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Exchange Rate Pass-Through into Vietnamese Import Prices by Industries and by Countries

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Abstract: This study analyzes the Exchange Rate Pass-Through (ERPT) into the prices of Vietnam's major import commodities in 5 industries including electric machinery; machinery and mechanical appliances; iron and steel; plastics; transport equipment. The monthly data from Jan. 2007-Dec. 2015 is used in the fixed effect model regression at the HS-6 digit level (or 9 digit level) and is aggregated into the HS-4 digit level. By comparing the behaviors of 7 major trading partners, namely China, Japan, EU-28, Republic of Korea, Singapore, Thailand and Taiwan, the results reveal that the degree of ERPT into each selected HS 4-digit-level commodity is different among partners. Not only the US dollar but also other currencies such as JPY, CNY, SGD and EUR are proved to be invoicing currencies. Therefore, besides implementing methods to prevent exchange rate risks for VND/USD, Vietnamese importers should also take care of the movement of the exchange rate of VND/SGD, VND/CNY, VND/JPY and VND/EUR. This evidence may have important implications for exchange rate policy makers of Vietnam. According to results drawn from trade statistics, VND should be pegged to a currency basket including USD, JPY, CNY, SGD and EUR.

Key words: Exchange rate pass-through, price-to-market, import prices, industry, Vietnam

INTRODUCTION

Since Doi moi reform, Vietnam has dramatically integrated into the regional and global economies. WTO accession in 2007 marked a remarkable highlight in trade relationships between Vietnam and its partners. Up to now, many bilateral and multilateral free trade area agreements have been signed such as Vietnam-Japan EPA (Economic Partnership Agreement), Vietnam-Korea FTA, Vietnam-EU FTA, ASEAN Economic Community. The international trade flow is forecast to be extremely large, however it should be noted that this trend will not only bring opportunities but also challenges and difficulties to the Vietnam economy in general and domestic enterprises in particular. There will certainly be a huge change in the correlation between VND and the currencies of Vietnam's trading partners. Transmission of uncertainties from outside into the domestic economy is expected to increase significantly.

In this context, it is necessary to determine which currencies are used in invoices when Vietnam imports commodities from abroad. We use the trade data of Vietnam's major partners including Japan, China, Republic of Korea, EU-28, Taiwan, Singapore and Thailand to estimate the degree of exchange rate pass-through into import prices (Table 1). Our empirical evidence is expected to provide Vietnamese importers with helpful information to prevent exchange rate risks. Moreover, it also proposes suitable exchange rate policy.

Literature review: Exchange Rate Pass Through (ERPT) has never been an old issue and is still being investigated by scholars, both from theoretical and practical perspectives.

Theoretically, ERPT is the percentage change in destination currency import prices caused by a one percent change in the exchange rate of the exporter's currency vis-a-vis the importer's currency (Goldberg and Knetter, 1997). Thus, the 1-1 reaction of import prices to exchange rate fluctuations (i.e., 1% change in exchange rate causes 1% change in import prices) is called full pass-through while a smaller degree of import price's reaction to exchange rate changes is called less pass-through. If the exchange rate fluctuation has no effect on the import price, it is called no pass-through.

Most studies of exchange rate pass-through explore the relationship between exchange rates and import

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Table 1: Vietnam's import good value by countries (2007-2015); US dollar trillion

Countries	2007	2008	2009	2010	2011	2012	2013	2014	2015
China	12.710	15.970	16.670	20.20	24.87	29.03	36.89	43.65	49.44
Republic of Korea	5.340	7.260	6.980	9.76	13.18	15.54	20.68	21.73	27.58
Japan	6.190	8.240	7.470	9.02	10.40	11.60	11.56	12.86	14.18
Taipei, Chinese	6.950	8.360	6.250	6.98	8.56	8.53	9.40	11.06	10.94
EU-28	5.150	5.570	5.870	6.38	7.76	8.78	9.42	8.84	10.32
Thailand	3.740	4.910	4.510	5.60	6.38	5.79	6.28	7.05	8.27
Singapore	7.610	9.380	4.250	4.10	6.39	6.69	5.69	6.83	6.03
United States of America	1.700	2.650	3.020	3.78	4.56	4.84	5.24	6.29	7.79

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prices based on the exporter's point of view such as Knetter (1992) and Gil-Pareja (2002). Other studies approach the problem from the importer's point of view (Feenstra, 1989) or from both sides (Parson and Sato, 2006). In this study, we investigate the degree of exchange rate pass-through by looking at the exporter's side.

From the exporter's point of view, the relationship between export price fluctuations (calculated in the exporter's currency) and the bilateral nominal exchange rate change is usually determined by the monopolist's profit maximization strategy, known as an evidence of Pricing to Market behavior (PTM). The PTM Theory, first introduced by Krugman (1986), argues that most markets in the world are imperfect competition and separated from each other, so, firms with market power in a segmented market are able to price discriminate between domestic and foreign markets. Such behavior is based on competitive conditions in foreign markets, so, that is termed "pricing to market".

