags of this variable as well as two lags of the bilateral exchange rate.

Results. Columns (1) and (4) of Panel A of Table 2 report the OLS estimates based on equation (2), while columns (2) and (5) report the first stage estimates and columns (3) and (6) report the second stage estimates from the IV analysis. To conserve space, for each column, we only report the coefficients of $\Delta e_{ij,t}$ (changes in bilateral exchange rate at time

t) and $\Delta e_{\$j,t}$ (changes in prices of the dollar in currency j at t), as well as time-t interaction terms of importing country's dollar invoicing share $S_{j,t}$ with $\Delta e_{ij,t}$ and $\Delta e_{\$j,t}$, respectively. Our OLS estimates in columns (1) and (4) are very similar to the results in Gopinath et al. (2020). The small differences are due to the fact that we are using the updated invoicing shares from Boz et al. (2020).

The results suggest that the import invoicing share plays an important role for the dollar pass-through: Column (4) reports that a 10 percent dollar appreciation is associated with a 2.8 percent increase in import prices for imports that are fully invoiced in U.S. dollars. However, our 2SLS estimates show that the effect of the invoicing share on the dollar pass-through is even larger. Column (6) shows that, once the dollar is instrumented by U.S. housing activity, a 10 percent dollar appreciation is associated with an 11.7 percent increase in import prices, more than three times larger than what the OLS estimate implies. The large change in the coefficient sizes when moving from OLS to the 2SLS suggests that the endogeneity of the dollar biases the estimated OLS coefficients strongly toward zero. And, more important, the coefficient of about one is exactly what the DCP predicts.

Of note, while the OLS specification in column (4) allows estimating the effect of changes to country j's dollar exchange rate, $\Delta e_{\$j,t}$, this variable drops out in the IV estimation in column (6). This is the case because our instrument for the dollar, U.S. housing permits, only varies at the time level. The predicted exchange rate therefore gets absorbed by the time fixed effects. In contrast, the predicted interaction between the dollar and the dollar invoicing share can be estimated in column (6) as it varies at the country-year level.

To detect the strength of the instrument, columns (2) and (5) also report the F-statistics from the first-stage regression. As the first-stage regressions only exploit variation at importer-time level, we report F-statistics clustered at that level. The large F-statistics in all specifications are consistent with the strong predictive power of U.S. housing activity for the dollar uncovered in Ma and Zhang (2019).

5.2 Robustness Checks

In this section, we discuss several robustness checks. First, we document that results are robust to restricting the sample to countries with the weakest trade links to the United States. Second, we show that the instrumental variable approach continues to work when controlling for U.S. monetary, financial, and risk conditions. Third, we discuss additional robustness checks that look at different subperiods and alternative proxies for U.S. housing activity. In all cases, we report results with and without interaction terms with the dollar invoicing share. For the latter case, similar to results in Table 2, the dollar term $\Delta e_{\$j,t}$ drops out in the 2SLS estimation with time fixed-effects.

U.S. trade links. U.S. housing activity could, through its effects on U.S. trade, indirectly affect trade prices between third countries. Such indirect effects should be stronger for countries with tighter trade links with the United States. To address this issue, we calculate the ratio of a country's imports and exports from the United States over its total imports and exports and then restrict the sample to importers and exporters with below-median, below 25th-percentile, and below 10th-percentile trade shares with the United States.[4] As shown in Table 3, results are very similar to the estimates from the full sample. Importantly,

[4]For some countries, like Chile and Colombia, U.S. trade represents a large fraction of total trade, with shares above 12 percent. In contrast, for other countries like the Euro area countries Germany, France, and Italy, trade with the United States is less important, with shares below 6 percent.

the estimated interaction terms between the dollar share and the dollar are statistically significant in all sample splits considered and not statistically different from the baseline estimates.

Controlling for monetary conditions and financial & risk factors. One may be concerned that the housing instrument predicts the dollar because it reflects U.S. monetary conditions or financial and risk factors. While housing market activity is certainly associated with U.S. monetary and financial conditions, Ma and Zhang (2019) show that neither can explain the *predictability* of the dollar.

