TABLE 2
Two-stage Least Squares Estimates of Growth of Real GDP per capita, RGDPG Using Alternative Measures of Openness Five-year Averages for 47 Developing Nations 1970, 1975, 1980, 1985, 1990 (absolute value of t-ratios in parentheses)

	OPEN=DOI	OPEN=TARDE	OPEN=BMP
Constant	0.1370 (6.1736)***	0.0672 (4.3701)***	0.0495 (2.861)***
LIND	0.0081 (5.9853)***	0.0005 (1.0566)	0.0016 (2.7283)***
DEF	-0.0435 (0.8278)	0.001 (0.0274)	-0.0647 (1.2333)
INV	0.7532 (6.8593)***	0.2259 (4.7490)***	0.2453 (4.7958)***
POPG	-0.0282 (5.6964)***	-0.0105 (2.9076)***	-0.0101 (2.5541)***
HDI	-0.6021 (6.3992)***	-0.0828 (2.9440)***	-0.1326 (3.5876)***
OPEN	-0.0001 (1.7323)*	0.0002 (4.0925)***	-0.0079 (3.6562)***
σ	0.0396	0.0386	0.0418
LLF	429.2090	426.1500	416.8953

*** **Significant at the 1% level**
** **Significant at the 5% level**
* **Significant at the 10% level**

GLOSSARY:
RGDPG = real GDP per capita five year growth rate (in 1985 international prices).
LIND = percentage of the labor force that is employed in the industrial sector.
DEF = ratio of total government expenditures on defense to GDP.
INV = public and private investment share of GDP (in 1985 international prices).
POPG = growth rate of population.
HDI = Human Development Index.
OPEN = one of the three measurements of openness:
DOI = re-constructed Dollar Openness Index (in 1985 international prices).
TRADE = export plus imports as a percentage of GDP.
BMP = black market premium [(Black market rate/official rate)-1]

Smuggling and the Black Market Premium

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Abstract

Empirical studies pertaining to the impact of smuggling on the black mar - ket premium (BMP) are very rare in the literature. This paper adds to the literature on the relation between smuggling and the black market premium in the foreign exchange market by pooling data from 70 countries over the period 1956-98 in an unbalanced panel framework. Using tariff as a proxy for smuggling into a country and controlling for other macroeconomic variables, our results strongly support the notion that smuggling leads to high BMP in the foreign exchange market supporting the theoretical literature.

JEL Classification: F31

Key Words: *Black Market Premium, Smuggling, Tariff*

1. Introduction

Where ever there is government intervention in international trade, there is smuggling.[1] Then the usual question comes in mind, in which direction does it affect the black market premium (hence BMP hereafter)?[2] For long time, economists have thought about it and attempted to provide an answer to this question from different perspectives. Government interventions through tariff, quota or other non-tariff barriers, induces importers and exporters to resort to alternative illegal means e.g., smuggling via under-invoicing of imports and exports. While under-invoicing of imports results in excess demand for foreign exchange in the black market, under-invoicing of exports results in excess supply. Thus, the ultimate impact of smuggling on the BMP is an empirical issue.[3]

Three types of models have focused on the determinants of the BMP. They are real trade models or long run models (Culbertson 1975, Sheikh 1976, Matrin and Panagaryia 1984, Pitt 1984, McDermott 1989); monetary models (Blejer 1978, Biswas and Nandi 1986, Olgun 1984) and portfolio and currency substitution models (Calvo and Rodriguez 1977, Dornbusch et al. 1983, Macedo, 1985, Frenkel 1990, Agenor 1991). There is another set of work which combines real trade model and portfolio model together and provides a unified approach that is capable of showing both long run and short run determinants of the BMP (Dornbusch 1986, Macedo 1987, Edwards and Montiel 1989, Frenkel 1990, Kharas and Pinto 1989, Kiguel and Lizondo 1990, Lizondo 1987, 1991, Pinto 1991).[4]

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[1] There exists contrast opinion regarding the definition of the term 'smuggling'. Here smuggling is defined as clandestine import of dutiable goods without paying the customs (Cooper 1974, ch. 13, p. 183 in Bhagwati eds.).

