Import Prices and Invoice Currency: Evidence from Chile *

Fernando Giuliano †
World Bank

Emiliano Luttini ‡
Central Bank of Chile

VERY PRELIMINARY

Abstract

An overwhelming amount of Chilean imports are invoiced in USD regardless country and sector of origin. We study the role of the invoice currency in the determination of exchange rate pass-through to border prices. Our main results are as follows. The invoice currency exchange rate pass-through to border prices is close to one-to-one over short periods of time. As the horizon lengthens, the influence of the invoice currency vanishes. In regard to the nominal effective exchange rate pass-through, we find it close to zero over short periods of time. After one year, border prices move close to one-to-one with changes in the nominal effective exchange rate. The same pattern holds for a panel of countries whose trade is mostly invoiced in USD, although there is large heterogeneity across countries.

JEL: F3, F4.

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†Bouchard 547, C1106ABG CABA, Argentina. E-mail: fgiuliano@worldbank.org. Phone: (54) 11 4316 9761.

‡Agustinas 1180, Santiago, Chile. Email: eluttini@bcentral.cl. Phone: (56) 2 2670 2876

1 Introduction

The sensitivity of domestic prices to nominal exchange rate fluctuations has long been an important topic in international macroeconomics. The level and determinants of exchange rate pass-through (ERPT) have important implication for the international transmission of monetary shocks and optimal monetary policy.

A recent surge in studies on ERPT, with the help of the increasing availability of microdata, has uncovered many important patterns that were neglected in earlier literature. Two such findings are of particular interest to our study. First, the currency of invoice of imports matters for the level of ERPT. Specifically, countries where most of their imports are invoiced in foreign currency have systematically higher ERPT than countries that don't (see Gopinath (2015)). Second, ERPT differs whether prices are measured at the border (i.e. at point of entry to the country) or at the retail (i.e. consumer) level. In particular, prices at the border are more sensitive to exchange rate fluctuations than prices at the retail level (see for example Burstein et al (2003) and Burstein et.al. (2005)).

In this paper we analyze the role of the invoice currency in the determination of ERPT to border prices. We first document the currency of invoicing patterns for Chilean imports and find that most imports are invoiced in foreign currency. Despite the fact that imports from the US barely account for Chilean trade, the share imports invoiced in US Dollars (USD) reaches over 90 per cent in value. This mismatch in trade originating in the US and trade invoiced in USD is in line with previous findings for other emerging economies. Given the distinct role of the USD in Chilean imports, we distiguish ERPT to border prices according to currency. Specifically, we make a distinction between ERPT due to fluctuations in the bilateral CLP-USD nominal exchange rate (invoice currency), and due to fluctuations in the nominal effective exchange rate (NEER). This exercise is also motivated by a recurrent concern in Central Banks, namely: what exchange rate parity is relevant to identify inflation pressures, invoice currency or NEER?

The main finding of this paper is the exchange rate of interest to analyze ERPT to border prices depends on the relevant horizon. In the short run, border prices translate one-to-one with

fluctuations in the invoice currency exchange rate, whereas changes in NEER do not affect prices. As the horizon lengthens, the influence of the invoice currency vanishes, and that of the NEER increases. After one year, prices move close to one-to-one with changes in the NEER, and they do not react to the invoice currency.

The intuition behind this result is simple. Since most exports to Chile are invoiced in USD, and with prices sticky in the currency of invoice, fluctuations in the invoice currency translate almost automatically into changes in prices in CLP in the short run. In the medium run though, exporters adjust their prices to better reflect the evolution of mark-ups in their own countries, something that is better captured by changes in the NEER. To put it simple, ERPT at the border is about the currency of invoice in the short run, and is about the country of origin in the medium-long run.

This result extends to other small open economies. We test our findings using aggregate import price indexes from Australia, Canada, Colombia, Mexico, Peru, Sweden and Turkey. We conduct standard pass-through regressions, distinguishing between the invoice currency exchange rate and NEER, and find that, although there is heterogeneity across countries, the general pattern holds: prices respond to the invoice currency exchange rate in the short run and to the NEER in the long run. In both cases ERPT is high. Our paper relates to many strands of literature on international macroeconomics. It relates to papers that study the relationship between nominal and real exchange rates, that were given much attention following Musa (1986). As in Alvarez et al. (2012), we find little evidence of pricing-to-market to Chile, or, in other words, relative purchasing power parity holds at the border.

