

Trade-Based Money Laundering and Terrorist Financing

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Money laundering can be defined, generally, as the process of concealing the existence, illegal source, or application of income derived from a criminal activity, and the subsequent disguising of the source of that income to make it appear legitimate. Deception is the heart of money laundering. The use of international trade to move money, undetected, from one country to another is one of the oldest techniques used to circumvent government scrutiny. International trade as a means of laundering money is also a technique generally ignored by most government law enforcement agencies. This article details how false international trade invoicing is used to move money across borders, undetected. This research details how the statistical analysis of the U.S. trade database can assist in measuring illegal money flows. It also details some statistical techniques that may be used to detect and monitor these abnormal transactions.

1. INTRODUCTION

This research paper contributes to the literature on trade-based money laundering and terrorist financing by providing an analysis of previously unused statistical techniques and methodologies as a means of monitoring, detecting and prosecuting criminal money laundering activities. The paper describes how new statistical profiling methodologies that evaluate transactions contained in a country's international trade database can mitigate the risks associated with trade-based money laundering. This paper discusses the application of four new trade-based money laundering profiling techniques which focus on country, customs district, product, and transaction price risk characteristics.

For years, individuals who study international trade pricing patterns have reported on the evidence that abnormal pricing in trade was being used to move money across borders, undetected by governments and law enforcement agencies. It was

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argued that abnormal trade pricing may be motivated by attempts to evade income taxes or import duties, or it may be related to moving “dirty” money earned from criminal activities. More recently, the concern has been that false trade invoicing is being used as a source of money used to support terrorist activities. Empirical evidence of trade-based money laundering has been published in both academic and professional publications (Bhagwati, 1964; Cuddington, 1987; DeBoyrie et al., 2005b; De Wulf, 1981; Gulati, 1987; Pak et al., 2003; Zdanowicz et al., 1999; Zdanowicz, 2004b).

Much of this information has generally been ignored by many individuals, law enforcement, and government agencies that have the responsibility to monitor money laundering methodologies. However, recently, three major events have revealed that there is a new focus on trade-based money laundering and terrorist financing.

Trade Transparency Units: The U.S. State Department and the U.S. Treasury Department supported the Immigration and Customs Enforcement Bureau (ICE) of Homeland Security with the funding necessary to establish Trade Transparency Units (TTU's) with Brazil, Argentina and Paraguay. This funding resulted in a US/Brazilian transnational investigation called "Operation Deluge." This investigation revealed \$200 million in Brazilian import duty fraud due to Brazilian imports at undervalued prices. These transactions also resulted in income tax evasion in the United States. The stings conducted by ICE agents in Miami led to the arrest of two individuals and the seizure of \$500,000 of merchandise awaiting export to Brazil. In Brazil, 128 arrest warrants were executed and 79 individuals were arrested. Brazilian government officials consider the trade-based money laundering scheme they detected through Operation Deluge to be the largest in Brazil's history (Coleman, 2006). The U.S. government is increasing its funding to ICE and supporting the establishment of additional TTU's with other countries. Operation Deluge has shown that an investment in analyzing and detecting trade-based money laundering has a significant positive return on investment.

FATF: Trade-Based Money Laundering Report: In June 2006, the Financial Action Task Force (FATF), a Paris-Based multinational agency, released the first comprehensive report on Trade-Based Money Laundering, which stated that “The international trade system is clearly subject to a wide range of risks and vulnerabilities that can be exploited by criminal organizations and terrorist financiers” (Financial Action Task Force, 2006).

The report explains that money laundering through the over- and under-invoicing of goods and services, is one of the oldest methods of transferring value across borders, and it remains a common practice today. It is accomplished by misrepresenting the price of a good or service in order to transfer money between colluding importers and exporters.

One of the key findings of the FATF report was that trade data analysis is a useful tool for identifying trade anomalies, which may lead to the investigation and prosecution of trade-based money laundering cases.

The study concludes, “trade-based money laundering represents an important channel of criminal activity and, given the growth of world trade, an increasingly important money laundering and terrorist financing vulnerability. Moreover, as the standards applied to other money laundering techniques become increasingly effective, the use of trade-based money laundering can be expected to become increasingly attractive.”

FFIEC Bank Secrecy Act Anti-Money Laundering Examination Manual: The Federal Financial Institutions Examination Council (FFIEC) released its first Bank Secrecy Act Anti-Money Laundering Examination Manual in 2005 and revised the manual in 2006 and 2007 (Federal Financial Institutions Examination Council, 2007). Some key points in the FFIEC BSA/AML Examination Manual include:

Objective: Bank examinations will “assess the adequacy of the bank’s systems to manage the risks associated with trade financing activities, and management’s ability to implement effective due diligence, monitoring, and reporting systems.”

Risk Factors: “While banks should be alert to transactions involving higher risk goods, they need to be aware that goods may be over- or under- valued in an effort to evade AML or customs regulations.”

Policies, Procedures, and Processes: “should require a thorough review of *all* applicable trade documentation to enable the bank to monitor and report unusual and suspicious activity. In addition to OFAC filtering, the monitoring process should give greater scrutiny to obvious over- or under pricing of goods and services.” This requirement that banks need to detect obvious over- or under-invoiced goods has been an area of significant debate, disagreement, and questioning. One technique that can assist financial institutions in determining normal price ranges is through the statistical analysis of the U.S. trade data base.

2. TRADE-BASED MONEY LAUNDERING

Money may be moved out of the United States to a foreign country by under-valuing U.S. exports or over-valuing U.S. imports. Money may be moved into the United States from a foreign country by over-valuing U.S. exports or under-valuing U.S. imports.

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2.1. EXAMPLE – OVERVALUED U.S. IMPORTS

Assume a terrorist or criminal wants to launder \$1 million dollars to a foreign country. He would need to have a foreign exporter to collude on the transaction. The set of transactions used to launder the money would include:

- 1) Foreign exporter purchases 10,000 razor blades for \$.10 per blade. (\$1,000)
- 2) Foreign exporter exports 10,000 razor blades to a domestic importer for \$100 per razor blade. (Total Invoice \$1,000,000)
- 3) Domestic importer receives 10,000 razor blades worth \$1,000 but pays the foreign exporter \$1,000,000.
- 4) Outcome: The domestic importer has moved \$1million to the foreign country less the \$1,000 transactions cost of the razor blades.

