Import Prices and Invoice Currency: Evidence from Chile.[1]

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[1] The views expressed herein are those of the authors and do not necessarily reflect the views of the World Bank nor the Ministry of Finance of Chile.

Outline

Some Facts on Exchange Rate Pass-through

- Stantdard open economy models identify exchange rate pass-through (ERPT) as crucial for the international transmission of monetary shocks and optimal monetary policy.

- ERPT differs whether prices are measured at the border (i.e. at point of entry to the country) or at the retail level. Prices at the border are more sensitive to exchange rate fluctuations than retail prices (Burstein et al (2003) and Burstein et.al. (2005)).

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Questions

- We study the role of the invoice currency in the determination of ERPT to border prices in Chile.
  - $\Rightarrow$ We distiguish ERPT to border prices according to currency
    - $\Rightarrow$ We make a distinction between ERPT due to fluctuations in the CLP-USD nominal exchange rate (most Chilean imports are invoiced in USD) and the CLP-exporter country exchange rate.

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Main Results

- We document the invoice currency for Chilean imports
  - $\Rightarrow$ An overwhelming amount of Chilean imports are invoiced in USD regardless country and sector of origin.
- As for the USD and exporter country ERPT to border prices
  - $\Rightarrow$ Over short periods of time...
    - $\Rightarrow$ The USD exchange rate pass-through is high and quantitatively important.
    - $\Rightarrow$ The exporter country exchange rate pass-through is not statiscally different from zero.
  - $\Rightarrow$ As the horizon lengthens...
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Data

- Our data is drawn from Customs Import Declaration collected by Chile's National Customs Service over the 2002-2015 period.
  - $\Rightarrow$ The data covers the universe of Chilean imports, about 300,000 transactions per month.
  - $\Rightarrow$ The Customs Import Declaration contains information of each transaction shipments value (reported in USD), quantity, invoice currency, country of origin, 8 digit HS.
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Data

- Prices are proxied through two approaches.
  1. As unit values (the ratio between imports shipment value and quantity)
     - We take the median across all imports coming from the same country, and having the same invoice currency and 8 digit SITC. This is our definition of good as well.
  2. We build aggregate unit value import indices.
     - We collapse the cross-sectional variation of the data to one number.
     - We perform a related approach to Chile's National Accounts to construct imports deflators.

- Data cleaning
  - We consider non-US imports. We drop as well Chinese because of the high correlation with the USD (all the results hold whenever China is included).
  - We focus on countries with at least a one per cent share on Chilean imports. Our sample covers roughly fifty per cent of Chilean imports (the US plus China account for virtually the rest).
  - We consider transactions where the shipping and made from country are the same.

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Baseline Estimation

- We consider dynamic lag pass-through regressions conditioning on the CLP-USD nominal and the CLP-exporter country exchange rates,

$$\Delta p^{b}_{gcq} = \sum_{i=1}^{8} \beta_i^{ber} \Delta ber_{c\,q-(i-1)} + \sum_{i=1}^{8} \beta_i^{usd} \Delta usd_{q-(i-1)} + \gamma' \mathbf{x}_{cq} + \alpha_g + \alpha_c + \epsilon_{cgq} \,,$$

  - p^{b}_{gcq} is border price of good g exported from country c at quarter q (expressed in Chilean pesos).
  - *usd* and *ber* are the USD and the exporter country exchange rates.
  - $\mathbf{x}$ includes the Chilean and exporter country GDP as well as their GDP deflators.
  - All variables are expressed in logarithms.

Estimation

- Economic rationale
  - Prices are sticky in the invoicing currency (Gopinath (2015)).
    - We expect the invoice currency exchange rate to have a distinct effect on impact.
  - As the time passes by the invoicing currency should be less relevant for ERPT.
    - An exporter country currency appreciation (against the USD) shrinks mark–ups (expressed in the exporter country currency) of firms invoicing in USD, triggering upward adjustment in prices expressed in the invoicing currency.
    - An exporter country currency depreciation boosts mark–ups of exporter firms, hence increasing competition in the export market triggering downward adjustment in border prices (expressed in the invoice currency).