PTM is considered to depend on exporter's pricing behavior which is the difference between the exporter's currency price and the marginal cost. The higher the pricing is than marginal cost, the greater the PTM probability will be and the smaller ERPT is. If there is no pricing to market behavior, import prices will be adjusted with the same proportion as the change in exchange rate and ERPT is complete. On the other hand, if PTM is complete (i.e., exporters adjust the price in their currencies by the same rate as the exchange rate change but in the opposite direction), exchange rate pass-through into local currency import prices is zero. ERPT is said to be incomplete when the adjustment of price is smaller than the degree of exchange rate shock (Ghosh and Rajan, 2007).

In the case where exporters aim at increasing or at least maintaining the competitiveness, they may change domestic-currency prices in order to limit the change in foreign currency prices. For example, when the domestic currency appreciates, the export price would increase, however, the exporters cut their domestic-currency prices, so that, foreign currency prices will not increase. When the foreign currency price remains unchanged, the PTM is complete or ERPT is zero. On the other hand when exporters have achieved a stable level of market share in foreign markets, it is not really necessary to implement PTM behavior (Marston, 1990). In this case, foreign currency price fluctuates along with the exchange rate shocks, ERPT is high or even complete.

In international business, the price discrimination of exporters is also expressed by the choice of currency for payment. Exporters can choose the Producer's Currency (PCP), Local Currency (LCP) or the currency of another country (Vehicle Currency Pricing-VCP). In order to minimize risk and maximize profit, exporters usually choose the PCP payment. In this case, exporters face demand uncertainty because they do not know how many goods will be bought by importers. However, importers bear the fluctuation of prices, so that exchange rate pass-through to import prices is high (Kamps (2006). The choice of invoicing currency is proved to depend on market structure of the importing country. When the exporter is a large country, the choice of PCP is common. Conversely, if a small country sells its products in a perfectly competitive market with little or no market segmentation, prices will be set at international prices (because small countries are price takers) and the invoicing currency is usually a strong international currency such as the the US dollar. Consequently, it is difficult to find a link between the export price (calculated by the exporter's currency) and the bilateral exchange rate between currencies of two countries.

Empirically, although the number of works on exchange rate pass-through is quite massive, most of them focus only on the cases of the United States and industrialized nations in Western Europe. Studies on ERPT of Asian countries have also been limited within the more developed countries in Northeast Asia (such as Japan, Republic of Korea and China) while researches on this issue in less developed countries including Vietnam are relatively rare.

It is quite easy to make a list of studies on ERPT in Vietnam such as Minh (2009), Hang and Thanh (2010), Trang and Cuong (2012), Tho and Trang (2016), however, all of them investigate exchange rate pass-through at the

macro level and the results do not provide details at industry or commodity level. So far, only the researches by Nhung (2010, 2014) use data of disaggregated goods at HS-9 digit level to examine Japanese exporter's exchange rate pass-through behavior into Vietnamese import prices.

Applying this micro level approach, we employ the data of 7 major trading partners of Vietnam including China, Korea, Singapore, Taiwan, Thailand, EU-28 and Japan to compare exporter's exchange rate pass-through behavior into each selected HS-4 digit level commodity. Besides, the results provide more information for Vietnamese importers not only to implement exchange rate risk prevention strategies for currencies used in invoices but also to select suitable exporters which help to minimize business risks. Moreover, information about the currencies used in trade relation between selected countries is particularly helpful to Vietnamese exchange rate policy makers.

MATERIALS AND METHODS

Analytical framework: With the fixed effect model regression applied by Nhung (2010, 2014), we use the data at a highly disaggregated HS 6-digit level (Japannese data at HS 9-digit level) to estimate ERPT into import prices:

$$\Delta \ln P_{ijt} = \alpha + \beta_1 \Delta \ln E_{jt} + \beta_2 \Delta \ln PPI_{ijt} + \beta_3 \Delta \ln IPI_t + \varepsilon_{it} \quad (1)$$

Where:

Δ = The first-difference operator
α = A commodity fixed effect
ε = An error term
P = The export price
E = The bilateral nominal exchange rate of the exporter's currency vis-a-vis the importer's currency
PPI = The Producer Price Index of exporting country (a proxy fo the exporter's marginal cost)
IPI = The Idustrial Poduction Idex of importing country (a proxy for the destination market demand)

i = 1, ..., M, j = 1, ..., N, t = 1, ..., T, respectively indicate the commodity of exports, exporting countries and time. In Eq. 1, only the value of β_1 is of concern. β_1 is a pass-through coefficient at the HS 4-digit level. The common slope pass-through coefficients gained from pooling all commodities at the HS 6-digit level (or HS 9-digit level) for each of HS 4-digit classifications is evaluated which gives us more accurate information on the exporter's behavior at an industry level. The goal of this study is to investigate the exporter's behavior, so the following specification is employed:

Table 2: The priors for tests to estimate pass-through coefficients

Eq. 2 $E^{TPR/VND}$	Eq. 3 $E^{TPR/USD}$	Values
No pass-through (PTM in VND)	No pass-through (PTM in USD)	$\beta_1 = 1$
Incomplete pass-through	Incomplete pass-through	$0<\beta_1<1$
Full pass-through	Full pass-through	$\beta_1 = 0$

The first column shows the hypothesis of coefficient β_1 in Eq. 2 and 3

$$\Delta \ln P_{ijt} = \alpha + \beta_1 \Delta \ln E^{TPR/VND}{}_t + \beta_2 \Delta \ln PPI_{ijt} + \beta_3 \Delta \ln IPI^{VND}{}_t + \varepsilon_{it} \quad (2)$$

Where:

P = The export currency price
$E^{TPR/VND}$ = The bilateral nominal exchange rate of each trading partner's currency vis-a-vis VND
PPI = The Producer Price Index of Vietnam's trading partners (calculated by their currencies)
IPI^{VND} = The Industrial Production Index of Vietnam (in VND)

If the null hypothesis of $\beta_1 = 0$ cannot be rejected, it would imply that exporters fully pass-through exchange rate fluctuations to Vietnamese importers. If β_1 is significantly positive and above 0, ERPT is incomplete. When, β_1 is closer to unity, exporters tend to stabilize the export price in VND. $\beta_1 = 1$ may suggest "no pass-through" or Pricing-To-Market (PTM) in Vietnam dong.

In fact, the US dollar is a strong currency and is commonly used as an invoicing currency in trade between countries, especially East Asia countries. Exporters may conduct PTM not in Vietnam dong but in a third currency such as the US dollar. Therefore, we need to use the bilateral nominal exchange rate of each trading partner's currency vis-a-vis USD to examine exchange rate pass-through into Vietnam's import prices through Eq. 3:

$$\Delta \ln P_{ijt} = \alpha + \beta_1 \Delta \ln E^{TPR/USD}{}_t + \beta_2 \Delta \ln PPI_{ijt} + \beta_3 \Delta \ln IPI^{VND}{}_t + \varepsilon_{it} \quad (3)$$

Where $E^{TPR/USD}$ is the bilateral nominal exchange rate of each trading partner's currency vis-a-vis USD. This equation is employed to analyze whether the US dollar (a third currency) is used as the invoicing currency in Vietnam's imports. Similarly, if the null hypothesis of $\beta_1 = 0$ cannot be rejected, this may imply that exporters fully pass-through exchange rate changes to Vietnamese importers. $\beta_1 = 1$ may suggest "no pass-through" or PTM in USD. The estimate of β_1 in both Eq. 2 and 3 can be interpreted in Table 2.

RESULTS AND DISCUSSION

Empirical analysis

Data description: We use monthly disaggregated commodity data for the period of Jan 2007-Dec 2015, at the HS-6 digit level (HS-9 digit level for Japanese data).

P (export prices): Although, this study aims to investigate exchange rate pass-through to import prices, goods import data is not available on the website of the Vietnam Customs, so, the data of export goods from partners is employed instead. Specifically, the trade data of Japan, EU-28 and Taiwan is published on the website of the Japan Customs, Eurostat, Korea International Trade Association and Taiwan Custom Administration, Ministry of Finance. The data of China, Singapore and Thailand is taken from www.trademap.org. Unit values are calculated by dividing each export value by its export volume in a consistent way for each commodity.

E: The bilateral nominal exchange rates (vis-a-vis the US dollar) are taken from the IMF International Financial Statistics. We then calculate the cross rate, i.e., the bilateral exchange rate of each currency vis-a-vis Vietnam dong.

PPI: The producer price index for each commodity of Japan, China, EU-28, Republic of Korea, Singapore, Taiwan and Thailand is respectively obtained from the website of the Bank of Japan (2010 = 100), CEIC database (2005 =100); Eurostat (2010 = 100); Economic Statistics System, The Bank of Korea (2010 = 100); Department Statistics Singapore (2012=100); Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. (Taiwan) (2011 = 100); Bureau of Trade and Economic Thailand (2010 = 100).

IPI: The industrial production index of Vietnam is drawn from the CEIC database (2010 = 100).