2.2. EXAMPLE - UNDERVALUED U.S. EXPORTS

Assume a terrorist or criminal wants to launder \$1 million to a foreign country. He would need to have a foreign importer to collude on the transaction. The set of transactions used to launder the money would include:

- 1) Domestic criminal or terrorist uses his \$1 million to purchases 200 gold watches for \$5,000 per watch. (\$1,000,000) The watches would be purchased for cash.
- 2) Domestic exporter sells the 200 gold watches to a foreign importer for \$5.00 per watch (\$1,000).
- 3) Foreign importer receives the 200 gold watches and is presented with an invoice for \$1,000, which he pays to the domestic exporter.
- 4) Foreign importer sells the gold watches at the market price of \$5,000 per watch and converts the 200 gold watches into \$1,000,000.
- 5) Outcome: The domestic exporter has moved \$1million to the foreign country less the \$1,000 transaction cost of the invoice payment.

2.3. MOTIVATIONS AND IMPACT

The motivations and impact of trade price manipulation include:

Under-Invoiced Exports

- Money Laundering from Illegal Activities
- Terrorist Financing
- Income Tax Avoidance/Evasion
- Capital Flight
- Avoid Export Surcharges
- Conceal Illegal Commissions

Over-Invoiced Exports

- Increase Export Subsidies
- Increase Value Added Tax Rebates

Over-Invoiced Imports

- Money Laundering from Illegal Activities
- Terrorist Financing
- Income Tax Avoidance/Evasion
- Capital Flight
- Justify High Domestic Prices under Price Controls
- Conceal Illegal Commissions

Under-Invoiced Imports

- Evade/ Reduce Import Duties
- Dumping at Below Market Prices

3. U.S. MERCHANDISE TRADE DATA BASE

This research on determining abnormal international trade pricing is based on the analysis of the monthly data contained in the United States Merchandise Trade Data Base. This database is produced by the U.S. Department of Commerce, Census Bureau and is used to determine the U.S. balance of trade. The database contains information at the transaction level and is reported to the U.S. Census Bureau from Shipper's Export Declarations and U.S. Customs Service Entry Summary forms, the legal documents required by U.S. Customs to be filed for any export or import. All transactions with a value of more than \$2,500 for exports and \$1,250 for imports are recorded, with exclusions for shipments involving the U.S. Armed Forces and diplomatic missions and for in-transit shipments through the United States. On average more than 10 million records per year are analyzed, with each record identifying the item, quantity and dollar value along with the mode of transportation, the U.S. customs district through which the goods passed and the foreign country involved in the trade. Products are classified using the international standard Harmonized Commodity Code System which contains over 17,000 categories of imports and over 9,000 categories of exports. All of the Census Bureau price data are converted to U.S. Dollar terms. If the original documents were stated in foreign currency terms, then the exchange rate at the beginning of the quarter in which the transaction occurred is used to convert to dollars, except if the exchange rate had changed by more than 5% over the quarter. In the latter case, the rate used is the end of the quarter rate. For each year analyzed, all

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individual transaction records on the 12 monthly United States import databases and the 12 monthly United States export databases are combined. The total data set is segmented and entered into a country/product table containing the price data for all combinations of countries and products. In this country/product table, over 232 columns represent every country and the world, while every import harmonized code and every export harmonized code are represented by over 26,000 rows. The resulting table contains over 6 million cells. Each cell in the table contains the data on the population of transactions related to the United States import or United States export of a particular commodity from or to a specific country, as well as from or to the world. Some cells are empty if no transactions existed between the United States and a country for a particular commodity.

4. RESEARCH METHODOLOGIES

During the past sixteen years, various methodologies have been employed to analyze abnormal international trade pricing:

4.1. COUNTRY AVERAGE PRICE VS. WORLD AVERAGE PRICE

In January 1992, *Money Laundering Alert* published the first article with results of an empirical analysis of trade-based money laundering. In that pioneering work, the average country price was compared to the average world price for every product (Money Laundering Alert, 1992). Abnormal international trade prices were determined based on this methodology. Some examples of abnormal export and import average prices derived from this research methodology include:

U.S. EXPORTS AT LOW AVERAGE PRICES

Product	Country	Country Average Price	World Average Price
Cooking Stoves	Colombia	\$ 76.62/each	\$ 425.65/unit
Erythromycin	Iran	\$ 0.10/gram	\$ 1.20/gram
Nickel Alloy Wire	Venezuela	\$ 2.21/kg	\$ 12.26/kg
Herring –Bone Tire	France	\$ 7.69/each	\$ 192.25/unit
Machine Guns	France	\$ 364.08/each	\$ 2,022.67/unit
Enriched 235 Uranium	Spain	\$ 15.50/kg	\$ 172.22/kg
Military Rifles	UK	\$ 106.87/each	\$ 387.55/unit

U.S. IMPORTS AT HIGH AVERAGE PRICES

Product	Country	Country Average Price	World Average Price
Razors	Colombia	\$ 34.81/each	\$ 0.09/unit
Cut Emeralds	Panama	\$ 974.58/carat	\$ 43.63/carat
Industrial Miners Diamonds	Venezuela	\$ 795.62/carat	\$ 6.45/carat
Untrimmed Pillowcases	France	\$ 909.29/each	\$ 0.62/unit
Cordless Telephones	France	\$ 4,232.50/each	\$ 47.65/unit
Unrecorded Magnetic Discs	Spain	\$ 698.16/each	\$ 0.43/unit
Slip Joint Pliers	UK	\$ 489.75/each	\$ 0.88/unit

One of the criticisms of comparing country average prices with world average prices was that the analysis did not account for country/product heterogeneity. It was pointed out the imported dresses from Haiti were different from imported dresses from France. This led to modifying the data analysis methodology to take into account country/product differences.

4.2. PRICES 50% ABOVE OR BELOW AVERAGE COUNTRY PRICE

The initial objective of this research methodology was to estimate the impact of over-invoiced imports and under-invoiced exports on the amount of money moved out of the United States during 1993. All records on the 12 monthly U.S. import databases and 12 monthly U.S. export databases for the period from January 1, 1993 through December 31, 1993, by commodity and by country were combined into an annual trade database. The commodities were defined by 10 digit harmonized commodity codes. This methodology recognized that the characteristics of import and export transactions might vary among countries. Therefore, this methodology analyzed import and export transactions relative to historical U.S./country trade. The analysis of total U.S./country imports and total U.S./country exports determined the average U.S./country import price and the average U.S./country export price for every commodity (Pak and Zdanowicz, 1994).