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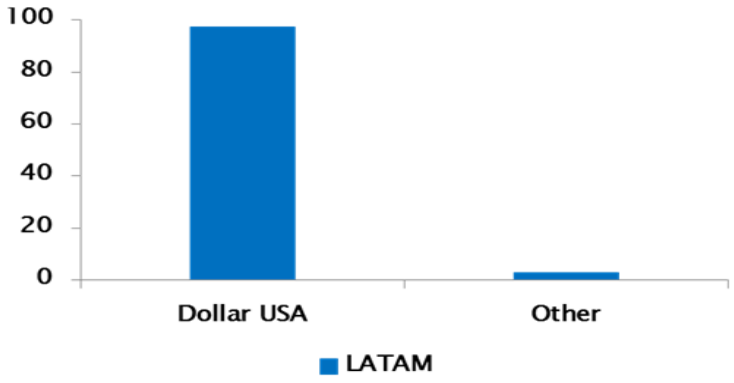
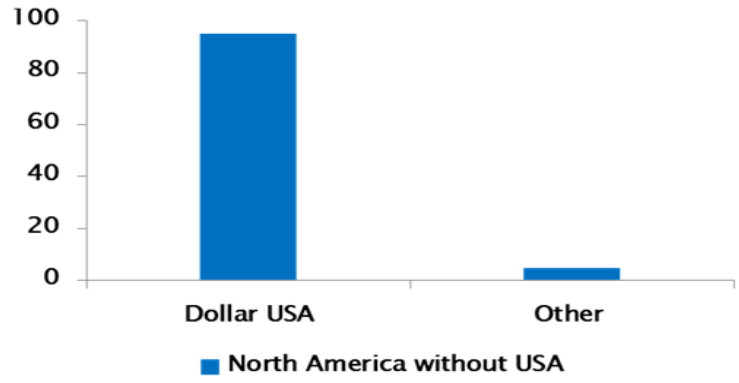
Invoice Curency Chilean Imports

