Is remittance cost a driver of trade misinvoicing? A case study of Vietnam

Quang Phu Tran

Department of Training Management, Ho Chi Minh National Academy of Politics, Hanoi, Vietnam

Abstract

Purpose – This study aims to investigate the impact of remittance costs on trade-based money laundering (TBML) and provide insights into the relationship between remittance costs and TBML, particularly focusing on import over-invoicing and low-income trade partners.

Design/methodology/approach – Utilizing an extended gravity model for TBML, bilateral data from Vietnam spanning 2011 to 2019 are analyzed to examine the correlation between remittance costs and TBML.

Findings – The study reveals a positive association between remittance costs and TBML, highlighting the significance of reducing remittance costs to curb TBML.

Research limitations/implications – The research is limited by the availability of data and focuses solely on Vietnam, implying potential variations in other contexts.

Practical implications – Policymakers should consider reducing remittance costs as a strategy to combat TBML effectively.

Social implications – Lowering remittance costs could contribute to the prevention of illicit financial activities, fostering economic stability and social development.

Originality/value – This study provides novel insights into the relationship between remittance costs and TBML, offering valuable implications for policy formulation and anti-money laundering (ML) efforts.

Keywords Capital flight, Remittance cost policy, Trade misinvoicing, Vietnam

Paper type Research paper

1. Introduction

The cost of remittances can significantly influence money laundering (ML) and trade misinvoicing, particularly in developing countries where these phenomena are prevalent. High remittance costs can incentivize individuals and businesses to seek alternative, often illegal, methods to transfer money across borders, thereby exacerbating capital flight and trade misinvoicing. Trade misinvoicing, a common method for illicit financial flows, involves the deliberate manipulation of trade invoices to move unrecorded capital out of a country. This practice is often driven by the desire to evade taxes or circumvent capital controls, and high remittance costs can further motivate such behavior (Nitsch and Peter, 2012; Dujava and Siranova, 2017). For instance, in less-developed countries (LDCs), stringent regulatory controls on trade and payments, coupled with high remittance costs, can lead to a thriving

black market for foreign exchange and increased capital flight (Biswas and Marjit, 2005).
Empirical studies have shown that trade misinvoicing is a significant component of ML, with
substantial amounts of unrecorded capital flows being detected in developing countries over
extended periods (Geda and Yimer, 2016). The presence of high remittance costs can
exacerbate these flows by making legal channels less attractive. In the context of China–
Africa trade, for example, trade misinvoicing has been linked to tax evasion and capital
flight, with high remittance costs potentially contributing to the persistence of these issues
(Ndoricimpa and Araral, 2024). Similarly, in India, ML through trade misinvoicing has been
substantial, with high remittance costs likely playing a role in the acceleration of these
outflows since 2004 (Jha and Truong, 2014). The impact of high remittance costs is also
evident in Pakistan, where historical reliance on high tariffs and non-tariff barriers has led to
significant trade misinvoicing, further compounded by the costs associated with legal
remittance channels (Qureshi and Mahmood, 2016). In Zimbabwe, political and
macroeconomic instability, coupled with high remittance costs, has led to increased
capital flight through trade misinvoicing, particularly in the export of valuable commodities
like diamonds, gold, and nickel (Kwaramba *et al.*, 2016). Hence, there is a need for
comprehensive research into the relationship between remittance costs and trade
misinvoicing.

Literature has highlighted the issue of money laundering (ML) through remittances.
Remittances represent a significant source of foreign exchange income for developing
nations, with countries like Vietnam relying heavily on these flows as a major component of
external capital. Recorded remittance flows have experienced rapid growth globally,
reaching approximately USD 530 billion in 2018, compared to USD 345 billion in 2010 (World
Bank, 2019). However, these figures likely underestimate the true magnitude of remittances,
as a substantial portion of transfers occur through informal channels that may be associated
with money laundering activities. While transaction costs may pose minimal issues for large
financial flows such as international trade, foreign direct investment, and development
assistance, they are often disproportionately high for remittances (Ahmed *et al.*, 2021).
Remittance service providers typically charge fees ranging from 10% to 15% of the
remittance amount to handle the relatively small transactions sent by impoverished
migrants, potentially driving transactions towards informal channels (Freund and
Spatafora, 2008).

Countries with limited capacity and less effective legal frameworks are often involved in
ML. While the banking system was traditionally viewed as a key avenue for money
laundering activities, there has been a shift towards non-bank financial institutions,
including currency exchange bureaus and remittance agencies (De Boyrie *et al.*, 2005). ML
activities also extend to a wide range of commercial intermediaries, involving the mingling of
legitimate and illegitimate funds, the use of loan-back arrangements, and the layering of
multiple transactions through offshore shell companies. As financial intermediaries are
required to report suspicious transactions, ML activities have diversified into various
sectors, such as illicit trade. The trade-based ML mechanism is particularly attractive due to
the sheer volume of transactions and the absence of advanced computer software, making it
difficult for authorities to detect anomalies in import and export pricing.

Vietnam's unique combination of geographical, social, economic, and legal factors indeed
creates a conducive environment for money laundering activities. Geographically, Vietnam
shares extensive borders with Cambodia, China, and Laos, which are also predominantly
cash-based economies. This geographical proximity facilitates the easy movement of cash
across borders, making it challenging for law enforcement agencies to monitor and control
illicit financial flows effectively (Huyen, 2019). Socially, Vietnam's status as a transnational
hub for various illicit activities, including drug trafficking and human trafficking, further
exacerbates the problem. The country's location near the Golden Triangle, a major opium

production area, has led to increased drug-related crimes, which often involve significant amounts of money that need to be laundered (Huyen, 2019). Economically, Vietnam is one of the fastest-growing countries in Southeast Asia, driven by robust economic development and a pro-business climate that attracts both domestic and foreign investments (Brown, 2014). However, this rapid growth has not been matched by a corresponding strengthening of the legal framework. The country's legal and institutional structures are often described as weak and plagued by issues such as corruption, poor governance, and a lack of stringent regulatory measures (Truong, 2013). This weak legal framework serves as a catalyst for money laundering, as it provides ample opportunities for criminals to exploit loopholes and engage in illicit financial activities with minimal risk of detection or prosecution (Le, 2014). The banking sector, which plays a crucial role in anti-money laundering (AML) efforts, is also affected by these systemic weaknesses. Despite the existence of AML regulations, their implementation is often hindered by inadequate enforcement and a lack of coordination among various stakeholders (Huyen, 2019; Toan, 2022). Furthermore, the stock market in Vietnam is susceptible to fraudulent activities due to internal collusion, weak market management, and insufficient penalties for violations, which can also be exploited for money laundering purposes (Nguyen *et al.*, 2020). The combination of these factors—geographical advantages for cross-border cash movement, social issues related to transnational crimes, rapid economic growth, and a weak legal framework—creates fertile ground for money laundering activities in Vietnam.

While the present analysis of ML in Vietnam has concentrated on the legal aspect (Le, 2013, 2014), the related risks (Ba and Huynh, 2018), and ML detection for the banking system (Cao and Do, 2012), disentangling the impact of remittance cost on trade misinvoicing has not been explored. Hence, the aim of this paper is to investigate the influence of remittance costs on the money outflow from Vietnam to her trading partners through trade misinvoicing. In addition, we examined whether this relationship is varied across income groups.

To analyze trade misinvoicing, we utilized HS2 trade data spanning from 2011 to 2019, obtained from the United Nations Commodity Trade Statistics Database (UN COMTRADE). The selected time frame is based on the availability of remittance cost data. Our empirical findings reveal that high remittance costs facilitate trade misinvoicing. Additionally, we highlight that this influence is notably heightened in the recent years and in the case of import over-invoicing, especially evident in Vietnam's trade with low-income and lower-middle-income countries. The novelty of our research lies in our attempt to quantify trade misinvoicing and investigate the relationship between remittance cost and trade misinvoicing within Vietnam, a transitioning economy. By employing bilateral data, we are able to control for bilateral factors that could impact the remittance cost-trade misinvoicing nexus, a feature not present in the current literature.

