

**ESTIMATING THE MAGNITUDE OF CAPITAL FLIGHT  
DUE TO ABNORMAL PRICING IN INTERNATIONAL TRADE:  
THE RUSSIA-USA CASE**

**CIBER Working Paper  
Center for International Business and Education Research  
Florida International University**

By

**Maria E. de Boyrie, Ph.D.**  
Assistant Professor of Finance  
New Mexico State University  
Dept. of Finance, MSC 3FIN  
P.O. Box 30001  
Las Cruces, NM 88003-8001  
Tel: (505) 646-3252 Fax: (505) 646-2820  
e-mail: [deboyrie@nmsu.edu](mailto:deboyrie@nmsu.edu)

**Simon J. Pak, Ph.D.**  
Associate Professor of Finance  
Penn State University  
Great Valley  
30 East Swedesford Road  
Malvern, PA 19355  
Trade Research Institute, Inc.  
Tel: (610) 725-5343 Fax: (610) 725-5224  
e-mail: [sjp14@psu.edu](mailto:sjp14@psu.edu)

**John S. Zdanowicz, Ph.D.**  
Professor of Finance  
Director, Center for Banking and Financial Institutions  
Florida International University  
Miami, Florida 33199, USA  
Trade Research Institute, Inc.  
Tel: (305) 348-2771 Fax: (305) 348-4182  
e-mail: [zdanowic@fiu.edu](mailto:zdanowic@fiu.edu)

**ESTIMATING THE MAGNITUDE OF CAPITAL FLIGHT  
DUE TO ABNORMAL PRICING IN INTERNATIONAL TRADE:  
THE RUSSIA-USA CASE**

**ABSTRACT**

Governmental and international lending agencies, as well as private sector firms who engage in international trade, have long been concerned with detecting and determining the magnitude of abnormal pricing in international trade. To detect such abnormal pricings, we present a framework analyzing millions of import/export transactions between the U.S. and Russia. The objectives of this study are to estimate the economic impact of over-invoiced/under-invoiced Russian imports/exports from/to the U.S and to determine if capital movement/capital flight through trade is due to money laundering, tax evasion or some sort of portfolio consideration. Our results lead us to conclude that capital movement through trade in this case can be attributed to either money laundering and/or tax evasion.

**KEY WORDS:** Auditing, Capital Flight, Imports/Exports, Trade, Transfer Pricing, Tax Policy, Regulation.

# **ESTIMATING THE MAGNITUDE OF CAPITAL FLIGHT DUE TO ABNORMAL PRICING IN INTERNATIONAL TRADE: THE RUSSIA-USA CASE**

## **I. Introduction**

During the early 1990s, the Russian Federation went through a very rapid privatization process and reforms in the banking, finance, political and administrative sectors. These events were accompanied by capital flight on a massive scale and made the country vulnerable to money laundering.

Since the beginning of the transition period, the Russian government has made efforts to control capital flight in two ways: first by attempting to modify Russia's financial system and currency regulations; and second by developing state controls over foreign trade. However these measures have been ineffective because of the absence of legal frameworks and institutional capacities that can oversee these developments.

Schemes for exporting capital through foreign trade, one that relies mainly on the mispricing of goods, was first reported to have been used in Russia during the 1991-1993 period.<sup>1</sup> According to Tikhomirov (1997), exported Russian goods

---

<sup>1</sup> One possible reason why foreign trade became the major gateway for capital flight is that Russian citizens and businesses have no legal right to open account in foreign banks without permission from a state bank or the state ministry. Commercial banks in Russia are allowed to move large amounts of money abroad only when justified by a contract or when authorized by the Central Bank.

were deliberately priced lower, while the imported goods were priced deliberately higher with the exporter usually receiving an additional payment from his foreign partner through a money transfer to his private account in a foreign bank or through an unregistered (cash) payment in Russia. As the Russian government took steps to regulate trade deals, double invoicing schemes became the favorite form of capital flight within the Russian Federation.<sup>2</sup>

Government authorities of developed and developing countries, as well as international lending agencies, are interested in detecting abnormal pricing for several reasons. First, abnormal international trade prices may be related to lack of knowledge of world-wide prices, income tax evasion, customs duty fraud, capital flight, and money laundering activities. In addition, over-invoiced import prices may serve also as a justification for excessively high domestic prices in countries where price controls exist and could conceal illegal commissions that are hidden in the inflated prices. Under-invoiced export prices, on the other hand, may be used to avoid or reduce export surcharges in countries where they exist.

Second, abnormal price detection may serve as a means of promoting efficiency in a government's procurement transactions. Economic growth and development are severely hindered when necessary import commodities related to

---

<sup>2</sup> According to Tikhomirov (pg. 593), double invoicing, which entails a high level of trust, requires a close business partnership between Russian and foreign companies. In essence, it involves signing two contracts for the same deal. The first is an official contract used for reporting and taxation purposes while the second, an unofficial contract, sets out the split in profit between

economic development and the welfare of the citizens are purchased at over-invoiced prices; while, the export of domestic goods at prices lower than arm's length prices may result in sub-optimal revenue flows to the country and its industries.

## **II. Abnormal Pricing and Capital Flight**

Capital flight is a major problem in many countries, including Russia.<sup>3</sup> Several factors may contribute to international capital flight: economic uncertainty, fiscal deficits (Dornbusch, 1984), financial repression, devaluation and the threat of expropriation (Kahn and Ul Haque, 1985), and potential confiscation of wealth. These are compounded by country differences in tax rates, inflation, risk of default on government obligations, and, political risk and instability.<sup>4</sup> Capital flight tends to erode the country's tax base, increases public deficit, reduces domestic investment and destabilizes financial markets.<sup>5</sup>

Tikhomirov (1997) studies the origins, mechanisms and impact of capital

---

the two colluding parties. The foreign partners take part of the earnings as payment for their services, while the larger part is transferred into accounts held by Russian in foreign banks.

<sup>3</sup> Capital flight may reflect money-laundering activities resulting from criminal activities such as drugs, smuggling and white collar crimes. For a detailed discussion of causes, methods and impact of capital flight on developing countries see Walter (1985 and 1986), Cuddington (1986, 1987), Varman-Schneider (1991), Dooley (1986, 1988), Pastor Jr. (1990) and Claessens (1997), among others.

<sup>4</sup> For some studies in this area please refer to Lessard and Williamson (1987), Dooley and Isard (1980) and Eaton and Turnovsky (1983).