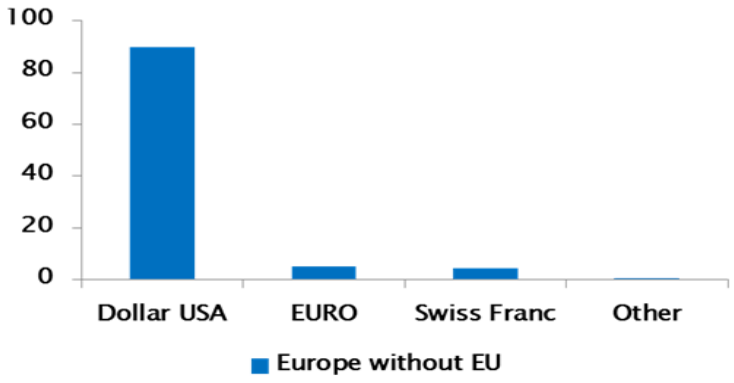
Table : Invoice Curency Chilean Imports

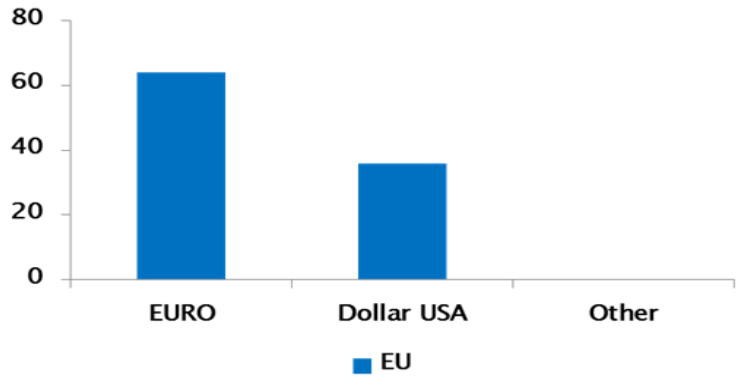
Year	USD	EUR	JPY	GBP	Other
2002	89.5	6.9	1.7	0.2	1.6
2003	88.4	8.8	1.4	0.2	1.2
2004	90.4	6.9	1.3	0.2	1.1
2005	89.7	8.0	1.2	0.2	0.8
2006	91.0	7.0	1.1	0.2	0.8
2007	91.4	6.4	1.4	0.2	0.7
2008	91.5	6.5	1.3	0.1	0.5
2009	89.8	8.6	0.8	0.1	0.6
2010	91.2	6.7	1.5	0.1	0.4
2011	91.0	7.2	1.2	0.1	0.5
2012	90.8	7.4	0.9	0.2	0.6
2013	90.1	8.1	1.1	0.2	0.5
2014	90.4	7.8	1.0	0.2	0.5
2015	90.1	7.9	1.3	0.2	0.6
Average	90.4	7.4	1.2	0.2	0.7

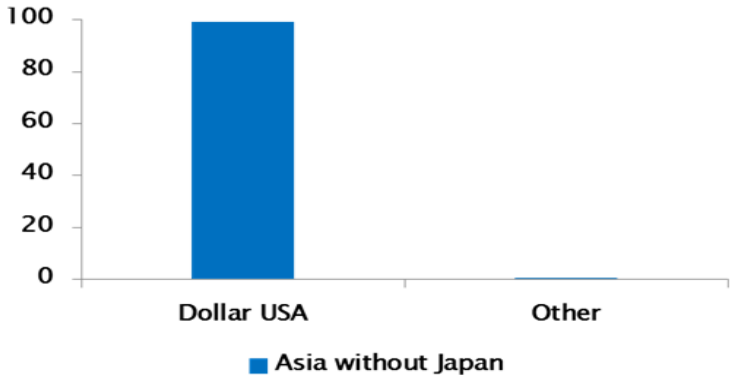
Invoice Curency Chilean Imports: By Origin