To provide robustness in our context, we directly control for financial and risk factors as well as U.S. monetary policy. To capture financial and risk factors, we consider an extensive list of related variables studied in the literature, including the implied volatility for the S&P 500 index (VIX); the corporate bond credit spread, measured as the difference between Moody's Baa and triple A corporate bond rates; the effective broad Japanese yen exchange rate; the global dollar factor from Verdelhan (2018); the world recession probability from Cuba-Borda et al. (2018); the intermediary capital ratio factor from He et al. (2017); and macro uncertainty from Jurado et al. (2015). We capture monetary conditions with the 2-year Treasury rate, the Treasury spread, the difference between the 10-year and 2-year Treasury rates, and the median forecast of the 3-month T-bill rate from the Survey of Professional Forecasters.

Table 4 reports the results. All columns in the table report the second-stage results of our 2SLS estimation. In columns (1) and (2), we control for the financial and risk factors; in columns (3) and (4), for the monetary variables; and in the last two columns, for all financial, risk, and monetary variables. We find that in all cases, the interaction terms between the dollar and the invoicing share remain statistically significant and quantitatively similar to the baseline estimates. This finding implies that the 2SLS results are not driven by any relationship between U.S. housing activity and U.S. monetary conditions nor by financial and risk factors.

Subperiods. The 2007–09 Global Financial Crisis (GFC) ended a great boom and bust cycle for the U.S. housing market. As depicted in Figure 1, U.S. building permits rose sharply before the GFC and then dropped to a historical low in 2009. Are our results driven by the boom-and-bust cycle of the U.S. housing market around the GFC? To answer this question, Table 5 reports 2SLS results that are estimated over several subperiods of our sample. The first two columns report the estimates when we exclude the GFC years 2007 to 2009 from our sample, columns (3) and (4) present results for the pre-2007 sub-sample, and columns (5) and (6) report estimates for the post-2009 subsample. We find that results for the different subsamples are quite similar to the baseline results. In particular, looking only at pre-GFC or post-GFC data delivers very similar coefficients that are not statistically different from each other at conventional levels.

Alternative housing instruments. We also check robustness to using different measures of housing activity, with results reported in Table 6. The first two columns show that results remain robust when we include up to three-year lags of building permits as instruments for the dollar exchange rate. Columns (3) to (4) present results when the dollar is instrumented by residential investment (PRFI) scaled by gross investment (GDPI), while columns (5) to

(6) report results when the dollar is instrumented by housing starts. We find that both alternative instruments generate results similar to our baseline.

6 Conclusion

This paper provides evidence on the effect of the U.S. dollar on international trade prices, using a new instrument for the dollar that is based on domestic U.S. housing conditions. We find that changes to a country's exchange rate against the dollar are fully passed through to import prices that are invoiced in dollars. The substantially larger coefficient estimates obtained through our 2SLS estimation indicate that the endogeneity of the dollar is a problem in the baseline OLS results. Reassuringly, the new larger coefficients are much closer to the theoretical predictions in Gopinath et al. (2020), underscoring the plausibility of our approach.

The instrumental variable strategy employed in this paper should be applicable to many additional questions in international finance. Instrumenting the dollar with U.S. housing starts can shed light on the effect of the dollar on any third country variable, as long as that variable is unrelated to domestic conditions in the United States.

References

Amiti, Mary, Oleg Itskhoki, and Jozef Konings, "Importers, exporters, and exchange rate disconnect," *American Economic Review*, 2014, *104* (7), 1942–78.

_ , _ , and _ , "International shocks and domestic prices: how large are strategic complementarities?," Technical Report, National Bureau of Economic Research 2016.

_ , _ , and _ , "Dominant currencies: How firms choose currency invoicing and why it matters," NBER Working Paper 27926, National Bureau of Economic Research 2020.

Auer, Raphael A and Raphael S Schoenle, "Market structure and exchange rate pass-through," *Journal of International Economics*, 2016, *98*, 60–77.

Berman, Nicolas, Philippe Martin, and Thierry Mayer, "How do different exporters react to exchange rate changes?," *The Quarterly Journal of Economics*, 2012, *127* (1), 437–492.

Bernanke, Ben S, "The global saving glut and the US current account deficit," *Remarks at the Sandridge Lecture, Virginia Assoc. Econ., Richmond, March 10.*, 2005.

Betts, Caroline M and Timothy J Kehoe, "Real exchange rate movements and the relative price of non-traded goods," Technical Report, National Bureau of Economic Research 2008.