For every country, an analysis of every reported import and export transaction for every commodity during 1993 was determined for all U.S./country import transactions, and all U.S./country export transactions. For every country, the analysis determined all U.S. import transactions for every commodity that were 50% above the average U.S./country import price. For every country, the analysis determined all U.S./country export transactions, for every commodity that were 50% below the average U.S./country export price.

The analysis determined the dollar amount of over-invoiced imports for every import transaction, for every commodity, for every country and determined the

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total dollar amount of over-invoiced imports for every country. The analysis also determined the dollar amount under-invoiced exports for every export transaction, for every commodity, for every country and determined the total dollar amount of under-invoiced exports for every country. This analysis determined the total amount of money moved out of the United States in 1993 due to transactions at import prices greater than 50% of the average U.S./country commodity price and export prices less than 50% of the average U.S./country export commodity price. This analysis was extended employing the same methodology for 1994, and 1995. The following are the estimates of money moved out of the United States:

MONEY MOVED OUT OF THE UNITED STATES DUE TO:

Import Prices >150% of Average Country Import Price

Export Prices < 50% of Average Country Export Price

Year	Money Moved Out of U.S.
1993	\$ 97.35 Billion
1994	\$116.18 Billion
1995	\$136.76 Billion

The following are some examples of abnormally priced imports and exports detected by this methodology.

ABNORMALLY HIGH U.S. IMPORT PRICES

Product	Country	Price
Telephone Answering Machines	Mexico	\$ 255.00/unit
Erythromycin	Japan	\$ 1,693.83/gram
Dot Matrix Printers	Sweden	\$ 5,493.26/unit
Toothbrushes	France	\$ 18.00/unit
Safety Pins	Canada	\$ 29.65/unit
Cassette Tape Players	Denmark	\$17,314.25/unit
Telephones (No Features)	Japan	\$ 270.43/unit

ABNORMALLY LOW U.S. EXPORT PRICES

Product	Country	Price
Telephone Answering Machines	Mexico	\$ 27.09/unit
Erythromycin	Japan	\$ 0.08/gram
Men's Bathrobes	Saudi Arabia	\$ 4.81/dozen
Generators (Int. Combustion)	France	\$ 9.56/unit
Electric Cooking Stoves	Mexico	\$ 30.55/unit
Refrigerators (Household)	Japan	\$ 40.43/unit
TV Receivers (Color)	Canada	\$ 31.40/unit

4.3. INTER-QUARTILE RANGE PRICE ANALYSIS

One of the main criticisms of the 50% deviation analysis was that the use of a 50% filter was arbitrary. This criticism was valid. In some cases the 50% filter may have been too low and in other cases it might have been too high.

In 1994, the U.S. Internal Revenue Service issued its 482 transfer pricing regulations and stipulated that the inter-quartile price range should be used to determine the validity of transfer prices in international trade. The IRS defines suspicious prices as those import prices that exceed the upper quartile import prices and those export prices that are less than the lower quartile export price. Based on the IRS defining the definition of arms-length pricing norms, the research methodology shifted to using the product/country inter-quartile price ranges as statistical filters. The median price, lower quartile export price and the upper quartile import price for every commodity exported and imported to and from every country were determined. Every import record was evaluated and compared to the country specific import upper quartile price to determine if it was over-valued. The dollar amount of over-valuation for every import transaction was determined. Similarly, every export record was evaluated and compared to the country specific export lower quartile price to determine if it was under-valued. The dollar amount of under-valuation for every export transaction was determined. The dollar amounts of all under-valued export transactions and all over-valued import transactions for every commodity, for every country were aggregated. The following table contains the total estimated money moved out of the U.S. for 2004, 2005, and 2006 due to abnormal pricing based on the inter-quartile range analysis (International Trade Alert, 2005).

MONEY MOVED OUT OF THE UNITED STATES DUE TO:

Import Prices > Upper Quartile Country Import Prices
Export Prices < Lower Quartile Country Export Prices

Year	Money Moved Out of U.S.
2004	\$167.76 Billion
2005	\$191.95 Billion
2006	\$189.05 Billion

The following are some examples of abnormally priced imports and exports detected by this methodology:

ABNORMALLY HIGH U.S. IMPORT PRICES

Product	Country	Price
Toilet/Facial Tissue	China	\$ 4,121.81/kg
Threaded Nuts	Belgium	\$ 2,426.70/kg
Tweezers – Base Metal	Japan	\$ 4,896.00/unit
Lawnmower Blades	Australia	\$ 2,326.75/unit
Razors	UK	\$ 113.20/unit
Used Clothing	Haiti	\$ 260.00/kg
Women's Cotton Briefs	Venezuela	\$ 50.00/unit

ABNORMALLY LOW U.S. EXPORT PRICES

Product	Country	Price
Diamonds – Not Industrial	India	\$ 13.45/carat
Forklift Trucks – Self-Propelled	Jamaica	\$ 384.14/unit
Bulldozers – Self-Propelled	Colombia	\$ 1,741.92/unit
Video Projectors – Color	Brazil	\$ 33.95/unit
Missile and Rocket Launchers	Israel	\$ 52.03/unit
Forklift Trucks – Self-Propelled	Haiti	\$ 555.73/unit
New Automobile Tires	Russia	\$ 3.97/unit

5. APPLICATIONS OF INTER-QUARTILE RANGE STATISTICAL ANALYSIS

The 1994 Internal Revenue Service's specification that the inter-quartile price range is the relevant arms-length definition of normal pricing gave researchers a statistical benchmark for the analysis of international trade pricing. Thus, many additional international trade pricing studies were conducted based on the U.S. government's Merchandise Trade Data Base and the U.S. Government's definition of abnormal international trade pricing. The following are summaries of some of these studies.

5.1. MONEY MOVED OUT OF AND INTO THE UNITED STATES

In addition to estimating the amount of money being moved out of the United States using the inter-quartile range analysis, the estimate of the amount of money moved into the U.S. was also determined. Money can be moved into the U.S. through over-valued exports and undervalued imports. The analysis indicates that during 2004, \$55.5 billion was the net capital flow into the U.S.