[2] It is defined as the percent by which the black market exchange rate exceeds the official rate where both rates are defined as number of units of domestic currency per unit of foreign currency (say, US dollar).

[3] Bhagwati (1964, ch. 9, p. 139) defined under-invoicing of import as the discrepancy between the stated value of imports and their actual value payable to the exporter abroad, such that the latter exceeds the former and results from tariff or other kinds of government restrictions.

[4] For a review of three kinds of model see Agenor (1992), pp. 13-16, Montiel et al., (1993), pp. 62-81, and Kiguel and O'Connell (1995), pp.21-52.

In this paper, we attempt to extend the literature on smuggling by investigating its impact on the BMP. For this purpose, in section 2, we provide our theoretical arguments and present a model that is used to assess the impact of smuggling on the BMP. Section 3 provides our empirical findings supporting mostly the notion that more smuggling leads to a higher BMP. Section 4 concludes the paper.

2. Theoretical Arguments and the Literature

As part of import substitution industrialization strategies, governments in developing countries maintain a highly overvalued exchange rate; the exchange rate is set below the equilibrium level (like a price ceiling). The goal of this policy is to make the import of capital and intermediate products cheaper (at government-determined price). Hence, there are often two markets of foreign exchange in developing countries. One is the official market where all foreign exchange is bought and sold at a rate fixed by the government. The other is the black market where transactions in foreign exchange are made at a market-determined price (Todaro 2000, pp 515-516). When controls are imposed, central banks often set the exchange rate at an officially fixed level and require all market participants to trade at those fixed rates. However, those in need of foreign exchange whose demands are not satisfied have no choice but to engage in black (illegal) or parallel (legal) market activity. The percentage difference between the black market rate and the official rate constitutes the black market premium.[5]

Factors that determine the BMP must also be the factors that determine the black market exchange rate itself. This implies that identifying the determinants of the BMP is the same as identifying the determinants of the demand for and the supply of foreign exchange in the black market. On the supply side, a few studies such as Culbertson

5 We will use the term “black market rate” to refer to both the “black market” & the “parallel market rate”. Throughout the paper we used “black market” and “parallel market” interchangeably. However, parallel market is not illegal in many developing countries. Sometimes government authorizes some vendors to function legally like any other authorized dealers of foreign exchange.

(1975), Sheikh (1976), Martin and Panagariya (1984), and McDermott (1989) have emphasized the role of smuggling, under-invoicing of exports and resale of officially allocated foreign exchange as the main sources of supply. Agénor (1992) has identified five possible sources of supply, such as, smuggling of exports, under-invoicing of exports, over-invoicing of imports, foreign tourists and overseas remittance etc. He also identified three determinants of demand such as legal and illegal imports, portfolio diversification and capital flight and residents' travel abroad. On the demand side, Macedo (1987) argues that in some countries, the tariff rate on import of some commodities is so high that it pays to smuggle the goods and finance them through the black market. Thus, high tariff rate can be identified as a major factor for increased demand for foreign exchange in the black market. On the other hand, portfolio-balance approach developed by Dornbusch et al. (1983), identifies portfolio diversification as a major component of the demand for foreign exchange in the black market. In such models, Agénor (1992, p. 15) argues that loss of confidence in domestic currency, fears of inflation, increasing taxation and low real domestic interest rates, all contribute to an increased demand for foreign currency. Kiguel and O'Connell (1995) identified under-invoiced exports, over-invoiced imports and central bank sales of reserves for capital outflows (whether legal or illegal) as the sources of supply of foreign exchange and under invoiced and smuggled imports as the source of demand and argued that illegal trade flows have important influence on parallel market exchange rate in the medium to long run. The main factors that are identified to affect this flow are trade taxes, foreign exchange rationing, official real exchange rate and fiscal deficit.