After checking the stationary of dependent and independent variables, using the Augmented Dickey Fuller (ADF), we found that almost every variable is non-stationary in level but stationary in first differences. Thus, the first-differenced form of the ERPT equation is employed. All commodities are selected based on the following criteria. First, we choose the top five imported categories of Vietnam including electric machinery; machinery and mechanical appliances; iron and steel; plastics and transport equipment (Table 3). Second, we choose all commodities, having a relatively large volume of transactions, being imported from at least two countries (We use the data of at least 2 countries in order to compare degree of exporter's exchange rate pass-through behaviours) and having not more than 9 missing data in the whole sample. The original dataset includes a larger number of commodities at the HS 6-digit level (HS 9 digit-level for Japan) and a broader range of HS 4-digit industry classifications.

The results of the pass-through coefficients at the HS 4-digital classifications are presented in the Appendix (Table 4-8).

Results and interpretation: For the first group (a) plastics (Table 4), the US dollar is proved to be widely used as the invoicing currency. Therefore, Vietnamese enterprises should apply methods to prevent risks caused by VND/USD fluctuations when importing commodities of this group. However, for three commodities including 3901, 3902 and 3907, the result reveals that Singaporean exporters tend to highly pass through and the US dollar appears absent from invoicing. It is necessary to care about VND/SGD shocks if Singapore is selected as exporter. In addition, the results also provide more information to help make the selection of trading partners easier. Specifically, for commodities 3904 and 3920, importing from Taiwan, Vietnamese enterprises would have to face less exchange rate risks because Taiwan's exchange rate pass-through coefficient is the lowest among statistically significant results. Even though, it is important to consider the quality of goods when choosing between Korea, Thailand or Taiwan. Meanwhile, for commodity 3907, selection of a Korean is considered to be better than one from Thailand.

As mentioned before, SGD is proved to be used as the invoicing currency, along with the US dollar for group (a). However, for the second group (b) iron and steel, only the US dollar plays a dominant role (Table 5). Besides, the null hypothesis cannot be rejected in both Eq. 2 and 3 for commodities 7216 and 7219, so, we do not

Table 3: Proportion of Vietnam's major import commodities; (%)

HS-2	Description	2007	2008	2009	2010	2011	2012	2013	2014	2015
85	Electric machinery	9.55	9.37	11.86	11.78	13.480	20.18	23.80	23.05	25.25
84	Machinery and mechanical appliances	13.98	13.79	14.27	13.57	12.370	11.16	11.17	11.60	12.74
39	Plastics	5.70	5.32	5.78	6.40	6.300	6.26	6.45	6.57	5.98
72	Iron and steel	8.96	9.64	8.79	8.41	7.200	6.63	6.13	6.28	5.26
87	Transport equipment	2.81	3.13	3.61	2.72	2.280	1.51	1.43	2.15	3.27
	Total	41.01	41.26	44.31	42.88	41.630	45.740	48.98	49.66	52.50

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Table 4: Estimates of pass-through coefficients across countries for group (a) plastics

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
3901	Polymers of ethylene in primary forms	Republic of Korea	0.298	0.218	0.405*	0.233
		Taiwan	-0.020	0.491	-0.698	0.611
		Thailand	0.793	1.050	0.406***	1.221
		Singapore	0.387***	0.405	0.243	0.488
3902	Polymers of propylene in primary forms	Republic of Korea	-0.149	0.145	-0.131	0.155
		Taiwan	-0.450	0.277	-0.932***	0.342
		Thailand	0.015	0.772	-0.202	0.898
		Singapore	0.385**	1.020	1.233	1.225
3903	Polymers of styrene in primary forms	Republic of Korea	0.254	0.219	0.209	0.234
		Taiwan	-0.804	0.489	-1.109*	0.609
		Thailand	0.436	0.896	0.621**	1.043
		Singapore	1.066	0.958	1.324	1.153
3904	Polymers of vinyl chloride in primary forms	Republic of Korea	0.585	0.760	0.330***	0.810
		Taiwan	1.143	0.734	1.929**	0.911
		Thailand	0.517	1.132	0.818***	1.341
3906	Acrylic polymers in primary forms	Taiwan	0.269	0.717	0.776	0.894
		Thailand	0.130	1.122	1.606	1.318
		Singapore	-0.578	0.774	-1.151	0.931
3907	Polyacetals, other polyethers, epoxide resins in primary forms	Republic of Korea	0.988	0.246	1.168***	0.261
		Taiwan	0.069	0.304	-0.195	0.379
		Thailand	-0.272	0.565	0.286**	0.660
		Singapore	0.004**	0.865	1.394	1.040
3909	Amino, phenolic resins in primary forms	Taiwan	-0.785	0.555	-0.391	0.694
		Thailand	-0.107	0.859	0.085***	1.000
		Singapore	-0.174	1.706	1.214	2.058
3917	Tubes, pipes and hoses and fittings therefor	Republic of Korea	1.019	1.997	1.017	2.132
		Taiwan	-1.358	2.865	-3.443	2.820
		Thailand	-3.319	2.500	-2.798	2.085
3919	Self-adhesive plates, sheets and other flat shapes of plastics	Republic of Korea	0.133	0.684	-0.241	0.730
		Taiwan	1.252	2.004	1.483	2.501
		Thailand	0.480	1.025	-0.500	1.193
		Singapore	-2.427	2.844	0.340	2.475
3920	Plates, sheets of non-cellular plastics not reinforced	Republic of Korea	0.117	0.829	0.154**	0.885
		Taiwan	0.293	1.487	0.243***	1.856
		Thailand	0.219	0.618	0.122***	0.723
		Singapore	1.409	1.515	2.177	1.859
3921	Plates, sheets of plastics, cellular plastic, unworked or merely surface-worked	Republic of Korea	-1.440	0.972	-1.181**	1.031
		Taiwan	0.270	2.018	-0.052	2.518
		Thailand	1.198	1.700	1.571	1.982
3923	Articles for packaging of goods of plastics	Republic of Korea	0.801	1.014	0.979**	1.083
		Taiwan	0.971	1.053	1.013	1.314
		Thailand	0.729	1.044	1.280	1.212
3926	Articles of plastics and other materials of 3901-3914	Republic of Korea	0.699	1.517	0.604***	1.620
		Taiwan	-1.791	2.461	-2.239	2.070
		Thailand	-1.500	1.731	-2.831	2.009