**TOTAL MONEY MOVED OUT OF U.S. BY COUNTRY DOLLAR VALUE
(THROUGH UNDER-VALUED EXPORTS AND OVER-VALUED IMPORTS)**

Year: 2004

UNDER-VALUED EXPORTS	OVER-VALUED IMPORTS	TOTAL MOVED OUT OF THE US	SHARE OF TRADE
\$111,593,487,257	\$56,167,170,400	\$167,760,657,657	7.34%

**TOTAL MONEY MOVED INTO U.S. BY COUNTRY DOLLAR VALUE
(THROUGH OVER-VALUED EXPORTS AND UNDER-VALUED IMPORTS)**

Year: 2004

OVER-VALUED EXPORTS	UNDER-VALUED IMPORTS	TOTAL MOVED INTO THE US	SHARE OF TRADE
\$48,066,362,572	\$175,219,246,010	\$223,285,608,582	9.77%

5.2. IMPACT OF NEW BANKING REGULATIONS ON MONEY MOVED OUT OF SWITZERLAND

When central banking authorities enact legislation that only focuses on financial institutions, criminals and terrorists will find alternative techniques and channels to launder their money. The conclusion of a study based on the inter-quartile range analysis supports the argument that money launderers and terrorists will shift their money laundering activities to false invoicing in international trade. In 1998, the Swiss Federal Government broadened the reach of its money laundering regulations to include not only banks, but its entire financial services sector. The law, known as the Federal Act on the Prevention of Money Laundering in the Financial Sector - Money Laundering Act (MLA), requires all financial institutions to report suspicious transactions to Switzerland's Federal Reporting Office for Money Laundering. The Act went into effect on April 1, 1998 (De Boyrie et al., 2005a).

The study measured the dollar amount of money moved from Switzerland to the United States through false invoicing, both before (1995 to 1997) and after (1998 to 2000), the date the money laundering law was enacted. In order to evaluate the possible impact of other economic factors that might increase Swiss capital outflows, a detailed statistical analysis was conducted. Other economic variables considered in the analysis included differences in U.S./Swiss interest rates, exchange rates, consumer price indices and producer price indices. The results of the statistical analysis indicated that the new law was the only factor that could explain the increase in capital outflows from Switzerland to the United States. The results of the research study determined that the dollar amount of money moved from Switzerland to the United States

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increased significantly after the law was enacted. The average amount of money moved increased from \$253 million per month before the law to \$628 million per month after the law. There was also a significant increase in money moved as a percentage of Swiss/U.S. trade. The average monthly amount of money moved as a percentage of Swiss/U.S. trade increased from 29% to 58%. Subsequent to the passage of the law, the monthly average dollar amount of money moved increased by 149% and the money moved as a percentage of Swiss/U.S. trade increased by 100%.

MONTHLY CAPITAL OUTFLOWS FROM SWITZERLAND TO U.S.

Year	\$ Amount/Month	% of Trade Volume
1995	\$ 222,270,140	29.06%
1996	\$ 315,550,450	35.41%
1997	\$ 220,770,123	22.31%
1998	\$ 413,664,512	45.28%
1999	\$ 900,088,394	83.49%
2000	\$ 571,560,220	44.52%

AVERAGE MONTHLY OUTFLOWS - BEFORE VS. AFTER NEW LAW

Time Period	\$ Amount	% of Trade Volume
Before the Law	\$ 252,863,571	28.93%
After the Law	\$ 628,437,709	57.76%
Percent Increase	149%	100%

5.3. MONEY MOVED TO AL QAEDA WATCH LIST COUNTRIES

After September 11, 2001, when terrorists attacked the United States and murdered over 3,000 individuals, the Department of State issued a watch list of Al Qaeda countries that had a high probability of harboring terrorist extremists. A study employing the inter-quartile range determined that over \$8.4 billion may have been moved from the United States to Al Qaeda watch list countries during 2004. A sample of some suspicious transactions is listed below. The following table contains the estimated amount of money moved by country (Freer, 2001; Zdanowicz, 2004b, 2005).

**ABNORMALLY HIGH IMPORT PRICES
FROM AL QAEDA WATCH LIST COUNTRIES**

Product	Country	Price
Cotton Dishtowels	Pakistan	\$ 153.72/unit
Glass Mirrors (less than 929 sq cm)	Indonesia	\$ 164.54/sq.cm
Razors	Egypt	\$ 22.89/unit
Air Pumps (hand/foot operated)	Malaysia	\$ 5,000.00/unit
Camshafts and Crankshafts	Saudi Arabia	\$ 15,200.00/unit
Footballs	Malaysia	\$ 142.50/unit

**ABNORMALLY LOW EXPORT PRICES
TO AL QAEDA WATCH LIST COUNTRIES**

Product	Country	Price
Color Video Monitors	Indonesia	\$ 22.43/unit
Color Video Monitors	Pakistan	\$ 21.90/unit
Sports Footwear (Athletic Shoes)	Jordan	\$ 0.40/pair
Radioactive Elements, Isotopes	Egypt	\$ 0.01/mbq
Bulldozers	Saudi Arabia	\$ 5,909.09/unit
Television Antennas	Malaysia	\$ 0.30/unit

**AL QAEDA WATCH LIST COUNTRIES
(THROUGH UNDER-VALUED EXPORTS AND OVER-VALUED IMPORTS)
For Countries on the Al Qaeda Watch List**

Obs	COUNTRY	UNDER-VALUED EXPORTS	OVER-VALUED IMPORTS	TOTAL MOVED OUT OF THE US	SHARE OF TRADE
	TOTAL	\$5,811,961,635	\$2,537,901,565	\$8,349,863,196	6.75%
1	MALAYSA	\$2,317,172,101	\$1,201,554,685	\$3,518,726,786	9.00%
2	S ARAB	\$690,811,190	\$316,492,990	\$1,007,304,181	3.85%
3	IRAQ	\$706,095,531	\$210,325,795	\$916,421,327	9.78%
4	INDNSIA	\$397,962,961	\$330,162,743	\$728,125,704	5.40%
5	ARAB EM	\$639,817,694	\$22,463,911	\$662,281,605	12.72%
6	ALGERIA	\$78,935,289	\$181,162,213	\$260,097,502	3.10%
7	PAKISTN	\$126,213,808	\$102,956,529	\$229,170,337	4.89%
8	EGYPT	\$200,826,873	\$27,078,209	\$227,905,082	5.14%
9	KUWAIT	\$159,018,609	\$56,749,463	\$215,768,072	4.54%
10	IRAN	\$152,952,617	\$12,628,410	\$165,581,027	70.03%
11	JORDAN	\$64,374,230	\$24,273,637	\$88,647,866	5.39%
12	OMAN	\$62,421,004	\$9,353,236	\$71,774,240	9.60%
13	QATAR	\$51,792,019	\$1,416,201	\$53,208,219	6.32%
14	BAHRAIN	\$39,923,000	\$6,629,735	\$46,552,735	6.59%
15	AFGHAN	\$38,156,092	\$96,595	\$38,252,686	20.95%
16	MOROC	\$26,974,330	\$9,784,635	\$36,758,964	3.54%