Boz, Emine, Camila Casas, Georgios Georgiadis, Gita Gopinath, Helena Le Mezo, Arnaud Mehl, and Tra Nguyen, "Patterns in Invoicing Currency in Global Trade," Technical Report, IMF Working Paper 2020.

Canzoneri, Matthew, Robert Cumby, Behzad Diba, and David López-Salido, "Key currency status: An exorbitant privilege and an extraordinary risk," *Journal of International Money and Finance*, 2013, *37*, 371–393.

Cook, David and Michael B Devereux, "External currency pricing and the East Asian crisis," *Journal of International Economics*, 2006, *69* (1), 37–63.

Corsetti, Giancarlo and Paolo Pesenti, "The simple geometry of transmission and stabilization in closed and open economies," Technical Report, National Bureau of Economic Research 2005.

_ , Keith Kuester, Gernot Müller, and Sebastian Schmidt, "The Exchange Rate Insulation Puzzle," Technical Report 2020.

Cuba-Borda, Pablo, Alexander Mechanick, and Andrea Raffo, "Monitoring the World Economy: A Global Conditions Index," *FRB IFDP Notes*, 2018, (2018-06), 15.

Dahlquist, Magnus and Julien Pénasse, "The missing risk premium in exchange rates," *Journal of Financial Economics*, 2022, *143* (2), 697–715.

Devereux, Michael B, Kang Shi, and Juanyi Xu, "Global monetary policy under a dollar standard," *Journal of International Economics*, 2007, *71* (1), 113–132.

_ , Wei Dong, and Ben Tomlin, "Importers and exporters in exchange rate pass-through and currency invoicing," *Journal of International Economics*, 2017, *105*, 187–204.

Feenstra, Robert C, Joseph E Gagnon, and Michael M Knetter, "Market share and exchange rate pass-through in world automobile trade," *Journal of International Economics*, 1996, *40* (1-2), 187–207.

Forbes, Kristin, Ida Hjortsoe, and Tsvetelina Nenova, "The shocks matter: improving our estimates of exchange rate pass-through," *Journal of international economics*, 2018, *114*, 255–275.

Garetto, Stefania, "Firms' heterogeneity, incomplete information, and pass-through," *Journal of International Economics*, 2016, *101*, 168–179.

Gilchrist, Simon and Egon Zakrajšek, "Credit spreads and business cycle fluctuations," *American economic review*, 2012, *102* (4), 1692–1720.

Goldberg, Linda and Cedric Tille, "Macroeconomic interdependence and the international role of the dollar," *Journal of Monetary Economics*, 2009, *56* (7), 990–1003.

Goldberg, Linda S and Cédric Tille, "Vehicle currency use in international trade," *Journal of international Economics*, 2008, *76* (2), 177–192.

_ and Cedric Tille, "Micro, macro, and strategic forces in international trade invoicing: Synthesis and novel patterns," *Journal of International Economics*, 2016, *102*, 173–187.

Gopinath, Gita, "The international price system," Technical Report, National Bureau of Economic Research 2015.

_ and Oleg Itskhoki, "Frequency of price adjustment and pass-through," *The Quarterly Journal of Economics*, 2010, *125* (2), 675–727.

_ , Emine Boz, Camila Casas, Federico J Díez, Pierre-Olivier Gourinchas, and Mikkel Plagborg-Møller, "Dominant Currency Paradigm," *American Economic Review*, 2020.

He, Zhiguo, Bryan Kelly, and Asaf Manela, "Intermediary asset pricing: New evidence from many asset classes," *Journal of Financial Economics*, 2017, *126* (1), 1–35.

