TRADE BASED MONEY LAUNDERING IN SELECT ASIAN ECONOMIES: A COMPARATIVE APPROACH USING THE GRAVITY MODEL

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ABSTRACT

Trade based money laundering (TBML) is a major issue for emerging Asian economies reliant on trade for economic expansion. In this paper, the gravity model is applied to examine how government attitude toward traditional money laundering practices affect the amount of TBML between Thailand, Singapore and Japan for the years 2001–2015. Results reveal that the amount of TBML between Japan, Thailand and Singapore is greater with higher levels of government attitude toward traditional money laundering. Findings can be used to review current anti-money laundering regulations to ensure appropriate enforcement activity to reduce criminal activity and encourage economic growth. **JEL Classification:** F14, E26, K4

INTRODUCTION

Money laundering is considered an illegal activity (He, 2010). Money laundering damages economic growth and has been used to finance terrorism and the proliferation of weapons of mass destruction. These activities represent serious threats to global security and the functioning of the entire global financial system (Simser, 2013). The Financial Action Task Force (FATF) is a global organization that provides guidance to government regulators related to fighting money laundering activities in their home economy (Financial Action Task Force, 2014). As indicated by FATF, there are three main methods by which criminal organizations move money for the purpose of disguising its origins and integrating it into the formal economy. The first is through the use of the financial system; the second involves the physical movement of cash and the third is through the physical movement of goods through the trade system. Emerging economies that engage in international trade are particularly vulnerable to the damaging effects of money laundering. Essentially, trade based money laundering

(TBML) is simply another form of money laundering (Ferwerda *et al.*, 2013). TBML is however difficult to estimate given the illicit nature of money laundering, especially so in emerging economies.

Estimating the amount of money laundering in a country is, by nature, imprecise as the movement of funds cannot be accounted for within conventional trade activities. Money laundering is damaging to an economy as these proceeds of crime distort the prices of goods, not reflecting the true demand of its constituents (Aluko and Bagheri, 2012). As a result, there are distortionary effects in the macro economy limiting legitimate economic growth (Quirk, 1997). The United Nations Office on Drugs and Crime (UNODC) conducted a study (UNODC, 2011) to determine the magnitudes of illicit funds generated by drug trafficking and organized crimes, and to investigate to what extent these funds are laundered. The report estimates that in 2009, criminal proceeds amounted to 3.6% of global Gross Domestic Product, with 2.7% (or USD 1.6 trillion) being laundered. As authorities have become more sophisticated in tracking conventional money laundering techniques like physical cash smuggling, criminals are using alternative ways of laundering money, including TBML. Unger and Den Hertog (2012) rightly claim that "similar to water which always finds its way, criminals also find new ways to escape anti money laundering regulations."

Trade represents an avenue for criminals to launder money under the guise of legitimate trade activities. Trade is one important 'backdoor' for launderers, who can use fake invoicing of exports and imports to disguise illicit money flows (Zdanowicz, 2005). The International Chamber of Commerce Global and Trade Finance Survey of 2013 describes how money can be laundered through trade finance in several ways, including mis-invoicing by incorrectly valuing the price of the good; mis-representing the amount of goods shipped; inaccurate representation of the goods; or shipping goods to sanctioned entities or countries for a higher profit (ICC Global Trade, 2013). The issue of mis-invoicing has been a significant issue particularly for emerging economies. The average mis-invoicing in developing countries over the period 1977-1983 was 20 percent of the total export earnings (Gulati, 1985). Cross border flows of illegal money is especially damaging to developing countries. According to data from the Global Financial Integrity Report (2013), the developing world lost U.S. $946.7 billion in illicit financial outflows in 2011. These capital outflows stem from crime, corruption, and tax evasion all manifested as TBML. Illicit outflows from the region averaged 5.7% of GDP annually. Globally, illicit financial outflows averaged 4% of world GDP.

In this paper, the focus is on estimating TBML as opposed to conventional money laundering. A useful construct to measure this is government attitude. Government attitude as defined is the willingness of countries in enforcing anti-money laundering regulations (Ferwerda *et al.*, 2013). This enforcement can be measured across countries by defining the number of court prosecutions and/or convictions. As such, in order to estimate TBML, government attitude will be operationalized as court prosecutions that include anti-money laundering regulations as part of the case.

Money laundering related to trade activity in Asia is a relatively recent phenomenon and is growing quickly due to economic expansion and as criminals seek alternative methods to hide their ill-gotten gains. As suggested earlier, money laundering is undesirable as it distorts the economic growth model and Asian economies are particularly affected by this as a significant percentage of their economy is dependent on trade (Zebregs, 2004). While there have been contributions related to estimating

trade flows and money laundering internationally in academic literature, the focus has not been on estimating TBML. Contributing validated academic literature related to developing a better understanding of the extent of TBML in Asian economies will allow key stakeholders like NGOs and governments of these economies to develop more effective enforcement guidelines and policies to reduce this illicit activity.

