

Determinants of Trade Misinvoicing

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Abstract Trade misinvoicing should be seen as an element of *de facto* capital account openness. Traditional explanations for trade misinvoicing—high custom duties and weak domestic economies—are less persuasive in a world of high growth emerging markets that have low trade barriers. We construct a 53-country data set over a 26 year span, covering both industrialized and developing countries, to study the phenomena of export and import misinvoicing. Capital account openness, differentials in interest rates, political stability, corruption, indebtedness and the exchange rate regime are identified as factors related to misinvoicing.

Keywords Trade Misinvoicing · Capital controls · Capital account openness · Political stability · Custom duties

JEL codes F14 · F32 · F41 · F43

1 Introduction

In this paper we argue that capital controls in countries with large trade flows are correlated with high levels of trade misinvoicing. After controlling for factors such as macroeconomic stability, corruption, currency overvaluation, and political instability, we find that the openness of the capital account still has a significant role to play in determining trade misinvoicing. We therefore, argue that misinvoicing should be viewed as a channel for *de facto* capital account openness.

The magnitude of trade misinvoicing is conventionally estimated by juxtaposing trade data from the importing and the exporting country. A firm interested in moving

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capital out of a country would underinvoice its exports, thus bringing reduced foreign exchange into the country. Similarly, overinvoicing of imports would allow the domestic importer to gain access to greater foreign exchange than required. Both these mechanisms leave domestic firms in control of hard currency assets overseas. Underinvoicing of imports, on the other hand, can result from an attempt to evade taxes on imports including customs duties and the Value Added Tax (VAT) on imports and circumvent quantitative restrictions.

The overall misinvoicing of imports that is computed using macroeconomic data reflects a certain cancelling out between certain firms who are engaged in underinvoicing of imports and other firms who are engaged in overinvoicing of imports. Similar considerations apply with misinvoicing of exports. To the extent that firms have heterogeneous goals, the measured misinvoicing is likely to understate the true scale of gross capital flows being achieved through misinvoicing in an economy.

The traditional literature focused on two broad motivations for misinvoicing. First, it emphasised high customs duties (de Boyrie et al. 2007; Boyce and Ndikumana 2001; Beja et al. 2005). When firms pay high rates of customs duties or VAT on imports or are subject to quantitative restrictions, they have an incentive to understate the true value of imports. Second, misinvoicing was viewed as a method for achieving capital flight, which was (in turn) motivated by fears of expropriation in interplay between unsound economic policy and political instability (Schulze 1994).

A critical factor influencing trade misinvoicing that has been identified in the literature is the extent of exchange rate overvaluation. An overvalued exchange rate as well as high inflation rate raise expectations of depreciation in the near future and stimulate capital flight. Research on the determinants of the large outflows of capital from Latin American countries in 1980s and Asian economies in late 1990s has identified explanatory variables such as macroeconomic instability, large budget deficits, low growth rates and the spread between foreign and domestic interest rates (Cuddington 1987; Muscatelli and Hallett 1992; Pastor 1990; Cuddington 1986; Vos 1992; Boyce 2002; Ketkar and Ketkar 1989). These factors, as well as others such as corruption, political freedom, and accountability were significant in explaining capital flight from sub Saharan Africa (Ngeno 2000; Murinde et al. 1996; Hermes and Lensink 1992; Ndikumana and Boyce 2002) as well as some of the other developing countries (Vu Le and Zak 2001)

By the logic of this traditional literature, when countries like India and China achieved high GDP growth and cut customs duties, the motivation for misinvoicing should have subsided. In this paper, we find that by and large, such a decline in misinvoicing is not visible. Hence, there is a need to review the evidence for misinvoicing, including countries with stable political systems and robust economic growth, in a period with low trade barriers, in a quest for alternative explanations. That analysis is undertaken in this paper.

The recent literature has identified interesting links between trade and capital account openness. Aizenman (2008) and Aizenman and Noy (2009) describe the two-way links between trade liberalisation and capital account liberalisation. Aizenman (2004) shows that in countries characterized by capital account restrictions, greater trade integration creates greater opportunities to shift capital

through trade misinvoicing. Conversely, Wei and Zhang (2007) show that capital controls impede trade. These factors may generate a causal relationship between greater trade openness and capital account liberalisation. Aizenman and Noy (2009) find that a one standard deviation increase in trade openness is associated with 9.5% increase in financial openness.

The contribution of this paper lies in a fresh examination of the evidence on misinvoicing with a broader dataset than has been generally used. Most of the existing literature has focused on countries from Africa and Latin America. We extend the data set by looking at a number of countries from South and East Asia, as well as Eastern Europe. We include a number of industrialized countries in our data set, which have not featured in most of the existing literature on capital flight. We examine variables such as custom duties, tax rates, political stability, economic stability, law and order, etc. as potential determinants of trade misinvoicing. We also analyse misinvoicing from the viewpoint of *de facto* openness of the current and capital accounts. We report evidence about the extent to which misinvoicing is motivated by the desire to avoid capital controls, and the extent to which it constitutes an important element of *de facto* convertibility.