<sup>5</sup> A common way to move significant amounts of capital out of the country is by over-invoicing imports and under-invoicing exports.

flight in the post-Soviet Russia. The author bases his study on the belief that the level of capital flight, through trade, can be estimated by calculating the difference between Russian export/import prices and the existing world prices for the same commodities. The author ascertains that although this method does not include the capital that is liable to be exported using other methods (e.g., barter trade and sham credit, among others) it may still provide an insight into the extent of the problem.<sup>6</sup>

Data used in the study are the Russian average contract and average world prices for listed commodities published in the quarterly bulletin of the Russian Government Center of Economic Analysis (Tsentr ekonomicheskoi kno'yukturi) and the official estimate of Russian exports for the same commodities published in the annual statistical handbooks of the Russian Statistical Committee (Goskomstat) for the years 1992-1995. The results are then compared to those provided by other private and governmental institutions.<sup>7</sup>

Even though the author cautions that the results may be biased due to the lack of reliable data, he reports that Russian government estimates (between \$35 and \$400 billion for the years 1990 through 1995) are at least three to six times lower than the actual capital exports. The results also demonstrate that the rates

---

<sup>6</sup> For the definition of barter trade, sham credit and double invoicing, please refer to Tikhomirov (1997), pp.592-593.

<sup>7</sup>These include Russian Ministry of International Affairs, Bank for International Settlement (BIS), International Bank for Reconstruction and Development (IBRD), International Monetary Fund (IMF), Russian Custom Committee, among others.

of capital flight are directly related to the lifting of the state control over exports of various commodities. In addition, the study reports that a considerable part of capital is being illegally exported from Russia to the US through trade operations between the Russian Far Eastern regions, which is rich in resources, and US West-Coast states, which is considered to be rich in money. Other countries that are used by Russia to export its capital are Cyprus, United Kingdom, Switzerland, The Netherlands, Germany and Denmark.

A different study by Abalkin and Whalley (1999) supports many of the results obtained by Tikhomirov (1997). The results of the study were obtained from a joint project on capital flight undertaken by the Institute of Economics based in Moscow and the Center for the Study of International Relations of the University of Western Ontario in Canada. The team used the Russian Federation balance of payments data compiled by the Bank of Russia. In order to quantify the amount of capital flight from Russia, the authors divided their 1992-1997 period in two (1992-1993 and 1994-1997).<sup>8</sup> This step was needed because of the non-availability of comparable data for the same variables in both periods. The 1992-1993 period was studied by examining the volume of non-returned revenues from exports and the volume of contraband exports of goods. Capital flight

---

<sup>8</sup> Data for the years 1992 and 1993 was obtained from the Russian Federation Trade Statistics and from some expertise provided by the Bank of Russia. As stated within the text, data for the 1994-1997 period was obtained from the Russian Federation Balance of Payment Accounts.

during this period was estimated between \$56 and \$70 billion.<sup>9</sup>

The size of capital flight for the 1994-1997 period was estimated using a modified version of Cuddington's model which the authors adjusted to include the errors and omissions account, export revenue arrears and uncovered import advances, as well as the difference between 'offered trade credits and advances' and 'raised trade credits and advances' accounts. The project's team concluded that on average, between 1994 and 1997, on an annual basis, \$17 billion exited the country in the form of capital flight. This number differs from that presented by the Central Bank which estimated the level of capital flight at annual rate of \$11 billion.<sup>10</sup> The team also concluded that of the approximately \$68 billion held abroad by Russian residents, 33 per cent accounted for illegal capital flight. Much like Tikhomirov (1997), Abalkin and Whalley (1999) credit the large amount of capital flight from the post-Soviet Russian Federation to several factors. Among them the authors include: (1) the ease of using invoicing and other trade schemes, (2) a large perceived social, political and credit risk, (3) tariff and export tax evasion via the non-repatriation of income on trade transactions, as well as (4) the hedging of Russian corporate income against risk of recession.

Abnormal trade pricing may be the least risky technique for shifting

---

<sup>9</sup> Capital flight is defined by Abalkin and Whalley (1999) as the cumulative sum of foreign currency profits that was not repatriated by Russian residents.

<sup>10</sup> The Central bank used the sum of non-receipt of export earnings, unredeemed import advances, non-equivalent barter and 50 percent of errors and omission to estimate the volume of capital

capital across borders because many government agencies do not have the capability to analyze systematically import and export transactions and determine abnormal pricing.<sup>11</sup> Studies by Zdanowicz, Pak and Sullivan (1999), Pak, Zanakis and Zdanowicz, and de Boyrie, Pak and Zdanowicz have considered this issue in some detail using the U.S. Merchandise Trade database published by the U.S. Census Bureau.

In order to detect abnormal international trade prices, which may be related to capital flight, Zdanowicz and Pak, together with Sullivan, Zanakis and de Boyrie, have presented in their studies a framework for filtering thousands of harmonized commodity codes and millions of import and export transactions. Together with Sullivan, Pak and Zdanowicz analyzed in some detail the statistics of trade merchandise between Brazil and the United States. The authors utilize 1995 U.S. Merchandise Trade Database at its most disaggregate level to document the amount of capital flow which may be disguised as commodity trade. The results of the study show that in the year 1995 capital flight from Brazil into the United States amounted to anywhere between \$2 and \$4 billion. In percentage basis, the amount of income shifted due abnormal pricing is between 11.13% for under-invoiced exports and 15.23% for over-invoiced imports.

---

flight.

<sup>11</sup> Several authors have examined the falsification of international trade documents to facilitate capital flight; see Bhagwati (1964), Bhagwati, Krueger and Wibulswasdi (1974), de Wulf (1981), and Gulati (1987).

In a different study, Pak, Zanakis and Zdadowicz utilized the same framework to estimate the economic impact of under/over-invoicing exports/imports from/to Greece. The study is performed relative to the United States. The authors reported that these transactions shifted between \$132 and \$276 million during 1995 from Greece to the U.S. and about \$5.5 billion from Greece to the World. The percentage of income shifted due to abnormal pricing in this case varies between 2.04% for under-invoiced exports and 5.88% for over-invoiced imports.

A later study on Switzerland's capital flight by de Boyrie, Pak and Zadanowicz, evaluates every reported import and export transaction between the United States and Switzerland during the years 1995 and 2000. The results of the study show that the amount of capital flight from Switzerland to the U.S. through trade is \$31 billion for the five year period, or an average of \$5.3 billion per year. Results also show that the amount of income moved through over/under invoicing is significant. For the year 1995 alone, the amount shifted out of Switzerland on a monthly basis ranges between 9.58% and 54.02% of total trade volume.<sup>12</sup> The current study on Russia show that the amount of income shifted through abnormal prices from Russia in 1995, based on U.S./Russia accounts for 3.46% and 5.79%

---

<sup>12</sup> In 1994, the United States 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. In the analysis, imports at prices exceeding the import upper quartile price, and exports at prices below the lower export quartile price are considered abnormal.

of total trade for exports and imports, respectively.<sup>13</sup>

The aim of this study is to develop a set of pricing standards for analyzing every import and export transaction between Russia and the United States and estimate the magnitude of capital flight from January 1995 through December 1999 due to abnormal pricing.<sup>14</sup> The inter-quartile range is adopted as the benchmark to determine if a transaction price is considered abnormal. This is consistent with the approach adopted and stipulated in the United States IRS regulation 482 on transfer pricing where the inter-quartile price is adopted as a criteria to determine the validity of transfer prices in international trade.

