TAX POLICY: THE EFFECT ON HEDGE FUND INVESTOR BEHAVIOR

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Abstract

The purpose of this essay is to empirically analyze the effect of changes in tax policies on hedge fund flows. We analyze the effect of the Tax Information Exchange Agreements (TIEAs) on hedge fund flows and, indirectly, on hedge fund manager and investor behavior in six tax haven countries.

The results show that the introduction of TIEAs caused structural changes in hedge fund net flows 20 months prior to their signature dates. Investors are aware that TIEAs will be signed before the actual signing date and act on this information. We also examine whether the hedge fund flows of the countries that signed TIEAs differed from that of the countries that did not sign TIEAs. The results show that although TIEAs cause structural changes and some outflow in tax haven countries' hedge fund dollar flows and net flows, it is not enough to offset the other benefits of investing in these countries because both the dollar flows and net flows of these countries increased after their structural breakpoints (SBPs). We conjecture that this is due to an amalgam of factors and that a different class of investors took the place of those who shifted their funds due to the regulatory changes.

Keywords: Taxation, Hedge Funds, Tax Havens, Tax Policy, Funds Flow.

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1. INTRODUCTION

The hedge fund industry has grown dramatically during the last few decades. Hedge funds are classified into two broad categories on the basis of domicile: onshore hedge funds and offshore hedge funds. Offshore hedge funds have contributed more to the rapid growth rate than onshore hedge funds, because they provide tax benefits, are less transparent, and exist within a looser regulatory environment, whereas onshore hedge funds "are subject to strict marketing prohibitions, accredited investor requirements, a limited number of investors, and tax disadvantage" (Aragon et al., 2014, p. 74). In our study, we focus on the offshore component and specifically on how changes in taxation regulation affect investor behavior.

In 2013, the Organisation for Economic Co-operation and Development (OECD) stated that there were "almost 800 bilateral TIEAs worldwide" (OECD, 2013, p. 6; See also Braun & Zagler, 2015; United Nations Conference on Trade and Development, 2011). While hedge fund

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studies have proliferated, there is comparatively little research focusing on hedge fund behavior as it relates to taxation issues. On the other hand, relevant research exists with respect to general taxation issues in tax havens. Bennedsen and Zeume (2018) report that the signing of TIEAs "is associated with a 2.5% increase in the value of affected firms" (p. 1221). Omartian (2016) finds that the use of TIEAs has led to a drop in the number of offshore incorporations. Li et al. (2018) document an increase in the use of tax avoidance strategies in politically uncertain times. On the other hand, Kemme et al. (2017) "find very limited evidence" that TIEAs "reduce tax evasion" (p. 519).

In this paper, we examine the effect that tax policy can have on hedge fund flows and (indirectly) on fund manager and investor behavior in six major tax haven countries. These are the Bahamas, the British Virgin Islands, the Cayman Islands, Guernsey, Bermuda, and Luxembourg. The first four countries listed were among the first major tax havens to sign TIEAs with the United States. The latter two countries did not sign TIEAs with the United States during the sample period (January 1998-December 2004). Like Kemme et al. (2017), we hypothesize that TIEAs caused changes to the hedge fund flows of these six countries. Consequently, it follows that hedge fund flows in the countries that signed TIEAs differ after their SBPs from fund flows in the countries that did not sign TIEAs. Later in this paper, we also discuss the rationale as to why tax policy, in the form of TIEAs, should not be expected to affect hedge fund flows.

We find that the use of TIEAs affected the structural stability of hedge fund flows. Specifically, they caused structural changes in both hedge fund dollar flow (Agarwal et al., 2009) and net flow (Chevalier & Elison, 1997; Sirri & Tufano, 1998) in tax haven countries. Both measures are widely accepted in the hedge fund literature.[5] The results suggest that tax policy does affect hedge fund manager and investor behavior. In addition, we use the month of signature as the theoretical SBP for the countries that signed TIEAs with United States and Nov 2001 (the SBP of the Cayman Islands) as the theoretical SBP for the countries that did not sign TIEAs with the United States. It is the earliest signature date in this study and structural changes in capital flow are expected to occur from this date. Our initial tests suggest that both hedge fund dollar flow and net flow increased in all six countries after their respective SBPs when considering both hedge fund dollar flow and net flow before and after the SBPs. When analyzing fixed effects (country and year), we note that there was outflow from the tax haven countries. This suggests, as we explain later in the paper, that although TIEAs cause structural changes in hedge fund flows and initial outflows, as suggested by the fixed effects tests, the disadvantage of disclosing tax information may not be sufficient to offset the advantages of investing in these tax havens.