The paper is organized as follows. Section 2 briefly describes methodological aspects of our work. Section 3 explains features of our dataset. Section 4 provides features of the invoice currency of Chilean imports together with our results. Section 5 concludes.

2 Methodology

To estimate pass-through at different horizons we build from standard dynamic lag pass-through regressions of form

$$\Delta p_{jt}^{b} = \sum_{i=1}^{12} \beta_{ji}^{neer} \Delta neer_{t-(i-1)} + \gamma' \mathbf{x}_{jt} + \epsilon_{jt}\,, \tag{1}$$

where p^b is border price, *neer* the NEER, and $\mathbf{x}$ is a vector of controls (includes a weighted average of international inflation and domestic activity), all variables are expressed in logarithms and domestic currency units, j and t index the group and time dimmension of the panel. Cumulative s periods NEER pass-through is $\beta^{s\,neer} = \sum_{i=1}^{s} \beta_{ji}^{neer}$. In particular, NEER impact and long–run pass-through are $\beta^{1\,neer}$ and $\beta^{12\,neer}$, respectively. Full NEER pass-through at horizon s takes value of one.

We depart from the empirical specification 1 in a simple yet significant way. We condition the response of border prices to both the NEER and invoice currency exchange rate. The economic rationale behind this is twofold. First, for the sample of countries we have at hand, the bulk of trade is invoiced in USD, since prices are sticky in the invoicing currency (see Gopinath (2015)), we expect the invoicing nominal exchange rate to have a distinct effect on border prices on impact. As the time passes by, the invoicing currency should be less determinant for ERPT. For example, 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. On the contrary, an exporter country currency depreciation against the USD boosts mark–ups of exporter firms, hence increasing competition in the export market and triggering downward adjustment in border prices (expressed in the invoice currency). Equation 1 is augmented to accomodate response of border prices to the NEER and invoice currency on different horizons, that is

$$p_{jt}^{b} = \sum_{i=1}^{12} \beta_{ji}^{icer} \Delta icer_{t-(i-1)} + \sum_{i=1}^{12} \beta_{ji}^{neer} \Delta neer_{t-(i-1)} + \gamma' \mathbf{x}_{jt} + \epsilon_{jt} \,, \tag{2}$$

where *icer* is the invoice currency exchange rate.

3 Data

Our data is drawn from Customs Import Declaration (CID) collected by Chile's National Customs Service. The data covers the universe of Chilean imports, about 300,000 transactions per month.[1] From the CID we use information of each transaction shipments value (reported in US dollars), invoice currency, and country of origin. Our study focuses on the 2002-2015 period.

Next we discuss how we build the dependent variable, unit value import index (UVII), used for estimating Equations 1 and 2. Before then, we get into some technical issues surrounding UVIIs.

3.1 Unit Value Import Indices

This study focuses on aggregate UVII. Casas et al. (2016) study a similar research question but using disaggregate UVII. We motivate our level of aggregation by earlier studies documenting the accuracy of UVII to proxy import price indices (IPI). Alterman (1991) summarizes a key drawback of UVII

"*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.*"

In terms of discrepancy between UVII and IPI, the previous study and Silver (2007) show that

[1] Official aggregate statistics on Chilean trade are built upon the same dataset.

aggregate UVII perform better than any disaggregate category of goods. In this regard, aggregate UVII is likely to mitigate some of the noise showing up at lower level of aggregation.

We construct monthly aggregate UVII for Chile using the CID.[2] We follow the same approach as the Central Bank of Chile (see Méndez, 2007). The basic unit of analysis in the construction of UVII is the code-country pair. We treat two observations with the same 8-digit code and shipped from the same country as corresponding to the same item. Even though the 8-digit classification system is very detailed for international standards, we still encounter heterogeneity within codes that may generate spurious price variations. To deal with this, we restrict the universe of imports to consumption goods that are homogeneous, or that have a low coefficient of variation of unit values (i.e. CV: 0.5) within each 8-digit code category. We also exclude items with price variation anomalies that probably originate in errors in the reported unit scale (for example, reported in thousands of units when should be reported in units), and other price outliers.

4 Results

4.1 Chile's Imports Invoice curency

Most of Chile's imports are denominated in USD. Table 1 documents the share of imports invoiced in USD, Euros (EUR), Japanese Yen (JPY), British Pound (GBP), and other currencies over time. On average 90 per cent of Chilean imports are denominated in USD.[3] This is consistent with evidence presented by Gopinath (2015) for other emerging economies.