In estimating the magnitude of capital flight, we compared the prices of Russia's imports/exports from/to the United States to the upper and lower quartile prices of similar products imported/exported from the United States by all countries in the world. The dollar value of price deviations was then estimated and aggregated. The analysis resulted in estimates of capital flight from Russia to the United States ranging from \$1.01 billion to \$4.85 billion during 1995-1999.

Similar analysis was repeated comparing Russia's individual import and export transaction prices with the United States and determining the dollar value

---

<sup>13</sup> When using U.S./World prices as the basis for the study, the results show that 19.43% and 13.14% of total trade is shifted through under-invoiced exports and over-invoiced imports, respectively.

<sup>14</sup> The methodology employed in this study was developed by Simon J. Pak and John S. Zdanowicz at Trade Research Institute, Inc. The computational techniques employed in this study were also used in earlier research. See Pak and Zdanowicz (1994), Pak, Zdanowicz and Sullivan (1999), Pak, Zanakis and Zdanowicz (2002), and de Boyrie, Pak and Zdanowicz (2002).

of price deviations based on Russia/United States import and export prices. This resulted in estimated capital flight from Russia to the United States ranging from \$244 million to \$550 million during the same period.

In order to determine if capital movement through trade is a due to money laundering, tax evasion or some sort of portfolio consideration, we tested two different models used in the literature to determine if the portfolio models can explain the capital flights through over/under-invoicing. These models are based on the theory that capital flight can be explained by differences in risk and return perceived by residents and nonresidents in holding claims on residents of Russia.

### **III. The Models**

Several studies have presented different methods of estimating the amount of capital flight: (1) the residual measure, (2) Dooley's method and (3) hot money measure, and (4) trade misinvoicing. The residual method is adopted by the World Bank (1985), Erbe (1985) and Morgan Guaranty (1986), among others. The hot money measure is used in Cuddington (1986). The residual measure, Dooley's method (1986, 1987, 1988), and the hot money measure follow the balance of payment identity. The first two methods make use of factors such as public debt, foreign direct investment, current account deficits, additions to reserves, and the capitalized value of reported earnings to measure capital flight, while the third, hot money measure, calculates private capital flows directly by

taking errors and omissions and private short-term capital figures from the balance of payments. The only measure that does not account for capital flight through the use of the balance of payments is the trade misinvoicing method. It is important to recognize that export under invoicing and import over invoicing can hide capital flight which can be measured through the differences in statistics of the reporting country and its trading partners.

Capital flight is often explained by the standard portfolio adjustment model, which is based on the assumption that domestic and international macroeconomic variables serve as explanatory variables of capital flight. This model has been suggested by Johnson (1976), Cuddington (1986, 1987), Dooley (1988), Ketkar and Ketkar (1989), and Pastor Jr. (1990), among others.<sup>15</sup>

This study tests two portfolio models, Cuddington (1987) and Pastor Jr. (1990), to explain the estimated capital flight from Russia through trade with the U.S.<sup>16</sup>

#### ***a. Cuddington (1987) Model***

Cuddington (1987) uses a model motivated by a “standard three-asset portfolio adjustment model.”<sup>17</sup> The explanatory variables for capital flight used in

---

<sup>15</sup> Examples of these variables include gross domestic products (GDP), external debt, deposit rates, real interest rates, inflation, exchange rates, import/export, etc.

<sup>16</sup> Cuddington’s model is also used by the Institute of Economics, Moscow, in a study performed in conjunction with the Center for the Study of International Relations of the University of Western Ontario.

<sup>17</sup> Cuddington, pg. 383.

his model are domestic interest rate, foreign interest rate augmented by the expected rate of depreciation of the domestic currency, and the domestic inflation rate. The author selects these three variables based on the assumption that households allocate their wealth among domestic financial assets, consumer durables and foreign financial assets. Cuddington finds these variables to have some explanatory power or causation effect for capital flight. He specifies the model as:

$$KF_t = a_0 + a_1 B_t + a_2 r_t + a_3 (r^*_t + x_t) \quad (1)$$

where:

KF	=	Capital Flight
B	=	Domestic inflation rate, calculated as the ratio of the logarithms of consumer price indexes (i.e., $\log(CPI / CPI^1)$ ).
$r$	=	Domestic interest rate, Deposit rate
$r^*$	=	Foreign interest rate, T-bill rate
$x$	=	Expected rate of depreciation of the domestic currency, calculated as $x = a(REER_t - R)$
REER	=	Real effective exchange rate. Since IMF- International Statistics does not publish the real effective exchange rate for Russia we estimated this variable using Pastor's definition, i.e., $e^r = \frac{P}{e \times P^{US}}$ .
R	=	Equilibrium rate. We are using the value of the real effective exchange rate for 1995 as the equilibrium rate. This is the year IMF-International Statistics uses as its index year.

***b. Pastor Jr. (1990) Model***

Pastor Jr. (1990) explains that capital flight occurs when investors decide to transfer their wealth from domestic assets (i.e., holdings of currency, savings in the domestic financial systems, or investments in real productive activity) to foreign assets when these domestic assets become increasingly unattractive. This model focuses on financial variables (i.e., change in inflation rate, financial incentive for capital flight, and degree of overvaluation) that he considers to be the causes of capital flight. That is,

$$CF = f(\text{CHINF}, \text{FINC}^1, \text{OVAL}) \quad (2)$$

$$CF = f(\text{CHINF}, \text{FINC}^2, \text{OVAL}) \quad (3)$$

where:

CF	=	Capital Flight
CHINF	=	Change in inflation rate, calculated as the difference in logarithms of consumer price indexes.
FINC	=	Financial incentive for capital flight measured as $(i^{\text{US}} - i - e)$ following Pastor's definition (FINC <sup>1</sup> ) and $\ln(1 + i^{\text{US}}) - \ln(1 + i) + \ln(e) - \ln(e^{-1})$ following Dolley's definition (FINC <sup>2</sup> ).
$i^{\text{US}}$	=	The rate paid on US Treasury bills
$i$	=	Domestic interest rate, Deposit rate

$e$	=	Ratio of local currency to dollar
$e$	=	Rate of change of the exchange rate (local currency to dollar)
OVAL	=	The degree of overvaluation measured as the average real exchange rate for the current year relative to an equilibrium value (please see the definition for R in Cuddington's model)
$e^r$	=	Real exchange rate
P	=	Domestic price level – producer price index for Russia
$P^{US}$	=	US Price level - producer price index for the US

The three variables included in Pastor's model are expected to have a positive influence on the dependent variable because capital flight is likely to occur when interest earnings on domestic savings are less than those of foreign assets, when exchange rate is considered overvalued since it would tend to reduce the value of domestic savings and when the expected profitability in the domestic economy is less than that expected in a foreign country.