Table 5: Estimates of pass-through coefficients across countries for group (b) iron and steel

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
7208	Flat-rolld products of iron, width > = 600 mm, h not clad	China	2.408	2.178	2.466*	3.781
		Republic of Korea	-2.373	2.624	0.216**	2.806
7210	Flat-rolled products of iron, wiidth > = 600 mm, clad, plated or coated	China	0.038	1.077	0.849**	2.109
		Republic of Korea	2.107	1.767	0.157*	1.320
7216	Angles, shapes and sections of iron	China	0.921	1.857	4.476	2.563
		Republic of Korea	4.546	1.773	5.295	1.620
7217	Wire of iron or non-alloy steel	China	-0.435	0.648	0.711*	1.276
		Republic of Korea	3.667	2.448	0.396**	2.625
		Japan	0.218	0.861	-0.241	0.913
7219	Flat-rolled products of stainless steel, width >= 600 mm	China	-1.305	1.940	0.744	0.806
		Republic of Korea	1.254	1.686	1.330	1.105

Table 6: Estimates of pass-through coefficients across countries for group (c) machinary and mechanical appliances

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
8409	Part for use solely/principally with the motor engines	China	-0.600	1.407	-0.647	2.754
		Japan	-1.323	1.529	-2.766*	1.598
		EU-28	-1.448	2.360	-1.379	2.482
8413	Pumps for liquids; liquid elevators	China	0.701***	2.257	-5.799	2.302
		Republic of Korea	2.553	2.766	2.283	2.130
		Japan	0.941*	2.089	1.143	2.191
		Taiwan	0.345	3.003	3.844	2.105
		Singapore	-2.330	1.832	-6.993	2.091
		EU-28	-2.366	1.667	-2.221	1.797
8414	Air, vacuum pumps; hoods incorp a fan	China	2.997	3.414	-2.907	2.661
		Republic of Korea	4.499	4.330	4.830	4.699
		Japan	0.619**	1.538	1.051*	1.607
		Taiwan	-0.451	2.327	-3.960	3.951
		Thailand	-5.099	4.466	-3.461	2.285
		Singapore	-7.488	4.757	-5.114	2.774
		EU-28	0.049	1.312	0.254***	1.414
8415	Air conditioning machines with motor-driven elements	China	4.675	4.268	9.937	8.317
		Republic of Korea	-1.709	2.695	-3.661	2.348
		Japan	0.343**	2.645	0.025	2.745
		Thailand	-0.844	1.122	0.445**	1.329
8418	Refrigerator, freezer	China	4.852	3.160	6.016	2.192
		Republic of Korea	3.372	2.483	3.008***	2.670
		Taiwan	2.251	4.467	3.238	7.592
		EU-28	-0.784	1.885	0.254**	2.031
8419	Machinery, plant or laboratory equipment	China	4.499	2.811	-1.773**	1.328
		Republic of Korea	-5.016	5.840	-5.973	2.259
		Japan	1.672	1.295	1.314	1.359
		Taiwan	2.957	2.644	6.346	4.488
		EU-28	-0.430	1.361	0.564***	1.467
8421	Centrifuges, filtering/purifying machinery	China	0.469***	6.030	-7.149	1.723
		Republic of Korea	0.646	2.014	1.042**	2.394
		Japan	0.184	0.936	0.286	0.980
		Taiwan	-0.965	2.545	-1.856	2.325
		Singapore	6.234	3.894	6.351	3.174
		EU-28	-0.902	1.366	-0.815	1.472
8424	Mechanical appliance for proj/dispersing/spray	China	1.849	3.496	2.863	2.813
		Republic of Korea	-1.716	1.537	0.388***	2.016
		Japan	0.098***	2.846	0.198	2.982
		Taiwan	-0.849	1.428	0.739**	2.820
		Thailand	-0.798	2.658	0.845***	2.892
		Singapore	1.107	1.963	2.165	1.613
		EU-28	-2.279	2.737	-1.887	2.946
8428	Lifting, handling, loading or unloading machinery	Republic of Korea	-0.510	2.943	-1.372	2.452
		Japan	0.009	1.861	0.054***	1.947
		Taiwan	1.326	2.578	4.203	2.776
		EU-28	-1.051**	1.260	-1.229**	1.603
8431	Machinery part usded for 84.25-84.30	China	-0.437	2.846	-0.312	1.567
		Republic of Korea	3.157	2.726	2.744	2.016
		Taiwan	-0.398	3.194	2.343	2.426
		Thailand	1.511	2.222	1.369	2.311
		EU-28	-0.782	1.437	-0.517	1.549
8448	Auxiliary machinery	China	3.192	3.667	0.266***	2.326
		Republic of Korea	-0.737	2.067	0.053	1.372
		Japan	-4.453*	2.610	-4.196	2.737
		Taiwan	-1.394	2.629	-0.144	1.469
		EU-28	0.450	2.361	-0.162	2.545
8451	Machinery for washing/clean/ironing/impreg tex yam	China	-1.535	2.722	-2.277	2.211
		Republic of Korea	0.784	1.172	0.228**	1.410
		Japan	0.035	2.719	0.297	2.836
		Taiwan	1.984	2.976	5.837	2.052
		EU-28	4.404	2.713	4.574	2.925
8452	Sewing machine and furniture	China	-1.525	1.959	3.172	3.811
		Republic of Korea	2.062	2.013	2.610*	2.304
		Japan	0.291	1.085	0.938**	1.138
		Taiwan	-0.481	2.758	-6.996	1.436
		Singapore	-1.523	2.716	0.366	2.796
		EU-28	-7.515*	2.493	-6.457	2.733
8453	Machinery for preparing, working hide, leather or reparing footwear	China	-4.104	2.004	4.585	1.690
		Republic of Korea	-0.437	2.241	-0.069	2.554