Our results suggest that trade misinvoicing should be seen as one element of *de facto* openness on the capital account. Economic agents, who desire capital movements for traditional reasons such as financial portfolio diversification or bets on exchange rate movements, are likely to achieve these movements through trade misinvoicing. To the extent that misinvoicing is feasible, countries do not have a choice about embarking on high capital account openness once they have adopted high current account openness. Thus, we link the older literature on trade misinvoicing with the considerable literature from the following decades on capital account liberalisation by emerging markets.

The remainder of this paper is organised as follows. In Section 2, we describe our method of measuring misinvoicing and the resulting dataset. Section 3 describes the remaining data and identifies the key determinants of trade misinvoicing. Section 4 presents the key results of both the graphical and regression analyses, while Section 5 concludes and proposes avenues for further research.

2 Measuring Misinvoicing: The Methodology

Trade misinvoicing can take place either through export and import overinvoicing or underinvoicing. Ideally, the observed exports from country A to country B (including the cost of insurance and shipping (CIF)) should match the observed imports of Country B from Country A. If the exports from Country A to B (CIF) are less than the claimed imports of Country B from A, then the difference can be attributed to export underinvoicing by Country A, or import overinvoicing by Country B.

Discrepancies between data from an importer and the data from the exporter could be attributed to mistakes in recordkeeping. However, if the errors in record keeping take place randomly and have mean zero, then averaging these across millions of containers should yield very small discrepancies at an aggregate level. When industrial countries trade with industrial countries, it is likely that record-keeping on

both sides is done using high quality computer systems. Hence, random errors in measurement are likely to be smaller.

The data on misinvoicing used in earlier studies was usually limited to a few countries or a continent. We construct a dataset for 53 major countries¹ (18 industrialized countries and 35 developing countries) over a span of 26 years (1980–2005) and evaluate the extent of trade misinvoicing in each country in the dataset against industrialized countries. These are the largest countries in terms of economic size measured by trade and GDP. In 2005 they accounted for 95% of world GDP when measured in US Dollars and 92.5% of world GDP when measured in PPP terms. Furthermore they accounted for more than 91% of world exports and imports. By focusing on both industrialized and developing countries we are able to identify the varying factors affecting capital mobility through trade misinvoicing.

We measure trade misinvoicing by using data from IMF's *Data on Trade Statistics* (DOTS). The DOTS database reports bilateral merchandise exports and imports data between trading partners. Misinvoicing is calculated by looking at the bilateral export and import data between individual countries and their trading partner. We focus on the misinvoicing implicit in trade data of a given country against industrial countries only. To the extent that industrial country trade statistics are more accurately captured, this is expected to be less noisy. This biases the interpretation of our overall results: the true scale of capital flows through misinvoicing against the world would be bigger when compared with the values seen here.

We measure misinvoicing in country i vis-à-vis its industrialized trading partners as follows:

$$Xmis_{it} = M_{jt} - (X_{it} * cif) \quad (1)$$

$$Mmis_{it} = M_{it} - (X_{jt} * cif) \quad (2)$$

Equation 1 measures export misinvoicing by country i in year t , where M_{jt} refers to imports of industrialized country j from country i in year t as reported by country j . X_{it} refers to exports of country i to industrialized country j in year t as reported by country i . cif refers to the ratio of cif to fob . A positive value of $Xmis_{it}$ would indicate export underinvoicing by country i in year t . On similar lines, a positive value of $Mmis_{it}$ in Eq. 2 would reflect import overinvoicing by country i in year t . The misinvoicing figures for country i are arrived at by applying Eqs. 1 and 2 to all the industrialized trading partners of country i .

While, the key objective of this paper is to evaluate the movement of capital by focusing on discrepancies in reported trade figures we understand that not all movement of capital through mispriced trade results in a difference between export and import values. For example, a form of trade mispricing that facilitates movement of capital or profits across borders is transfer pricing by multinational corporations. Kar and Curcio (2011) point out that in such cases, the mispricing occurs within the same invoice due to previous agreement between buyer and seller. Consequently, such mispricing will not result in any discrepancy between the import and the export values, and will not show up as trade misinvoicing.

¹ The list of countries is given in Appendix A.

Next, we compare the extent of misinvoicing in developing and industrialized countries over the period 1980–2005. In the modern period, where industrial countries have near-zero customs duties and near-zero barriers to capital mobility, we would expect to get small values for misinvoicing for trade between industrial countries and industrial countries. If we maintain a null hypothesis that zero trade misinvoicing is indeed present, then the distribution of estimated misinvoicing that is obtained between a pair of industrialized countries would reflect the sampling noise present in this estimation.

Figure 1 describes the kernel density plots of export and import misinvoicing measures. Figures (a) and (b) show misinvoicing vis-a-vis industrialized countries (ICs), while (c) and (d) show misinvoicing vis-a-vis the rest of the world. The solid black line represents the density plot for industrialized countries, while the dashed line refers to the developing countries. The vertical lines exhibit the 2.5% and 97.5% boundaries for the industrialized countries.