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17	LEBANON	\$29,554,177	\$2,411,754	\$31,965,930	5.95%
18	TUNISIA	\$12,256,463	\$5,566,000	\$17,822,463	3.81%
19	BRUNEI	\$3,088,678	\$13,780,559	\$16,869,237	3.70%
20	SYRIA	\$5,902,256	\$2,737,644	\$8,639,900	1.80%
21	SUDAN	\$4,340,695	.	\$4,340,695	6.04%
22	YEMEN	\$1,906,847	\$38,840	\$1,945,687	0.66%
23	ERITREA	\$749,224	.	\$749,224	1.38%
24	SOMALIA	\$333,418	\$1,182	\$334,600	3.41%
25	DJIBUTI	\$330,563	.	\$330,563	0.75%
26	LIBYA	\$51,966	\$236,599	\$288,564	0.08%

5.4. ABNORMAL WEIGHT

The terrorist attack of September 11, 2001 transformed the world’s perspective on the terrorist movement. It was an event that changed the focus of all countries regarding the monitoring of their ports of entry in an attempt to protect themselves against the importation of weapons of mass destruction (WMD) and other contraband related to terrorist activities. In the United States, the enactment of the Patriots Act and the creation of the Department of Homeland Security were attempts to minimize terrorist related money laundering and smuggling (Zdanowicz, 2003).

Based on the inter-quartile analysis of the weight characteristics of U.S. import data thousands of import transactions with abnormal weights were observed.

ABNORMAL U.S. IMPORT WEIGHTS

Country	Product	Weight
Egypt	Razors	15 kg/unit
Indonesia	Coffee	1.26 kg/kg
France	Footwear	46 kg/pair
Germany	Sweaters	57 kg/dozen
Malaysia	Briefcases	98 kg/unit
Pakistan	Fabric	62 kg/sq meter
Indonesia	Pillows	55 kg/unit
Pakistan	Towels	2 kg/unit

Although these examples reflect the importation of abnormally weighted cargo into the United States, they are only a sample of transactions. The implications regarding port security are crucial for the development of the policies necessary to protect the citizenry from international terrorism.

6. TRADE FINANCING

The U.S. government created the Federal Financial Institutions Examination Council, which adopted a common examination manual in an attempt to eliminate inconsistent bank examinations. The examination, first published in June 2005, resulted from the collaboration of the Federal Reserve Board, Office of the Comptroller of the Currency, Federal Deposit Insurance Corporation, National Credit Union Administration and the Office of Thrift and Supervision. The examination manual was revised in 2006 and 2007 based on input from the industry. A significant addition to the manual was the inclusion of trade financing as an area for bank risk monitoring and examination.

6.1. FFIEC MANUAL

The 2007 FFIEC Examination Manual states that financial institutions engaged in trade financing activities should give greater scrutiny to:

- 1) Items shipped that are inconsistent with the nature of the customer's business (e.g., a steel company starts dealing in paper products, or an information technology company starts dealing in bulk pharmaceuticals).
- 2) Customers conducting business in high-risk jurisdictions.
- 3) Customers shipping items through high-risk jurisdictions, including transit through non-cooperative countries.
- 4) Customers involved in potentially high-risk activities, including activities that may be subject to export/import restrictions (e.g., equipment for military or police organizations of foreign governments, weapons, ammunition, chemical mixtures, classified defense articles, sensitive technical data, nuclear materials, precious gems, or certain natural resources such as metals, ore, or crude oil).
- 5) Obvious over- or under-pricing of goods and services.
- 6) Obvious misrepresentation of quantity or type of goods imported or exported.
- 7) Transaction structure appears unnecessarily complex and designed to obscure the true nature of the transaction.
- 8) Customer directs payment of proceeds to an unrelated third party.
- 9) Shipment locations or description of goods not consistent with letter of credit.
- 10) Documentation showing a higher or lower value or cost of merchandise than that which was declared to customs or paid by the importer.
- 11) Significantly amended letters of credit without reasonable justification or changes to the beneficiary or location of payment. Any changes in the names of parties also should prompt additional OFAC review.

Before conducting the complex price analysis of the letter of credit transaction, financial institutions should conduct character-based analysis to determine if further and more extensive analysis is warranted. According to the FFIEC, “Unless customer behavior or transaction documentation appears unusual, the bank should not be expected to spend undue time or effort reviewing all information.” The analysis of trade data will provide filters to determine suspicious transactions that should be evaluated in more detail (Zdanowicz, 2007; Money Laundering Alert, 2008).

Character-based analysis requires a financial institution to evaluate the non-price characteristics about the financing transaction such as: the risk of the country of import or export, the risk of the product, the client’s appearance on PEP lists, or the results of OFAC filtering. Many of the existing “Know Your Customer” policies can be applied to international trade financing activities. The FFIEC provides guidance to assess the appropriateness and comprehensiveness of a bank’s customer due diligence (CDD) policies, procedures, and processes.

6.2. CHARACTER-BASED ANALYSIS - COUNTRY, PRODUCT AND CUSTOMS DISTRICT RISK PROFILES

The analysis of the U.S. trade database will assist financial institutions with identifying trade financing transactions that should be investigated in more detail. The analysis of the U.S. trade database may assist in evaluating six of the eleven red flags listed in the FFIEC Examination Manual (items 2, 3, 4, 5, 6 and 10 in the list above). Various risk profiles can be determined by evaluating recent U.S. international trade transactions such as:

Country Risk Index: A risk profile of every country in the world, based on the most recent 12-month abnormal pricing history in the country’s international trade.

Product Risk Index: A risk profile of every product classification, based on the most recent 12-month abnormal pricing history of that product.

U.S. Customs District Risk Index: A risk profile of every U.S. Customs District based on the most recent 12-month abnormal pricing history of transactions in the customs district.