The equations are estimated using an ordinary least squares (OLS) procedure.

#### **IV. Data**

##### ***a. Trade Data Base & Global Price Matrix***

Our research is based on the data contained in the United States Merchandise Trade Data Base, which is produced by the United States Department of Commerce, Bureau of Census. The 1995-1999 annual data base

contains transactions data for over 15,000 import harmonized commodity codes and over 8,000 export harmonized commodity codes, and detail over 18 million import transactions and 13 million export transactions per year. The harmonized commodity code system assigns specific ten-digit codes to various products imported into and exported from the United States. The United States adopted the classification of commodities by ten-digit harmonized codes in 1989. In addition to price and quantity details for all harmonized commodity codes, the database also details the information for approximately 235 countries and each of the 44 United States customs districts, and differentiates between air and sea transportation. The database does not contain the names of the individuals or firms involved in the transactions. Export values are F.A.S. (Free Along Side Ship), and import values are C.V. (Customs Value). The import database also contains insurance and freight for each transaction.

We combined all records on the 12 monthly United States import and export for each year from 1995 to 1999, by harmonized commodity code and by country. We examined every record of United States/World trade for each harmonized commodity code. For each commodity code we determined the upper and lower quartile prices as well as the median prices for all United States/world transactions during the 1995 – 1999 period. We recognize that the characteristics of import and export transactions may vary among countries. Therefore we also investigated import and export transactions relative to United States/country trade,

for every commodity for all countries. We analyzed total United States/country imports and total United States/country exports and determined the lower, median and upper quartiles United States/country import price and lower, median and upper quartiles United States/country export price for every commodity traded.

The results of this analysis are a global price matrix for each of the five years. Every country and the world are represented by 236 columns, while every import harmonized code and every export harmonized code are represented by over 23,000 rows. The resulting matrix contains over 5.5 million cells. Each cell contains the price data based on the population of transactions related to the United States import or United States export of a particular commodity from and to a specific country, as well as from and to the world. Some cells are empty if no transactions existed between the United States and a country for a particular commodity.

The issue of homogeneity of the products defined by a harmonized commodity code in the international price matrix should also be addressed. Harmonized commodity codes should not be confused with Standard Industrial Classification (SIC) codes. SIC codes attempt to classify firms by industry and in most cases lead to mis-specification in transfer pricing issues. Industrial classifications are very broad and include firms with diverse markets and multiple product lines. Their use in transfer pricing disputes has been discredited in prior litigation. Harmonized commodity codes relate to specific product classifications

and are more useful in determination and analysis of transfer prices. However, some harmonized commodity codes are more detailed than others. Thus, harmonized commodity codes will provide more meaningful information for some commodities and less for others. In all cases, the information contained in the global price matrix is the most exhaustive and the most detailed U.S. information compiled from public sources that can be used to assist in the determination of "comparable" prices.

***b. Macroeconomic Variables***

Monthly data from January 1995 to December 1999 are obtained from various issues of the International Monetary Funds' (IMF) *International Financial Statistics* (IFS) for most of the macroeconomic variables used in this study. The variables utilized include interest rate (i.e., deposit rate), exchange rate, and the producer price index for Russia. The consumer price index in price form was obtained from the OECD Main Economic Indicators series. The data for the US was obtained from the *International Financial Statistics*. In June 1999, the IMF's *International Financial Statistics* changed its base year from 1990 to 1995. All data collected before this period was adjusted to reflect 1995 as the index year.

**V. Results**

***a. Abnormal Pricing in Russia-United States Trade***

Even though the database used in this analysis does not identify the firms engaged in abnormal pricing transactions, the analysis of transaction prices

between Russia and the United States reveals that significant abnormalities in pricing exist. From the global price matrix, we selected the prices for each commodity traded between the United States and Russia and the prices for the same commodity traded between the United States and the world. We examined every import and export transaction between Russia and the United States during the January 1995 – December 1999 period.

We first analyzed Russia's import prices for products purchased from the United States and compared them to the prices for products with identical classification code purchased from the United States by the world. This allowed us to determine the degree of over-invoicing of imports into Russia from the United States based on comparisons to the import upper quartile prices from the United States paid by all countries. The degree of under-invoicing of exports from Russia was determined based on the lower quartile prices of corresponding commodities imported by the U.S. from world.

Based on the upper/lower quartile prices of U.S. trade with all countries, capital flight from Russia to the U.S. during the five-year period studied was \$8.92 billion. This resulted from \$7.24 billion under-invoiced exports from Russia to the U.S. and \$1.68 billion over-invoiced imports into Russia also from the U.S. Results appear in Table 2A. All these represent the amounts by which all trades violated inter quartile ranges for each item.

A similar summary based on average U.S./Russia trade prices, lowers the

total capital shifted from Russia to U.S during the 1995-1999 period to \$1.86 billion (Table 1B). These are not insignificant amounts for Russia, if one considers its total 1995-1999 trade with the U.S.: \$34.38 billion, resulting from \$22.36 billion exports from Russia and \$12.02 billion imports from the US (Table 1C). Assuming a 25% average tax rate, the \$1.86 billion trade shifted would result in \$465 million lost revenue for the treasury of Russia.

A question that may be of interest to Russian authorities and trade agencies is which type of items corresponds to the highest dollar amounts in income shifted to the U.S. from Russia. Tables 2A-B reveals the capital outflows from the top 25 such items at ten-digit level of the commodity codes (HS10). Based on U.S./Russia lower quartile prices, the estimated amount of capital flight from Russia is \$997 million from the top 25 under-invoiced exports to U.S. (accounting for 86.6% of the total for all items). Based on U.S./World average prices, the amount is \$5.91 billion from the top 25 under-invoiced exports to U.S.. The total amount shifted by the top 25 import items is \$477 million or 67% of all import dollars shifted. When the US/World upper quartile prices are used, this income shifted by the top 25 import products grows to \$884 million or 53% of the total for all products.