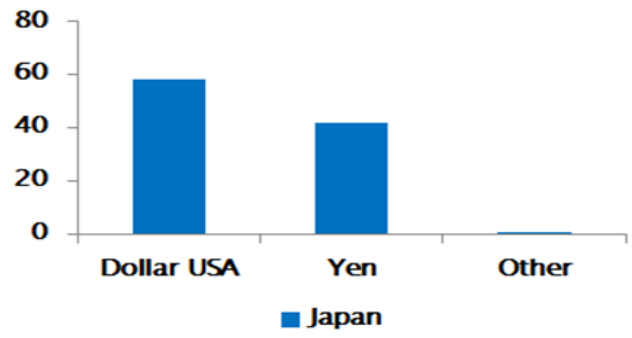




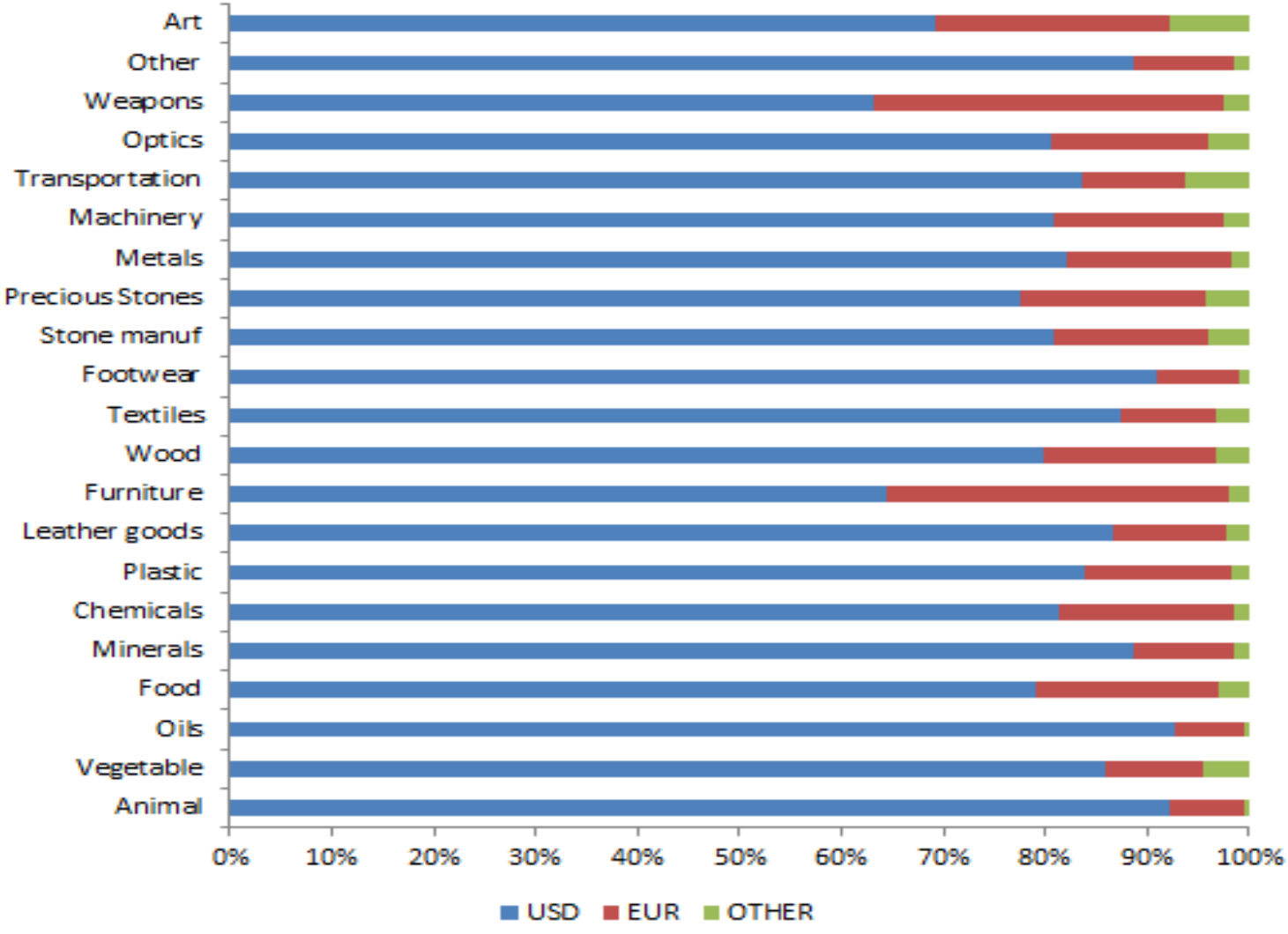








Invoice Curency Chilean Imports: By Sector



Invoice Curency Chilean Imports: Takeaways

- The invoicing currency pattern documented here is consistent with the theoretical predictions of Goldberg and Tille (2008).
  - The dominant role of the USD and to less extent the EUR is predicted by exporters from small countries being less likely to invoice in their own currencies.
- From a theoretical perspective, the overwhelming role of the USD across sectors is however tougher to rationalize.
  - The exports of industries where goods are more homogeneous should be invoiced in narrower groups of currencies, or even a single one.
  - The emergence of a common invoicing pattern might be explained by the USD been the currency with lowest transactions costs among currencies.