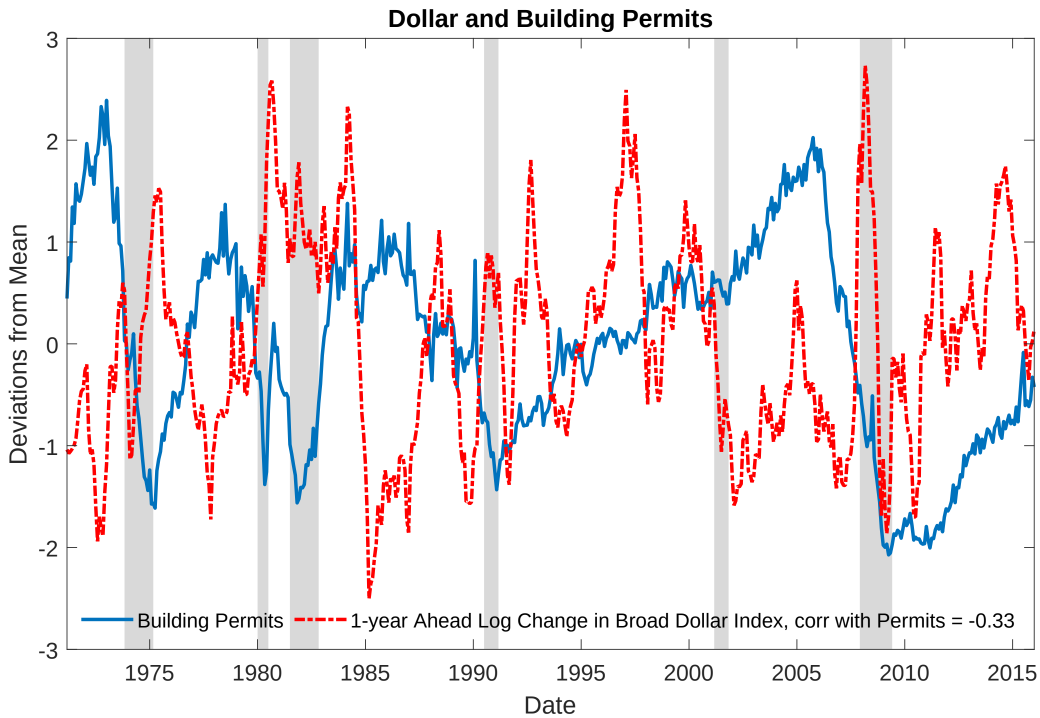
Jurado, Kyle, Sydney C Ludvigson, and Serena Ng, "Measuring uncertainty," *American Economic Review*, 2015, *105* (3), 1177–1216.

Lilley, Andrew, Matteo Maggiori, Brent Neiman, and Jesse Schreger, "Exchange rate reconnect," Technical Report, National Bureau of Economic Research 2019.

Ma, Sai and Shaojun Zhang, "Housing Cycles and Exchange Rates," Fisher College of Business Working Paper 2019-03 2019.

Verdelhan, Adrien, "The share of systematic variation in bilateral exchange rates," *The Journal of Finance*, 2018, *73* (1), 375–418.

Figure 1. US Housing Investment and the Dollar



The figure plots the time-series of the standardized US building permit authorized and one-year ahead log change in average dollar index. The average dollar Index is computed as an equal-weighted average value of the U.S. dollars against a broad group of currencies which consists of 19 advanced economies and 13 emerging markets. Shaded areas correspond to NBER recession dates. The sample spans the period 1971 to 2016

Table 1. U.S. Housing Activity Predicts the Dollar

Panel A: Time-series Evidence

Forecasting regression: $e_{\$j,t} = \alpha_j + \beta^H H_{t-1} + \epsilon_{j,t}$

	(1)	(2)	(3)	(3)	(4)	(5)
Housing Measure	Permits	Permits	Permits	Permits	PRFI/GDPI	Housing Starts
β^H	-2.98^{**}	-4.07^{***}	-3.87^{***}	-3.61^{**}	-1.81^{***}	-1.30^{**}
	(-2.21)	(-3.00)	(-2.93)	(-2.49)	(-2.33)	(-1.96)
F-stats p-value	0.027	0.003	0.003	0.003	0.026	0.036
Controls	None	Financial Cond.	Monetary Policy	All	None	None

Panel B: Additional Controls with Permits

Controls	Excess Bond	Term Spread	Credit/GDP	Broker-dealer	Real Dollar	All
β^H	-2.89^{***}	-3.08^{***}	-3.00^{***}	-2.67^{**}	-3.02^{***}	-3.28^{**}
	(-2.92)	(-3.73)	(-3.13)	(-2.76)	(-3.23)	(-2.77)
Control	-1.93^{**}	-2.36^{**}	-1.39	0.19	-1.96^{*}	
	(-2.37)	(-3.04)	(-1.40)	(0.44)	(-1.94)	