Each risk index is based on the analysis of every U.S. import and export transaction, for all products, countries, and U.S. customs districts. The analysis is based on the Internal Revenue Service’s 482 Transfer Pricing Regulations, which define the inter-quartile range as the arms-length pricing range in international trade. The risk indices can be updated every month as new U.S.

trade data is released to the public. The three character-based profiling risk indices discussed in this section are new statistical methodologies and will assist law enforcement and financial institutions with mitigating risk.

All three risk indices are determined by calculating the dollar amount of money moved out of the U.S. as a percentage of the total trade for a country, product or customs district. This may result in shares of trade that exceed 100%. For example, assume that the median export price for a product is \$100 and that the lower price filter (lower quartile price) is \$50. A reported export transaction for \$10 would result in an estimated undervalued export transaction of \$40. Thus, the percentage undervaluation for this transaction would be 400% ($\$40/\$10 = 400\%$).

6.3. COUNTRY RISK INDEX

An analysis of the total dollar value of abnormal international trade pricing by country is detailed in the following table. This table contains a sample of the dollar amount of money moved out of the U.S. in 2004 through undervalued exports and overvalued imports for the top 25 countries (out of 218 countries) that trade with the U.S.. This analysis shows that the largest amount of money being moved out of the U.S. corresponds to the largest U.S. trading partners. This analysis may not be useful in identifying high-risk countries.

**TOTAL MONEY MOVED OUT OF U.S. BY COUNTRY DOLLAR VALUE
(THROUGH UNDER-VALUED EXPORTS AND OVER-VALUED IMPORTS)
Year: 2004**

Obs	COUNTRY	UNDER-VALUED EXPORTS	OVER-VALUED IMPORTS	TOTAL MOVED OUT OF THE US	SHARE OF TRADE
1	CANADA	\$11,039,683,286	\$7,256,738,049	\$18,296,421,335	4.12%
2	JAPAN	\$8,151,814,635	\$5,974,212,167	\$14,126,026,802	7.68%
3	CHINA	\$6,007,716,795	\$7,800,914,990	\$13,808,631,785	5.97%
4	MEXICO	\$8,785,360,653	\$4,192,936,064	\$12,978,296,718	4.87%
5	FR GERM	\$6,407,989,714	\$5,433,984,370	\$11,841,974,084	10.90%
6	U KING	\$7,594,995,153	\$2,484,349,794	\$10,079,344,947	12.24%
7	KOR REP	\$5,816,253,001	\$1,425,414,117	\$7,241,667,118	9.99%
8	FRANCE	\$3,897,833,867	\$1,625,064,324	\$5,522,898,191	10.41%
9	TAIWAN	\$3,094,430,949	\$1,698,479,949	\$4,792,910,898	8.51%
10	SINGAPR	\$3,636,170,934	\$713,527,417	\$4,349,698,351	12.46%
11	PHIL R	\$3,398,036,934	\$512,074,712	\$3,910,111,646	24.11%
12	MALAYSA	\$2,317,172,101	\$1,201,554,685	\$3,518,726,786	9.00%
13	BELGIUM	\$3,126,261,045	\$345,127,901	\$3,471,388,946	11.84%
14	IRELAND	\$1,129,283,725	\$2,266,965,110	\$3,396,248,835	9.54%
15	HG KONG	\$2,937,782,192	\$347,808,479	\$3,285,590,672	13.08%

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16	NETHLD	\$2,550,432,078	\$526,550,514	\$3,076,982,591	8.34%
17	ITALY	\$1,536,748,889	\$1,489,132,352	\$3,025,881,241	7.80%
18	SWITZLD	\$2,277,817,712	\$735,336,191	\$3,013,153,903	14.41%
19	BRAZIL	\$2,376,524,681	\$555,731,959	\$2,932,256,640	8.37%
20	INDIA	\$1,791,009,935	\$505,472,160	\$2,296,482,094	10.60%
21	AUSTRAL	\$1,821,607,280	\$257,314,622	\$2,078,921,902	9.53%
22	THAILND	\$1,181,887,099	\$729,875,756	\$1,911,762,854	7.99%
23	DENMARK	\$1,451,172,673	\$432,241,119	\$1,883,413,791	31.26%
24	ISRAEL	\$1,004,123,800	\$456,182,415	\$1,460,306,216	6.16%
25	SWEDEN	\$775,593,211	\$469,080,673	\$1,244,673,884	7.80%

However, the following table contains a sample (top 25 out of 218 countries) of the Country Risk Index for 2004 which measures the money moved from the U.S to all countries in the world as a percentage of their trade with the U.S. This type of character-based analysis will provide the bank with an indication that a more detailed analysis is warranted. An analysis of the Product Risk Index and the Customs District Risk Index will provide additional evidence regarding the risk of financing the transaction.

COUNTRY RISK INDEX – 2004
TOTAL MONEY MOVED OUT OF U.S. BY COUNTRY
(THROUGH UNDER-VALUED EXPORTS AND OVER-VALUED IMPORTS)
RANK ORDERED BY PERCENT OF TRADE

Obs	COUNTRY	UNDER-VALUED EXPORTS	OVER-VALUED IMPORTS	TOTAL MOVED OUT OF THE US	SHARE OF TRADE
1	AZERBJN	\$528,389,802	\$157,416	\$528,547,218	268.54%
2	YUGOSLV	\$169,598,049	\$741,061	\$170,339,110	72.49%
3	IRAN	\$152,952,617	\$12,628,410	\$165,581,027	70.03%
4	CUBA	\$247,970,745	.	\$247,970,745	61.91%
5	KAZAKHS	\$291,952,547	\$7,378,273	\$299,330,820	34.90%
6	BULGAR	\$214,509,017	\$14,467,039	\$228,976,056	33.72%
7	ESTONIA	\$156,854,211	\$9,510,139	\$166,364,350	31.52%
8	DENMARK	\$1,451,172,673	\$432,241,119	\$1,883,413,791	31.26%
9	BARBADO	\$99,437,204	\$820,250	\$100,257,454	26.08%
10	PHIL R	\$3,398,036,934	\$512,074,712	\$3,910,111,646	24.11%
11	ANTIGUA	\$31,027,519	\$1,270	\$31,028,789	23.94%
12	LIBERIA	\$813,897	\$33,439,992	\$34,253,890	23.64%
13	B VIRGN	\$24,263,203	\$13,856	\$24,277,059	21.11%
14	AFGHAN	\$38,156,092	\$96,595	\$38,252,686	20.95%
15	ANDORRA	\$2,416,758	\$21,034	\$2,437,792	19.44%
16	KENYA	\$129,810,252	\$7,197,135	\$137,007,387	18.36%
17	POLAND	\$429,068,286	\$52,566,628	\$481,634,914	17.47%
18	SLVENIA	\$102,026,329	\$18,606,648	\$120,632,978	17.13%