The rest of the paper is organized as follows: Section 2 discusses data description. Section 3 develops the model specification. Section 4 discusses the estimation results. Section 5 is the conclusion.

2. Literature review and hypothesis development

2.1 Remittance cost

For many years, specialized financial enterprises have been increasingly involved in providing specific services such as money remittance (MR), foreign currency exchange (CE), and managing means of payment for various entities. The globalization of financial markets and advancements in information technology have facilitated the movement of funds globally, thereby fostering the expansion of these specialized financial services. Criminals seeking to move, conceal, and utilize funds derived from illegal activities must find ways to launder these funds discreetly, evading detection by law enforcement and authorities. Given

the array of products and services offered, the diverse distribution channels, the rapid transfer speeds, and the frequent reliance on cash transactions, the MR/CE sector presents significant opportunities for money laundering unless appropriate safeguards are implemented. Specific risks associated with this sector include not only the potential misuse of MR/CE businesses for money laundering but also the ownership of such businesses by criminal organizations and the collusion of corrupt employees with criminals.

Remittances are typically transmitted through either formal or informal means. Informal remittances refer to money transfer services conducted without formal contracts, thereby often escaping inclusion in national accounts. Formal channels encompass money transfer services provided by banks, postal banks, non-bank financial entities, foreign exchange bureaus, and money transfer operators (MTOs) such as Western Union and MoneyGram. Informal channels, on the other hand, involve cash transfers facilitated by personal relationships through entrepreneurs, unofficial courier firms, acquaintances, relatives, or self-arranged methods. Understanding how to reduce the expenses associated with sending remittances is a matter of great interest for both scholars and policymakers due to the significant role remittances play in the economies of developing nations (Beck and Martínez Pería, 2011; Ratha *et al.*, 2018). While transaction costs are generally inconsequential for large-scale financial transactions like international trade, foreign direct investment (FDI), or development aid, they pose a significant challenge for remittance transfers. In contrast to these larger transactions, the fees charged by formal remittance service providers often constitute a notable percentage, typically ranging from 10% to 15% of the transferred amount, particularly for the modest sums typically sent by low-income migrants. This high cost places a financial burden on both the migrant sending the remittance and the recipient, who ultimately receives a reduced amount from their overseas family member's earnings. On the supply side, major international banks typically prioritize high-value remittance services over those catering to migrant workers. Moreover, disadvantaged immigrants may be reluctant to use banks for remittance services, preferring instead smaller financial institutions, money transfer operators, or informal channels like the hawala system, relatives, friends, or transport companies. Reducing the cost of remittance transactions stands as a critical policy objective, with potential benefits including an increased formal economic contribution of remittances, improved financial inclusion, and augmented net income for recipient households. High transaction costs deter migrants from sending money through formal channels. Conversely, substantial official transaction expenses incentivize migrants to opt for informal channels with lower transaction costs, especially the trade-misinvoicing channel.

The cost of remittances plays a crucial role in determining the volume and channels through which remittances are sent, with significant implications for both the sending and receiving economies. High transaction costs are a major deterrent for migrants, often leading them to use informal channels to remit money, which can undermine financial inclusion and reduce the net income of receiving households (Ahmed and Martínez-Zarzoso, 2016). Reducing these costs is a key policy objective and part of the 2030 Sustainable Development Goals, as it can bring remittances into the formal economy, thereby enhancing financial inclusion and increasing the net income of receiving households (Ahmed *et al.*, 2021). Empirical evidence suggests that a 1% decrease in the cost of remitting USD 200 leads to about a 1.6% increase in remittances, highlighting the significant impact of transaction costs on the volume of formal remittances. Additionally, factors such as migrant stock, exchange rate stability in the recipient country, and financial development in both the recipient and sending countries also drive remittance flows (Ahmed *et al.*, 2021). The consequences of high remittance costs extend beyond the volume of remittances; they also affect the macroeconomic stability and development potential of recipient countries. For instance, remittances can stabilize private consumption and shelter economies from various shocks,

but this effect diminishes with higher levels of remittance inflows and financial development (Ebeke, 2011). Moreover, remittances can have a contractionary or expansionary effect on the recipient economy depending on whether they accrue to hand-to-mouth wage earners or credit-constrained entrepreneurs, respectively (Buyukkarabacak *et al.*, 2017). High remittance costs can exacerbate these dynamics by limiting the amount of money that reaches the most productive uses. Furthermore, remittances can influence public policy by reducing the insurance role played by government consumption in more open economies and affecting fiscal policies, particularly in countries with governance issues (Ebeke, 2011). The macroeconomic effects of remittances also include potential increases in inflation, consumption, and leisure, but these benefits can be offset by a prolonged decline in GDP if remittances are not effectively channeled into productive investments (Bahadir *et al.*, 2018).

2.2 Trade misinvoicing
Trade misinvoicing refers to the manipulation of prices, quantities, or qualities of imported and exported goods, often driven by illicit capital movements between nations (Pakhlyan, 2020). Traditionally, under-invoicing of imports aims to evade customs duties or value-added tax (VAT). However, newer forms of trade misinvoicing have emerged to allow economic actors to control foreign currency assets without government oversight (Bohoslavsky, 2018; Umar, 2021). Export under-invoicing is particularly attractive for firms seeking to transfer capital out of a country, leading to diminished foreign exchange reserves. Conversely, import over-invoicing enables domestic importers to access a more foreign exchange than stated in trading documents. Thus, trade misinvoicing serves as a conduit for capital flight, driven by investor concerns about expropriation risks stemming from unstable economic policies or political conditions (Schulze, 1994). Although some capital flight may be legally processed through standard financial channels like portfolios or short-term investments, certain portfolios may be unattractive due to low returns or illegal due to home country capital controls. Consequently, misinvoicing in international trade transactions facilitates illegal capital flows. Moreover, trade misinvoicing can aid in legitimizing illicit funds, mostly from criminal activities, by disguising them through trade transactions while maintaining their value (Hendriyetty and Grewal, 2017), a method referred to as trade-based money laundering (Umar, 2021). Discrepancies in trade statistics between importing and exporting countries can reveal trade misinvoicing, with the ideal scenario being that the observed export value from country A to country B matches the observed import value of country B from country A. If exports from countries A to B fall short of the declared imports of country B from A (adjusted to the same Incoterms pricing), it suggests either import over-invoicing by country B or export under-invoicing by country A.

Trade misinvoicing, a prevalent method in TBML, involves the deliberate falsification of the value or quantity of goods in international trade transactions to illicitly transfer money across borders. Measuring trade misinvoicing is complex and requires robust methodologies. One approach is the gravity model of international trade, which estimates illicit financial flows using product-level trade data, providing an upper bound for export and import misinvoicing without assuming the reliability of trade statistics (Paz, 2022). Another method involves analyzing discrepancies in mirrored bilateral trade data and factoring in structural determinants like freight costs to compute TBML risk indicators at a country and product level (Gara *et al.*, 2019; Toan, 2022). Traditional measures often assume that developed countries report trade statistics accurately, but evidence shows significant misinvoicing between developed countries, necessitating methodologies that attribute discrepancies to specific trade partners (Tandon and Rao, 2017).

Measuring trade misinvoicing in TBML offers several advantages over other methods, primarily due to its ability to capture the nuanced and complex nature of illicit financial flows

through trade transactions. One significant advantage is the detailed insight it provides into the mechanisms of TBML, which involves concealing criminal earnings and shifting value through trade transactions to justify illicit origins (Sivaguru and Tilakasiri, 2023). This method allows for the identification of misinvoicing practices, a common TBML technique where the value of goods is deliberately misstated to move money across borders (Benguria and Wagner, 2024). By focusing on trade invoicing, authorities can detect discrepancies between the invoiced value and the actual value of goods, which is crucial for identifying and preventing TBML.