Comparing the density plots of the developing countries with the industrialized countries, it is evident that a sizeable proportion of observations for developing countries lie outside the 95% interval for the industrialized countries. This pattern is

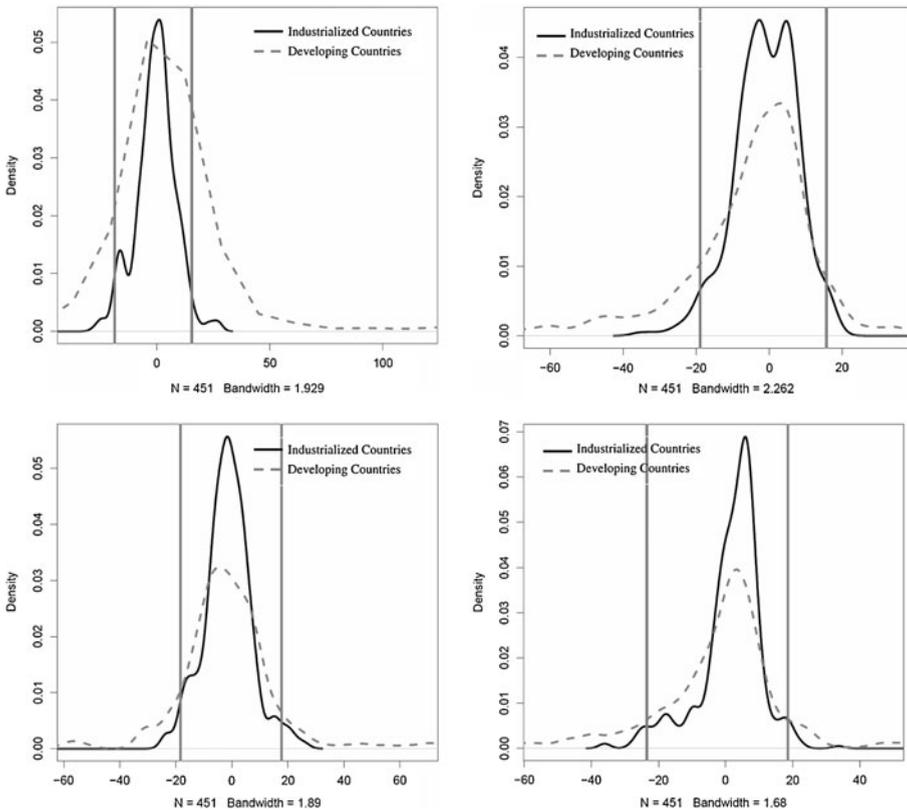


Fig. 1 Kernel density plots of invoicing measure

uniform across export and import misinvoicing *vis-à-vis* industrialized countries as well as the world. Thus, the extent of misinvoicing seems to be significantly higher among developing countries compared to industrialized countries. Even if we maintain a null hypothesis that no misinvoicing takes place between industrialized trade partners, the evidence for developing countries clearly rejects the null hypothesis that misinvoicing is absent when it comes to developing countries.

The extent of misinvoicing has steadily decreased in industrialized countries over the last 25 years. Figure 2 traces the path of export misinvoicing across six countries—three industrialized countries and three emerging markets. Around 1980, the United States (US) was experiencing export underinvoicing worth of more than 14% of its exports. However, over the next 25 years this has steadily declined to less than one percent in 2005. Similarly, Italy and France, which



Fig. 2 Export misinvoicing as a percentage of exports (1980–2005)

experienced capital flight through export underinvoicing in early 1980s saw a reversal in its trend since 1992 as capital started flowing into these economies through trade misinvoicing. A similar pattern of decline in capital flight through export misinvoicing was also witnessed in other industrialized countries like Spain, Netherlands, Finland, and Canada. The experience with industrialized country misinvoicing is broadly consistent with the dates of capital account liberalisation by industrialized countries; this suggests that once capital account restrictions are eliminated, the motivation for trade misinvoicing subsides.

In contrast, the decline in capital flight through export underinvoicing in developing countries was nowhere as dramatic as in the industrialized countries. In fact, the evidence from developing countries is quite mixed. While some countries like India and Philippines witnessed a decline in export misinvoicing between 1980 and 2005, others like Brazil, Chile and Colombia did not experience a significant decline. On the other hand, several countries like Indonesia, Thailand and Malaysia saw an increase in export misinvoicing. The broad empirical facts for developing countries are consistent with the prevalence of restrictions against capital mobility.

Focusing on import underinvoicing also yields a similar picture where the developed countries witnessed a strong decline in capital flight through import underinvoicing during the period 1980–2005, whereas the developing countries provide a mixed response.

Finally, we focus on the extent to which trade misinvoicing facilitates *de facto* capital account convertibility.² This can be measured by looking at the gross flows induced by misinvoicing amongst the various industrialized countries as well as developing countries. We normalize the extent of capital flows through misinvoicing by officially recorded gross flows on the capital account as well as GDP. While data on gross flows is taken from IMF's *Balance of Payments Statistics*, data on GDP is taken from World Development Indicators.³ This also provides a numerical proxy for the shrinking of the tax base induced by trade misinvoicing.

We find that during 1980 to 2005 countries in our sample have experienced an additional 18% of capital flows through misinvoicing of trade compared to official capital flows. Moreover, these flows were about 3% of the GDP of these countries. In industrialized countries misinvoicing induced capital flows equivalent to 11% of official flows and 1.8% of GDP. The extent of misinvoicing induced capital flows was much higher in developing countries. Compared to official flows, these flows were around 37.9%, while as a share of GDP they amounted to 7.6%. While Denmark, Belgium and Netherlands experienced highest financial flows through misinvoicing amongst the industrialized countries, South Africa, Philippines, Malaysia and Egypt witnessed high capital flows within developing countries. Table 1 lists the extent of capital flows induced by trade misinvoicing.