Our results have significant implications, both from tax and methodology perspectives. First, we show that a change in tax policy does not necessarily have a large and significant impact on hedge fund flows and investor behavior. The results show that the introduction of TIEAs caused structural changes in both the hedge fund dollar flow and net flow of the six tax haven countries studied (the Bahamas, the British Virgin Islands, the Cayman Islands, Guernsey, Bermuda, and Luxembourg). The structural break in the six tax haven countries' hedge fund dollar flows occurred about 20 months after their theoretical SBPs (the months in which the countries signed their TIEAs). This is largely due to the two-year lockup period restrictions for new investors. On the other hand, the hedge fund net flows—which capture the change in size

[5] Studies by Goetzmann et al. (2003), Baquero and Verbeek (2005), Agarwal et al. (2009), Ding et al. (2009), and Getmansky (2012) show that hedge fund flows and net flows are appropriate measures.

due to net capital flow—show that the structural breaks in the six tax haven countries' hedge fund net flows occurred 20 months before the dates on which the countries signed their TIEAs. We conjecture that investors can circumvent tax agreements by moving funds into different jurisdictions, thus diminishing the effectiveness of important policy tools used to collect additional tax revenue. Second, there are methodological implications. The results also show structural breaks in hedge fund flows between 2000 and 2003, suggesting that future studies using time series methodology could benefit from taking structural breaks into account (i.e., many studies use the sample period 1998-2010 without testing for potential structural changes) in addition to fixed effects.

2. HEDGE FUND OVERVIEW, RELATED LITERATURE, AND HYPOTHESES

Hedge funds represent a distinct investment class as they differ from traditional investment vehicles in terms of both legal structure and investment strategies. When compared to mutual fund managers, hedge fund managers are much less restricted in their investment activities. For example, hedge fund managers can use leverage, sell (short) or buy (long) securities they do not own, or take highly concentrated positions in specific stocks, countries, or industries.

Onshore hedge funds differ significantly from offshore funds. Onshore funds achieve their freedom from registration and regulation under the Investment Company Act of 1940 by satisfying the exemption qualifications of either section 3(c)(1) or section 3(c)(7) of the Act. A section 3(c)(1) fund must have fewer than 100 accredited investors. A section 3(c)(7) fund can have an unlimited number of qualified purchasers only. However, the Securities Exchange Act of 1934 requires hedge funds with more than 499 investors to report on a quarterly basis. Hence, in order to avoid quarterly reporting, a section 3(c)(7) fund, must have fewer than 499 investors. In general, onshore hedge fund investors are usually accredited or qualified investors, as defined by Rule 501 of regulation D under the Securities Act of 1933. In contrast, offshore hedge funds, in general, are not concerned with the exemption requirements because they are typically corporations registered in tax havens such as the Bahamas, the British Virgin Islands, the Cayman Islands, Bermuda, or Luxembourg, where tax liabilities for non-U.S. investors are minimal.

Most onshore hedge funds are structured as limited partnerships in order to pass through taxable income to fund investors (Aragon et al., 2014; McCrary, 2002). Aragon et al. (2014) note that the use of a partnership structure:

> exposes tax-exempt investors to unrelated business taxable income (UBTI) that is generated from leveraged investments (LePree, 2008). Offshore funds, on the other hand, are generally organized under a corporate structure that avoids UBTI, making them more appealing to tax-exempt investors, like endowments and pension funds, in addition to non-U.S. investors (p. 74).

According to BarclayHedge's Hedge Fund Database, only 25.68% of hedge funds are domiciled in the United States, while 53.38% are domiciled in the Caribbean, 18.23% are domiciled in Europe, and 2.71% are domiciled in the rest of the world.

Onshore hedge funds, meanwhile, are generally held by a limited number of accredited or qualified taxable U.S. individual investors. Cumming and Dai (2010), as cited in Aragon et al. (2014, p. 74, fn. 4) studied hedge fund regulations in 29 countries and discovered that, unlike offshore hedge fund managers, "onshore fund managers are restricted to only one (private

placement) of a possible seven distinct marketing channels: banks, fund distribution companies, wrappers, private placements, investment managers, other regulated financial service institutions, and nonregulated financial intermediaries". Therefore, onshore hedge funds are subject to more restrictions in respect of investor account numbers, investor types, and marketing channels than offshore hedge funds. According to Liang and Park (2008), "in the recent survey by WSJ.com, some economists warned against heavy regulation on hedge funds: '… we would push them offshore if we tried to regulate with a heavy hand. Better have them onshore with light regulation'" (p. 7).

Despite the increased research into hedge funds as an asset class, there is little research focusing on the influence of tax policies on the mobility of capital flows. Kudrle (2009a) suggests that many current and past tax haven initiatives use reputation as a foundation for making changes to existing tax legislation. One example, according to Kudrle (2009a), is the Financial Action Task Force, which uses factors such as money laundering, transparency, insufficient cooperation and, more recently, the financing of terror organizations in order to push for tax reforms. Other organizations, such as the Organisation for Economic Cooperation and Development (OECD), have persistently used reputation and other tools to drive changes in tax cooperation among countries (Kudrle, 2009a). One such tool is the TIEA. The European Union has issued various directives in this area, notably the Savings Tax Directive (STD), which came into effect on January 7, 2005. As a result of the European Union's STD, "all EU member countries and some third countries and dependent territories are required to either" withhold taxes "or exchange information on the interest income of foreign citizens" (Schwarz, 2009, p. 97). There are a number of reasons why countries may not want to sign STDs or TIEAs. Schwarz (2009) argues that countries with highly profitable financial sectors are often reluctant to sign such agreements. Non-participation also prevents or minimizes effects from spilling over into the labor market.