There are different channels through which smuggling can affect the BMP. First, the importers undertake over-invoicing of imports in an attempt to smuggle commodities into a country. Winston (1969) provided some example from Pakistan showing how importers over-invoice imports in collaboration with foreign suppliers who supply equipments at a fictitious price and then how the payment is settled via secret foreign bank accounts of importers. This secret money is then remitted into the country via black market channel that creates

excess supply of black foreign exchange. On the other hand, the incentive to under-invoice depends on the relative magnitude of import tariff and black market premium. If import tariff rate is higher than premium there will be under-invoicing. The magnitude of the difference between the correct and faked price on the invoicing determines the amount of buying and selling of foreign exchange in the black market

Second, more smuggling leads to corruption in customs officials that allow illegal activities in exchange for bribes in terms of cash or other means of payment that creates extra demand for black market dollars. For example, in Bangladesh, when job market candidates are asked to offer their priority list in civil service, in most of the cases they select customs and income tax as the first and the second choice respectively.[6] The problem is so severe that sometimes candidates prefer customs job to Foreign Service. Customs job can provide the official the highest amount of black money per month in excess of his or her legal salary. The attractiveness of a job is determined not by its salary but by the illegal money that comes as a byproduct of smuggling.

Third, most of the illegal payments of smuggling are settled via hundi.[7] This hundi business is exclusively done via black market and considered as safe heaven to smugglers. This works as a complement to the smuggling activity and like smugglers it is difficult to detect a hundi trader. The beneficiaries holding higher-level position in public office or in political arena, protect smugglers and hundi-trader out of their own monetary interest. The black market money earned by smuggler or dishonest customs official seek a safe place and the holders may not find it safe to keep it within a country. This creates capital flight

[6] Tanzi (1999) also mentioned about this problem. For detailed analysis by Tanzi, see p.114 of Jain Eds. (1999).

[7] Hundi (also hoondee, hoondi, hoondy) is defined as a negotiable instrument, such as a bill of exchange or promissory note, used by native bankers in India and worded in the vernacular; also money remitted by such an instrument (The Oxford English Dictionary, 2nd ed., 1989, p. 490). This term has gained popularity due to increased transfer of black money across borders. The Bangladesh government is trying in vain to stop it without realizing that hundi is an end result of a hidden economy and low-cost but advanced communication network.

and some extra demand for black market dollars. The ultimate impact depends on whether smuggling results in excess supply or excess demand. In our paper we only considered only in-smuggling. Hence, we expect that smuggling creates extra demand for dollars in the black market.

Dornbusch et al. (1983) introduced a simple model in which they identified determinants of the BMP. Even though Dornbusch et al. (1983, p. 28) mentioned smuggling and its impact on BMP, they did not include any variable explicitly that can capture the impact of smuggling. They used official real exchange rate as a proxy for smuggling and tourists' expenditure. We observed that once we introduce smuggling explicitly into the model with real exchange rate that is already there, this model can replicate the real trade behavior of representative agents in a better fashion.

As indicated, empirical studies in this area are rare. To the best of our knowledge, only one study has addressed the issue empirically, i.e., Phylaktis (1992) who introduced import tariff as a measure of foreign exchange restriction, applied the Dornbusch et al., (1983) model by using annual data for Chile over the period 1974-1984. Phylaktis showed that import tariff raises the BMP in the long run through affecting the flow demand for black dollars by import smugglers. Given the limitations of Phylaktis (1992), i.e., one country and 11 observations, we intend to engage in a relatively more comprehensive empirical analysis of the impact of smuggling on the BMP by using data for 70 developing countries over the period 1956-98.