19	CZECH	\$350,028,716	\$62,282,789	\$412,311,505	15.96%
20	SWITZLD	\$2,277,817,712	\$735,336,191	\$3,013,153,903	14.41%
21	HG KONG	\$2,937,782,192	\$347,808,479	\$3,285,590,672	13.08%
22	ARAB EM	\$639,817,694	\$22,463,911	\$662,281,605	12.72%
23	TURKEY	\$889,053,935	\$163,868,214	\$1,052,922,150	12.69%
24	PORTUGL	\$343,236,195	\$72,192,340	\$415,428,535	12.63%
25	BURKINA	\$2,834,423	\$75	\$2,834,498	12.56%

6.4. PRODUCT RISK INDEX

A similar analysis was conducted to determine a product risk index. First, the amount of money moved out of the U.S. by under-invoicing exports and over-invoicing imports for products defined by the six-digit harmonized codes were calculated. The Product Risk Index was calculated by finding and ranking the products that had the highest percentage of trade related to money moved out of the U.S. The following table is a sample of the Product Risk Index that ranks the products based on this metric. There are 4,758 six-digit product codes.

PRODUCT RISK INDEX – 2006
MONEY MOVED OUT OF THE UNITED STATES BY PRODUCT
RANK ORDERED BY PERCENT OF TRADE

Rank	Product	Money Moved Out of US \$	Percent of Trade
1	Cartridges for Riveting	416,426,777	2,756.98%
2	Iodides and Iodides Oxides	529,245,774	1,500.75%
3	Photo Plates and Film	165,778,813	747.94%
4	Mechanisms for Music Boxes	6,653,673	694.50%
5	Optical Fibers	1,956,532,697	627.56%
6	Rare Earth Metals	79,794,777	605.30%
7	Cadmium and Articles Thereof	13,184,553	459.90%
8	Radioactive Elements & Isotopes	1,617,767,386	416.36%
9	Recorded Media Sound or Image	1,567,385,322	388.22%
10	Unrecorded Cards with Magnetic Stripe	213,685,706	384.93%
11	Formic Acid	59,890,154	377.94%
12	Dielectric Fixed Capacitors	523,967,404	277.96%
13	Unsaturated Chlorine Derivatives	62,813,577	257.24%
14	Fixed Resistors	1,241,694,299	250.67%
15	Salt of Inorganic Acid	86,570,802	226.22%
16	Pen Nibs and Nib Points	73,429,037	197.32%
17	Phosphinates	33,808,292	180.02%
18	Hydrides/Nitrides/Azides/Silicides	312,245,013	174.33%
19	Electrical Insulators of Glass	57,288,622	154.24%
20	Tubes, Pipes & Hoses with Fittings	178,460,024	148.50%

6.5. CUSTOMS DISTRICT RISK INDEX

A similar analysis was conducted to determine the Customs District Risk Index. First, the amount of money moved out of the U.S. by under-invoicing exports and over-invoicing imports for each of the forty-five U.S. Customs Districts were calculated. The Customs District Risk Index was calculated by finding and ranking the customs districts that had the highest percentage of trade related to money moved out of the United States. The following table is a sample of the Customs District Risk Index that ranks the customs districts based on this metric.

**TOTAL MONEY MOVED OUT OF U.S. - CUSTOMS DISTRICT
PERCENT OF TRADE (2006)
(THROUGH UNDER-VALUED EXPORTS AND OVER-VALUED IMPORTS)**

Obs	CUSTOMS DIST	UNDER-VALUED EXPORTS	OVER-VALUED IMPORTS	TOTAL MOVED OUT OF THE US	SHARE OF TRADE
1	VESSELS	\$10,440,522	\$62,203	\$10,502,725	12.65%
2	NORFOLK	\$4,366,882,223	\$1,186,220,163	\$5,553,102,386	12.49%
3	WASH DC	\$1,135,910,310	\$237,210,543	\$1,373,120,853	10.98%
4	CLEVLND	\$3,723,789,413	\$3,774,890,944	\$7,498,680,356	9.67%
5	ALASKA	\$1,981,926,506	\$500,164,352	\$2,482,090,858	9.35%
6	WILM NC	\$489,857,335	\$1,224,482,864	\$1,714,340,199	9.20%
7	MIAMI	\$5,457,244,652	\$1,172,529,595	\$6,629,774,247	9.20%
8	P RICO	\$1,912,460,747	\$1,045,689,699	\$2,958,150,446	9.09%
9	SAVANNH	\$4,555,773,333	\$2,808,081,132	\$7,363,854,466	8.93%
10	MINNPLS	\$352,484,563	\$937,729,699	\$1,290,214,261	8.88%
11	DALLAS	\$3,013,005,092	\$2,053,358,044	\$5,066,363,136	8.69%
12	CHICAGO	\$4,694,399,341	\$5,557,520,573	\$10,251,919,914	8.50%
13	SAN FRN	\$6,262,545,997	\$3,092,980,638	\$9,355,526,635	8.42%
14	BOSTON	\$1,381,013,743	\$1,297,384,689	\$2,678,398,433	8.05%
15	LOS ANG	\$18,087,424,830	\$5,272,017,132	\$23,359,441,961	7.09%
16	CHRLSTN	\$1,914,536,435	\$1,557,621,260	\$3,472,157,695	7.05%
17	SAN DGO	\$2,304,323,215	\$1,252,101,304	\$3,556,424,519	7.00%
18	NY CITY	\$14,807,060,703	\$5,821,751,035	\$20,628,811,738	6.99%
19	NOGALES	\$821,952,582	\$848,289,515	\$1,670,242,097	6.79%
20	ST LOUI	\$89,475,979	\$715,287,030	\$804,763,008	6.72%

6.6. INTERNATIONAL PRICE PROFILING SYSTEM – IPPS

The FFIEC BSA/AML Examination Manual stipulates that financial institutions engaged in trade financing conduct both character-based and transaction-based analysis. Transaction-based analysis is the evaluation of import or export prices to determine “obvious over- or under-pricing of goods and services.” The analysis of the U.S. Merchandise Trade Data Base can produce statistical price filters to assist

financial institutions with detecting abnormally priced products. This analysis is defined as the International Price Profiling System.