Tables 3A-B list the top and bottom five commodity groups at two-digit level of the commodity codes (HS2) that are most susceptible to be used for income shifting. In order to organize Tables 3A-B, the total dollar amount of

exports/imports for each product category traded between U.S. and Russia was calculated. The categories were then ranked based on the total dollar amount of exports/imports for all categories. Only those categories that exported/imported more than 1% of the total sum of all categories (\$22,363,139,052 for exports and \$12,023,894,373 for imports) were kept. The list of product categories was then ranked again based on the amount of under-invoiced exports and over-invoiced imports. Only the top and bottom five categories were included in Tables 3A and 3B.

Table 3A presents the five product categories that are most susceptible to be used to move money out of the country. The results are for Russian exports and imports based on the upper/lower quartiles prices of U.S. trade with Russia and U.S. trade with the world. The dollar amount of under-invoiced exports and over-invoiced imports is also shown in this table. The percentage amount represents the amount over/under-invoiced over the total dollar amount of exports/imports for all categories. Similarly, Table 3B shows the five least susceptible product categories to be used in order to move capital into or out of the country.

It is worthwhile to mention that, as presented in Table 3A, the amount of income shifted (or capital flight) through exports based on U.S./World lower quartile prices are larger than those for U.S./Russia lower quartile prices. This implies that the United States is paying more for Russian products than for similar

products from the rest of the World. When looking at exports, one can see that four of the top five categories are the same whether one examines the amount of income shifted based on U.S. and Russia over (under) invoiced imports (exports) or based on those between the U.S. and the world. The same case can be made for imports. The amount of under-invoiced exports ranges between 1.55% and 65.38% when using U.S./Russia lower quartile prices and 10.49% and 85.93% when using U.S./World lower quartile prices. The range decreases when looking at over-invoiced imports. Within this category, the amount varies between 2.46% and 15.69% and 0.73% and 86.87% when using U.S./Russia and U.S./World lower quartile prices, respectively. When studying the top five over invoiced imports from the U.S. into Russia, in most cases, the results show that Russia is importing from the U.S. at higher prices than the US is exporting to the rest of the World.

Unlike Table 3A, Table 3B table shows that when studying the five least susceptible industrial categories, only one out of five categories, when looking at exports, is independent of whether U.S./Russia or U.S./World lower quartile prices is utilized. On the other hand, when imports are examined, four out of five categories are still included in this table whether either form of deviation from lower quartile prices is utilized. The amount of variation when looking at the percentage amount of under-invoiced exports is quite different than that found in Table 3A. In this case the percentage variation is from 0.00% to 1.74% or 0.28% and 10.22%, depending on the deviation from lower quartile prices used. When it

comes to over-invoiced imports, the range is between 0.06% and 2.34% and 3.08% and 6.49%, respectively.

It should be emphasized that our analysis identifies *potential* abnormally priced trades. It helps investigators to identify items for auditing; it does not prove that they are abnormal. In particular when the number of transactions is small for a certain commodity, such as expensive military item, such identification may not be reliable.

***b. Regression Analysis***

In estimating equations (1), (2), and (3), the ordinary least squares regressions (OLS) are used with and without up to two-month lagged independent variables. The lags are introduced because some of the import or export decisions may have been made several months before such transactions are reported. This resulted in a total of eighteen different specifications including three specifications of Cuddington's model using no lag, one-month lag and two-month lag with the dependent variable defined as a percentage of total trade; three specifications of the same model with dependent variable defined in dollar terms; and twelve different specifications of Pastor's model using the same lag structure and definition of the dependent variables as in Cuddington's model. In addition, Pastor's and Dooley's definition of the financial incentive for capital flight were included within this last set of specifications.

Table 4 presents the results for selected specifications.<sup>18</sup> Table A, found in the Appendix, presents the results of all the regressions. Empirical results do not support either of the two portfolio models we tested. For example, we found specification number nine to be the most significant of them all, even though the significance is weak at most. The results for this specification show that an increase in the deposit rate in Russia and the US Treasury bill rate produces capital flight. Specifications four and five show similar results. The sign of the deposit rate coefficient in Russia is counter intuitive because a decrease, not an increase, in the deposit rate in Russia would induce capital movement from Russia.<sup>19</sup> Another intriguing result is that of inflation and the degree of overvaluation for the results show that increasing inflation tends to retard capital flight and that the degree of overvaluation has a significant negative coefficient - opposite to what theory would predict.<sup>20</sup>

The results presented in Table 4 and Table A do not support the portfolio models in explaining capital movement out of Russia. The results demonstrate that capital movement out of Russia is not due to financial conditions in either Russia or the United States and this lead us to conclude that the capital movement

---

<sup>18</sup>The specifications included in this table were selected because they had the highest  $R^2$  and adjusted  $R^2$ .

<sup>19</sup>The t-statistic shows this value to be insignificant.

<sup>20</sup>It is interesting to note that of all the variables studied, the most significant one is the degree of overvaluation. In six out of eighteen specifications this variable was significant at the 10% level, in three out of eighteen at the 5% level and in four out of eighteen at the 2% level. It is also

out of Russia may be due to other factors like money laundering activities and/or tax evasion.<sup>21</sup>

## **VII. Conclusion**

The analysis of the Russian trade with the U.S. has resulted in estimates of significant capital outflows through over-invoiced imports and under-invoiced exports. According to our estimates, Russia's capital flight to the United States during 1995-1999 ranges from a maximum of \$8.92 billion to our most conservative estimate of \$1.86 billion. Our analysis only considers trade-pricing abnormalities in Russia-United States trade. An important and interesting extension of our study would be to estimate the amount of capital flight from Russia through trade with all of its trading partners. This will require an analysis of a detailed database of the Russian imports and exports with all of its trading partners.

---

worthy to note that the regressions generated a negative OVAL coefficient.

<sup>21</sup>This conclusion is based on the idea that no country would buy abroad when their currency is undervalued. It would cost the investor more to buy abroad than it would to buy at home. Yet in the 1995-1999 period, imports accounted for 35% of all transactions.