² We are thankful to an anonymous referee for suggesting this to us.

³ The Balance of Payments Statistics as published by the International Monetary Fund provides for an analytically consistent dataset to measure gross flows for an economy. Gross Flows is defined as the sum total of the following variables in the IMF database: Direct investment abroad, direct investment in reporting economy, portfolio investment assets, portfolio investment liabilities, other investment assets and other investment liabilities. The data may be found at elibrary-data.imf.org.

Table 1 Capital flows through misinvoicing (average 1980 to 2005)

	Share of gross flows	Share of GDP		Share of gross flows	Share of GDP
Algeria	73.0%	3.8%	Kuwait	28.1%	5.8%
Argentina	17.6%	1.1%	Malaysia	114.6%	13.0%
Australia	12.6%	1.4%	Mexico	108.5%	6.1%
Austria	20.3%	4.1%	Netherlands	73.8%	11.9%
Belgium	87.9%	39.2%	New Zealand	19.6%	2.2%
Brazil	16.3%	1.1%	Nigeria	104.3%	10.1%
Canada	33.4%	3.5%	Norway	20.1%	1.9%
Chile	14.1%	2.0%	Pakistan	65.2%	3.5%
China, P.R.: Hong Kong	106.6%	67.0%	Peru	42.5%	3.4%
China, P.R.: Mainland	66.5%	7.7%	Philippines	179.4%	11.2%
Colombia	19.7%	1.1%	Poland	61.6%	6.8%
Czech Republic	47.3%	8.6%	Portugal	19.4%	2.9%
Denmark	282.1%	6.8%	Romania	63.9%	4.4%
Egypt	135.6%	11.3%	Russian Federation	44.3%	9.9%
Finland	28.9%	3.6%	Saudi Arabia	91.8%	6.9%
France	11.2%	1.5%	Singapore	101.9%	45.6%
Germany	25.7%	2.4%	South Africa	538.1%	30.0%
Greece	37.4%	3.3%	Spain	17.3%	1.6%
Hungary	54.3%	6.3%	Sweden	21.1%	2.3%
India	49.8%	1.9%	Switzerland	35.9%	9.4%
Indonesia	58.9%	3.4%	Thailand	26.8%	2.9%
Iran, Islamic Republic of	92.4%	3.9%	Turkey	20.7%	1.1%
Ireland	11.9%	6.3%	Ukraine	30.6%	4.9%
Israel	56.8%	6.5%	United Kingdom	6.6%	1.9%
Italy	24.2%	2.2%	United States	8.3%	0.6%
Japan	15.3%	0.8%	Venezuela, Rep. Bol.	41.7%	4.3%
Korea, Republic of	114.2%	6.2%			

3 Empirical Analysis

In this section, we use regression analysis to study the principal determinants of cross-country variation in the level of trade misinvoicing over the period 1980 to 2005. Our primary dependent variable is trade misinvoicing measured as export underinvoicing as well as import overinvoicing *vis-à-vis* industrialized countries.

3.1 Data

Our principal variable of interest is the extent of capital account liberalization. We expect capital account liberalization to mitigate capital flight by reducing market distortions. With an open capital account, capital flight is likely to take place through

the capital account. Consequently, a country with an open capital account, even if it witnesses capital flight, is not likely to see it happen through trade misinvoicing. The extent of *de jure* capital account liberalization is measured using the index, developed by Chinn and Ito (2006). The index is the first principal component of the binary variables pertaining to cross border financial transactions, based on the International Monetary Fund's (IMF) categorical enumeration reported in Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The index ranges from -2.54 to 2.54 and a higher value of the index indicates greater financial openness.

We introduce a number of other control variables that have been found in the literature to influence misinvoicing. Countries with high current account deficit are likely to experience capital moving off to foreign shores. A persistent current account deficit can be looked upon as a manifestation of economic instability and induces capital owners to transfer resources to foreign shores. A country that is faced with persistent current account deficit is likely to undertake a devaluation to improve the current account balance. Alternatively, it can raise resources internally by engineering a transfer from the private sector. This can happen either by direct appropriation/nationalization of private assets or generating seignorage revenue through an inflation tax. In either of the cases the private sector will have an incentive to move its assets beyond the control of the government. We include the ratio of the current account balance to GDP with data on GDP and current account balance taken from the World Development Indicator (WDI) database. While in the original data, a positive number indicates a current account surplus we consider negative of this ratio so that a positive number reflects a current account deficit.

Typically, in countries with high custom duties, importers will have the incentive to declare a lower worth of their goods to avoid paying these duties. The average custom duties is calculated by looking at the ratio of total customs revenue calculated on merchandise goods to the value of merchandise goods being imported into the country. Data on both custom revenue and merchandise trade is taken from the *World Development Indicator* (WDI) database.⁴

Capital flight also tends to occur in countries that have low political stability. Politically less stable countries such as Nigeria and Zimbabwe have experienced a substantial volume of capital flight through import misinvoicing. Political instability causes capital flight as agents seek to minimize the risk of expropriation and future portfolio losses due to political crises. The Political Stability index is taken from the *Political Risk Services* (PRS) database. This variable is made up of several components including government stability, socio-economic conditions, investment profile, internal and external conflicts, corruption, law and order and ethnic tensions, among others. Across all these sub categories a low score implies greater risk. Overall, the political stability index ranges from 0 to 100 with a higher score reflecting a more stable regime.