Trade misinvoicing, a significant component of illicit financial flows, is influenced by a variety of determinants that span economic, political, and institutional factors. One of the primary drivers is tax evasion, as firms manipulate invoice values to reduce tax liabilities, a phenomenon observed in the China–Africa trade where tax evasion significantly contributes to misinvoicing (Ndoricimpa and Araral, 2024). Similarly, in Pakistan, higher duty rates are directly associated with increased under-invoicing of imports, indicating that firms misinvoice to evade higher tariffs (Khan *et al.*, 2024). The presence of natural resources in exporting countries also exacerbates export misinvoicing, as seen in Africa's trade with China, where resource-rich countries are more prone to such practices (Ndoricimpa and Araral, 2024). Furthermore, political stability and corruption control are crucial as well; improved political stability reduces both export and import over-invoicing, while effective corruption control diminishes export under-invoicing. In Benin, customs tariffs and tariff differentials between neighboring countries, such as Nigeria, significantly influence trade misinvoicing, with products like textiles and second-hand goods being particularly susceptible (Bessan and Ayédoun, 2022). The role of capital controls is dual-faceted; while capital controls imposed by importing countries increase the likelihood of misinvoicing to circumvent these controls, those imposed by exporting countries tend to decrease misinvoicing by deterring such practices through punitive measures (Lai and Hou, 2023). Additionally, trade openness and current account deficits are associated with higher levels of misinvoicing, as seen in the China–Africa trade context (Ndoricimpa and Araral, 2024). The institutional capacity and political willingness to deter capital flight are also critical, with less-developed countries, autocracies, and resource-rich nations showing higher levels of offshore wealth linked to under-invoiced exports. In Nigeria, trade misinvoicing adversely affects domestic resource mobilization, highlighting the sensitivity of domestic resources to the dynamics of misinvoicing (Afolabi, 2022). Furthermore, transaction costs, economic and financial development, and trade policy variables are significant determinants, as evidenced by a comprehensive study covering 194 countries (Dujava and Siranova, 2017).

2.3 Effect of remittance cost on trade misinvoicing
The theoretical link between remittance costs and TBML is rooted in how illicit financial flows are disguised and transferred across borders. TBML leverages the complexity of international trade to obscure the origins of illicit funds, often using trade transactions to bypass traditional financial systems. This relationship can be influenced by remittance costs, as higher fees may push individuals and organizations to seek alternative, less regulated channels, such as TBML, to move funds. TBML operates through the manipulation of trade transactions, including practices like over- or under-invoicing, multiple invoicing, and misrepresentation of goods and services (Hataley, 2020). The complexity and sheer volume of global trade make it difficult for authorities to detect these activities. High remittance costs can encourage the use of informal, less regulated channels, which are more vulnerable to exploitation by criminal networks for money laundering (Jayasekara, 2022). In countries with stringent currency controls, TBML may also be used as a way to circumvent high fees and regulatory scrutiny. Efforts to combat TBML face

regulatory and monitoring challenges, particularly the lack of a global system for sharing trade and customs data, requiring coordination across multiple jurisdictions (Hataley, 2020). Organizations such as the OECD and FATF have developed "red flags" systems to detect suspicious trade transactions, but these systems rely heavily on strong inter-agency cooperation and information sharing.

The cost of remittances plays a significant role in influencing money laundering and trade misinvoicing activities. High remittance costs can drive individuals and businesses to seek alternative, often informal, channels to transfer money, which can inadvertently facilitate money laundering and trade misinvoicing. For instance, in Sri Lanka, the pegging of the local currency to the US dollar and the vague customer due diligence processes have led to an increase in the use of informal remittance services, which are exploited by criminals, including drug traffickers, to transfer illicit funds overseas (Jayasekara, 2022). This scenario is not unique to Sri Lanka; globally, the high cost of remittances can lower the pocketbook cost of corruption for recipients, making them less concerned about corrupt behavior and more likely to engage in or tolerate such activities (De Vries et al., 2024). Furthermore, remittances can increase the risk of corruption, as seen in Latin American countries where remittance-receiving households are more likely to be targeted for bribes, thus perpetuating a cycle of corruption and informal financial flows (Wong et al., 2024). Trade misinvoicing, a common method of TBML, is also influenced by the cost of remittances. When formal remittance channels are expensive or cumbersome, businesses may resort to trade misinvoicing to move capital unrecorded across borders. This involves practices such as export under-invoicing and import over-invoicing, where discrepancies in trade statistics are exploited to transfer funds illicitly (Nitsch and Peter, 2012). The problem is exacerbated in regions with significant foreign direct investment (FDI) flows, such as Vietnam, where FDI is positively associated with TBML, particularly when trading with low-income countries (Toan, 2022). The liberalization of trade, as seen with the African Continental Free Trade Area (AfCFTA), can further increase the vulnerability to TBML by expanding trade volumes and creating more opportunities for trade misinvoicing (Iyanda, 2018). Efforts to combat these issues include the development of comprehensive payment ecosystems and the implementation of risk-based approaches, such as the "red flags" systems used by financial intelligence agencies and customs to detect suspicious transactions (Гирич and Левашенко, 2022).

Based on the above argument, we propose the following hypothesis.

H1. Remittance cost rises the trade misinvoicing.

3. Data and model specification
3.1 Data
We compute TBML by using data from UNCOMTRADE at the 2 digits (HS2). The UNCOMTRADE database covers bilateral merchandise export and import data among trading partners. Nevertheless, trade misinvoicing occurs for several reasons, such as tax evasion, quota avoidance, smuggling, and ML (De Boyrie et al., 2007). Our study focuses on both export under-invoicing and import over-invoicing as potential avenues of capital flight from Vietnam. Export under-invoicing happens when Vietnamese exporters inform a lower value of money acquired than the value informed as imports by their counterparts. In import over-invoicing, Vietnamese importers inform a higher value of money used for importing than the value informed by their counterparts. The sum of the two implies the total capital that streams illicitly in and out of Vietnam. We follow Toan (2022) to compute Vietnam's trade misinvoicing by considering the bilateral export and import data between Vietnam and its trading partners as follows:

$$Xmis_{it} = \sum\nolimits_{k=1}^{99}(M_{vikt} - cif * X_{vikt}), \qquad (1)$$

$$Mmis_{it} = \sum\nolimits_{k=1}^{99}(M_{ivkt} - cif * X_{ivkt}). \qquad (2)$$

Equation (1) calculates Vietnam's export misinvoicing in year t, where M_{vikt} captures imports of country i from Vietnam in year t at sector k, as informed by country i. X_{vikt} reflects Vietnam's exports to country i in year t at sector k, as informed by Vietnam. The correction factor, cif, means the ratio of CIF's price to FOB's price. We follow Kwaramba *et al.* (2016) and Toan (2022) in attributing the value of 10% to cif in our study. After summing up over the HS2 sectors, a positive value for $Xmis_{it}$ would imply Vietnam's export under-invoicing in year t. Similarly, Equation (2) calculates Vietnam's import misinvoicing in year t, where M_{ivkt} captures imports of Vietnam from country i in year t at sector k, as informed by Vietnam, and X_{ivkt} covers country i's exports to Vietnam in year t at sector k, as informed by country i. A positive value for $Mmis_{it}$ in Equation (2) would show import over-invoicing by Vietnam in year t. Lastly, misinvoicing trade ($Tmis$) is calculated as the ratio of the sum of export under-invoicing and import over-invoicing across sectors to country i's GDP and zero otherwise [1].