## REFERENCES

- Abalkin, Leonid and John Whalley (1999), "The Problem of Capital Flight from Russia," *The World Economy*, Vol. 22, No. 3: 421-445.
- Bhagwati, J.N. (1964), "On the Underinvoicing of Imports," *Bulletin of the Oxford University Institute of Economics and Statistics*, Vol. 26: 389-397.
- Bhagwati, J.N., Krueger, A. U. and Wibulswasdi, C. (1974), "Capital Flight from LCD's: A Statistical Analysis," in J.N. Bhagwati ed., *Illegal Transactions in International Trade*, North-Holland Publishing, Amsterdam: 148-154.
- Claessens, Stijn (1997), "Estimates of Capital Flight and its Behavior," *Revista de Analisis Economico*, Vol. 12, No. 1: 3-34.
- Cuddington, J. T. (1986), *Capital Flight: Estimates, Issues and Explanations*, Princeton University Press, Princeton, New Jersey.
- \_\_\_\_\_ (1987), "Capital Flight," *European Economic Review*, Vol. 31: 382-388.
- de Boyrie, Maria E., Simon J. Pak, and John Zdanowicz (2004), "The Impact of Switzerland's Money Laundering Law on Capital Flows Through Abnormal Pricing in International Trade," *Applied Financial Economics*, forthcoming.
- De Wulf, L. (1981), "Statistical Analysis of Under- and Overinvoicing of Imports," *Journal of Development Economics*, Vol. 8: 303-323.
- Dooley, M., and Isard, P. (1980), "Capital Controls, Political Risk, and Deviations from Interest Rate Parity," *Journal of Political Economy*, Vol. 88, No. 2: 370-384.
- Dooley, Michael P. (1986), "Country Specific Risk Premiums, Capital Flight, and Net Investment Income Payments in Selected Developing Countries," *International Monetary Fund*.
- \_\_\_\_\_ (1988), "Capital Flight: A Response to Differences in Financial Risks," *International Monetary Fund Staff Papers*, Vol. 35: 422-436.

- Dornbusch, R. (1984), "External Debt, Budget Deficits, and Disequilibrium Exchange Rates," NBER Working Paper 1336, National Bureau of Economic Research, Cambridge, MA (April).
- Eaton, J., and Turnovsky, S. (1983), "Exchange Risk, Political Risk, and Macroeconomic Equilibrium," *American Economic Review*, March: 183-189.
- Erbe, S. (1985), "The Flight of Capital from Developing Countries," *Intereconomics*, November/December: 268-275.
- Gulati, S.K. (1987), "A Note on Trade Misinvoicing," Paper presented at conference on Capital Flight and Third World Debt, Institute for International Economics, Washington, DC (October 2-4).
- Khan, M. and Haque, N. U. (1985), "Foreign Borrowing and Capital Flight: A Formal Analysis," *Staff Papers*, International Monetary Fund, Vol. 32, No. 4 (December): 606-628.
- Lessard, D. R. and Williamson, J. (1987), *Capital Flight and Third World Debt*, Institute of International Economics, Washington DC.
- Low, Patrick (1995), "Preshipment Inspection Services," World Bank Discussion Paper # 278.
- Morgan Guaranty Trust Company (1986), "LDC Capital Flight," *World Financial Markets*, March.
- Pak, S. J. and Zdanowicz, J. S. (1994), "An Estimate of Lost U.S. Federal Income Tax Revenues Due to Over-Invoiced Imports & Under-Invoiced Exports," Trade Research Institute, Report 9404-01.
- Pak, S. J. and Zdanowicz, J. S. (1994), "A Statistical Analysis of the U.S. Merchandise Trade Data Base And Its Uses in Transfer Pricing Compliance and Enforcement", *Tax Management Transfer Pricing Report*, Vol. 3, No. 1 (May 11): 50-57.
- Pak, Simon J., Steve H. Zanakis, and John S. Zdanowicz (2003), "Detecting Abnormal Pricing in International Trade: The Greece-U.S. Case," *Interfaces*, Mar/April, Vol. 33, No. 2: 54-65

- Pastor Jr. Manuel (1990), "Capital Flight from Latin America," *World Development*, Vol. 18, No. 1: 1-18.
- Tikhomirov, Vladimir (1997), "Capital Flight from Post-Soviet Russia," *Europe-Asia Studies*, Vol. 49, No. 4: 591-615.
- Varman-Schneider, B. (1991), *Capital Flight from Developing Countries*, Westview Press, Oxford U.K.
- Walter, I. (1985), *Secret Money: The World of International Financial Secrecy* Lexington Books, Lexington, Mass.
- Walter, I. (1986), "The Mechanics of Capital Flight," Paper presented at the Conference on Capital Flight and Third World Debt, Institute for International Economics, (October 2-4).
- World Bank (1985), *World Development Report*, Washington, DC, World Bank.
- Zdanowicz, John, Simon Pak and Michael Sullivan (1999), "Brazil-United States Trade: Capital Flight Through Abnormal Pricing," *International Trade Journal*, Vol XIII, No. 4: 423-443.

**Table 1A**  
**Income Shifted From Russia to the US (All Items)**  
**Based on US-World Upper/Lower Quartile Prices**

	<b>Exports</b>	<b>Imports</b>	<b>Total</b>
1995	735,603,882	292,159,786	1,027,763,668
1996	632,429,341	379,875,295	1,012,304,636
1997	661,519,083	364,237,128	1,025,756,211
1998	679,003,202	331,206,054	1,010,209,256
1999	4,533,250,700	313,256,005	4,846,506,705
<b>Five Year Total</b>	<b>7,241,806,207</b>	<b>1,680,734,268</b>	<b>8,922,540,475</b>

**Table 1B**  
**Income Shifted From Russia to the US (All Items)**  
**Based on US-Russia Upper/Lower Quartile Prices**

	<b>Exports</b>	<b>Imports</b>	<b>Total</b>
1995	131,165,086	128,801,297	259,966,383
1996	262,127,410	165,900,196	428,027,606
1997	98,679,356	146,206,218	244,885,574
1998	164,170,641	213,062,782	377,233,423
1999	495,423,762	55,275,068	550,698,830
<b>Five Year Total</b>	<b>1,151,566,255</b>	<b>709,245,561</b>	<b>1,860,811,816</b>

**Table 1C**  
**1995-99 Russia Trades with the U.S.**

	<b>Exports</b>	<b>Imports</b>	<b>Total</b>
1995	\$3,785,435,861	\$2,223,160,428	\$6,008,596,289
1996	\$3,413,380,542	\$2,786,431,863	\$6,199,812,405
1997	\$4,059,899,442	\$2,555,209,152	\$6,615,108,594
1998	\$5,552,041,011	\$2,991,500,458	\$8,543,541,469
1999	\$5,552,382,196	\$1,467,592,472	\$7,019,974,668
<b>Five Year Total</b>	<b>\$22,363,139,052</b>	<b>\$12,023,894,373</b>	<b>\$34,387,033,425</b>