3. The Model

In order to establish the impact of smuggling on the BMP, we select a simple model from the literature that identifies the determinants of the BMP and add import tariff rate as a measure of smuggling. Dornbusch et al. (1983) developed a model of BMP and established its validity by drawing data from Brazil. However, they argued that their model could be applied to any other country. The model was a partial equilibrium model in which Dornbusch et al. (1983) basically focused on the interaction of portfolio diversification decisions and the deter-

minants of net flow of dollars associated with smuggling and tourism. On the portfolio side of the model, depreciation-adjusted interest rate differential was identified as a key factor contributing to portfolio diversification decision. On the real side of the model, where tourism and smuggling in commodities induces demand for black market dollars, the relative price proxied by official real exchange rate is identified as the determinant of the premium.[8] Thus, treating the U.S. as foreign country and the U.S. dollar as foreign currency, we assume that the model inclusive of a measure of smuggling takes the following form:[9]

Where, $BMP_{it}=(BEX_{it}-OEX_{it})/OEX_{it}$, $d_{it}=(OEX_{it}-OEX_{it-1})/OEX_{it-1}$,

$REX_{it}=P_{it}/(OEX_{it})P_{it}^{*}$,

i stands for cross section dimension and t stands for time dimension, and is an error term.

Note that, in this formulation, BEX_{it} is the black market value of one U.S. dollar (reserve currency) in terms of domestic currency (i.e., country i's currency over time t); OEX_{it} is the official exchange rate defined in the same manner as BEX_{it}; i* is the U.S. nominal interest rate, i is country i's nominal interest rate; d_{it} is the rate of depreciation of domestic currency in the official market. REX_{it} is the official real exchange rate defined in a way that an increase reflects real appreciation of domestic currency (based on OEX_{it}) and $SMUG_{it}$ is our newly introduced variable as a measure of smuggling.

[8] Even though Dornbusch et al. (1983) mentioned about smuggling and its impact on BMP, they did not use any variable explicitly for smuggling.

[9] The reason for considering USA, as the foreign country is a matter of convenience but the choice of US dollar as the foreign currency can be justified in that it is widely used in black market transaction in most of the countries. However, there exists black market for currencies other than US dollar in many countries.

P and P* represent the domestic and the foreign price respectively.

As far as the expected signs of the coefficients are concerned, we expect β_2 to be positive. This is because a real appreciation at official exchange rate (i.e., an increase in REX) increases the relative cost of domestic goods compared to foreign goods and provides an incentive to the smugglers to smuggle into a country from the rest of the world. An increase in the U.S. interest rate adjusted for depreciation of the domestic currency (i* + d) relative to domestic interest rate (i) results in an increased demand for dollars in the black market that again leads to an increase in the BMP. Hence, an estimate of β_3, the coefficient attached to the depreciation-adjusted interest rate differential is expected to be positive. Finally**,** if higher degree of smuggling results in excess demand for dollars in the black market, we would expect an estimate of β_4 to be positive. We considered only in-smuggling in our model that makes our expected sign of β_4 to be positive.

4. Empirical Results

Before we provide our empirical results, a few words are necessary about the sources of the data. The data on the BMP is collected from the Global Development Network database of the World Bank. However, some missing observations are filled out from World Currency Yearbook. The official exchange rates are collected from the International Financial Statistics (IFS CD-ROM) published by the International Monetary Fund (IMF). The real exchange rate data is collected from the Penn World Table version 6.0. Finally, the data on import tariff rate that is used as a proxy for smuggling, is taken from World Development Indicator CD-ROM, 2001, published by the World Bank.[10] It is to be noticed that the Penn World Table makes it

[10] This approach can be extended to an open economy framework to estimate the size of smuggling. Tariff is one such instrument used by a government that distorts the functioning of a market economy. Hence, it could be a good proxy for smuggling and it is already used by Phylaktis (1992), as mentioned before. However, as a word of caution, it should be mentioned that tariff is not the only instrument that affects border trade. For simplicity and to avoid the use of any subjective indicators for other non-tariff barriers and law enforcement, we used

possible to use comparable price data for all countries based on common basket. The reasoning is that once the value of goods and services of each country is expressed in terms of U. S. goods and services they are converted into same units. The official depreciation rate is nothing but the annual depreciation rate that is calculated from the IFS CD-ROM. Foreign country in our analysis throughout is the U. S. We used three month treasury bill rate as a proxy for foreign interest rate. It is to be noted that this treasury bill rate is considered as the risk free return in empirical research that considers the U. S. as the reference country. However, no uniform domestic interest rate data is found. Hence, we used different interest rates for different countries depending on the availability of the data.