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ERPT Dynamics: Imports Invoiced in USD

- We first characterize the dynamics of ERPT of imports invoiced in USD.
- Our analysis is based on the reduced form model

$$\Delta p^{b}_{gcq} = \sum_{i=1}^{8} \beta_i^{ber} \Delta ber_{c\,q-(i-1)} + \sum_{i=1}^{8} \beta_i^{usd} \Delta usd_{q-(i-1)} + \gamma' \mathbf{x}_{cq} + \alpha_g + \alpha_c + \epsilon_{cgq} ,$$

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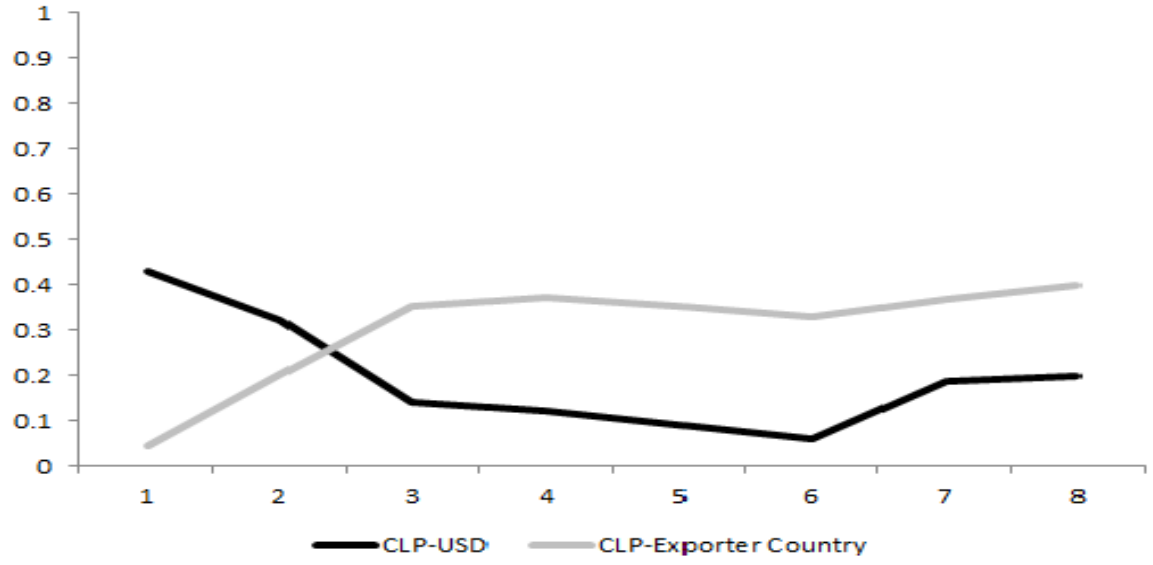

- The USD ERPT is high up-to the first two quarters. The exporter currency ERPT is low over the same horizon.

- The exporter currency ERPT takes the leading role afer two quarters. The USD ERPT becomes less relevant over the same period.
  - The high exporter currency ERPT seems counterintuitive in light of the ”Dominant Currency Hypothesis”. Next, we look at medium-term ERPT regression to look at the robustness of the result.

Medium-term ERPT According to Invoice Currency

- Countries that invoice their exports in USD as well as domestic currency let us to test assymetries in medium-term ERPT according to invoice currency,
  - We extend our analysis to medium-term ERPT by region as well as by invoice currency.

$$\begin{aligned}\Delta^{annual} p^{b}_{gcq} &= \beta^{ber}_{c}\Delta^{annual} ber_{c\,q} \times D_{ber} + \\ &+\beta^{usd}_{c}\Delta^{annual} usd_{q} \times D_{ber} + \\ &+\gamma' \mathbf{x}_{cq} + \alpha_g + \alpha_c + \epsilon_{cgq}\,,\end{aligned}$$

  - Δ^{annual} is the non-overlapped annual difference operator (difference between december against december of each year).
  - D_{ber} and D_{usd} are dummy variables indexing USD and exporter currency invoice exports.

Medium-term ERPT According to Invoice Currency: Europe and Japan

Table : Medium-term ERPT and Invoice Currency: Europe + Japan.

Currency	Invoice USD	Invoice Exporter Currency
USD (β^{usd})	0.456	-0.285
	(0.241)	(0.204)
Exporter (β^{ber})	0.475*	0.910***
	(0.197)	(0.148)
Observations	14512	

t statistics, calculated with robust standard errors, are in parentheses. ***,**, and * denote significance at the 1, 5, and 10 percent levels. respectively.