⁴ Apart from evading custom duties, there might be an incentive to underreport imports to circumvent quantitative restrictions. We are unable to capture the effect of quantitative restrictions on import misinvoicing due to the lack of availability of uniform and consistent data on duty equivalent for quantitative restrictions for the set of countries under observation. Furthermore, given that except Algeria, Iran and Russia, all other countries under observation are WTO members, the use of quantitative restrictions is expected to have declined in recent years.

Although corruption forms a part of the political stability measure we employ, we also separately look at the impact of corruption on trade misinvoicing. By distorting the economic and financial environment through allowing people to assume positions of power through patronage rather than ability and increasing the pervasiveness of bribes connected with licenses, corruption is likely to result in capital moving out of the country. The corruption measure is also taken from the PRS database and goes from 0 to 6, with a higher number indicating a less corrupt regime. With a view of making it more intuitive we take the inverse of this measure so that a higher number refers to greater corruption. Data on inflation is taken from the WDI database with inflation being measured as the annual growth rate of the implicit GDP deflator. We consider the log of average inflation instead of the level of inflation as a few countries in the sample have extremely high average inflation rates: this implies that the parameter estimates from a regression would be determined by a handful of observations.⁵

Capital is likely to illegally move from home country to a foreign country if the returns are higher in the latter. To evaluate this possibility we look at both the real interest rate prevailing in the home country as well as the real interest rate spread. While the real interest rate is calculated by looking at the difference between the deposit rates prevailing in a country and the inflation rate, the real interest rate spread is the difference between real deposit rates in the home country and a risk free real interest rate. We proxy the risk free interest rate with real deposit rates prevailing in the US.⁶ One would expect capital flight to be inversely related with real deposit rates and positively related with real interest rate spread. Data on various interest rates were taken from the WDI database.

Highly indebted countries are likely to witness greater capital flight. Data on indebtedness, defined as the ratio of external debt to GDP, has been taken from the WDI database. Several studies focusing on the African countries, including Khan and Ul-Haque (1985), have shown that typically the government engages in foreign borrowing from donor countries and multilateral agencies, while the private sector shifts funds abroad. Moreover, the drain of foreign exchange resources through capital flight creates further demand for external borrowing. Khan and Ul-Haque (1985) also point out that residents of indebted countries are subjected to *expropriation risk*, implying that residents can have their domestic assets expropriated by the government through outright nationalization, taxes, or exchange controls, whereas, the risk on similar assets held abroad is negligible.

We also control for trade openness, exchange rate regime and extent of currency overvaluation. While data on trade openness, defined as the ratio of sum of imports and exports of goods and services to GDP, is taken from WDI database, we use the exchange rate index formulated by Levy-Yeyati and Sturzenegger (2005), which is a *de facto* classification based on data on exchange rates. The index ranges from 1 to 5 with a lower number implying a more flexible exchange rate regime. Finally, data on overvaluation is taken from Johnson et al.

⁵ Several papers including Romer (1993), Gruben and McLeod (2002) and Tytell and Wei (2004) have also used log of inflation to counter the extremely high rates of inflation observed in certain countries.

⁶ A positive real interest rate spread implies that the real deposit rates in the United States are higher than in the home country.

(2010). Beginning from 1990, the authors run a cross-sectional regression of the log of a country's price level relative to the US on the country's per capita GDP in PPP terms. The Balassa-Samuelson effect implies that as per capita GDP of a country increases, the real exchange rate, given by the relative price level vis-à-vis the US, should appreciate. The predicted value of the above regression is then taken as the equilibrium exchange rate and the difference between the predicted and actual exchange rate is a measure of overvaluation.

Before we turn to the regression results, we briefly describe the bivariate relationship between trade misinvoicing and some of the explanatory variables. We find that higher capital flight through export underinvoicing tends to be associated with countries that have greater level of corruption, higher custom duties, lower political stability, closed capital account and high level of external debt. Countries with low political stability are also found to engage in capital flight through import overinvoicing. Countries that have high custom duties tend to be associated with low import overinvoicing as importers have the incentive to declare a lower worth of their goods to avoid paying these duties. We find corruption and capital account openness exert limited influence on capital flight through import overinvoicing.

Finally, we obtain the rather surprising relationship that more indebted countries engage in lower import overinvoicing. A closer look reveals that this result is driven by Latin American economies like Argentina and Peru, which have witnessed high levels of external indebtedness but have experienced relatively modest capital flight through import misinvoicing.

3.2 Empirical Results

In this section we identify the key determinants of trade misinvoicing by employing Feasible Generalized Least Squares (FGLS) estimation. We allow for the presence of AR (1) autocorrelation within panels and a heteroskedastic error structure. While Table 2 illustrates the principal determinants of capital flight through export underinvoicing vis-à-vis industrialized countries, Table 3 highlights principal predictors of capital flight through overinvoicing of imports with industrialized countries. Looking across Table 2 it is evident that while countries can engage in capital flight through both export underinvoicing and import overinvoicing, the underlying factors driving these are quite different.