Table 6: Continue

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
		Taiwan	1.744	1.650	1.394**	2.798
8465	Mach-tool for working wood/cork/bone/hard rubber	China	-1.149	2.665	5.773	2.339
		Japan	2.777	3.215	3.462	3.378
		Taiwan	-2.794	1.745	-1.364	2.971
8466	Machinery parts and accessories for 84.56-84.65	China	-0.249	2.561	0.054**	2.874
		Republic of Korea	3.968	2.545	5.828*	2.936
		Japan	2.006	2.414	1.796	2.530
		Taiwan	1.160	3.804	2.620	2.462
		EU-28	-2.715	3.383	-3.674	3.643
8467	Tool with self-containd non-elec motor	China	-2.739	2.596	-4.779	4.824
		Japan	1.221	1.217	0.994	1.277
		Taiwan	-2.963	3.721	0.960**	1.342
8471	Automatic data processing machines,optical reader	China	4.068	4.566	-2.884	2.940
		Republic of Korea	-1.752	4.826	-4.399	2.193
		Taiwan	3.889	1.216	0.753***	2.177
		Singapore	3.294	2.062	5.184**	2.493
		EU-28	4.038	3.141	0.839**	2.395
8477	Machinery for working rubber, plastic	China	4.142**	3.202	4.802	2.255
		Republic of Korea	0.040	2.518	0.372***	2.938
		Japan	0.990	2.133	0.504**	2.234
		Taiwan	3.039	2.413	1.295*	2.104
8479	Machines, appliances having individual functions	Republic of Korea	-0.346	2.797	0.377**	2.152
		Japan	-0.079	1.604	-0.144	1.681
		Taiwan	-0.104	3.213	-0.639	2.459
		EU-28	1.936	1.943	2.353	2.094
8480	Moulding boxe for metal foundry	China	3.885	3.704	-1.748	2.035
		Republic of Korea	-3.344	2.144	-3.481	2.455
		Japan	-1.132	1.558	-0.250	1.635
		Taiwan	-2.398	2.422	1.499	1.119
		Thailand	3.432	3.933	3.750	2.670
8481	Tap, cock, valve for pipe, tank	China	2.658	2.578	0.142**	2.983
		Republic of Korea	0.360	2.345	0.803***	2.671
		Japan	0.612	0.864	0.885***	0.904
		Taiwan	2.464	2.375	1.626*	2.038
		Thailand	-2.031	1.826	-1.485	2.152
		Singapore	-0.429	2.688	1.901	2.895
		EU-28	3.459**	1.539	3.264	1.660
8482	Ball or roller bearings	China	2.841	3.845	-4.601	7.504
		Republic of Korea	0.323	2.805	0.189*	2.090
		Japan	0.194	1.160	0.426***	1.217
		Taiwan	3.263	3.726	3.926	2.336
		Thailand	0.121	2.032	2.122	2.409
8483	Transmission shafts, cranks, gearing	China	-0.730	3.030	0.903***	1.936
		Republic of Korea	-1.408	2.481	-1.631***	1.886
		Japan	1.084	1.178	0.623	1.233
		Taiwan	-3.769	2.431	3.200	1.012
		Thailand	2.029	2.056	1.012**	2.437
		EU-28	-1.047	2.272	0.179**	2.452
8484	Gaskets combined with other material	Japan	-1.164	2.817	0.905	2.952
		Taiwan	1.332	2.854	3.817	2.925
		Thailand	2.109	3.817	2.785	2.521
		EU-28	-1.462	3.026	0.525***	3.258