3.2 Model specification

We apply a gravity model to quantify the impact of remittance costs on trade misinvoicing. Although prior economists are incorporating the main variables of the gravity model as drivers of trade misinvoicing, they are still very far from reaching a consensus (Cantore and Cheng, 2018; de Melo and Solleder, 2020). To consider this issue and lessen the estimation bias, we use full fixed effects in the panel data, so bilateral resistance (distance, border, common language, and colony) and multilateral resistance are dropped from the estimation of our specification model.

$$Tmis_{it} = \beta_0 + \beta_1 Remitcost_{it} + \beta_2 CONTROL1_{it} + \beta_3 CONTROL2_i + \alpha_i + \alpha_t + \varepsilon_{it} \qquad (3),$$

where superscript i denote Vietnam's trading countries and t denotes year. $Tmis_{it}$ is defined as Vietnam's trade misinvoicing with partner country i at year t. We use the average of the total transaction cost in the Remittance Prices Worldwide database as a proxy for remittance cost. We define *remitcost* as the average of the total transaction cost in percentage of the amount sent for sending USD 200 charged by each single remittance service provider from country i to its trading partners. This is our main explanatory variable that is available for the period 2011–2020.

$CONTROL1_{it}$ and $CONTROL2_i$ are vectors of bilateral variables that are standard in the gravity model. $CONTROL1_{it}$ are time-varying variables, including the GDP and members of the same free trade agreements (*rta*). Meanwhile, $CONTROL2_i$ is time-invariant variables, including bilateral distance, dummy variables for the common border, religion, and colonial. As per the approach of Anderson and van Wincoop (2003), the inclusion of α_i and α_t allows us to consider multilateral resistance and control for observable and unobservable partner- and year-specific factors that may affect trade misinvoicing. To deal with the zero-trade problem, we apply the Poisson pseudo-maximum likelihood. Standard errors are clustered at the partner level. Table A2 of Appendix describes the variables.

We drop the missing observations and winsorize the data, the final data set contains 635 observations covering 77 trading partners of Vietnam from 2011 to 2019 [2]. The list of trading partners is reported in Table A3 of Appendix. Control variables are from the CEPII database. Table 1 reports the statistical description of variables. The left-hand side panel of Figure 1 displays the distribution of the average of *Tmis* and *Remitcost* over countries and years. *Tmis* was steady before 2014, started to increase sharply in 2015 and reached a peak in

	Count	Mean	Sd	Min	Max
Tmis	635	0.04	0.09	0.00	0.64
Xmis	635	0.02	0.05	0.00	0.25
Mmis	635	0.02	0.04	0.00	0.32
Remitcost	635	7.28	3.66	1.31	20.34
GDP	635	0.35	1.36	0.00	14.34
D	635	8.97	0.76	5.86	9.87
comcol	635	0.11	0.32	0.00	1.00
comrelig	635	0.01	0.01	0.00	0.04
RTA	635	0.13	0.33	0.00	1.00

Source(s): Table created by the author

Table 1.
Statistical summary

Figure 1.
Distribution of TBML (*Tmis*) and remittance cost (*Remitcost*) over years and countries
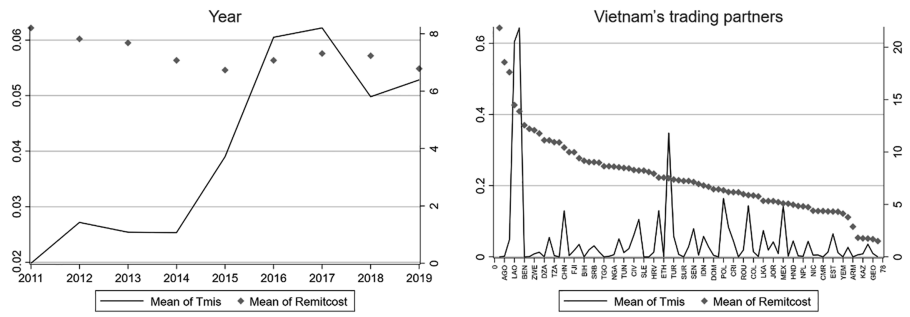
Note(s): The mean value of *Tmis* is on the left-hand scale, and the mean value of *Remitcost* is on the right-hand scale
Source(s): Figure created by the author

the year 2017, followed by a fall in 2018. Meanwhile, remittance costs slightly decreased over these periods. The right-hand side panel indicates that, in general, the distribution of TBML and remittance costs vary across countries. Figure 2 shows the variance in the distribution of both series over income groups. We adhere to the World Bank Group's classification, which divides the world's economies into four income categories: low, lower-middle, upper-middle, and high. Due to the limited number of observations, we consolidate these into two broader groups: LIC & LMC, encompassing low- and lower-middle income countries, and HIC & UMC, encompassing high and upper-middle income countries. While remittance costs in LIC & LMC are higher than those in HIC & UMC, trade misinvoicing is mainly related to HIC & UMC.

4. Results discussion
4.1 Benchmark results
The estimation results presented in Table 2 highlight the significant impact of remittance costs on trade misinvoicing. Column (1) of the table focuses solely on the remittance cost variable, while column (4) incorporates additional control variables. Across all regressions, the coefficients for remittance costs are significantly positive, indicating that higher remittance costs lead to increased trade misinvoicing. Specifically, column (1) reveals that a 1% increase in remittance costs results in approximately a 9% rise in trade misinvoicing. This finding aligns with Freund and Spatafora's (2008) hypothesis, suggesting that high
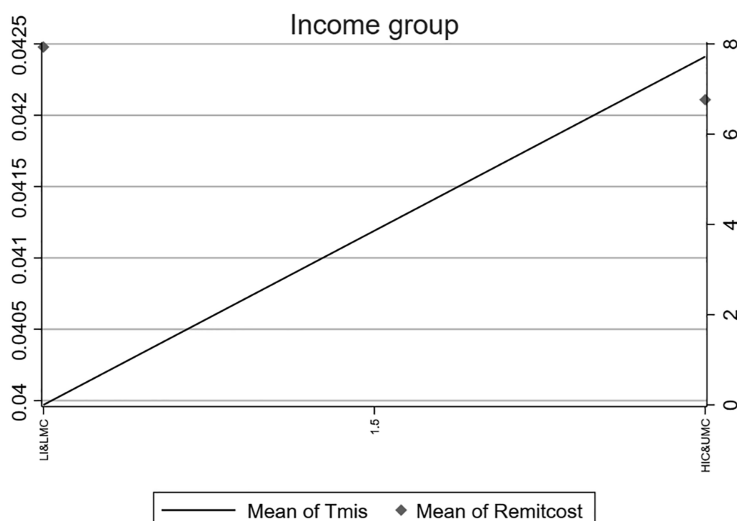
Note(s): The mean value of *Tmis* is on the left-hand scale, and the mean value of *Remitcost*
is on the right-hand scale
Source(s): Figure created by the author

Variables	(1) Tmis	(2) Xmis	(3) Mmis	(4) Tmis	(5) Xmis	(6) Mmis
Remitcost	0.09***	0.05**	0.14***	0.06***	0.03**	0.08***
	(0.024)	(0.023)	(0.025)	(0.014)	(0.020)	(0.017)
rta				1.64***	1.03***	1.93***
				(0.156)	(0.186)	(0.162)
GDP				0.12***	0.07***	0.35***
				(0.040)	(0.049)	(0.039)
Constant	−3.43***	−3.59***	−4.81***	−2.43***	−4.65***	−0.92*
	(0.170)	(0.175)	(0.198)	(0.435)	(0.507)	(0.526)
Observations	414	382	400	414	382	400
R-squared	0.034	0.010	0.057	0.463	0.168	0.548
Partner FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Note(s): Standard errors clustered at partner level in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Table created by the author

remittance costs discourage formal remittance channels and incentivize foreign investors to
launder money through commodity trade. This phenomenon is supported by various studies
that explore the broader implications of remittance costs and their economic impacts. For
instance, Sricharoen's research on migrant workers from Cambodia, Myanmar, and Laos
indicates that reducing remittance costs could enhance the volume of formal remittances,
thereby mitigating the need for informal channels (Sricharoen, 2020). Gautam's (2014)
findings on governance suggest that high remittance costs could exacerbate corruption and

poor governance by increasing the reliance on informal financial channels. These findings support our hypothesis H1.