The "International Price Profiling System" (IPPS) is a new risk-based analysis system that evaluates the risk characteristics of prices related to international trade transactions. The details about this methodology have not been published in the academic literature. The IPPS may be employed to evaluate transactions that have a risk of being related to money laundering, terrorist financing, income tax evasion, and import duty fraud. This new International Price Profiling System is currently being used by some financial institutions as a means of mitigating trade financing risk. It has also been reported that some European countries are evaluating their international trade transactions with similar methodologies.

Money is moved across borders through false invoicing of import or export transactions. Money is moved out of a country by under-invoicing exports or over-invoicing imports. Money is moved into a country by over-invoicing exports or under-invoicing imports.

The IPPS evaluates an international trade price based on four (4) different filters.

World	5th and 95th Percentile
Country	5th and 95th Percentile
World	Mean (-) and (+) 2 Standard Deviations
Country	Mean (-) and (+) 2 Standard Deviations

The statistical filters are calculated from twelve months of international trade transaction data as reported by the U.S. Department of Commerce.

The IPPS analysis evaluates an international trade price and produces a "Risk Index" that may range between "-4" and "+4". A negative "Risk Index" reflects the potential of money being moved out of the United States to a foreign country. A positive "Risk Index" reflects the potential of money being moved into the United States from a foreign country. The magnitude of the "Risk Index" reflects the probability or likelihood that a price is over-valued or under-valued, and is determined in the following manner.

<u>Risk Index</u>	<u>Analysis</u>	<u>Interpretation of Price Abnormality</u>
-4	Violates 4 Filter Prices	\$ Moved Out - Very Extreme Indication
-3	Violates 3 Filter Prices	\$ Moved Out - Extreme Indication
-2	Violates 2 Filter Prices	\$ Moved Out - Moderate Indication
-1	Violates 1 Filter Price	\$ Moved Out - Slight Indication
0	Violates 0 Filter Prices	No Risk of \$ Moved Out or In
+1	Violates 1 Filter Price	\$ Moved In - Slight Indication
+2	Violates 2 Filter Prices	\$ Moved In - Moderate Indication
+3	Violates 3 Filter Prices	\$ Moved In - Extreme Indication
+4	Violates 4 Filter Prices	\$ Moved In - Very Extreme Indication

The International Price Profiling System is based on statistical analysis and indicates suspicious prices in international trade. It does not prove that the suspicious transactions are related to money laundering, terrorist financing, or other illegal activities. There is some probability that the IPPS will generate false positives. It is the responsibility of the governmental agencies or financial institutions to conduct further investigations as to the nature of the suspicious transactions. The investigations can only lead to three mutually exclusive outcomes: (1) the suspicious price is “right” – i.e., there may be some unique characteristic that is reflected in the price; (2) the suspicious price is “wrong” – for example, it may be due to a clerical error; or (3) the suspicious price is “abnormal” and indicates a criminal activity. The IPPS is meant to be a dynamic analytical tool. Institutions should modify the price filters based on the outcomes of using the system. Some products may require wider or narrower price filters. This can only be determined by evaluating the results of the price profiling.

The following presentation demonstrates the application of the IPPS.

6.6.1. EXPORT OF TOMATO KETCHUP TO KUWAIT

The following is an example of the International Price Profiling System for the export of tomato ketchup to Kuwait at a price of \$.14 per kilogram. This price is below the lower bounds as calculated by all four of the risk measures. Therefore it indicates a risk index of -4.

WORLD		KUWAIT	
Transactions:	2,378	Transactions:	26
95 th Percentile:	\$ 1.28	95 th Percentile:	\$ 2.53
MEDIAN:	\$ 0.81	MEDIAN:	\$ 0.58
5 th Percentile:	\$ 0.55	5 th Percentile:	\$ 0.51
Mean + 2SD:	\$ 2.20	Mean + 2SD:	\$ 3.55
MEAN:	\$ 0.81	MEAN:	\$ 0.76
Mean – 2SD:	\$ 0.30	Mean – 2SD:	\$ 0.16
Risk Index = - 4			

6.6.2. IMPORT OF SOCCER BALLS FROM PAKISTAN

The following is an example of the International Price Profiling System for the import of soccer balls from Pakistan at a price of \$30.00 per unit. This price is above the upper bounds as calculated by all four of the risk measures. Therefore it indicates a risk index of -4.

WORLD		PAKISTAN	
Transactions:	3,014	Transactions:	966
95 th Percentile:	\$ 7.14	95 th Percentile:	\$ 7.02
MEDIAN:	\$ 2.79	MEDIAN:	\$ 3.54
5 th Percentile:	\$ 1.35	5 th Percentile:	\$ 2.19
Mean + 2SD:	\$ 27.40	Mean + 2SD:	\$ 20.61
MEAN:	\$ 2.96	MEAN:	\$ 3.73
Mean – 2SD:	\$ 0.32	Mean – 2SD:	\$ 0.67
		Risk Index = - 4	

7. CONCLUSION

This paper provides new information that will contribute to the attempt to minimize trade-based money laundering and terrorist financing. It provides an analysis of previously unused statistical techniques and methodologies as a means of monitoring, detecting and prosecuting criminal money laundering and terrorist financing activities through international trade. The paper describes how new statistical profiling methodologies that evaluate transactions contained in a country's international trade database can mitigate the risks associated with trade-based money laundering. This paper discusses the application of four new money laundering profiling techniques which focus on country risk profiles, customs district risk profiles, product risk profiles, and transaction price risk characteristics. The practice of profiling as a means of detecting suspicious individuals and activities is controversial and frowned on by many. However, the statistical analysis of information and statistical profiling is crucial in the fight against money laundering and the financing of terrorist activities.

The analysis of the U.S. Merchandise Trade Data Base (and other country's trade databases) provides a vast amount of information to assist financial institutions, law enforcement and governmental agencies to detect and minimize trade-based money laundering. The inclusion of other countries databases would make the analysis even more robust. The events of September 11, 2001 have made the analysis of trade-based terrorist financing even more compelling

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