Chilean imports are invoiced in USD regardless country of origin, except for countries in the Eurozone. Figure 1 shows the invoice currency by region of origin. For example, European countries not in the European Union also heavily invoiced in the USD. 98 per cent of imports from Mercosur, 97 per cent of imports from the rest of Latin America, and 99 per cent of imports from Asia (excluding Japan) are denominated in USD. Two-thirds of German exports to Chile are invoiced in

[2]Given the scope of this article, we limit the sample to goods included in the CPI. This excludes imports of intermediate inputs and capital goods.

[3]Similar conclussions may be achieved if we rather consider the share of total inbound transactions in Chilean customs.

EUR. But even in Germany, about a third of exports to Chile are invoiced in USD.

The second most used currency is the EUR, in a far second place, which in 2014 accounted for 14 per cent of transactions and 8 per cent of the value of imports. The EUR is used mostly in imports originating in the Eurozone, but it also has minor share in imports originating from Mercosur (1.2 per cent), European countries not in the European Union (5.1 per cent), Africa (7.4 per cent), and the Middle East (2.7 per cent). Japan, Great Britain and Switzerland also invoice a non-negligible share of their exports to Chile in their own currencies. Their overall impact on Chilean invoice stats is small: the GBP has a 0.8 per cent share in shipping and 0.3 per cent in value and the JPY a 0.6 per cent and 1.7 per cent. The invoicing currency pattern documented here is consistent with the theoretical predictions of Goldberg and Tille (2008). More concretely, 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.

The preeminence of USD holds across sectors. Figure 2 shows the invoice currency by region of origin. If we define a sector according to a 4-digit HS classification, there were over 1100 sectors represented in Chilean imports in 2014. About 10 per cent of those sectors traded exclusively in USD, and in 93 per cent of them the USD accounts for over half of imports. From a theoretical perspective, the overwhelming role of the USD across sectors is however tougher to rationalize. The emergence of a common invoicing pattern might be explained by the USD been the currency with lowest transactions costs among currencies.

Finally, no imports in Chile are invoiced in domestic currency units. This is an extreme version of a feature also found in most emerging economies: Most of international trade in such countries is invoiced in foreign currency. This is true for most of the years in our sample. In a few years (between 2002 and 2005) there are some recorded transactions in CLP, but they amount to less than 0.1 per cent of total imports.

4.2 NEER Pass-through

For Chile NEER Pass-through is high and stable over short- and long-horizons. Figure 3 shows the cumulative pass-through of a NEER depreciation to UVII. We find a high short-term pass-through, a 1 per cent NEER depreciation passes-through .84 to UVII. Moreover, NEER pass-throgh is stable over time. One year after, a 1 per cent NEER depreciation passes-through .78 to UVII. Our result is consistent with those of Gopinath (2015). For a sample of thirty-five developed and developing countries. This author finds that countries with high short-run pass-through have high long-run pass-through.

4.3 NEER and Invoice Currency Exchange Rate Pass-through

We study the NEER and invoice currency exchange rate pass-through to UVII at short and long horizons. Border prices are key to understand how external prices transfer to domestic ones. Quantifying the NEER and invoice currency exchange rate pass-through to UVII at short and long horizons is an important issues for policy makers. Using Colombian data Casas et al. (2017) document an strong role for the invoice currency at short- and long-horizons. We provide evidence for the Chilean economy that goes in the opposite direction.

NEER and invoice currency exchange rate pass-through to UVII are different from each other in a noticeable way. Figure 4 shows the estimates of Equation 2. Over short-horizons the invoice currency exchange rate pass-through to UVII is high, about 1, while the NEER pass-through is not distiguishable from 0. As time elapses the initial pattern is reversed. The invoice currency exchange rate pass-through to UVII becomes negligible whereas the NEER pass-through becomes relevant. That is, while in the short term the invoice currency exchange rate pass-through to UVII is key, in the long term what matters is the exchange rate with respect to the countries origin of imports.

The intuition behind this result is simple. At the time of NEER changes, transactions are already agreed upon. Thus, by construction fluctuations in the invoice currency are the sole relevant to short term pass-through to domestic currency UVII. However, given that about 80 per cent of imports come from countries other than the invoice currency, in longer horizons the behavior of

the currency of those countries with respect to the peso is crucial. In particular, either exporters adjust their prices to reflect the evolution of mark-ups in their own countries or importers change the country-source of their imports. The latter should be reflected in lower UVII measured in the invoice currency. To study this hypothesis we estimate Equation 2 using UVII in USD (instead of local currency) as a dependent variable. The result of this exercise, as shown in Figure 5, bring support to our previous hypothesis. Taken together, these results seem consistent with an important short-run nominal friction that quickly lessens over time.