The analysis of remittance costs on trade misinvoicing, specifically export under-invoicing (*Xmis*) and import over-invoicing (*Mmis*), reveals significant insights into the mechanisms of TBML in Vietnam. The coefficient of remittance costs (*Remitcost*) is statistically significant across all regressions, indicating a robust relationship between high remittance costs and increased trade misinvoicing activities. Notably, the impact of remittance costs on *Mmis* is substantially higher than on *Xmis*, suggesting that foreign investors are more likely to collude with Vietnamese importers to launder money through import activities when remittance costs are elevated. This finding aligns with the broader context of Vietnam's economic landscape, where foreign direct investment (*FDI*) plays a crucial role. However, FDI is also associated with increased TBML, particularly through export under-invoicing when trading with low-income countries, as highlighted by Toan (2022). The high cost of remitting funds through formal channels often drives migrants to use informal methods, exacerbating the issue of TBML.

Next, to examine the effect of control variables, we consider the estimation results with control variables in columns (4)–(6). As we control the partner-fixed effects, variables in $CONTROL2_i$ are absorbed. It can be seen that variables in $CONTROL1_{it}$ have expected results. Specifically, trade misinvoicing can be explained by the GDP of partner countries that captures the size of the economies. Regional trade agreements (*rta*) foster the TBML as cultural proximity can mitigate information asymmetry and communicate the money launderers in various countries together.

We further add more variables to control the effect of remittance cost on trade misinvoicing. We use financial freedom (*FinFree*) from Economic Freedom, quality of government (QOG) from the International Country Risk Guide and exchange rate (in natural logarithm form) from the World Bank database. The results presented in Table A4 of Appendix indicate that a higher degree of financial freedom and better government quality lead to an increase in trade misinvoicing, while the impact of exchange rates appears negligible. One possible explanation for this is that laundering money becomes more challenging in countries with high financial freedom and strong governance, prompting money launderers to engage in trade with less developed nations, such as Vietnam, where regulations may be less stringent.

Furthermore, the relationship between remittance costs and trade misinvoicing is complex and varies significantly across different years and income groups, particularly around the structural break observed in 2016. We run a regression of each sub-sample by year and describe the results in columns (1) and (2) of Table 3. While the effect of remittance cost is mute in the period 2011–2015, it becomes more evident in the period 2016–2019. During the period from 2011 to 2015, the effect of remittance costs on trade misinvoicing was relatively muted. This could be due to the relatively stable global economic environment and the lack of significant regulatory changes affecting remittance costs and trade practices during this period. However, from 2016 to 2019, the effect of remittance costs on trade misinvoicing became more pronounced. This period saw significant changes in global trade dynamics, including the implementation of stricter anti-money laundering regulations and advancements in financial technology, which made it easier to track and reduce illicit financial flows. The increased scrutiny and regulatory measures likely made it more difficult for traders to engage in misinvoicing, thereby highlighting the impact of remittance costs on trade practices. Additionally, the economic downturns and uncertainties during this period may have incentivized traders to resort to misinvoicing as a means of capital flight or tax evasion, further amplifying the relationship between remittance costs and trade misinvoicing.

Variables	(1)		(2)	(3)		(4)
		By years			By income	
	2011–2015		2016–2019	LI&LMC		HIC & UMC
	Tmis		Tmis	Tmis		Tmis
Remitcost	0.02		0.11***	0.09***		0.01
	(0.024)		(0.020)	(0.026)		(0.027)
rta			1.15***			1.16***
			(0.179)			(0.228)
LnGDP	0.22***		0.06	0.20**		0.11**
	(0.051)		(0.043)	(0.079)		(0.054)
Constant	−5.75***		−2.98***	−1.34		−4.52***
	(0.567)		(0.525)	(0.904)		(0.542)
Observations	224		190	174		240
R-squared	0.46		0.52	0.23		0.48
Partner FE	YES		YES	YES		YES
Year FE	YES		YES	YES		YES

Note(s): Standard errors clustered at partner level in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Table created by the author

Table 3.
Estimation results with subsamples by year and income groups

Next, in our sample, high-income and upper-middle-income countries (UMC&HIC) account for 53.39%, while low-income and lower-middle–income countries (LI&LMC) are 46.61%. We run a regression of each sub-sample of income groups and describe the results in columns (3) and (4) of Table 3. It can be seen that the influence of remittance cost on trade misinvoicing becomes more evident when trading with poor countries. For instance, an increase of 1% in the remittance cost leads a 9% increase in trade misinvoicing in LI&LMC, which is nearly five times higher than that in HIC&UMC. This suggests that when remittance costs in LI&LMC are high, foreign investors from LI&LMC view Vietnam as a mere transit for illegal financial outflows. Furthermore, higher remittance costs reduce the net amount received by households, which can exacerbate economic vulnerabilities and incentivize informal financial practices, including trade misinvoicing, to circumvent high transaction costs and maximize remittance value (Kpodar and Imam, 2022). Additionally, remittance-receiving households in poorer countries are more likely to be targeted for corruption, as they are perceived to have additional financial resources, further complicating the economic landscape and potentially driving misinvoicing as a means to protect or conceal assets (Wong et al., 2024).

4.2 Instrumental variable estimation result

Thus far, we have overlooked the possibility that remittance costs might be influenced by factors within our proposed model. This could lead to a situation where there is a reverse causality due to the simultaneous relationship between remittance cost and trade misinvoicing, potentially biasing our results. At this point, the severe trade misinvoicing may tempt the government to adjust remittance costs in order to curb the flow of trade misinvoicing. Furthermore, there are unobservable factors that could also influence remittance costs, which we have not considered in our analysis. These arguments imply the potential existence of an endogeneity problem that could distort our findings. Therefore, we employ the instrumental variable method to address this endogeneity issue arising from reverse causality and omitted variables. The instrumental variable we utilize is bank concentration, defined as the proportion of assets held by the three largest banks relative to the total number of banks in the system. Beck et al. (2022) have highlighted that remittance

corridors dominated by a few large banks tend to have higher fees, which can influence the flow of remittances and financial inclusion. This observation aligns with findings that high remittance costs drive migrants to use informal channels, thereby reducing the volume of formal remittances and impacting economic development (Ahmed *et al.*, 2021). However, the relationship between bank concentration and trade misinvoicing is more complex. Trade misinvoicing, a form of trade-based money laundering, involves the deliberate falsification of the value, volume, or the type of commodity in international trade transactions. The level of bank concentration should not directly affect trade misinvoicing because the latter is more influenced by regulatory environments, enforcement mechanisms, and the ease of conducting illicit financial flows rather than the structure of the banking sector itself. The validity of exclusion restrictions in this context hinges on the assumption that bank concentration impacts trade misinvoicing only through its effect on remittance costs and financial inclusion, not directly. For instance, while bank concentration can affect the availability and cost of credit for small businesses; by influencing their operational capacities and financial health (Park, 2008), it does not inherently alter the incentives or opportunities for trade misinvoicing. Furthermore, banking system concentration has been associated with both increased stability and fragility, depending on the level of concentration and the mediating factors such as profitability and credit costs (Calice and Leonida, 2018). This duality suggests that while bank concentration can influence economic stability and credit availability, its direct impact on trade misinvoicing remains tenuous. Moreover, the broader economic implications of bank concentration, such as its effect on financial development and systemic banking crises, further support the validity of exclusion restrictions. Studies have shown that bank concentration does not significantly determine financial development, with real income and institutional quality being more prominent factors (Law and Abdullah, 2006). Additionally, systemic banking crises, which can be influenced by bank concentration, have a robust negative impact on international trade flows due to financial constraints, but this impact is more related to credit availability than to trade misinvoicing (Gil-Pareja *et al.*, 2017). Therefore, while bank concentration can indirectly affect economic activities through various channels, its direct impact on trade misinvoicing is not substantiated by the available evidence. In conclusion, the instrumental variable of bank concentration is valid under the exclusion restrictions as it primarily affects remittance costs and financial inclusion, which in turn can influence economic activities. Therefore, variables related to remittances, such as the level of bank concentration, can serve as effective instruments to address the endogeneity issue. The data on bank concentration used in our analysis was obtained from the World Bank database.