One of the key determinants of capital flight through export underinvoicing is the extent of current account deficit. This variable is significant across almost all the specifications outlined in Table 2. A one percentage point increase in the ratio of current account deficit to GDP raises capital flight through export underinvoicing by 0.15 to 0.26 percentage points. A higher current account deficit raises the probability of devaluation of the domestic currency, and reduces the incentive to invest in domestic assets. In such circumstances, investors seek out different routes to acquire foreign assets.

A rise in capital account openness is associated with a strong and significant decline in export overinvoicing. As countries undertake greater integration with the global financial market, allowing domestic residents to buy and sell foreign assets, the incentive to take out capital through trade misinvoicing diminishes. An increase

Table 2 FGLS estimates: determinants of export underinvoicing

	I	II	III	IV	V	VI
Dependent variable: share of export underinvoicing in exports to industrialized countries						
Current Account Deficit	0.267*** [3.311]	0.221*** [2.770]	0.204*** [2.550]	0.203*** [2.449]	0.152*** [1.900]	0.083*** [0.667]
Capital Account Openness	-1.326** [-2.349]	-1.137** [-2.060]	-1.298** [-2.324]	-1.039* [-1.675]	-0.854** [-1.992]	-1.423** [-1.982]
Customs Duty	0.026 [0.177]	0.198 [1.305]	0.177 [1.252]	0.169 [0.985]	0.312** [2.287]	0.333** [2.150]
Political Stability	-0.079* [-1.717]	-0.074* [-1.811]	-0.087** [-2.090]	-0.071* [-1.700]	-0.094** [-2.054]	0.107* [1.702]
Real Interest Rate		-0.015 [-0.411]	-0.021 [-0.518]	-0.007 [-0.181]	0.016 [0.453]	0.040 [0.920]
Log of Inflation			0.127 [0.606]	0.217 [1.084]	0.194 [0.936]	0.32 [0.564]
Exchange Rate Rigidity				-0.083 [-0.408]		
Trade Openness					0.062*** [3.710]	0.877*** [3.864]
Indebtedness						0.050** [1.983]
Rho	0.81	0.81	0.77	0.76	0.75	0.75
No of countries	36	34	34	34	33	17

Robust t statistics in parentheses

*** indicates significance at 1%, ** indicates significance at 5% and * indicates significance at 10%

Table 3 FGLS estimates: determinants of import overinvoicing

	I	II	III	IV	V	VI
Dependent variable: share of import overinvoicing in imports to industrialized countries						
Current Account Deficit	0.260*** [4.846]	0.219*** [3.208]	0.232*** [3.331]	0.228*** [2.906]	0.246*** [3.205]	0.734*** [2.619]
Custom Duties	-0.357*** [-3.448]	-0.332*** [-3.054]	-0.320*** [-2.875]	-0.274** [-2.396]	-0.275** [-2.390]	-0.319** [-1.982]
Overvaluation	0.028* [1.935]	0.047*** [2.702]	0.053*** [2.994]	0.067*** [3.314]	0.073*** [3.574]	0.049 [1.295]
Political Stability	-0.043 [-1.309]	-0.044 [-1.038]	-0.042 [-1.018]	-0.022 [-0.375]	-0.028 [-0.462]	-0.113 [-0.746]
Capital Account Openness		-0.188 [-0.361]	-0.35 [-0.592]	-0.664 [-0.982]	-0.84 [-1.218]	1.003 [0.830]
Log of Inflation				-0.469 [-1.009]	-0.464 [-0.986]	-2.781 [-1.567]
Real Rate	0.071*** [3.434]	0.053 [1.568]		0.046 [1.184]		-0.005 [-0.0646]
Exchange rate regime			-0.042	-0.586 [-1.555]	-0.571 [-1.494]	1.32 [1.324]
Indebtedness					-0.023	
Rho	0.79	0.79	0.80	0.72	0.74	-0.026 [-0.357]
No of countries	33	33	33	33	33	16

Robust t statistics in parentheses

*** indicates significance at 1%, ** indicates significance at 5% and * indicates significance at 10%

in the capital account liberalization index by 0.1 points, by modifying laws to allow freer movement of capital, results in lowering export misinvoicing by 0.8 to 1.3 percentage points.

Apart from the above direct impact on capital flight, liberalization of the capital account can influence the extent of capital flight through what Kose et al. (2009) term as ‘potential collateral benefits’ of financial integration. Liberalization of the capital account can act as a catalyst for imposing discipline on macroeconomic policy. With financial globalization, the threat of capital outflow, in the face of opportunistic policies, acts as a ‘disciplining effect’ for the policymaker. Thus, an open capital account induces policymakers to undertake and adhere to good policies. As pointed out by Tytell and Wei (2004) these include national competition policy, regulation of banks, equity, and labour markets and finally, monetary and fiscal policy. Several papers like Tytell and Wei (2004), Gruben and McLeod (2002) and Razin and Yuen (1995) have argued that capital account openness appears to lower inflation by disciplining monetary authorities. Similarly, Kim (2003) goes on to argue that capital account liberalization is associated with a lower fiscal deficit. Finally, countries with better institutions tend to have fewer restrictions on capital account transactions: capital account liberalisation is often correlated with improvements in institutional capacity in the country. For these reasons, there is a need for caution in interpreting the causal link between *de jure* capital account liberalisation and misinvoicing.

Adherence to good policies like low inflation and fiscal deficit increases the economic stability of the country and boosts the confidence of investors to hold assets within the country thereby reducing the extent of capital flight.