Let us now turn our attention to the empirical results. Like Dornbusch et al. (1983), we would have preferred to estimate the model by using time series data. But considering the small number of time series observations and to provide a multi country picture, we intend to estimate equation (1) by using pooled data from 70 countries over the period 1956-98. These countries are selected based on the availability of the data on relevant variables. The countries considered are Argentina, Bangladesh, Barbados, Belize, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Cameroon, Central African Republic, Chile, China, Colombia, Costa Rica, Cyprus, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Gambia, Ghana, Greece, Guatemala, Guinea, Guyana, Honduras, Hungary, India, Indonesia, Israel, Ivory Coast, Jamaica, Jordan, Kenya, Lesotho, Madagascar, Malawi, Malaysia, Mauritania, Mauritius, Mexico, Morocco, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Peru, Philippines, Poland, Republic of Congo, Senegal, Sierra Leon, South Africa, South Korea, Sri Lanka, Syria, Tanzania, Thailand, Togo, Trinidad & Tobago, Tunisia, Turkey, Uganda, Uruguay, Venezuela, Zambia, and Zimbabwe.

average import tariff as the sole measure of smuggling. There are few other studies that provide a positive linkage between smuggling and tariff (Naya and Morgan 1969, Johnson 1972, Bhagwati and Hansen 1973, Cooper 1974, Sheikh 1976, Martin and Panagariya 1984, Pitt 1984, Macedo 1987, Norton 1988).

Now, it is sensible to describe the panel estimation procedures that are used.[11] We consider five cases for the model 1 in a panel set up. In case 1, simple Ordinary Least Squares (OLS) is applied to the pooled data.[12] This estimation is valid, if and only if it is assumed that all the countries under consideration have the same slopes and the same intercepts. This is too restrictive in the sense that some of the developing countries have individual characteristics that distinguish them from other developing countries. For example, some countries may undertake capital control while others not in a particular year. This gives rise to case 2 that allows individual intercepts and also preserves the OLS characteristic of case 1. In this case, we take account of country specific factors by including 69 country dummies while one dummy is reserved for common mean intercept and apply the OLS technique again. In standard econometrics textbooks, this second method is called "one-way fixed effect model" or "least squares dummy variable" model and it assumes that there are common slopes but different intercepts for each cross-section and intercepts are assumed to be deterministic. The advantage of using this technique is that it provides consistent estimates of parameters even if individual characteristics are correlated with regressors.

The third case is the straightforward extensions of case 2 where in addition to 69 country dummies, we introduce 42 time dummies (one time dummy is reserved for mean intercept) and apply the same technique as case 2. This case captures country-effect as well as time-effect and is known as "two-way fixed effect model". In spite of their large-sample advantage, fixed effect estimations have limitations in the sense that developing countries may differ from each other with respect to individual characteristics while the reason for this difference

[11] We have used SAS Window version 8 to perform most of our estimations. The details of each panel estimation technique is available in the SAS online documentation especially in the TSCSREG procedure of SAS User's Guide (Section SAS/ETS).

[12] As an additional exercise we calculated the variance inflation factor (VIF) to check for multicollinearity and found that it is approximately equal to one for all regressors except intercept. This implies that the estimation does not suffer from multicollinearity.

may be unknown.[13] Another disadvantage is that we have to estimate too many parameters. Hence, the benefit of controlling for individual heterogeneity comes at the cost of too many parameters. To avoid this kind of problem, we introduce case 4. This model is known as "one-way random-effect model" or "error component model" which is similar to case 2 with the difference that each cross-section intercept is drawn from a common distribution and it can also avoid too many parameters. Similarly, to capture the time-effect in a random-effect framework I introduce case 5 that is also known as "two-way random-effect model". But the cost of using 4 and 5 are substantial in the sense that the individual-effect is required to be uncorrelated with the regressors, which is not always possible. Table 1 reports the results of all the five cases of panel regression together. (Table 1)