As for monetary policy our result suggest that inflationary pressures coming from NEER as opposed to an invoice currency depreciation are different. If the domestic currency depreciates solely with respect to the invoice currency, there are short-term inflationary pressures derived from the invoice currency. If rather the domestic currency weakens against the set of countries from which Chile imports, and will imply higher prices in dollars whose effect will be felt after one or two quarters.

5 Robustness

Results hold for a panel of countries which primarily invoice their trade in USD (countries picked from Gopinath 2015). TO BE COMPLETED

6 Closing Remarks

The analysis of exchange rate pass-through to border prices is key to understanding inflationary pressures in response to domestic currency depreciation. We presented evidence that inflationary pressures derived from changes on the NEER differs from those derived from the invoice currency. Specifically, a depreciation against the invoice currency presents inflationary pressures over short-lived periods. On the contrary, a NEER depreciation does not entail pass-through over short periods of time, but it fully passes-throuhg to border prices after a year.

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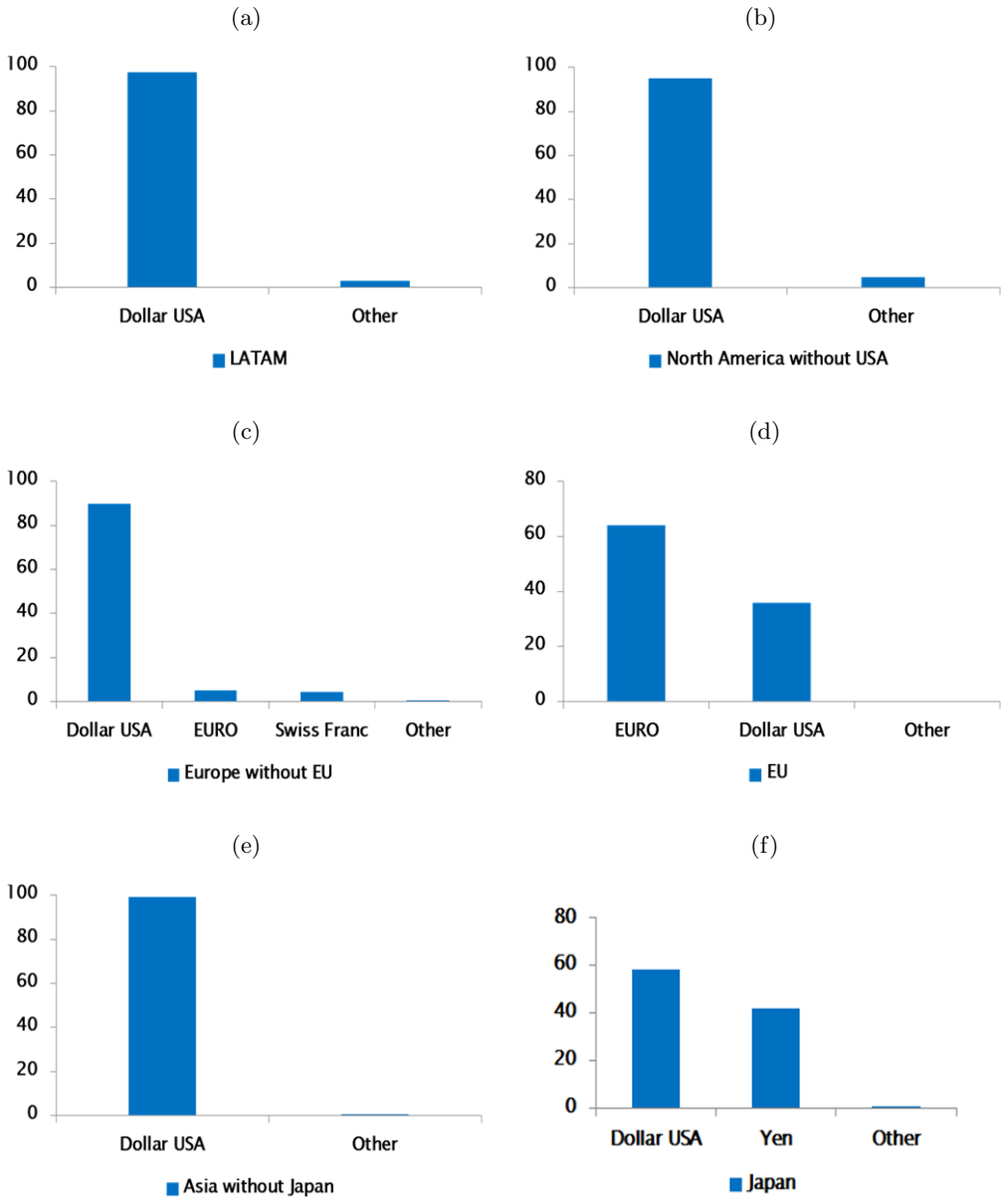
Table 1: Invoice Curency of Chilean Imports