In this paper, we focus on the effect that TIEAs may have on the hedge fund flows. The OECD Global Forum Working Group on Effective Exchange of Information developed a model TIEA agreement in 2002. The text of the agreement states that its purpose is "to promote international co-operation in tax matters through exchange of information" (OECD, 2002). Of the countries that signed TIEAs with the United States, we focus on the following: the Bahamas (Jan 25, 2002), the British Virgin Islands (April 03, 2002), the Cayman Islands (Nov 27, 2001), and Guernsey (Sep 19, 2002). Our reasoning for this is that more than 70% of offshore hedge funds are domiciled in these countries. We compare these countries with Bermuda and Luxembourg, the two major offshore hedge fund countries that did not sign TIEAs with the United States.

Overall, we expect to find no difference between the hedge fund flows for the countries that signed TIEAs with the United States in the sample period and the countries that did not. The reasons for this are as follows. First, as mentioned previously, investors may be able to circumvent tax agreements by moving funds into different jurisdictions, thus diminishing the effectiveness of important policy tools used to collect additional tax revenue. Second, a decrease in flows may affect liquidity as investors seek to move their assets elsewhere through the redemption process. Clarke et al. (2007) suggest that sustained redemptions often require fund managers to sell their less liquid assets, which may depress asset values. They argue, therefore, that the desire of fund managers to not depress the fund values should act as a damper on fund cash flows, even in the face of TIEAs. Third, Yang (2013) finds that the behavior of hedge fund managers is affected by an amalgam of factors, including investment strategy, past performance on returns and the expectation of performance persistence, regulation, and tax

strategy. Yang (2013) also found that individual fund characteristics had bigger impacts on hedge fund cash flows than country of origin.

The month of signature is used as the theoretical SBP (see Table 1) for the countries that signed TIEAs with United States. We used November 2001 (the SBP of Cayman Islands) as the theoretical SBP for the countries that did not sign TIEAs with the United States because it is the earliest signature date in this study and structural change in capital flow are expected from this date onwards. The earliest date is chosen because it signifies to investors that other countries may also sign agreements, but at a later date. This is similar to a signaling effect, where the signature of one agreement signals that agreements may be signed by other jurisdictions.

Table 1: Descriptive Statistics of Funds from Different Domiciles

Domicile	Active Funds	Inactive Funds	Total Funds	Date of Signature	Theoretical SBP	Total TIEAs Signed
BAH	36	103	139	25-Jan-2002	Jan-2002	27
BVI	260	394	654	3-Apr-2002	Apr-2002	19
CI	1152	1547	2699	27-Nov-2001	Nov-2001	26
GUE	85	73	158	19-Sep-2002	Sep-2002	18
BER	172	234	406	N/A	Nov-2001	N/A
LUX	87	74	161	N/A	Nov-2001	N/A

Table 1 shows the number of funds operating in each of the six tax havens. For four of the countries, the date of signature and, therefore, the theoretical breakpoint is shown, along with the total number of TIEAs signed. U.S. = the United States, BAH = Bahamas, BVI = British Virgin Islands, CI = Cayman Islands, GUE = Guernsey, BER = Bermuda, LUX = Luxembourg, SBP = Structural Breakpoint.

Hypothesis 1: TIEAs caused structural changes in tax haven countries' hedge fund dollar flows.

Hypothesis 2: TIEAs caused structural changes in tax haven countries' hedge fund net flows.

Hypothesis 3: Hedge fund dollar flows in the tax haven countries that signed TIEAs are no different after their SBPs than hedge fund dollar flows in the tax haven countries that did not sign TIEAs after their SBPs.

Hypothesis 4: Hedge fund net flows in the tax haven countries that signed TIEAs are no different after their SBPs than hedge fund net flows in the tax haven countries that did not sign TIEAs after their SBPs.

3. DATA AND DESCRIPTIVE STATISTICS

There are several hedge fund data providers. Here, we use monthly data on individual hedge funds and fund-of-funds (FOFs) obtained from the BarclayHedge Hedge Fund Database. Both hedge funds and FOFs are included for the purpose of the study. We also include both active and inactive funds in order to minimize survivorship bias. Survivorship bias has been widely studied in both the mutual fund and hedge fund industries. It can result in mutual fund performance overstatements of about 0.5 to 1.4% per year if the data only contains survivor funds (Brown et al., 1992; Brown & Goetzmann, 1995; Malkiel, 1995). Liang (2000) finds that, for hedge fund returns, "survivorship bias exceeds 2% per year" (p. 309; see also Brown

et al.,1999, and Fung & Hsieh, 1998). Therefore, it is necessary to include both active and inactive funds in any study. In addition, most hedge fund studies do not differentiate between onshore and offshore hedge funds. The majority use aggregated samples (e.g., Getmansky, 2012; Liang, 1999). A few recent studies (Aragon et al., 2014; Brown et al., 1999; Kudrle, 2009a) have begun to depart from the practice of aggregation by dividing their samples into onshore and offshore funds.