It is clear that the estimated coefficient for SMUG (which is referred as TARIFF) is highly statistically significant in most of the cases with correct sign of coefficients. However, the specification test result is somewhat inconclusive. Hence, smuggling is significantly important in determining the BMP or higher level of smuggling into a country results into a higher premium for black market dollars. The interest rate coefficients turned out to be insignificant in all the cases. This finding is convincing especially in developing countries where the interest rate is mainly government-determined. Another reason for redundancy may arise from using different interest rates for different countries due to lack of data It may also result from the relative invariance property of interest rate differential over time for each group. The high LM statistics and its associated low P values in case 1 represent that the cross-section variation is substantial and the homoskedastic pooled-OLS is rejected. The high value of F test statistic and their associated low P values in cases 2 and 3 shows that the null hypothesis of no fixed effect is rejected. This establishes the fact that the individual country-effects and or time-specific effects do play a key role.

[13] For example, India and Pakistan both received their independence from the British rule in the year 1947 while their current economic structures are heterogeneous and the reasons are difficult to detect in most of the cases.

The high value of the Hausman test statistic referred as m statistic and its associated high P value in case 4 shows that the null hypothesis of no correlation between the individual effects and regressors is not rejected. However, it is rejected in case 5. Hence, the specification test result is somewhat mixed. Based on inconclusive result regarding the choice of the model we prefer the fixed-effect estimator because it gives us higher R^2.

5. Summary and Conclusion

Smuggling into a country is considered to be an issue of research interest for economists for long time. Many economists provided theoretical models to explain why smuggling occurs and its implications for welfare. From studying the literature of smuggling, we realized that smuggling has important implications for BMP. Some economists provided some theoretical analysis to explain the linkage between smuggling and tariff or other protective measures. Except Phylaktis (1992), we found no empirical work that explicitly shows that smuggling affects the BMP. In this paper we have applied Dornbusch et al. (1983) model of BMP in a modified form and extended the empirical literature of smuggling for 70 countries and 43 years and used import tariff as a measure of smuggling that mostly supports the notion that smuggling raises the BMP in developing countries. From specification test result it is also found that the fixed effect model performs better than the random effect model in most of the situations. Our result also supports the simple OLS regression result, provided by Phylaktis (1992), for Chile over 11 years' time period. This panel regression result is tremendously important for empirical research in this area in that any research on smuggling always suffers from data problem because of its hidden nature. This approach can overcome the data availability problem and investigate the impact of smuggling when the data has two dimensions.

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Table 1: Panel Regression Result with TARIFF as a Proxy for Smuggling

Cases	Constant	REX	(i*+d-i)	SMUG	R^2	Test Statistic
Case 1	-0.18 (3.01)	0.01 (11.37)	0.00 (0.10)	0.77 (2.39)	0.06	LM=340.96, $X^2_{(1)=0.000}$
Case 2	0.15 (0.68)	0.01 (10.98)	-0.00 (0.54)	0.94 (2.56)	0.20	F=4.66, P<0.0001
Case 3	0.30 (1.10)	0.01 (11.70)	-0.00 (0.66)	0.44 (0.94)	0.22	F=3.48, P<0.0001
Case 4	-0.20 (2.44)	0.01 (11.12)	-0.00 (0.36)	0.87 (2.49)	0.06	m=3.33, P=0.34
Case 5	-0.22 (2.60)	0.01 (11.50)	-0.00 (0.42)	0.71 (0.37)	0.07	m=9.11, P=0.03

Note: Figures in parentheses are absolute values of t-ratios. F represents F statistic that is used to choose between the OLS and the fixed-effect model. P represents P values and m represents the Hausman specification test that is used for choosing between the fixed-effect and the random-effect model. Breusch and Pagan (1980) provide LM statistic calculated directly from the OLS residual to compare the OLS with the GLS while the rejection of the null hypothesis favors the random-effect model. The LM test has a Chi square distribution with one degree of freedom.