This table reports the coefficient, Newey-West t-statistic (in parenthesis), and the p-value from F-statistic from regressions that explain the dollar with different measures of housing activity. PRFI/GDPI is the ratio of private residential fixed investment to the gross investment. Column (2) and (3) of Panel A control for monetary policy variables and financial conditions. Panel B reports results with additional controls using U.S. building permits , see section 5.2 for more details. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 2. Exchange Rate Pass-through

	Specification #1			Specification #2		
	OLS	First Stage	Second Stage	OLS	First Stage	Second Stage
	(1)	(2)	(3)	(4)	(5)	(6)
Instrumented var.		Dollar			Dollar x Share	
$\Delta e_{\$j,t}$	0.781***		0.588***	0.620***		
	(0.0143)		(0.0319)	(0.0402)		
$\Delta e_{\$j,t} \times S_j$				0.281***		1.171***
				(0.0595)		(0.255)
H_t		-3.726***				
		(0.0550)				
$H_t \times S_j$					-3.716***	
					(0.1130)	
$\Delta e_{ij,t}$	0.0521***	0.670***	0.160***	0.276***	0.0358	0.430***
	(0.0123)	(0.0160)	(0.00970)	(0.0260)	(0.0266)	(0.0313)
$\Delta e_{ij,t} \times S_j$				-0.222***	0.7359	-0.417***
				(0.0470)	(0.0463)	(0.159)
First-stage F-stats		104.88			38.65	
Observations	46,820	46,820	46,820	25,597	25,597	25,597
Number of dyad	2,647	2,647	2,647	2,112	2,112	2,112

All regressions include two lags of the independent variables, lags 0-2 of exporter log changes in PPI, and time fixed-effects (except for column 3). The standard errors for OLS are clustered by dyads and associated standard errors are reported in parenthesis. Column (2) anmd (3) reports the 2SLS estimates using one-year lag of U.S. building permits as the instrument for the changes in US dollar. Column (5) and (6) reports the 2SLS estimates using one-year lag of U.S. building permits $\times$ Dollar-invoicing shares S_j as the instrument for the changes in US dollar $\times$ Dollar-invoicing Shares. The first-stage F-stats are clustered at the importer-year level. For column (6), the dollar term $\Delta e_{\$j,t}$ is absorbed by the time-fixed effects, because the instrument for the dollar, U.S. housing permits, only varies at the time level. The standard errors are reported in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 3. IV Robustness: Control for Trade Links with United States

Trade share with US	Below Median		Below 25 perc.		Below 10 perc.	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{\$j,t}$	0.543***		0.949***		0.923***	
	(0.0562)		(0.133)		(0.251)	
$\Delta e_{\$j,t} \times S_j$		1.508***		0.963**		2.744***
		(0.346)		(0.458)		(0.890)
$\Delta e_{ij,t}$	0.406***	0.386***	0.126**	0.391***	0.0749	0.271**
	(0.0431)	(0.0379)	(0.0618)	(0.0456)	(0.113)	(0.109)
$\Delta e_{ij,t} \times S_j$		-0.580***		-0.201		-0.341***
		(0.219)		(0.314)		(0.108)
First-stage F-stats	44.36	17.65	20.40	8.07	7.61	3.12
Observations	13,066	6,185	3,461	1,654	331	190
Number of dyad	675	497	182	130	20	16

All import price regressions include two lags of the independent variables, lags 0-2 of exporter log changes in PPI. Column (2), (4), and (6) also include time fixed-effects. The trade with U.S. is the share of the sum of imports and exports of goods and services to or from the U.S. The first-stage F-stats are clustered at the importer-year level. For column (2), (4) and (6), the dollar term $\Delta e_{\$j,t}$ is absorbed by the time-fixed effects, because the instrument for the dollar, U.S. housing permits, only varies at the time level. The standard errors are reported in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 4. IV Robustness: Control for Monetary Policy and Financial & Risk Factors