This research proposal will seek to extend the gravity model by operationalizing the construct of government attitude into variables that can be measured and validated against the model. In this case, government attitude will be measured in this proposal by the number of money laundering court prosecutions filed in respective Asian countries selected. A review of the literature in this area has not identified the use of court prosecutions as a variable and as such if validated can be considered a contribution to the academic literature.

This paper proceeds as follows: the next section discusses how this paper fits into the existing TBML and gravity model literature, the third section develops the econometric model and hypotheses to be tested, the fourth section reports the regression and hypotheses results, the fifth section offers limitations to this study, and the last section concludes and offers direction for future research opportunities.

LITERATURE REVIEW AND THE GRAVITY MODEL

Money laundering has existed since the 1930s (Bosworth-Davies and Saltmarsh, 1994). Money laundering is however growing quickly and is considered a serious global issue. Consequently, the Financial Action Task Force (FATF, 2014) was established in 1989 to set global standards that member countries can adopt to help address this global phenomenon by writing and enforcing anti-money laundering regulations in their respective court systems.

Research related to TBML has focused on the impact of TBML in specific geographies (Thanasegaran and Shanmugam, 2007), Liao and Acharya, 2011), and sectors including real estate (Ritzen, 2011), diamonds (van Dijck, 2009), and commodities (UNCTAD, 2016). These papers provide an understanding of the typologies used to launder money and identifies trends or patterns that can be identified. There has been no empirical studies conducted using economic models to help explain the extent of TBML based on the government attitude in a specific country. As such there is a gap in the current academic literature that this research proposal looks to address.

There have been other attempts in the literature to explore issues related to money laundering using game theory (Araujo, 2010). Other efforts to estimate money laundering have included using the Mundlak specification to test the effect of anti-money laundering policy on the crime rate (Ferwerda, 2009). The two sector dynamic general equilibrium model has also been used to estimate money laundering within the Italian economy (Argentiero *et al.*, 2008). Findings from Argentiero *et al.* (2008) point to 12 percent of the Italian economy attributable to money laundering. While the findings are useful, the model focuses on only 2 sectors – in this case, the regular and criminal sectors. Extending to multiple sectors is inherently a weakness of the two sector dynamic general equilibrium model (Argentiero *et al.*, 2008). Overall, the models described here have generally been applicable under restrictive assumptions based on limited data sets that can change significantly when the model specifications

change. The gravity model has been an exception in estimating trade, having been tested against multiple and robust data sets.

Tinbergen was the first economist to apply the gravity model to estimating trade between two countries and subsequent researchers have applied this model successfully in further analysis to other areas of international trade theory (Tinbergen, 1963). Inherently, the gravity model is based on Newton's universal law of gravity, where two objects are attracted to each other based on their mass and inverse distance between each other squared (Ferwerda, *et al*., 2013). The volume of trade could be estimated as an increasing function of the national incomes of the trading partners (mass of the 2 objects) and a decreasing function of the distance between them, where distance becomes a proxy for cost of the trade (Poyhonen, 1963). The successful application of the gravity model has allowed for the further extension of additional variables such as population size, which denotes the "share of domestic demand in total national product" with the goal to determine total foreign demand and supply for that country (Linnemann, 1966). Aitken (1973) applies the same functional form and specification as that in Linnemann's model with cross-sectional data, including exporter and importer populations. Subsequently, Aitken (1973) was able to use the gravity model to estimate the trade flows within the European Economic Community and European Free Trade Association. What these research papers have attempted to demonstrate is that the gravity model has been fairly robust in estimating trade flows.

The first extension of the gravity model to estimate TBML flows was made by Ferwerda *et al.* (2013) where they examined the robustness of the gravity model for estimating TBML specifically related to the U.S. and trading partners. An assumption validated by Ferwerda *et al.* (2013) is that TBML is closely related to trade flows as this type of money laundering can only occur through trade.

Building on Ferwerda (2013)'s research, this proposal attempts to extend the applicability of the Gravity Model to estimate trade flows and illicit financial flows on select Asian economies based on a specific construct uniquely relevant to these countries. Specifically, the construct of Government attitude will be measured and tested. Government attitude will be measured in terms of number of prosecutions and convictions reflected in court cases. Court cases will include actions that specifically reference money laundering 'money laundering'; 'tax evasion' and 'corruption' (FATF, 2014).