We conducted endogeneity tests to assess the validity of our instrumental variables, and the results are presented in Table 4. Firstly, the Hausman test reveals significant χ^2 in the model using *Remitcost*, indicating potential endogeneity issues with remittance cost. This

(First stage model)	Coefficient *Remitcost*
Hausman test of endogeneity [χ^2]	10.952
	(0.000)
LM statistic	8.556
(Under-identification test)	(0.002)
Cragg-Donald Wald *F*-statistic	20.442
(Weak identification test)	

Note(s): We report endogeneity tests of *Remitcost* on *Tmis* from the specification using 2SLS. *p*-values are in brackets
Source(s): Table created by the author

Table 4.
Endogeneity test

highlights the need to address potential endogeneity. Next, the LM statistics from the under-identification test show that the χ^2 statistics are significant, suggesting that our instrumental variable is appropriate. Finally, we observe a significant Cragg-Donald Wald F-statistic, indicating that our instrumental variables are sufficiently powerful to address the endogeneity problem. These tests provide evidence supporting the validity of our instrumental variable.

The findings presented in Table 5 indicate that our assessment of the impact of remittance costs on trade misinvoicing remains consistent, albeit with more pronounced effects when accounting for the issue of endogeneity.

To ensure our results are not impacted by omitted-variable bias, we utilize the method proposed by Oster (2019) to estimate the necessary influence of unobservables that would need to outweigh the effect of observables and undermine our conclusions. By applying Oster's (2019) approach to our regressions in Table 2, we find that the impact of unobservables would need to be more than 1.5–1.75 times greater than that of observables to invalidate our conclusions. In literature, results are typically considered robust if this ratio exceeds one. Consequently, our findings appear to be robust to omitted-variable bias.

5. Conclusion

This paper disentangles the impact of remittance costs on TBML by using panel data from Vietnam from 2011 to 2019. Our empirical findings document a positive correlation between remittance cost and TBML, thereby confirming the remittance-cost-fueled capital flight hypothesis. We further indicate that this effect becomes particularly strong for import over-invoicing and when trading partners are LIC&LMI.

Our findings suggest several policy implications. First, the governments should implement policies to reduce the cost of remitting, encouraging the migrants to use formal channels when sending money back home. Second, as the effect of remittance cost on TBML becomes stronger for import over-invoicing and when Vietnam has trades with LIC&LMI, the Vietnamese Government should keep an eye on the suspected import transaction.

Decreases in transaction costs are likely to stimulate an uptick in remittance flows and/or a shift of these flows towards the formal sector, thereby reducing trade-misinvoicing. Such a transition could offer substantial advantages to policymakers and development

Variables	(1) Tmis	(2) Xmis	(3) Mmis
Remitcost	0.06**	0.05**	0.14**
	(0.173)	(0.169)	(0.235)
rta	1.97***	1.33***	2.51***
	(0.332)	(0.316)	(0.414)
LnGDP	0.10**	0.20*	0.25**
	(0.098)	(0.111)	(0.125)
Constant	−3.28***	−6.09***	−1.21
	(1.121)	(0.820)	(1.373)
Observations	474	474	474
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Note(s): Robust standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Second-stage of IV estimation is reported
Source(s): Table created by the author

Table 5.
IV estimation result

practitioners. Firstly, when crafting policies aimed at encouraging remittances or fostering investment, it is crucial to have accurate insights into the actual volume of these flows. Misinformation may lead to misguided initiatives. Secondly, from an efficiency perspective, a significant proportion of informal remittances within an economy suggests considerable profits accruing to banks and official money transfer providers, signaling potential avenues for enhancing competition and boosting received remittances. Thirdly, utilizing formal channels (especially financial institutions like banks) for money transfers may yield positive externalities, such as improved access to credit and the utilization of financial institutions for savings.

Despite the significant findings, this study has several limitations, particularly regarding the measurement of trade misinvoicing. One major limitation is the challenge of accurately quantifying trade misinvoicing due to the complexity and often opaque nature of these transactions. Trade misinvoicing involves deliberate manipulation of trade invoices to move money across borders illicitly, and detecting these discrepancies requires reliable and comprehensive trade data, which is not always available or accurate. The measurement of trade misinvoicing often relies on discrepancies between reported import and export data from different countries. However, such discrepancies can also arise from legitimate reasons such as differences in reporting standards, exchange rate fluctuations, and timing issues in trade reporting. These factors can complicate the estimation of trade misinvoicing and potentially lead to either overestimation or underestimation of TBML activities. Future research should focus on improving the methodologies for detecting and measuring trade misinvoicing. This could involve developing more sophisticated econometric models that account for the various legitimate reasons for trade data discrepancies or incorporating alternative data sources such as financial transaction records and customs enforcement data to triangulate the estimates of trade misinvoicing.

Notes

1. We report a statistical summary of raw material in Table A1 of Appendix.

2. The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Afolabi, J.A. (2022), "Trade misinvoicing and domestic resource mobilization in Nigeria", *International Journal of Development Issues*, Vol. 22 No. 1, pp. 91-106, doi: 10.1108/IJDI-09-2022-0208.

Ahmed, J. and Martínez-Zarzoso, I. (2016), "Do transfer costs matter for foreign remittances? A gravity model approach", *Economics*, Vol. 10 No. 1, doi: 10.5018/economics-ejournal.ja.2016-4.

Ahmed, J., Mughal, M. and Martínez-Zarzoso, I. (2021), "Sending money home: transaction cost and remittances to developing countries", *The World Economy*, Vol. 44 No. 8, pp. 2433-2459, doi: 10.1111/twec.13110.

Anderson, J.E. and van Wincoop, E. (2003), "Gravity with gravitas: a solution to the border puzzle", *The American Economic Review*, Vol. 93 No. 1, pp. 170-192, doi: 10.1257/000282803321455214.

Ba, H. and Huynh, T. (2018), "Money laundering risk from emerging markets: the case of Vietnam", *Journal of Money Laundering Control*, Vol. 21 No. 3, pp. 385-401, doi: 10.1108/JMLC-09-2017-0050.

Bahadir, B., Chatterjee, S. and Lebesmuehlbacher, T. (2018), "The macroeconomic consequences of remittances", *Journal of International Economics*, Vol. 111, pp. 214-232, doi: 10.1016/j.jinteco.2018.01.010.

Beck, T. and Martínez Pería, M.S. (2011), "What explains the price of remittances? An examination across 119 country corridors", *The World Bank Economic Review*, Vol. 25 No. 1, pp. 105-131, doi: 10.1093/wber/lhr017.

Beck, T., Janfils, M., Kpodar, K. and Kpodar, M.K.R. (2022), *What Explains Remittance Fees? Panel Evidence*, International Monetary Fund, Washington, DC.

Benguria, F. and Wagner, R. (2024), "Trade invoicing currencies and exchange rate pass-through: the introduction of the euro as a natural experiment", *Journal of International Economics*, Vol. 150, 103937, doi: 10.1016/j.jinteco.2024.103937.

Bessan, E. and Ayédoun, C. (2022), "Misinvoicing in Benin's international trade: an analysis from mirror statistics", *Journal of Economics, Finance and Management Studies*, Vol. 05 No. 11, doi: 10.47191/jefms/v5-i11-18.

Biswas, A.K. and Marjit, S. (2005), "Mis-invoicing and trade policy", *The Journal of Policy Reform*, Vol. 8 No. 3, pp. 189-205, doi: 10.1080/13841280500181684.

Bohoslavsky, J.P. (2018), "Tax-related illicit financial flows and human rights", *Journal of Financial Crime*, Vol. 25 No. 3, pp. 750-769, doi: 10.1108/jfc-04-2017-0029.