On the other hand, increased trade openness is associated with greater capital flight. Export misinvoicing increases by about 0.8 percentage points with an increase in trade openness of one percentage point. A larger tradeable sector offers greater opportunities for agents to misinvoice trade, with the objective of moving capital outside the country.

Political stability also shows up as a significant predictor of capital flight and has a strong negative influence on export underinvoicing. Typically, in countries with low political stability, residents take out their money to avoid the possibility that government in some form can erode the future value of such holdings. Higher customs duties are also associated with higher capital flight although the impact is not significant across all specifications. On the other hand, real interest rate, inflation rate, and exchange rate regime do not have a significant impact on export underinvoicing.

Finally, we find that countries with higher external indebtedness have experienced greater capital flight. A number of reasons have been put forward for the positive association between capital flight and external debt. Debt disbursements can signal an increase in the probability of a fiscal crisis and induce capital flight. Provision of external debt is also likely to put upward pressure on domestic currency, motivating residents to acquire foreign assets before an expected devaluation takes place.

Focusing on subsamples and looking specifically at the industrialized and developing countries separately one can see that the overall results are largely driven by the performance of the developing countries (Table 4). For the

Table 4 FGLS estimates: determinants of export underinvoicing (sub sample analysis)

	Dependent variable: share of export underinvoicing in exports to industrialized countries								
	Industrialized countries					Developing countries			
	I	II	III	IV	V	VI	VII	VIII	IX
Current Account Deficit	-0.188 [-1.134]	0.042 [0.272]	0.018 [0.115]	-0.039 [-0.222]	-0.04 [-0.244]	0.322*** [3.414]	0.298*** [3.216]	0.285*** [2.900]	0.260** [2.154]
Capital Account Openness	-0.183 [0.0894]	0.645 [0.339]	0.24 [0.136]	0.07 [0.0366]	0.534 [0.300]	-1.006** [-2.475]	-1.196** [-1.969]	-1.249** [-1.982]	-1.407** [-2.074]
Customs Duty	2.366*** [3.625]	2.122*** [3.596]	2.131*** [3.866]	2.061*** [3.472]	1.681*** [2.725]	-0.123 [-0.741]	0.038 [0.220]	0.012 [0.0706]	0.084 [0.674]
Political Stability	0.008 [0.0991]	0.075 [0.997]	0.068 [0.877]	0.079 [1.007]	0.108 [1.347]	-0.171** [-2.519]	-0.193*** [-3.016]	-0.193*** [-2.896]	-0.216*** [-3.019]
Real Interest Rate		-0.432*** [-2.802]	-0.383*** [-2.113]	-0.405*** [-2.066]	-0.382** [-2.179]		-0.004 [-0.0948]	0.001 [0.0261]	-0.039 [-0.824]
Log of Inflation			-0.137 [-0.270]	-0.125 [-0.241]	-0.108 [-0.212]			0.361 [1.398]	-0.011 [-0.0265]
Exchange Rate Rigidity				-0.191 [-0.714]					-0.324 [-0.763]
Trade Openness					-0.059 [-1.642]				
Indebtedness									
Rho	0.73	0.74	0.69	0.72	0.68	0.85	0.83	0.81	0.61
No of countries	11	11	11	11	11	25	23	23	23

Robust t statistics in parentheses

*** indicates significance at 1%, ** indicates significance at 5% and * indicates significance at 10%

industrialized countries, customs duty and real interest rate show up as key predictors of export misinvoicing. The positive relationship between customs duty and export underinvoicing is largely driven by countries like Australia and Japan, which maintained relatively high customs duties. On the other hand, in developing countries, export underinvoicing can largely be explained by capital account openness, political stability and trade openness. Countries like Singapore, Czech Republic, Ireland and Peru had undertaken significant liberalization of the capital account over the last two decades and witnessed diminishing capital flight through export misinvoicing during this period. Countries like India, Philippines and Columbia, however, which moved relatively little on liberalization of capital account during most of this period, witnessed strong capital flight through trade misinvoicing. More politically stable countries like Singapore, Czech Republic and Korea witnessed lower misinvoicing compared to countries like Pakistan, Nigeria and Algeria. Finally, trade openness also shows up as a significant predictor of trade misinvoicing among developing countries.

Next, when we focus on the key determinants of capital flight through import overinvoicing, the results are quite different from above. The current account deficit continues to be a significant determinant of capital flight through import overinvoicing. Again, across all specifications it exerts a significant positive impact on trade misinvoicing. However, both capital account openness and political stability do not have a significant impact on trade misinvoicing. Customs duties now show up as a strong determinant of import overinvoicing. Higher custom duties exert a strong negative impact on the desire to overinvoice and the effect is significant across all specifications. By reporting a lower value of shipment, traders are able to evade import tariffs or custom duties, avoid quotas, and launder illegally obtained money, and engage in capital flight. We find that a one percentage point increase in custom duties reduces import overinvoicing by around 0.3 percentage points.