ECONOMETRIC MODEL AND HYPOTHESES

As previously described, the gravity model has been demonstrated to be a robust model in estimating trade flows. The traditional gravity model can be explained in the following form (van Bergeijk, 2010):

$$T_{ij} = (GDP^{\alpha}_{i} * GDP^{\beta}_{j}) / D^{\theta}_{ij}, \quad (1)$$

where Tij represents bilateral trade between countries i and j. Bilateral trade is defined here as the value of goods and services exchanged in a specified period of time, typically annually. GDP_i represents gross domestic product (GDP) for country i, GDP_j represents GDP for country j and D_{ij} represents the distance between the trading partners, also represented as trading costs. This equation explains bilateral trade using

economic size and distance; the larger the two trading partners, the larger the bilateral trade flows. The larger the distance between the two countries, the smaller the bilateral trade flows.

For the purposes of this research proposal, a log linear representation of the gravity model will be adopted. Ferwerda, *et al.* (2013) apply the following model:

$$X_{ij} = \beta_0 + \beta_1 Y_i + \beta_2 Y_j + \beta_3 N_i + \beta_4 N_j + \beta_5 D_{ij} + \beta_6 P_{ij} + e_{ij}, \quad (2)$$

where X_{ij} is the value of trade between countries i and j, Y_i is the Gross Domestic Product of country j, N_j is the size of the population of country j, D_{ij} and P_{ij} represent the distance between country i and country j and a possible special relationship, respectively.

Ferwerda, *et al.* (2013) also extend the standard gravity model to include two additional money laundering policy variables – Egmont membership and government attitude. The Egmont Group is a cooperation of national Financial Intelligence Units fighting money laundering. Financial Intelligence Units are governmental agencies tasked with enforcing anti- money laundering policies in compliance with the Financial Action Task Force recommendations (FATF, 2014). Per Ferwerda *et al.* (2013), government attitude is calculated as a score for the attitude of a government towards money laundering. This construct has not been validated in their article or subsequent academic studies. As such, this research introduces the idea of using court cases to measure government attitude. It represents the 'score of attitude' that Ferwerda, *et al.* (2013) highlight in their paper. The operationalized variable of this construct would be court prosecutions, with the unit of measure being the number of court cases relating specifically to money laundering. Ferwerda *et al.* (2013, p. 13) goes on to indicate that *"One of the driving factors of TBML is licit trade itself: the larger the trade flow, the larger opportunities for fraud."* In other words, within regular, licit trade, there is money laundering occurring due to illicit trade. The trade data evaluated by Ferwerda, *et al.* (2013, p. 14) suggests that *"...money launderers use TBML as an alternative for traditional money laundering when the country they send their money to is fighting (the traditional form of) money laundering intensively."* Countries fight money laundering with court prosecutions and enforcing anti-money laundering regulations. If in fact a country's regulators are focused on stamping out non-trade based money laundering, money launderers will use trade as an alternative method and subsequently see an increase in TBML over non-trade based money laundering.

This paper represents the enhanced gravity model in the following manner:

$$Z_{ij} = \beta_0 + \beta_1 GDP_{ij} + \beta_2 POP_{ij} + \beta_3 D_{ij} + \beta_4 E_i + \beta_5 GA_{ij} + e_{ij}, \quad (3)$$

where E represents membership of the Egmont Group of country and GA_{ij} is the average of government attitude of country i and j. Z_{ij} in this case represents the amount of TBML between countries i and j as a subset of overall trade. Table 1 provides definitions and sources of the variables in equation (3).

Because all three countries are members of the Egmont Group (Egmont Group, 2016), this construct will be held constant and β_4 will not tested. However the influence of government attitude represents an opportunity to be tested here across specific Asian countries. A uniqueness of Asian countries is the significant variability

of regulatory enforcement and volume of trade and as such presents an opportunity to measure government attitude's impact on levels of TBML. As a test of robustness, this paper will use three alternative proxies to measure the construct of government attitude including prosecutions, convictions, and corruption indices. All three countries selected have a public judicial system allowing for the development of the required indices. The time frame of the data collected will be established for the year range from 2001 to 2015. This period is based on China's entry to the World Trade Organization in 2001 representing a significant change in the structure of international trade (Li and Minyou, 2015). In addition, data on court persecution/convictions are not comprehensive for prior years potentially skewing results.

The first hypothesis postulates that the stricter a government is towards stamping out traditional money laundering, the greater the level of TBML that occurs.

> Hypothesis 1: The amount of TBML between Japan, Thailand and Singapore is greater with higher levels of government attitude toward traditional money laundering.