*Note: Imports = Russia Imports from USA; Exports = Russia Exports to USA*

**Table 2A**  
**Income Shifted (\$ amount) From Russia to the US**  
**(Top 25 Items in Russia-US Trade)**

	US-World Upper/Lower Quartile Prices			US-Russia Upper/Lower Quartile Prices		
	Exports	Imports	Total	Exports	Imports	Total
1995	\$456,762,977	\$128,241,284	\$585,004,262	\$107,284,102	\$71,665,095	\$178,949,197
1996	\$397,210,699	\$221,758,377	\$618,969,076	\$235,093,255	\$110,284,235	\$345,377,490
1997	\$415,834,965	\$149,311,654	\$565,146,619	\$73,219,549	\$101,220,997	\$174,440,546
1998	\$388,462,830	\$154,390,414	\$542,853,245	\$122,829,816	\$158,359,972	\$281,189,788
1999	\$4,250,811,573	\$230,442,362	\$4,481,253,935	\$458,784,257	\$35,795,003	\$494,579,259
<b>Five Year Total</b>	<b>\$5,909,083,045</b>	<b>\$884,144,091</b>	<b>\$6,793,227,137</b>	<b>\$997,210,979</b>	<b>\$477,325,301</b>	<b>\$1,474,536,280</b>
	<i>Under Invoiced</i>	<i>Over Invoiced</i>		<i>Under Invoiced</i>	<i>Over Invoiced</i>	

**Table 2B**  
**Income Shifted (%) From Russia to the US**  
**(Top 25 Items in Russia-US Trade)**  
**(The Income shifted through the top 25 items as a percent**  
**of the income shifted through all items)**

	US-World Upper/Lower Quartile Prices			US-Russia Upper/Lower Quartile Prices		
	Exports	Imports	Total	Exports	Imports	Total
1995	62.09%	43.89%	56.92%	81.79%	55.64%	68.84%
1996	62.81%	58.38%	61.14%	89.69%	66.48%	80.69%
1997	62.86%	40.99%	55.10%	74.20%	69.23%	71.23%
1998	57.21%	46.61%	53.74%	74.82%	74.33%	74.54%
1999	93.77%	73.56%	92.46%	92.60%	64.76%	89.81%
<b>Five Year Total</b>	<b>81.60%</b>	<b>52.60%</b>	<b>76.14%</b>	<b>86.60%</b>	<b>67.30%</b>	<b>79.24%</b>

*Note: Imports = Russia Imports from USA; Exports = Russia Exports to USA*

**Table 3A. Top 5 Product Categories Most Susceptible to Capital Flight**

Commodity Classification at 2 digit level (HS2)	CATEGORY	Ranking based on Top 5 Categories			
		Exports based on		Imports based on	
		Deviation U.S.-Russia Prices	Deviation U.S.-World Prices	Deviation U.S.-Russia Prices	Deviation U.S.-World Prices
28	INORGANIC CHEMICALS; ORGANIC OR INORGANIC COMPOUNDS OF PRECIOUS METALS, OF RARE-EARTH METALS, OF RADIOACTIVE ELEMENTS OR OF ISOTOPES	1 \$591,434,760 29.44%	2 \$1,723,899,718 85.80%	N/R	N/R
71	NATURAL OR CULTURED PEARLS, PRECIOUS OR SEMIPRECIOUS STONES, PRECIOUS METALS; PRECIOUS METAL CLAD METALS, ARTICLES THEREOF; IMITATION JEWELRY; COIN	2 \$99,860,775 2.31%	1 \$2,815,787,076 65.20%	N/R	N/R
72	IRON AND STEEL	3 \$95,150,695 2.33%	3 \$539,107,640 13.21%	N/R	N/R
76	ALUMINUM AND ARTICLES THEREOF	4 \$69,984,177 1.55%	4 \$472,487,735 10.49%	N/R	N/R
49	PRINTED BOOKS, NEWSPAPERS, PICTURES AND OTHER PRINTED PRODUCTS; MANUSCRIPTS, TYPESCRIPTS AND PLANS	5 \$45,727,349 65.38%	N/R	N/R	N/R
62	ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, NOT KNITTED OR CROCHETED	N/R	5 \$251,248,250 85.93%	N/R	N/R
84	NUCLEAR REACTORS, BOILERS, MACHINERY AND MECHANICAL APPLIANCES; PARTS THEREOF	N/R	N/R	1 \$175,275,753 12.92%	1 \$601,915,294 44.38%
85	ELECTRICAL MACHINERY AND EQUIPMENT AND PARTS THEREOF; SOUND RECORDERS AND REPRODUCERS, TELEVISION RECORDERS AND REPRODUCERS, PARTS AND ACCESSORIES	N/R	N/R	2 \$88,477,307 15.69%	2 \$186,164,167 33.02%
02	MEAT AND EDIBLE MEAT OFFAL	N/R	N/R	3 \$82,943,177 2.46%	N/R
88	AIRCRAFT, SPACECRAFT, AND PARTS THEREOF	N/R	N/R	4 \$70,170,070 3.99%	3 \$183,983,470 33.02%
87	VEHICLES, OTHER THAN RAILWAY OR TRAMWAY ROLLING STOCK, AND PARTS AND ACCESSORIES THEREOF	N/R	N/R	5 \$60,535,444 10.17%	4 \$132,813,296 0.73%
89	SHIPS, BOATS AND FLOATING STRUCTURES	N/R	N/R	N/R	5 \$96,473,868 86.87%

Note: Dollar amount represents the amount of capital flight from Russia through exports or imports. The percentage amount represents dollar of capital flight to total exports or imports. N/R = Not Ranked as one of the Top 5 Categories. HS2 = 2 digit harmonized code.

**Table 3B. The Five Least Susceptible Product Categories for Capital Flight**

Commodity Classification at 2 digit level (HS2)	CATEGORY	Exports based on		Imports based on	
		Deviation U.S.-Russia Prices	Deviation U.S.-World Prices	Deviation U.S.-Russia Prices	Deviation U.S.-World Prices
89	SHIPS, BOATS AND FLOATING STRUCTURES	1 \$0 0.00%	1 \$130,704 0.28%	N/R	N/R
52	COTTON, INCLUDING YARNS AND WOVEN FABRICS THEREOF	2 \$366,725 1.40%	N/R	1 \$12,740 0.06%	4 \$789,278 3.75%
39	PLASTICS AND ARTICLES THEREOF	3 \$568,991 1.01%	N/R	N/R	N/R
26	ORES, SLAG AND ASH	4 \$673,543 1.06%	N/R	N/R	N/R
53	VEGETABLE TEXTILE FIBERS NESOI; YARNS AND WOVEN FABRICS OF VEGETABLE TEXTILE FIBERS NESOI AND PAPER	5 \$784,962 1.74%	N/R	N/R	N/R
43	FURSKINS AND ARTIFICIAL FUR; MANUFACTURES THEREOF	N/R	2 \$2,409,704 10.22%	N/R	N/R
22	BEVERAGES, SPIRITS AND VINEGAR	N/R	3 \$3,879,234 1.33%	N/R	N/R
16	EDIBLE PREPARATIONS OF MEAT, FISH, CRUSTACEANS, MOLLUSCS OR OTHER AQUATIC INVERTEBRATES	N/R	4 \$4,743,879 6.47%	N/R	N/R
79	ZINC AND ARTICLES THEREOF	N/R	5 \$5,003,418 4.23%	N/R	N/R
17	SUGARS AND SUGAR CONFECTIONARY	N/R	N/R	N/R	5 \$1,156,240 6.49%
64	FOOTWEAR, GAITERS AND THE LIKE; PARTS OF SUCH ARTICLES	N/R	N/R	5 \$303,094 2.34%	3 \$687,915 5.32%
37	PHOTOGRAPHIC OR CINEMATOGRAPHIC GOODS	N/R	N/R	2 \$69,561 0.55%	2 \$462,752 3.68%
09	COFFEE, TEA, MATE AND SPICES	N/R	N/R	4 \$196,659 1.63%	1 \$370,737 3.08%
69	CERAMIC PRODUCTS	N/R	N/R	3 \$150,061 1.19%	N/R