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

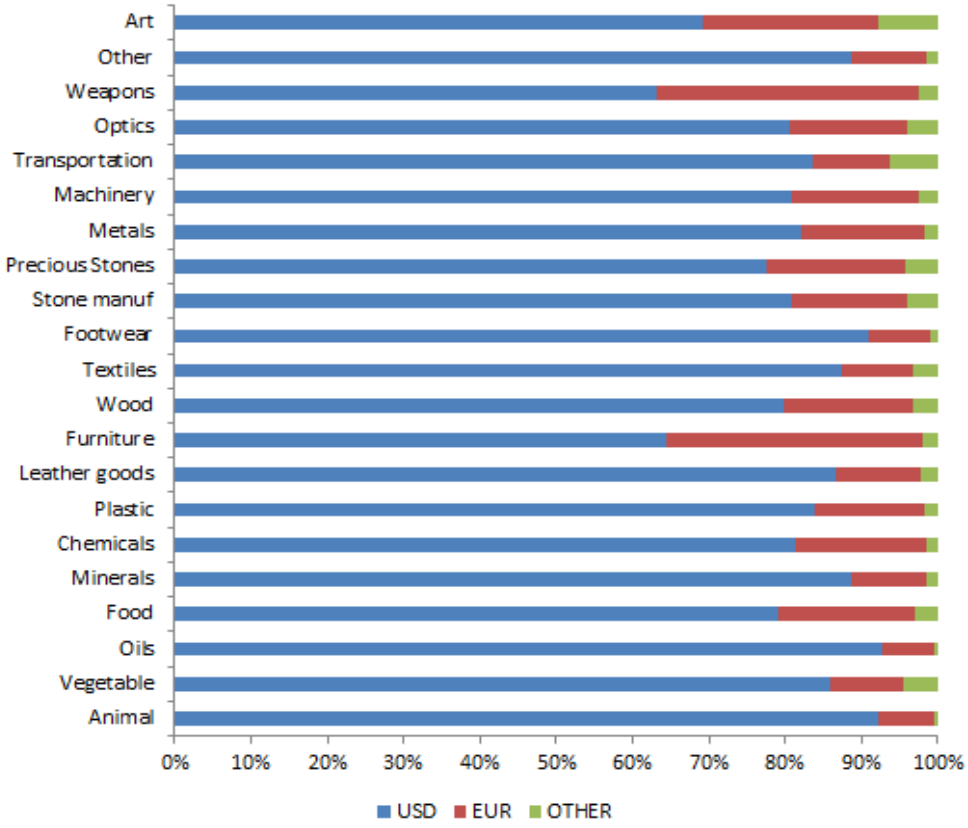
Notes: To be added.

Figure 1: Invoice Curency of Chilean Imports by Origin.



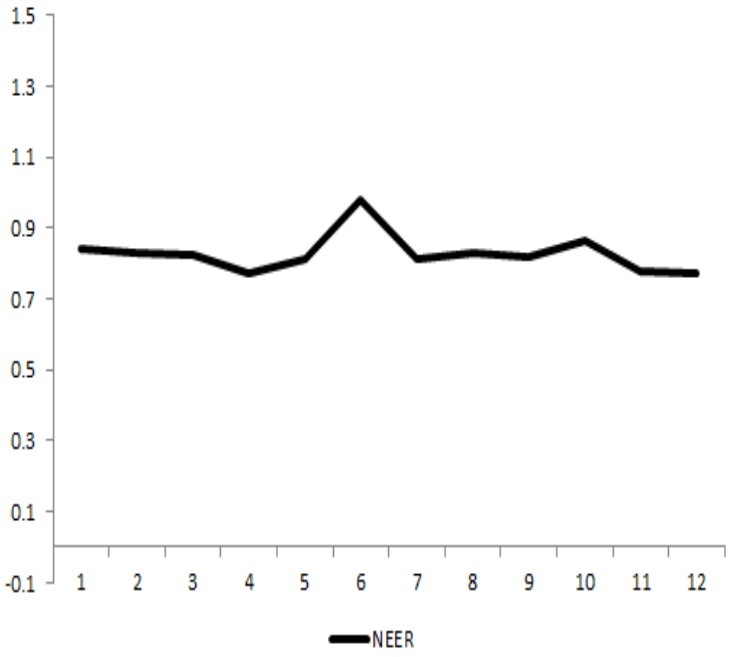
Notes: To be added.