In this case, both Japan and Singapore are mature economies with strict anti-money laundering policies in place, as assessed by the Financial Action Task Force and the establishment of their Financial Intelligence Units (FATF, 2014). Both countries have been individually reviewed and have received high ratings for their comprehensive anti-money laundering policies and have legal statutes that make money laundering a criminal offense. (FATF, 2014). While Thailand has set up an anti-money laundering task force, the codification of laws has not occurred and their Financial Intelligence Unit is relatively immature (FATF, 2014). The implication of this is that TBML in Thailand is in fact *lower* compared with similar activity in Japan and Singapore. For clarity, the hypothesis can be therefore be broken out to two sub-hypotheses and can be stated as follows (difference italicized):

> Hypothesis 2a: The comparative amount of TBML activity between Japan and Singapore is higher than the comparative amount of TBML activity between Thailand and *Japan* due to the prevalence of government attitude in Japan and Singapore.

> Hypothesis 2b: The comparative amount of TBML activity between Japan and Singapore is higher than the comparative amount of TBML activity between Thailand and *Singapore* due the prevalence of government attitude in Japan and Singapore.

TESTING THE HYPOTHESES AND RESULTS

The first hypothesis is tested using the equation (3) formulation as a panel, and is run for three alternative measures of government attitude. Government attitude and government attitude intensity can be measured by the amount of prosecutions and convictions of cases in each of the three countries for 2001 to 2015 in money laundering, tax evasion, and corruption cases, respectively. The Japanese conviction data was generated by applying the G7 conviction-to-prosecution ratio to the amount

of Japanese prosecutions, and other data gaps were filled by applying simple averages between the two most closest years. The third measure of government attitude is the Corruption Perception Index sourced from Transparency International (2016). This measure ranks countries based on their perceived level of corruption. Descriptive statistics for all equation (3) variables are reported in Table 2.

Equation (3) panel data methodology in this paper follows the pooling technique described by Kmenta (1986). Estimation procedures allow for heteroskedasticity and timewise autocorrelation over time within cross-sections. The results are reported in Table 3 below.

Notice that the results are as theoretically expected. Traditional gravity model factors are all of the right sign and are statistically significant. Importantly for this study, all three government attitude variables are positive and significant confirming hypothesis 1 and validating Ferwerda, *et al.* (2011). Because the data are logged prior to estimation, the coefficients can be interpreted as constant elasticities. For example, the coefficient on prosecutions is 0.029, suggesting that for every 10 percent increase in prosecutions of traditional money laundering within the three economies is associated with a 0.29% increase TBML volumes within the panel for the 2001-2015 period.

The second hypothesis to be tested postulates where the comparative amount of TBML activity between Japan and Singapore is higher than the comparative amount of trade based money laundering TBML activity between Thailand and Japan or Singapore is due to a greater number of money laundering cases filed in Japan and Singapore than in Thailand. Three unique government attitude-to-population ratios will be constructed for each country to test the second hypotheses. The hypotheses are proven if the computed ratios of both Japan and Singapore show statistically higher ratios for that of Thailand. Table 4 reports the means test for all three government attitude-to-population ratios for each country in comparison to the other two countries. For example, the first row and second column of Table 4 indicates that in Japan, the mean prosecutions-to-population ratio is 1.64, meaning that 1.64 people out of one million Japanese are prosecuted per year on average over the time series. Compare this to Singapore's mean prosecutions-to-population ratio at 36.88 (in the third column, country j). Interesting findings in the table include the variance in how many prosecutions actually turn into convictions. For example, for Singapore of the 36.88 per-million people who were prosecuted for traditional money laundering, a whopping 36.26 per million (or 98.3%) end up convicted. Compare the later value with Thailand, where 3.01 per million are prosecuted, but a mere 0.36 per million (or 11.9%) were actually convicted. The means tests reveal that three of the four computed government attitude ratios for Japan and Singapore are statistically higher than Thailand's ratios indicating partial support for hypothesis 2; only in the case of prosecutions, did Japan and Thailand have insignificantly different attitudes.

LIMITATIONS

Any study will have limitations. The intent of this paper is to examine how government attitude toward traditional money laundering practices affects the amount of TBML between countries. This study specifically focuses on Thailand, Singapore and Japan as they provide basis of comparisons supporting the gravity model. However,

selection of other countries with significantly different economic development status and distances may not support the hypothesis. Both Singapore and Japan are developed economies compared to Thailand as an emerging economy. Distances between Japan and Singapore, and between Japan and Thailand are comparatively similar. Selection of other country pair comparisons may not result in similar validation of the proposed TBML hypotheses.