Note: Dollar amount represents the amount of capital flight from Russia through exports or imports. The percentage amount represents dollar of capital flight to total exports or imports. N/R = Not Ranked as one of the Top 5 Categories. HS2 = 2 digit harmonized code. Ranking is from least susceptible to most susceptible within the bottom 5 categories.

**Table 4**  
**The Determinants of Capital Flight for Russia**  
**Results for Selected Specifications based on R<sup>2</sup> and Adjusted R<sup>2</sup>**

Specification	Variables								
	CHINF	FINC <sup>1</sup>	FINC <sup>2</sup>	OVAL	r	B	r <sup>*</sup>	x	R <sup>2</sup> /R <sup>2</sup> Adj.
4 Pastor's Model 1 month lag	0.2234 (1.590)	-0.0474 (-1.40)‡		-0.2148 (-2.095)§					0.111/ 0.053
5 Pastor's Model 1 month lag	0.1990 (1.491)‡		-0.0489 (-1.419)‡	-0.2105 (-2.073)§					0.111/ 0.053
9 Cuddington's Model 2 month lag					0.0003 (0.961)	-0.2327 (-1.339)‡	0.0802 (1.521) ‡	-0.4805 (-2.376)§	0.129/ 0.052

**Note:** Specifications 4 & 5 are obtained using Pastor's definition. Specification 9 is obtained using Cuddington's model. The dependent variable is defined as a percentage of total trade.

t-values are reported in parentheses below the coefficient estimated, *d.f.* = 50.

§ Significant at the 2% level (two-tailed test)

† Significant at the 5% level (two-tailed test)

‡ Significant at the 10% level (two-tailed test)

FINC<sup>1</sup> = FINC using Pastor's definition

FINC<sup>2</sup> = FINC using Dooley's definition

**Table A**  
**The Determinants of Capital Flight for Russia**

Specification	Variables								
	CHINF	FINC <sup>1</sup>	FINC <sup>2</sup>	OVAL	r	B	r*	x	R <sup>2</sup> /R <sup>2</sup> Adj.
1 No lag	-0.1251 (-0.885)	-0.0234 (-0.703)		-0.1611 (-1.58)‡					0.083/ 0.027
2 No lag	-0.1363 (-1.015)		-0.024 (-0.71)	-0.1599 (-1.58)‡					0.086/ 0.028
3 No lag					0.0003 (1.064)	-0.2774 (-1.63)‡	0.0103 (0.254)	-0.2565 (-1.67)‡	0.102/ 0.026
4 1 month lag	0.2234 (1.590)	-0.0474 (-1.40)‡		-0.2148 (-2.09)§					0.111/ 0.053
5 1 month lag	0.1990 (1.491) ‡		-0.048 (-1.4)‡	-0.2105 (-2.07)§					0.111/ 0.053
6 1 month lag					0.0002 (0.84)	0.0147 (0.084)	0.0383 (0.805)	-0.2910 (-1.61)‡	0.085/ 0.005
7 2 month lag	0.1288 (0.895)	-0.0481 (-1.41)‡		-0.1986 (-1.863)					0.082/ 0.021
8 2 month lag	0.1007 (0.735)		-0.047 (-1.3)‡	-0.1911 (-1.81)†					0.078/ 0.016
9 2 month lag					0.0003 (0.96)	-0.2327 (-1.33)‡	0.0802 (1.52)‡	-0.4805 (-2.37)§	0.129/ 0.052
10 No lag	-116.41 (-1.40)‡	4.5539 (0.233)		-74.339 (-1.246)					0.087/ 0.029
11 No lag	-114.26 (-1.45)‡		4.8314 (0.238)	-74.556 (-1.263)					0.087/ 0.029
12 No lag					0.0230 (0.11)	-173.73 (-1.74)†	6.4022 (0.269)	-141.57 (-1.57)‡	0.106/ 0.030
13 1 month lag	97.8720 (1.172)	-8.6761 (-0.439)		-103.80 (-1.70)†					0.082/ 0.022
14 1 month lag	93.5087 (1.178)		-9.022 (-0.44)	-103.10 (-1.71)†					0.082/ 0.022
15 1 month lag					-0.023 (-0.11)	10.9616 (0.106)	27.2266 (0.972)	-170.69 (-1.61)‡	0.075/ -0.004
16 2 month lag	36.4130 (0.425)	-11.426 (-0.56)		-94.923 (-1.49)					0.048/ -0.01
17 2 month lag	27.9163 (0.342)		-9.942 (-0.47)	-91.645 (-1.46)					0.046/ -0.017
18 2 month lag					0.0237 (0.115)	- 142.570 (-1.393)	47.5046 (1.529)	-271.120 (-2.27)§	0.117/ 0.039

**Note:** Specifications 1,2,4,5,7,and 8 are obtained using Pastor's definition. Specifications 3,6 and 9 are obtained using Cuddington's model. The dependent variable is defined as a percentage of total trade. Specifications 10, 11, 13, 14, 16, and 17 are obtained using Pastor's definition - dependent variable is defined in dollar term. Specifications 12, 15 and 18 are obtained using Cuddington's model -dependent variable is once again defined in dollar terms.

t-values are reported in parentheses below the coefficient estimated, *d.f.* = 50.

§ Significant at the 2% level (two-tailed test)

† Significant at the 5% level (two-tailed test)

‡ Significant at the 10% level (two-tailed test)

FINC<sup>1</sup> = FINC using Pastor's definition, FINC<sup>2</sup> = FINC using Dooley's definition