Another important variable explaining the extent of misinvoicing is the extent of currency overvaluation. Exchange rate overvaluation induces devaluation expectations, which could induce capital flight for hedging purposes. The farther the adjustment is postponed, the stronger the expectation will be for the devaluation. Moreover, in some Latin American countries like Argentina and Mexico, the central bank and the government authorized transfers abroad at the official exchange rates. In such instances, capital flight was a direct result of overvaluation. We find that a one percentage point increase in overvaluation results in 0.03 to 0.07 percentage point increase in capital flight through import overinvoicing. The real interest rate has a sign opposite to may be expected. However, once we control for other variables like capital account openness, exchange rate regime, etc. we obtain the expected sign but the impact is not significant across any of the specifications. Similarly, the real interest rate differential, the exchange rate regime, indebtedness, and inflation do not have a significant impact on import overinvoicing.

Splitting the overall sample into developing and industrialized countries yields a similar result as before with bulk of the results being driven by the developing countries.

4 Key Results

With the help of a combination of graphical and econometric analysis we arrive at the following key results:

- The extent of misinvoicing is seen to be higher among developing countries than industrialized countries over the period 1980–2005. Also, misinvoicing has declined steadily in industrialized countries, while with developing countries, trends remain mixed.
- Though there is evidence of misinvoicing in countries all over the world, our regression results suggest that different factors are at play in affecting export underinvoicing and import overinvoicing.
- Current account deficit, custom duties, and currency overvaluation are the main factors that impact import overinvoicing.
- Export underinvoicing is found to be affected by political instability, capital account openness, current account deficit, trade openness and external indebtedness.
- We also find that there are different factors affecting export misinvoicing in developing and industrialized countries. While current account deficit, capital account openness and political instability are the primary factors driving export underinvoicing in developing countries, custom duties and interest rates are the significant variables driving export underinvoicing in industrialized countries.

5 Conclusion and Further Research

Economists have long been aware of trade misinvoicing. The traditional literature has focused on evasion of custom duties and economic instability, as being the forces at work with misinvoicing. If misinvoicing was driven by economic instability and custom duties, in many emerging markets such as China and India, conditions have changed enough to deliver a sharp reduction in misinvoicing. The broad summary statistics suggest that such a reduction has not taken place. This suggests the need for a further exploration of the factors affecting misinvoicing.

In this paper we examine the evidence in both industrial and emerging economies. We find that while there are many macroeconomic and institutional variables affecting misinvoicing, they vary in industrial and emerging economies. Moreover, the variables that affect export misinvoicing are different from those affecting import misinvoicing. The paper highlights that custom duties and economic instability are

not the only factors leading to capital flight through trade misinvoicing, as previously believed. Capital account openness, interest rate differentials and the exchange rate regime play an important role.

There is a need for further research to understand why different institutional mechanisms are affecting misinvoicing in developing and industrial countries. Moreover, when custom duties have been drastically reduced in developing countries post liberalization, why do they continue to play a vital role even today in import misinvoicing? We find that capital account openness plays a major role in export misinvoicing. However, we do not get a similar relationship in the case of import overinvoicing. In the latter case, we believe that the net import misinvoicing is a result of two competing factors - desire to keep capital out of the country leading to import overinvoicing, and the willingness to evade custom duties resulting in import underinvoicing. The importance of each factor is an area for further research.

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Appendix

Appendix A

Table 5 List of countries

Industrialized countries	Developing countries	
Australia	Algeria	Mexico
Austria	Argentina	Nigeria
Belgium	Brazil	Pakistan
Canada	Chile	Peru
Denmark	China	Philippines
Finland	Colombia	Poland
France	Egypt	Portugal
Germany	Greece	Romania
Italy	Hong Kong	Russia
Japan	Hungary	Saudi Arabia
Netherlands	India	Singapore
New Zealand	Indonesia	South Africa
Norway	Iran, I. R. of	Thailand
Spain	Ireland	Turkey
Sweden	Israel	Ukraine
Switzerland	Korea	United Arab Emirates
United Kingdom	Kuwait	Venezuela, Rep. Bol.
United States	Malaysia	

Appendix B

Table 6 Summary statistics of key variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Export Misinvoicing vis-à-vis IC	1345	3.19	22.7	-89.27	169.54
Import Misinvoicing vis-à-vis IC	1345	-3.77	15.89	-138.43	81.65
Net Misinvoicing vis-à-vis IC	1345	-0.92	10.69	-48.36	62.76
Export Misinvoicing vis-à-vis World	1319	-1.14	17.98	-78.94	106.03
Import Misinvoicing vis-à-vis World	1319	-1.45	15.15	-115.64	72.87
Net Misinvoicing vis-à-vis World	1319	-1.41	8.74	-43.56	31.28
Political Stability	1132	70.35	14.82	20.00	97.00
Corruption	1135	3.76	1.45	0.00	6.00
Exchange Rate Rigidity	1142	3.57	1.38	1.00	5.00
Average Custom Duties	652	6.42	9.09	-0.09	66.34
Inflation	1329	40.96	282.99	-25.70	6836.88
Real Interest Rate	1028	5.94	10.99	-91.72	88.11
Indebtedness	616	45.05	25.72	0.74	158.57
Capital Account Openness	1263	0.81	1.64	-1.77	2.54
Real Interest Differential	1028	-0.47	11.02	-80.12	95.34
Trade Share	1297	69.65	49.62	11.55	456.09
Current Account Deficit	1254	0.07	9.58	-54.67	240.50
Exchange Rate Overvaluation	1251	6.93	40.28	-231.79	193.03

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