Medium-term ERPT According to Invoice Currency: Europe and Japan

Table : Medium-term ERPT and Invoice Currency: Europe + Japan.

Currency	Germany	Spain	France	Italy	Japan	UK	Sweden
Panel A: Invoice USD.							
USD (β^{usd})	−0.211	−0.282	0.840	−0.411	0.0795	0.525	1.087
	(0.497)	(0.711)	(0.708)	(0.700)	(1.256)	(1.046)	(0.794)
Exporter (β^{ber})	1.089**	1.030*	−0.326	1.684**	−0.468	0.478	-0.225
	(0.381)	(0.495)	(0.503)	(0.547)	(0.767)	(0.967)	(0.616)
Panel B: Invoice Exporter Currency.							
USD (β^{usd})	−1.158**	−0.0841	−0.439	−0.892	−0.370	−0.356	1.329
	(0.428)	(0.575)	(0.644)	(0.574)	(1.309)	(0.979)	(0.876)
Exporter (β^{ber})	1.427***	1.254***	0.761*	1.385***	-0.107	1.462	-0.941
	(0.279)	(0.312)	(0.370)	(0.419)	(0.793)	(0.876)	(0.682)
Observations	4434	2804	2423	1873	1271	896	811

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Medium-term ERPT: Countries Invoicing Just in USD

Table : Medium-term ERPT and Invoice USD: LATAM + Korea.

Currency	Invoice USD
USD (β^{usd})	0.662***
	(0.108)
Exporter (β^{ber})	0.437***
	(0.0974)
Observations	8911

Table : Medium-term ERPT and Invoice USD: LATAM Countries + Korea.

Currency	Brazil	Argentina	Peru	Mexico	Korea	Canada	Colombia
USD (β^{usd})	0.331	-0.185	-3.029**	0.650	1.300**	0.309	0.853
	(0.199)	(0.415)	(0.956)	(0.842)	(0.465)	(0.908)	(0.445)
Exporter (β^{ber})	1.146***	1.125**	5.256***	-0.367	0.551	1.072	-0.863
	(0.243)	(0.373)	(1.255)	(1.030)	(0.631)	(1.456)	(1.125)
Observations	3422	2528	736	674	599	579	373

t statistics, calculated with robust standard errors, are in parentheses. ***,**, and * denote significance at the 1, 5, and 10 percent levels. respectively.

Medium-term ERPT According to Invoice Currency: Takeaways

- When imports are invoiced in USD.
  - Pooling regressions suggest a similar role for the USD and exporter currency ERPT.
    - This result hides substantial cross-country heterogeneity.
  - When the analysis is performed country by country the exporter currency seems to be the relevant for ERPT.
- When imports are invoiced in the exporter currency.
  - There is full ERPT in such currency.
  - There is no role for the USD.

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Caveat: Unit Values

- We proxied prices through unit values.
  - ⇒ Alterman (1991) summarizes a key drawback of unit values "*They reflect not only underlying price changes, but changes in product mix as well, even at the finest level of commodity detail. For example, if there is a market shift from cheap economy cars to expensive luxury cars, the unit value of the commodity (autos) will increase, even if all prices for individual products remain constant.*"
  - ⇒ Alterman (1991) and Silver (2007) show aggregate unit values has less discrepancy with respect to import price indices than any disaggregate category of goods.
  - ⇒ Aggregate unit values is likely to mitigate some of the noise showing up at lower level of aggregation.