Figure 2: Invoice Curency of Chilean Imports by Sector.



Notes: To be added.

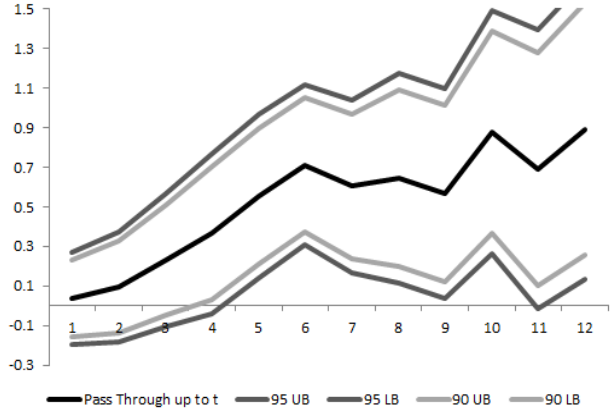
Figure 3: NEER Pass-through to Unit Value Import Index.



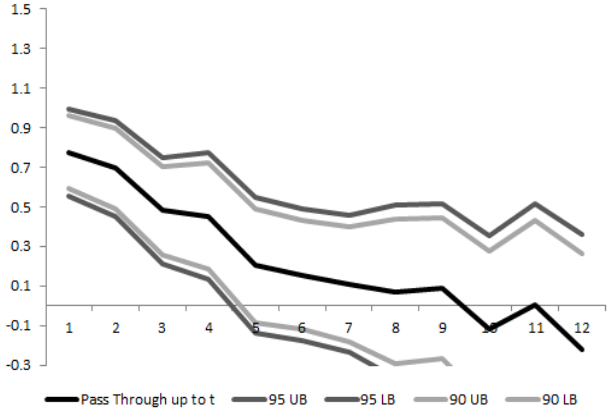
Notes: To be added.

Figure 4: NEER and Invoice Currency Exchange Rate Pass-through to Unit Value Import Index in CLP.

(a) NEER

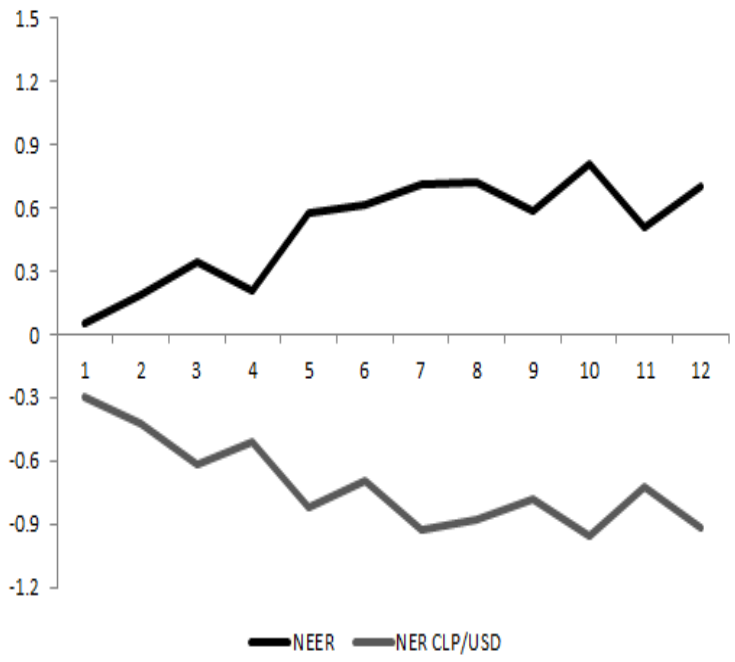


(b) Invoice Currency



Notes: To be added.

Figure 5: NEER and Invoice Currency Exchange Rate Pass-through to Unit Value Import Index in USD.



Notes: To be added.