Brown, D. (2014), "Vietnam in the global economy", *Contemporary Southeast Asia: A Journal of International and Strategic Affairs*, Vol. 36 No. 2, pp. 329-332, doi: 10.1355/cs36-2j.

Buyukkarabacak, B., Chatterjee, S. and Lebesmuehlbacher, T. (2017), "The macroeconomic consequences of remittances", SSRN Scholarly Paper 2422901, doi: 10.2139/ssrn.2422901.

Calice, P. and Leonida, L. (2018), "Concentration in the banking sector and financial stability: new evidence", World Bank Policy Research Working Paper, 8615.

Cantore, N. and Cheng, C.F.C. (2018), "International trade of environmental goods in gravity models", *Journal of Environmental Management*, Vol. 223, pp. 1047-1060, doi: 10.1016/j.jenvman.2018.05.036.

Cao, D.K. and Do, P. (2012), "Applying data mining in money laundering detection for the Vietnamese banking industry", in Pan, J.S., Chen, S.M. and Nguyen, N.T. (Eds), *Intelligent Information and Database Systems*, Springer, pp. 207-216, doi: 10.1007/978-3-642-28490-8_22.

De Boyrie, M.E., Pak, S.J. and Zdanowicz, J.S. (2005), "The impact of Switzerland's money laundering law on capital flows through abnormal pricing in international trade", *Applied Financial Economics*, Vol. 15 No. 4, pp. 217-230, doi: 10.1080/0960310042000313200.

de Boyrie, M.E., Nelson, J.A. and Pak, S.J. (2007), "Capital movement through trade misinvoicing: the case of Africa", *Journal of Financial Crime*, Vol. 14 No. 4, pp. 474-489, doi: 10.1108/13590790710828181.

de Melo, J. and Solleder, J.M. (2020), "Barriers to trade in environmental goods: how important they are and what should developing countries expect from their removal", *World Development*, Vol. 130, 104910, doi: 10.1016/j.worlddev.2020.104910.

De Vries, C.E., Doyle, D., Solaz, H. and Tertytchnaya, K. (2024), "Remittances and corruption", in De Vries, C., Doyle, D., Solaz, H. and Tertytchnaya, K. (Eds), *Chapter 01, Money Flows: the Political Consequences of Migrant Remittances*, Oxford University Press, doi: 10.1093/oso/9780192897022.003.0005.

Dujava, D. and Siranova, M. (2017), *Getting the Measures of Trade Misinvoicing Right: Bilateral Panel Data Approach (wp98)*, Institute of Economic Research, Slovak Academy of Sciences, available at: https://ideas.repec.org/p/sav/wpaper/wp98.html

Ebeke, C.H. (2011), "Essays on the macroeconomic consequences of remittances in developing countries", PhD thesis, Université d'Auvergne - Clermont-Ferrand I, available at: https://theses.hal.science/tel-01066213

Freund, C. and Spatafora, N. (2008), "Remittances, transaction costs, and informality", *Journal of Development Economics*, Vol. 86 No. 2, pp. 356-366, doi: 10.1016/j.jdeveco.2007.09.002.

Gara, M., Giammatteo, M. and Tosti, E. (2019), "Magic mirror in my hand ... How trade mirror statistics can help us detect illegal financial flows", *The World Economy*, Vol. 42 No. 11, pp. 3120-3147, doi: 10.1111/twec.12840.

Gautam, D.P. (2014), "Remittances and governance: does the government free ride?", Working Papers, Article 14-40, available at: https://ideas.repec.org/p/wvu/wpaper/14-40.html

Geda, A. and Yimer, A. (2016), "Capital flight and its determinants: the case of Ethiopia", *African Development Review*, Vol. 28 No. S1, pp. 39-49, doi: 10.1111/1467-8268.12180.

Gil-Pareja, S., Llorca-Vivero, R. and Martínez-Serrano, J.A. (2017), "Does the degree of development matter in the impact of banking crises on international trade?", *Review of Development Economics*, Vol. 21 No. 3, pp. 829-848, doi: 10.1111/rode.12284.

Hataley, T. (2020), "Trade-based money laundering: organized crime, learning and international trade", *Journal of Money Laundering Control*, Vol. 23 No. 3, pp. 651-661, doi: 10.1108/jmlc-01-2020-0004.

Hendriyetty, N. and Grewal, B.S. (2017), "Macroeconomics of money laundering: effects and measurements", *Journal of Financial Crime*, Vol. 24 No. 1, pp. 65-81, doi: 10.1108/jfc-01-2016-0004.

Huyen, T.Q. (2019), "International cooperation to prevent and combat transnational drug trafficking at border locations: a case study of Vietnam", *Journal of Law, Policy and Globalization*, Vol. 85, p. 206.

Iyanda, A.E. (2018), "The threat of trade-based money laundering to the African continental free trade area", *Journal of Anti-Corruption Law*, Vol. 2 No. 1, doi: 10.14426/jacl.v2i.1285.

Jayasekara, S.D. (2022), "Trade-based money laundering and informal remittance services: implications on the sustainability of the balance of payments of a small open economy", *Journal of Money Laundering Control*, Vol. 26 No. 4, pp. 877-891, doi: 10.1108/JMLC-03-2022-0042.

Jha, R. and Truong, D.N. (2014), *Trade Misinvoicing and Macroeconomic Outcomes in India (2014-02)*, The Australian National University, Australia South Asia Research Centre, available at: https://ideas.repec.org//pas/asarcc/2014-02.html

Khan, B.M., Hussain, K. and Liaqat, Z. (2024), "Trade misreporting: evidence from Pakistani importers", *The World Economy*, Vol. 47 No. 2, pp. 390-414, doi: 10.1111/twec.13398.

Kpodar, K. and Imam, P. (2022), "How Do transaction costs influence remittances", IMF Working Papers, Vol. 2022 No. 218, p. 1, doi: 10.5089/9798400224270.001.

Kwaramba, M., Mahonye, N. and Mandishara, L. (2016), "Capital flight and trade misinvoicing in Zimbabwe", *African Development Review*, Vol. 28 No. S1, pp. 50-64, doi: 10.1111/1467-8268.12181.

Lai, M. and Hou, J. (2023), "Let's misinvoice more? The effect of de jure capital controls on trade misinvoicing", *The World Economy*, Vol. 46 No. 7, pp. 2157-2186, doi: 10.1111/twec.13381.

Law, S.H. and Abdullah, A.Z. (2006), "Bank concentration and financial development: the cross-country evidence", *The IUP Journal of Financial Economics*, Vol. 4 No. 2, pp. 56-65.

Le, C.N. (2013), "The growing threat of money laundering to Vietnam: the necessary of intensive countermeasures", *Journal of Money Laundering Control*, Vol. 16 No. 4, pp. 321-332, doi: 10.1108/jmlc-05-2013-0014.

Le, C.N. (2014), "The international anti-money laundering regime and its adoption by Vietnam", *Asian Journal of International Law*, Vol. 4 No. 1, pp. 197-225, doi: 10.1017/s2044251313000349.

Ndoricimpa, A. and Araral, E. (2024), "Determinants of illicit capital movement in China-Africa trade: evidence of trade misinvoicing", *African Development Review*, Vol. 36 No. 2, pp. 334-349, doi: 10.1111/1467-8268.12747.

Nguyen, T.H.P., Nguyen, T.B.T., Nguyen, T.T.C. and Nguyen, H.T. (2020), "The impact of opportunity factors leading to fraudulent behavior in Vietnam stock market", *Proceedings of the 13th Economics & Finance Conference*, Prague, pp. 287-305.

Nitsch, V. and Peter, R. (2012), "Trade mispricing and illicit flows", in *Draining Development*, pp. 309-334.

Oster, E. (2019), "Unobservable selection and coefficient stability: theory and evidence", *Journal of Business and Economic Statistics*, Vol. 37 No. 2, pp. 187-204, doi: 10.1080/07350015.2016.1227711.