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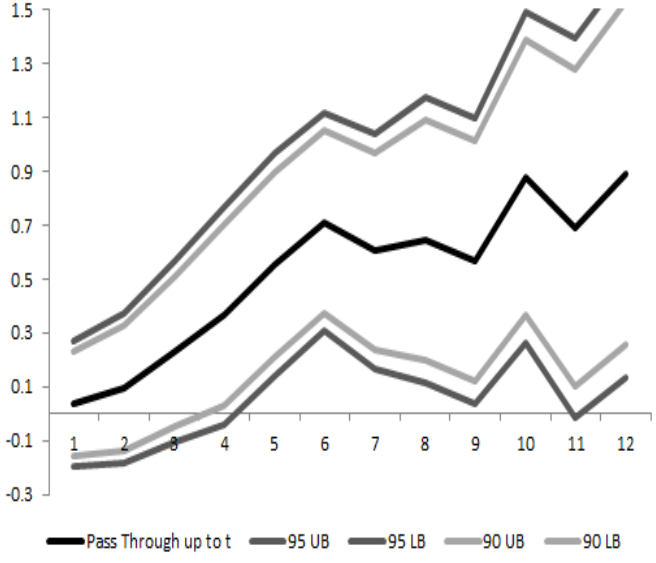
Robustness

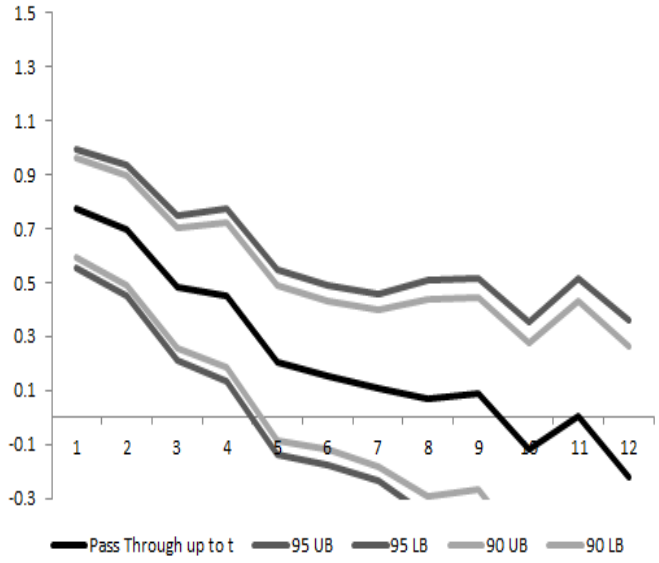
- Construction of Aggregate Unit Value Import Index
- Construction of Regional Unit Value Import Index

NEER and USD ERPT: Aggregate Evidence

NEER



Invoice Currency

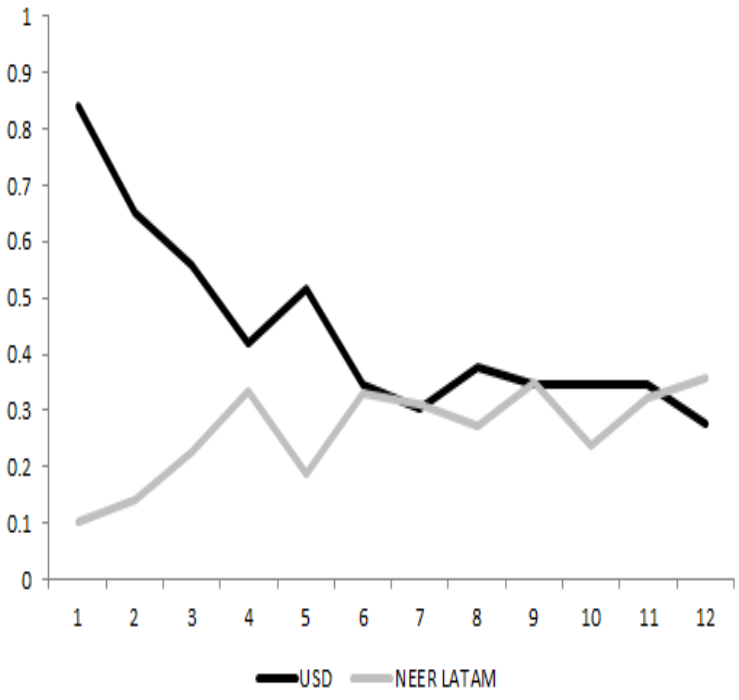


$$\Delta^{monthly} p_m^b = \sum_{i=1}^{12} \beta_i^{neer} \Delta^{monthly} neer_{m-(i-1)} + \sum_{i=1}^{12} \beta_i^{usd} \Delta^{monthly} usd_{m-(i-1)} + \gamma' \mathbf{x}_m + \epsilon_m$$