Table 2: Descriptive Statistics of Fund Characteristics

Panel A: Fund Asset Under Management (in millions of dollars)

AUM	BAH	BVI	CI	GUE	BER	LUX
1998	24200	131000	2040000	13700	69900	37300
1999	27600	133000	2420000	12600	91600	47600
2000	37300	183000	4270000	16000	134000	48300
2001	51900	240000	7090000	20000	188000	38700
2002	53100	264000	10200000	28500	222000	45400
2003	57500	371000	15900000	59400	290000	55800
2004	86100	611000	31100000	109000	491000	106000

Panel B: Fund Annual Dollar Flow (in millions of dollars)

ADF	BAH	BVI	CI	GUE	BER	LUX
1998	8274	19125	72103	1706	12229	11981
1999	3099	9525	32862	-1484	20392	9665
2000	9456	32941	183396	3365	42084	708
2001	14459	35230	279323	3838	52523	-9475
2002	1094	2608	306039	8474	33986	6951
2003	3807	62294	562696	30441	65883	10037
2004	28213	127531	1508063	48565	199854	49831

Panel C: Fund Annual Net Flow

ANF	BAH	BVI	CI	GUE	BER	LUX
1998	0.566	0.134	0.164	0.109	2.275	0.360
1999	0.073	0.334	0.345	0.008	1.240	0.042
2000	0.545	0.315	0.563	0.097	0.535	0.020
2001	0.373	0.185	0.547	0.015	0.402	0.222
2002	0.612	0.296	0.931	0.101	0.388	0.790
2003	0.305	2.070	0.708	0.899	0.537	0.311
2004	1.276	1.349	0.925	0.627	1.265	0.583

Table 2 shows the descriptive fund characteristics of each tax haven for the years 1998 through 2004. Panel A shows fund assets under management in millions. Panel B shows the annual dollar flow in millions by year by jurisdiction. A negative sign equals a net outflow. Panel C shows the annual net flows scaled by size. US = United States, BAH = Bahamas, BVI = British Virgin Islands, CI = Cayman Islands, GUE = Guernsey, BER = Bermuda, LUX = Luxembourg, AUM = Assets Under Management, ADF = Annual Dollar Flow, ANF = Annual Net Flow.

Our sample period extends from January 1998 to December 2004. We focus on this period for several reasons. First, offshore hedge funds are relatively young compared to onshore hedge funds (Brown et al., 1999). We note that there were only a few offshore hedge funds in operation prior to our sample period. Second, the tax haven countries signed TIEAs with the United States from late 2001 to late 2002. Third, in December 2004, the U.S. Securities and Exchange Commission passed a rule that removed the private adviser exemption by requiring

hedge fund advisers to register under the Investment Advisers Act of 1940. However, since this rule excludes any fund with a lockup period of more than two years, hedge fund advisers can circumvent the registration by imposing a two-year lockup period on investors. As a result, investors might increase their holdings in offshore hedge funds that do not have such prolonged lockup periods. Since fund flows might be influenced by this new registration rule, we do not include the data past December 2004, which allows us to focus on hedge fund flows before and after the TIEAs. The summary statistics for the six tax haven countries studied in this paper are shown in Tables 1 and 2.

Computation of Dollar Flows

Using the methodology proposed by Agarwal et al. (2009), monthly dollar flows for country *i* during month *m* are computed as:

$$DF_{i,m} = AUM_{i,m} - AUM_{i,m-1}(1+R_{i,m}) \quad (1)$$

where DF is equal to dollar flow for country *i* in month *m*, $AUM_{i,m}$ is assets under management for country *i* during month *m*, and $R_{i,m}$ represents the average hedge fund return for country *i* during month *m*.

Computation of Net Flows

Early studies—including Spitz (1970), Smith (1978), and Patel et al. (1991)—reported relationships between a fund's annual dollar growth and both its size and returns. Sirri and Tufano (1998) examined funds flows into and out of individual U.S. equity mutual funds to better understand this behavior. They found that hedge fund returns are positively related to fund flows. In a more recent study, Goetzmann et al. (2003) found that fund size affects hedge fund flow and that small funds experience greater inflows whereas large funds are more likely to experience outflows. We take Getmansky's (2012) approach to dealing with the size effect as related to fund flow. She measured net flows by scaling the beginning-of-quarter assets under management to measure flows where DF captures the change in net money flows independent of size. We compute monthly net fund flows ($NF_{i,m}$) of each country *i* during month *m* by scaling monthly dollar flows by beginning-of-month AUM in order to capture the size effect on net capital flows

$$NF_{i,m} = DF_{i,m}/AUM_{i,m-1} \quad (2)$$

Hedge fund dollar flows and net flows from the six tax haven countries are shown in Figures 1 to 6.

4. METHODOLOGY

We focus on the hedge fund flows of six countries that are considered to be tax havens for the purposes of taxation on investment income: (1) The Bahamas, (2) The British Virgin Islands, (3) The Cayman Islands, (4) Guernsey, (5) Bermuda, and (6) Luxembourg. We analyze the time period from January 1998 to December 2004. The first four countries signed TIEAs with the United States within this time period while the last two countries did not.