Another limitation to consider is endogeneity between the amount of trade and the population size of the countries identified. The elimination of the population variable may in fact discount the possibility of a positive correlation between the two variables, potentially invalidating the basis of the hypothesis and subsequent test. There is also the possibility of endogeneity between the independent variables being tested potentially leading to biased outcomes. A high degree of correlation between GDP and population may influence outcomes. Singapore's population is comparatively significantly smaller than either Thailand or Japan.

CONCLUSION AND FUTURE RESEARCH

The purpose of this paper is to test two TBML hypotheses. Using panel data for three Asian countries between 2001-2015, evidence is found to support (1) TBML is greater with higher levels of government attitude toward traditional money laundering, and (2) computed ratios of government attitude of both Japan and Singapore show significantly statistically higher ratios than Thailand, suggesting greater TBML flows between developed economies rather than North-South.

This paper also contributes to the literature by demonstrating the validity of the gravity model against the hypothesis. The results provide multiple stakeholders, including regulators, a better understanding of the extent of TBML and develop appropriate regulatory policies. The findings here provide additional data points for regulatory agencies and other policy-makers to assess TBML as an indicator of potential corruption. The data collected itself can be useful research to understand the number of court prosecutions against money laundering as no comprehensive study has yet been conducted. The validated model will also provide future researchers opportunities to use these findings to extend into other geographies. Future studies can also apply a larger cross-section of economies at various classifications of development to test for broader TBML relationships.

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TABLE 1. DEFINITION OF VARIABLES

Variable	Description	Measurement	Source
Z_{ij}	Amount of trade based money laundering occurring between country *i* and *j*	Trade between countries T_{ij}, Millions of U.S. $	IMF Direction of Trade Statistics Yearbook
GDP_{ij}	Gross Domestic Production between country *i* and *j*	Billions of U.S. $	World Bank World Development Indicators
POP_{ij}	Population between country *i* and *j*	Millions	World Bank World Development Indicators
$Dist_{ij}$	Distance between country *i* and *j*	Measured in km between capital cities	U.S. Geological Survey
E_{i}	Member of Egmont Group a financial intelligence consortium fighting money laundering	Binary scale: 1 = member; 0 = non member	www.egmontgroup.org/
GA_{ij}	Average government attitude or willingness to enforce anti-money laundering regulations in country *i* and *j*	Court prosecutions and/or convictions that include money laundering filed in respective trading pair	U.S. Department of State Money Laundering and Financial Crimes Country Database

TABLE 2. DESCRIPTIVE STATISTICS

	Observations	Mean	Std. Dev.	Maximum	Minimum
Trade (in billions)	45	32.69	2.03	67.01	10.59
GDP (in billions)	45	3233.16	332.16	5960.0	89.30
Pop (in millions)	45	86.66	8.73	128.1	4.1
$Dist_{ij}$ (in km)	45	3788.2	254.62	5318.0	1434.6
Prosecutions	45	193.62	14.53	436	14
Convictions	45	136.54	12.978	284	18
Corruption (Index)	45	63.64	4.99	94	32

TABLE 3. PANEL RESULTS FOR GOVERNMENT EFFECTIVENESS ALTERNATIVES (2001-2015)

GA	β_0	$\beta_1 GDP_{ij}$	$\beta_2 POP_{ij}$	$\beta_3 D_{ij}$	$\beta_5 GA_{ij}$	R^2
Prosecutions	1.873 (5.58)**	0.415 (8.96)**	-0.009 (-0.44)	-0.478 (-4.73)**	0.029 (1.80)*	0.996
Convictions	2.528 (5.09)**	0.529 (9.49)**	-0.026 (-1.16)	-0.751 (-5.77)**	0.086 (3.07)**	0.998
Corruption	-3.467 (-2.18)**	0.347 (8.61)**	0.248 (3.23)**	-0.796 (-5.57)**	1.697 (3.35)**	0.998

Notes: Figures in parentheses are t-statistics. *p<0.10, **p<0.05.

TABLE 4. HETEROSCEDASTIC MEANS TEST

GA/Pop (million)	Mean $Value_i$	Mean $Value_j$	t-Statistic	p-Value
Japan-Singapore Prosecutions	1.64	36.88	3.96	0.001*
Japan-Thailand Prosecutions	1.64	3.01	-0.904	0.381
Singapore-Thailand Prosecutions	36.88	3.01	3.93	0.001*
Japan-Singapore Convictions	0.98	36.26	3.92	0.002*
Japan-Thailand Convictions	0.98	0.36	8.97	<0.001*
Singapore-Thailand Convictions	36.26	0.36	3.92	0.002*

Notes: *p<0.05.