Pakhlyan, A. (2020), "'Documenting' of illicit Financial Flows through trade misinvoicing", Амберд, Vol. 2 No. 3, pp. 113-118.

Park, Y. (2008), "Banking market concentration and credit availability to small businesses", *SSRN Electronic Journal*, (SSRN Scholarly Paper 1116744), doi: 10.2139/ssrn.1116744.

Paz, L.S. (2022), "Measuring illicit financial flows: a gravity model approach to estimate international trade misinvoicing", WIDER Working Paper 2022, UNU-WIDER, doi: 10.35188/UNU-WIDER/2022/155-6.

Qureshi, T.A. and Mahmood, Z. (2016), "The magnitude of trade misinvoicing and resulting revenue loss in Pakistan", *The Lahore Journal of Economics*, Vol. 21 No. 2, pp. 1-30, doi: 10.35536/lje.2016.v21.i2.a1.

Ratha, D.K., De, S., Plaza, S., Schuettler, K., Seshan, G.K., Wyss, H. and Yameogo, N.D. (2018), "Migration and remittances: recent developments and outlook: global compact on migration (English)", Migration and Development Brief No. 27, World Bank Group, Washington, DC, available at: http://documents.worldbank.org/curated/en/753091534421290610/Global-compact-on-migration

Schulze, G.G. (1994), "Misinvoicing imports: the interdependence of tax and tariff evasion", *Public Finance Quarterly*, Vol. 22 No. 3, pp. 335-365, doi: 10.1177/109114219402200304.

Sivaguru, D. and Tilakasiri, K. (2023), "The phenomenon of trade-based money laundering (TBML) – a critical review in Sri Lankan context", *Journal of Money Laundering Control*, Vol. 26 No. 6, pp. 1088-1099, doi: 10.1108/JMLC-10-2022-0151.

Sricharoen, T. (2020), "Migration and remittances: evidence from Cambodia, Myanmar and Lao migrant workers", *GATR Journals*, jber191, available at: https://ideas.repec.org/p/gtr/gatrjs/jber191.html

Tandon, S. and Rao, R.K. (2017), "Trade misinvoicing: what can we measure?", Working Papers, Article id:12152, available at: https://ideas.repec.org/p/ess/wpaper/id12152.html

Toan, B.H. (2022), "Effects of foreign direct investment on trade-based money laundering: the case of Vietnam", *Cogent Social Sciences*, Vol. 8 No. 1, 2132672, doi: 10.1080/23311886.2022.2132672.

Truong, Q. (2013), "Vietnam: an emerging economy at a CrossRoads", Working Papers, Article 2013/09, available at: https://ideas.repec.org//p/msm/wpaper/2013-09.html

Umar, B. (2021), "Effects of trade misinvoicing on money laundering in developing economies", *Journal of Money Laundering Control*, Vol. 26 No. 1, pp. 60-68, doi: 10.1108/jmlc-11-2021-0124.

Wong, P.H., Merkle, O. and Siegel, M. (2024), "Remittance receivers as targets for corruption in Latin America", *Journal of Development Studies*, Vol. 60 No. 2, pp. 324-343, doi: 10.1080/00220388.2023.2265526.

World Bank (2019), "Remittance prices worldwide: making markets more transparent".

(The Appendix follows overleaf)

Appendix

	Count	Mean	Sd	Min	Max
Trade misinvoicing	635	325.73	1995.29	0.00	25474.32
Export under-invoicing	635	267.53	1839.74	0.00	24809.94
Import over-invoicing	635	58.20	247.25	0.00	3035.83

Table A1.
Statistical summary of raw variables (m. USD)

Variable	Description	Source
Tmis	the ratio of the sum of export under-invoicing and import over-invoicing to its trading partner's GDP and zero otherwise	Self-compilation
Xmis	The ratio of Vietnam's export under-invoicing to its trading partner's GDP	Self-compilation
Mmis	The ratio of Vietnam's import over-invoicing to its trading partner's GDP	Self-compilation
Remitcost	The average of the total transaction cost in percentage of the amount sent for sending USD 200 charged by each single remittance service provider from country i to its trading partners	Remittance Prices Worldwide
comrelig	The dummy taking a value of 1 if there is a common religion between two countries	CEPII
comcol	The dummy taking a value of 1 if a country is a common colonizer post 1945	CEPII
RTA	The dummy taking a value of 1 if a country has a regional trade agreement	CEPII
D	Log value of the distance between countries i and j, and 0 otherwise	CEPII
FinFree	Financial freedom index	Economic Freedom
QOG	Quality of government index	ICRG
LnEx	Natural logarithm of the exchange rate of 1USD against local currency	WB

Note(s): CEPII: The Center d'Etudes Prospectives et d'Informations Internationales
ICRG: International Country Risk Guide
Source(s): Table created by the author

Table A2.
Variable description

No.	Partner	Percent	No.	Partner	Percent	No.	Partner	Percent
1	AGO	1.42	27	GUY	1.42	53	NPL	1.42
2	ARM	1.42	28	HND	1.42	54	PAK	1.42
3	AZE	1.42	29	HRV	1.42	55	PAN	1.42
4	BEN	0.63	30	HUN	1.26	56	PER	1.42
5	BGD	1.42	31	IDN	1.42	57	PHL	1.42
6	BGR	1.42	32	IND	1.42	58	POL	1.42
7	BIH	1.42	33	JAM	1.42	59	PRY	1.42
8	BLR	1.42	34	JOR	1.42	60	ROU	0.94
9	BOL	1.42	35	KAZ	1.42	61	SDN	0.63
10	BRA	1.42	36	KEN	1.42	62	SEN	1.42
11	CHN	1.42	37	KHM	0.63	63	SLE	1.42
12	CIV	1.42	38	LAO	0.63	64	SLV	1.42
13	CMR	0.63	39	LBN	1.42	65	SRB	1.42
14	COL	1.42	40	LKA	1.42	66	SUR	1.42
15	CRI	0.63	41	LTU	1.42	67	TGO	1.1
16	CUB	0.31	42	LVA	1.42	68	THA	1.42
17	DOM	1.42	43	MAR	1.42	69	TUN	1.42
18	DZA	1.42	44	MDA	1.42	70	TUR	1.42
19	ECU	1.42	45	MDG	0.63	71	TZA	1.42
20	EGY	1.42	46	MEX	1.42	72	UGA	1.42
21	EST	1.42	47	MMR	0.63	73	UKR	1.42
22	ETH	1.42	48	MOZ	1.42	74	UZB	1.42
23	FJI	1.42	49	MYS	1.42	75	YEM	1.42
24	GEO	1.42	50	NAM	0.63	76	ZAF	1.42
25	GHA	1.42	51	NGA	1.42	77	ZWE	1.42
26	GTM	1.42	52	NIC	1.42			

Source(s): Table created by the author

Table A3.
List of partner
countries

Variables	(1) Tmis	(2) Tmis	(3) Tmis	(4) Tmis
Remitcost	0.07***	0.05**	0.06***	0.01**
	(0.015)	(0.022)	(0.015)	(0.022)
rta	1.67***	0.80***	1.82***	1.25***
	(0.162)	(0.189)	(0.187)	(0.205)
LnGDP	0.12***	0.07***	0.16***	0.10***
	(0.044)	(0.053)	(0.043)	(0.064)
FinFree	0.01**			0.01***
	(0.004)			(0.004)
QOG		1.73**		0.24**
		(0.758)		(0.882)
LnEX			−0.01	−0.04
			(0.025)	(0.027)
Constant	−2.91***	−4.79***	−2.07***	−4.02***
	(0.569)	(0.660)	(0.502)	(0.764)
Observations	406	380	349	319
R-squared	0.457	0.146	0.507	0.231
Partner FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table A4.
Adding more control variables

Note(s): Standard errors clustered at partner level in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Table created by the author

Corresponding author
Quang Phu Tran can be contacted at: tranquangphu@hcma.edu.vn