Figure 1: The Bahamas - Monthly Hedge Fund Dollar Flow and Net Flow

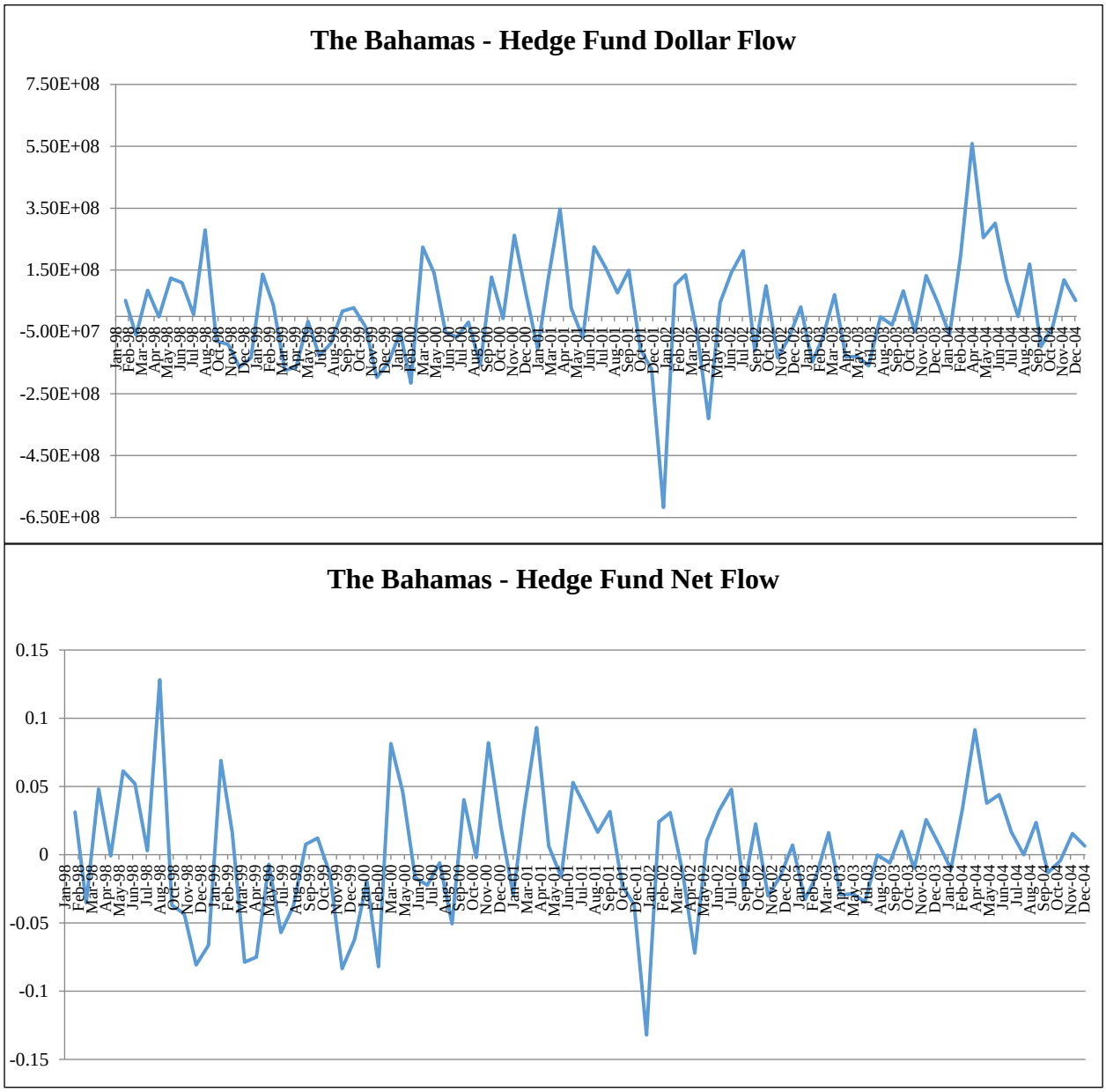


Figure 2: The British Virgin Islands - Monthly Hedge Fund Dollar Flow and Net Flow