Table 7: Estimates of pass-through coefficients across countries for group (d) electric machinery

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
	Electric motors and generators	China	0.596	1.929	0.668***	3.781
		Republic of Korea	-4.661	4.725	-4.700	2.987
		Japan	-0.089	1.689	1.736**	1.788
		Taiwan	1.658	2.523	0.838***	2.122
		Singapore	6.213	2.616	0.811*	1.066
		EU-28	-1.398	3.089	-3.680	3.407
8504	Electric transformer, static converter	China	1.585	2.531	0.042***	2.928
		Japan	0.425	1.295	0.411	1.373
		Taiwan	6.756	2.293	5.692	2.707
		Thailand	0.368	2.700	0.149***	2.198
		Singapore	-2.774	2.576	0.552**	2.757

Table 7: Continue

HS-4	Code description	Countries	$E^{TPR/VND}$ β_1	$E^{TPR/VND}$ SE	$E^{TPR/USD}$ β_1	$E^{TPR/USD}$ SE
		EU-28	0.369	1.860	0.315**	2.059
8507	Electric accumulator	China	-6.926	2.742	0.098**	1.222
		Thailand	2.487	2.727	3.461	3.233
		Singapore	-2.853	1.912	-5.446	3.848
8511	Electrical ignition or starting equipment	China	-0.564	4.413	-7.486	8.581
		Japan	-2.097	1.644	-1.345	1.746
		Thailand	1.834	1.482	2.074	1.760
8514	Industrial, laboratory electric furnaces and ovens	China	0.249	2.179	0.042***	2.032
		Taiwan	-7.348	3.835	3.779	3.852
		EU-28	-0.983	2.573	-2.091	2.839
8515	Electric, laser/photon beam/plasma arc solderg	China	7.706	5.450	6.728	1.575
		Republic of Korea	3.808	3.897	0.381**	2.136
		Japan	-0.672	2.206	0.199***	2.330
		Taiwan	-3.142	5.409	0.597*	1.937
8516	Electric instantaneous water heater, hair dryer	China	-1.500	1.789	0.465**	3.529
		Republic of Korea	1.613	2.747	1.674	2.111
		Thailand	-0.260	1.337	-0.434	1.579
		Singapore	0.212	2.022	0.499	2.521
		EU-28	-0.943	3.033	0.224***	3.351
8518	Microphones and stands, loudspeaker	China	-0.136	1.829	1.355***	3.561
		Republic of Korea	-0.789	3.328	-1.196	3.523
		Singapore	2.241	3.315	0.280**	1.156
8529	Part suitable for use with recpt appliance televisions,	China	4.502	2.692	5.876	2.263
		Japan	0.822	0.663	1.477**	0.697
		Thailand	-0.422	3.287	0.401***	3.892
		EU-28	-1.243	3.729	-4.060	2.111
8531	Machinery part usded for 84.25-84.30	Republic of Korea	1.812	5.633	0.732***	2.940
		Singapore	0.612	1.146	0.771***	1.774
		EU-28	-0.807	3.851	0.021*	2.254
8532	Electrical capacitors, fixed, variable or adjustable	China	0.567	2.132	-0.805	2.143
		Republic of Korea	-2.595	5.829	-2.508	2.208
		Japan	0.257	1.572	-0.707	1.665
		Taiwan	0.265	4.063	-0.116	2.213
		Singapore	-1.116	2.003	0.413**	0.519
8536	Electrical app for switchg not exceeding1000 Volt	China	5.515	3.841	-2.529	2.496
		Republic of Korea	1.172	1.980	0.935**	2.096
		Japan	0.476	0.381	0.891**	0.403
		Taiwan	0.561	2.846	0.667***	2.751
		Thailand	-0.188	0.984	0.053**	1.165
		EU-28	1.240	1.064	0.806	1.176
8539	Electric filament or discharge lamps	China	-0.022	0.046	0.954**	2.090
		Japan	1.922	3.682	1.738	3.899
		Taiwan	-3.723	2.258	-1.631	1.771
		Thailand	-1.593	2.818	-0.263	3.350
		EU-28	1.138	2.626	0.094***	2.909
8541	Diodes/transistors and similar semiconductor devices	China	1.675	2.197	0.685**	1.929
		Japan	0.551	0.738	0.889	0.781
		Taiwan	6.026	2.865	0.486*	1.895
		Singapore	-1.487	2.874	0.189**	3.633
8544	Insulated wire, cable	China	0.824	1.339	0.938***	2.615
		Republic of Korea	-0.566	3.724	-1.026	3.955
		Japan	-1.589	1.935	-1.398	2.010
		Taiwan	2.454	2.195	-0.232	4.443
		Thailand	-0.978	1.095	-1.310	1.304
		Singapore	2.761	2.393	1.490	3.024
		EU-28	-0.743	2.172	0.095*	2.396