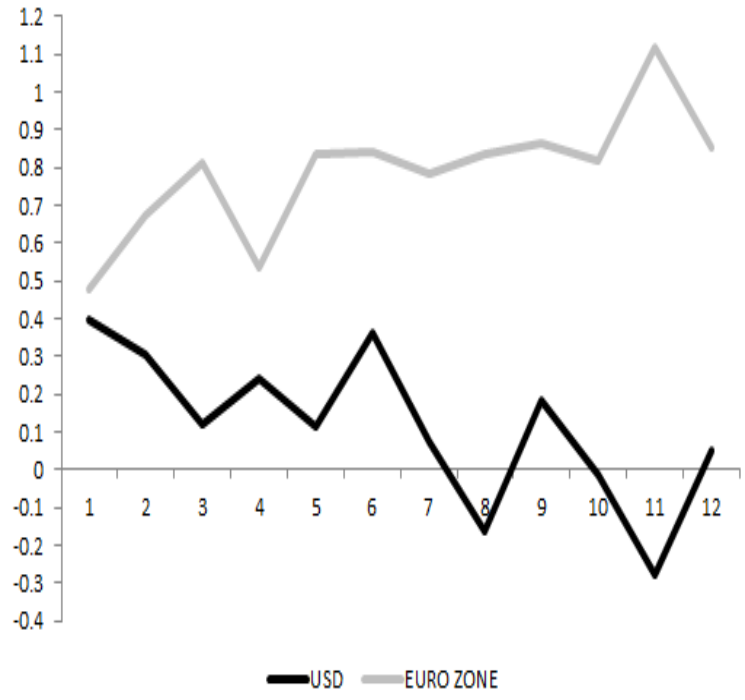
where *neer* is Chile's nominal effective exchange rate and $\mathbf{x}_m$ are the same controls as before but at monthly frequency.

NEER and USD ERPT: Regional Evidence

LATAM



EURO Zone



$$\Delta^{monthly} p^{b}_{rm} = \sum_{i=1}^{12} \beta^{neer}_{ri} \Delta^{monthly} neer_{r\,m-(i-1)} + \sum_{i=1}^{12} \beta^{usd}_{i} \Delta^{monthly} usd_{m-(i-1)} + \\ + \gamma' \mathbf{x}_{rm} + \epsilon_{rm}$$

where $neer_r$ is Chile's multilateral exchange rate wrt region r and $\mathbf{x}_m$ are the same controls as before but at monthly frequency.

Policy Implications

- Our result suggest that inflation pressures coming from NEER depreciations differ from invoice currency exchange rate depreciations.
  - $\Rightarrow$ If the domestic currency depreciates just with respect to the invoice currency, there are short-term inflation pressures derived from the invoice currency.
  - $\Rightarrow$ If rather the domestic currency weakens against the set of countries from which it imports, there will be higher prices in USD after two quarters or so.

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Outline

Conclussions

- We documented an overwhelming amount of Chilean imports are invoiced in USD regardless country and sector of origin.
- As for the USD and exporter country ERPT to border prices
  - $\Rightarrow$ Over short periods of time...
    - $\Rightarrow$ The USD exchange rate pass-through is high and quantitatively important.
    - $\Rightarrow$ The exporter country exchange rate pass-through is not statiscally different from zero.
  - $\Rightarrow$ As the horizon lengthens...
    - $\Rightarrow$ The influence of the USD decreases.
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