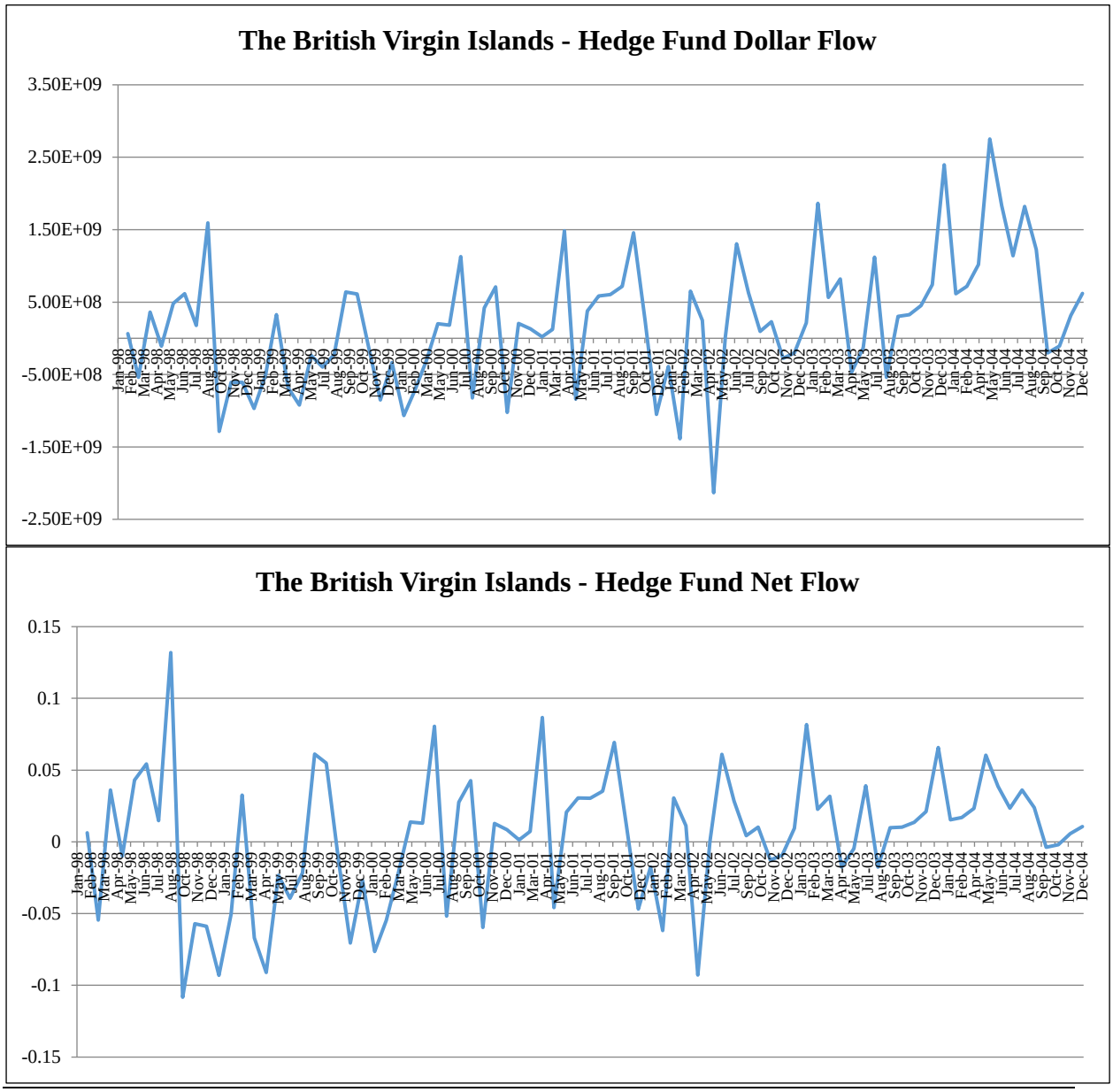


Figure 3: The Cayman Islands - Monthly Hedge Fund Dollar Flow and Net Flow