Controls	Financial & Risk Factors		Monetary Policy		All	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{\$j,t}$	0.706***		0.690***		0.384***	
	(0.0769)		(0.0818)		(0.0449)	
$\Delta e_{\$j,t} \times S_j$		1.216***		1.146***		0.832*
		(0.391)		(1.180)		(0.485)
$\Delta e_{ij,t}$	0.231***	0.459***	0.239***	0.355***	0.460***	0.455***
	(0.0477)	(0.0333)	(0.0492)	(0.0825)	(0.0439)	(0.0386)
$\Delta e_{ij,t} \times S_j$		-0.136***		-0.270***		-0.234
		(0.0514)		(0.0515)		(0.294)
First-stage F-stats	177.10	58.22	98.20	56.11	162.18	48.12
Observations	24,785	22,984	24,785	22,984	24,785	22,984
Number of dyad	2,123	2,054	2,123	2,054	2,123	2,054

Financial and risk factors include the VXO, the corporate bond spread (Baa-AAA), the effective broad Japanese Yen exchange rate, the global dollar factor, the world recession probability, the HKM intermediary capital ratio factor, and the JLN macro uncertainty. Monetary controls include the 2-year T-bill rate, the term spread (10yr minus 2yr rate), and the SPF one-year forecast of the 3m T-bill rate. For all regressions, the interaction terms between all controls and the dollar invoicing share are included. All import price regressions include two lags of the independent variables, lags 0-2 of exporter log changes in PPI. Column (2), (4), and (6) also include time fixed-effects. The first-stage F-stats are clustered at the importer-year level. For column (2), (4) and (6), the dollar term $\Delta e_{\$j,t}$ is absorbed by the time-fixed effects, because the instrument for the dollar, U.S. housing permits, only varies at the time level. The standard errors are reported in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 5. IV Robustness: Different Sub-Periods

Sub-periods	Exclude GFC		Pre–GFC		Post-GFC	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{\$j,t}$	0.405***		0.347***		0.196***	
	(0.0288)		(0.0369)		(0.0468)	
$\Delta e_{\$j,t} \times S_j$		0.572**		0.740**		1.113***
		(0.257)		(0.331)		(0.390)
$\Delta e_{ij,t}$	0.485***	0.419***	0.552***	0.415***	0.454***	0.282***
	(0.0232)	(0.0395)	(0.0319)	(0.0518)	(0.131)	(0.366)
$\Delta e_{ij,t} \times S_j$		0.0214		-0.0843		-0.0875
		(0.161)		(0.204)		(0.234)
First-stage F-stats	191.32	79.13	398.77	59.18	74.82	29.13
Observations	31,912	15,843	24,785	11,073	7,127	4,770
Number of dyad	2,645	2,109	2,510	1,732	2,573	1,984

All import price regressions include two lags of the independent variables, lags 0-2 of exporter log changes in PPI. Column (2), (4), and (6) also include time fixed-effects. GFC stands for 2007-2009 Great Financial Crisis. For column (2), (4) and (6), the dollar term $\Delta e_{\$j,t}$ is absorbed by the time-fixed effects, because the instrument for the dollar, U.S. housing permits, only varies at the time level. The standard errors are reported in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 6. IV Robustness: Alternative Housing Instruments

Instruments:	1-3 lags of permits		US PRFI/GDPI		Housing Starts	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{\$j,t}$	0.417***		0.376***		0.586***	
	(0.0194)		(0.0216)		(0.0335)	
$\Delta e_{\$j,t} \times S_j$		1.231***		1.148***		1.579***
		(0.171)		(0.215)		(0.336)
$\Delta e_{ij,t}$	0.460***	0.463***	0.487***	0.429***	0.348***	0.409***
	(0.0149)	(0.0276)	(0.0164)	(0.0300)	(0.0226)	(0.0352)
$\Delta e_{ij,t} \times S_j$		0.153		-0.400***		-0.655***
		(0.114)		(0.136)		(0.208)
First-stage F-stats	88.86	251.11	313.89	31.22	39.95	49.11
Observations	44,966	25,119	46,820	25,597	46,820	25,597
Number of dyad	2,643	2,110	2,647	2,112	2,647	2,112

All import price regressions include two lags of the independent variables, lags 0-2 of exporter log changes in PPI. Column (2), (4), and (6) also include time fixed-effects. PRFI/GDPI is the share of US gross domestic private investment (GDPI) attributable to the private residential fixed investment (PRFI). For column (2), (4) and (6), the dollar term $\Delta e_{\$j,t}$ is absorbed by the time-fixed effects, because the instrument for the dollar, U.S. housing permits, only varies at the time level. The standard errors are reported in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$