* at 10%; ** at 5%; *** at 1%, β_1 denotes the common pass-through coefficient for each HS 4-digit level, 'SE' the Standard Errors. $E^{TPR/VND}$, $E^{TPR/USD}$ is the bilateral nominal exchange rate of each trading partner's currency vis-a-vis VND and USD

have enough evidence to make conclusions about these commodities. For the rest, it is better for Vietnamese importers to choose China as partner.

Next, for the group (c) machinery and mechanical appliances, we get inconsistent results. Although, the US dollar is still widely used in invoices, CNY, JPY and EUR also appear in trade relations between Vietnam and China, Japan, EU-28. Exchange rate risk prevention methods are necessary for VND/CNY, VND/JPY and VND/EUR. Moreover, it is noticeable that China is not the preferential

Table 8: Estimates of pass-through coefficients across countries for group (e) transport equipment

			$E^{TPR/VND}$		$E^{TPR/USD}$	
HS-4	Code description	Countries	β_1	SE	β_1	SE
(e) Transport equipment						
8704	Trucks, motor vehicles for the transport of goods	China	0.476**	1.744	-1.014	3.398
		Republic of Korea	-0.953	2.651	-0.190	2.050
		Japan	0.562	0.348	0.294	0.370
8708	Parts and accessories of 8701-8705	China	2.512	1.643	3.504	3.205
		Republic of Korea	1.691	3.052	0.571**	3.253
		Japan	0.552**	0.240	0.714***	0.254
8714	Parts and accessories of 8711-8713	China	0.581***	1.490	-1.320	2.916
		Japan	0.335	1.429	0.528	1.496
		Thailand	0.450	2.396	1.281*	2.812

* at 10%; ** at 5%; *** at 1%, β_1 denotes the common pass-through coefficient for each HS 4-digit level, 'SE' the Standard Errors. $E^{TPR/VND}$, $E^{TPR/USD}$ is the bilateral nominal exchange rate of each trading partner's currency vis-a-vis VND and USD

choice for this group. Among partners, Japan exporters tend to exchange rate pass-through at least to import prices of commodities 8413 and 8482. Similarly, it is best to import from Thailand for commodities 8424, 8483, Taiwan for 8477, 8481, Republic of Korea for 8418, 8452, 8466 and Singapore for commodity 8471 (Table 6).

Results drawn from the fourth group (d), electric machinery, proves that the US dollar is the dominant currency because the null hypothesis for all commodities in this group cannot be rejected in Eq. 2 while almost every value of statistically significant coefficient β_1 in Eq. 3 is between zero and one (Table 7). For commodities 8501, 8529, it is ideal to import from Japan, 8504, 8531 from Singapore, 8515 from Taiwan, 8536 from Republic of Korea and for commodities 8516, 8518, 8539, 8541, 8544, Vietnamese importers should choose China as exporter.

For the last group (e) transport equipment (Table 8), both USD and CNY are invoicing currencies, yet there is not enough evidence for Vietnamese importers to choose whether China, Japan or others as partner is the best.

CONCLUSION

Beside the US dollar, other currencies including JPY, CNY, SGD and EUR have also been used in invoices when Vietnam imports goods from abroad. Therefore, Vietnamese enterprises should not only be concerned about VND/USD exchange rate shocks but also apply appropriate methods to prevent risks caused by exchange rate fluctuations of VND/USD, VND/CNY, VND/JPY, VND/SGD and VND/EUR. In terms of exchange rate management in order to limit exchange rate risks which may impact on Vietnamese importers, it is necessary for VND to be pegged with a basket of currencies including USD, JPY, CNY, SGD and EUR.

Although, the regression results of the five groups are not the same, there is a common conclusion that the US dollar has been widely used as the invoicing currency in almost every selected commodity. This suggests that the proportion of USD in the currency basket may be relatively high. However, the specific proportion of USD as well as other remaining currencies needs to be further investigated.

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