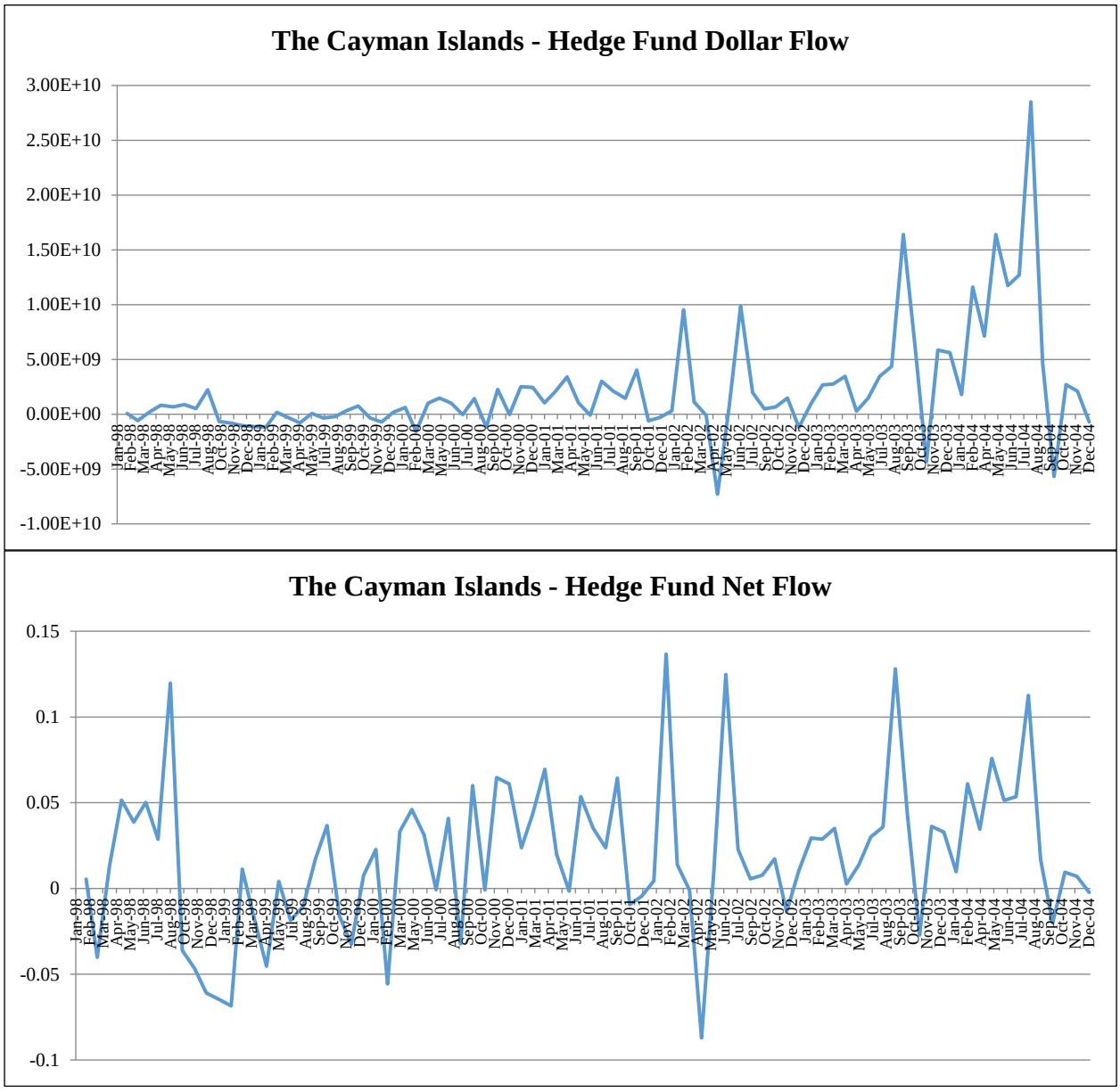


Figure 4: Guernsey - Monthly Hedge Fund Dollar Flow and Net Flow

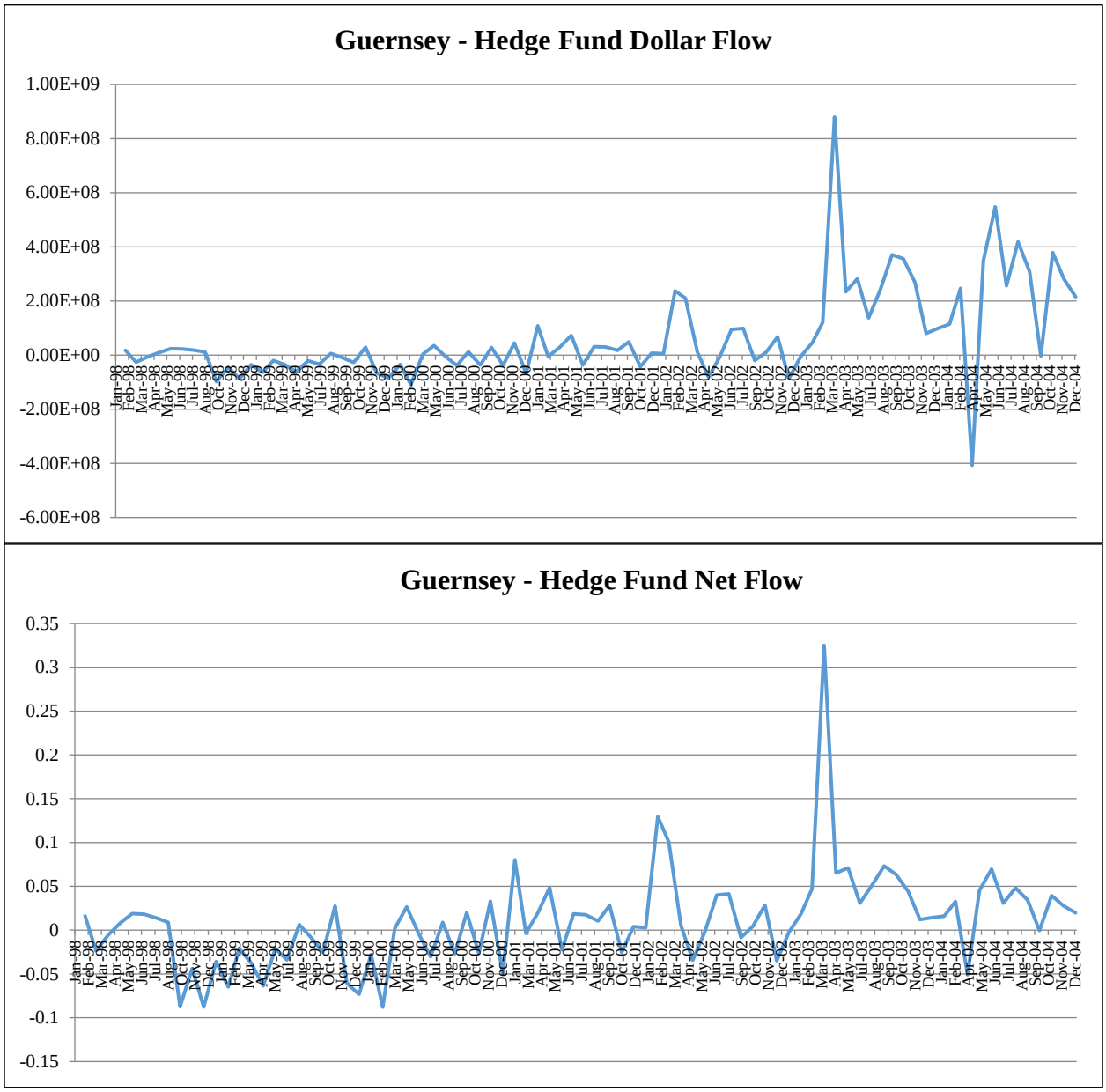


Figure 5: Bermuda - Monthly Hedge Fund Dollar Flow and Net Flow

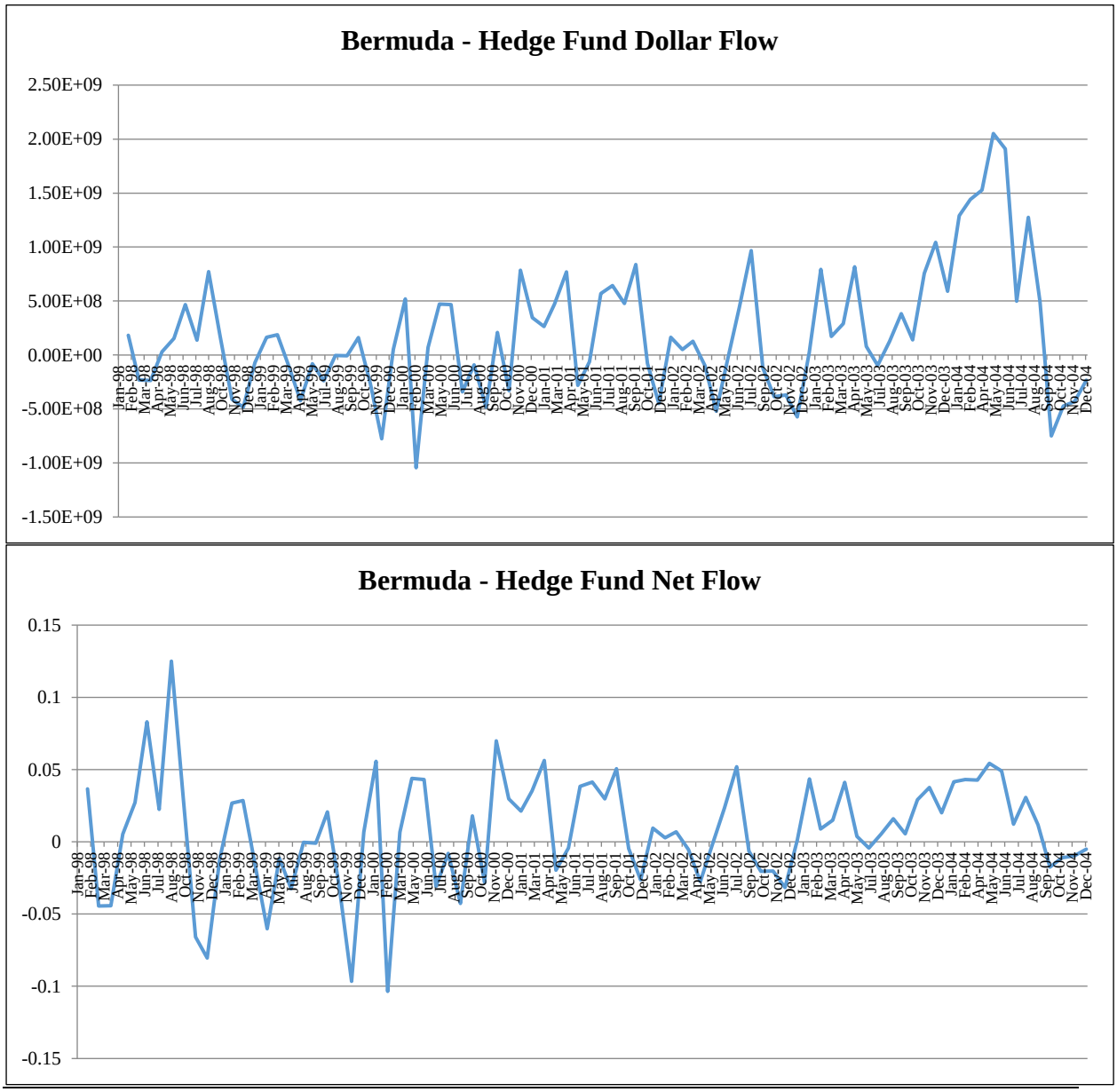
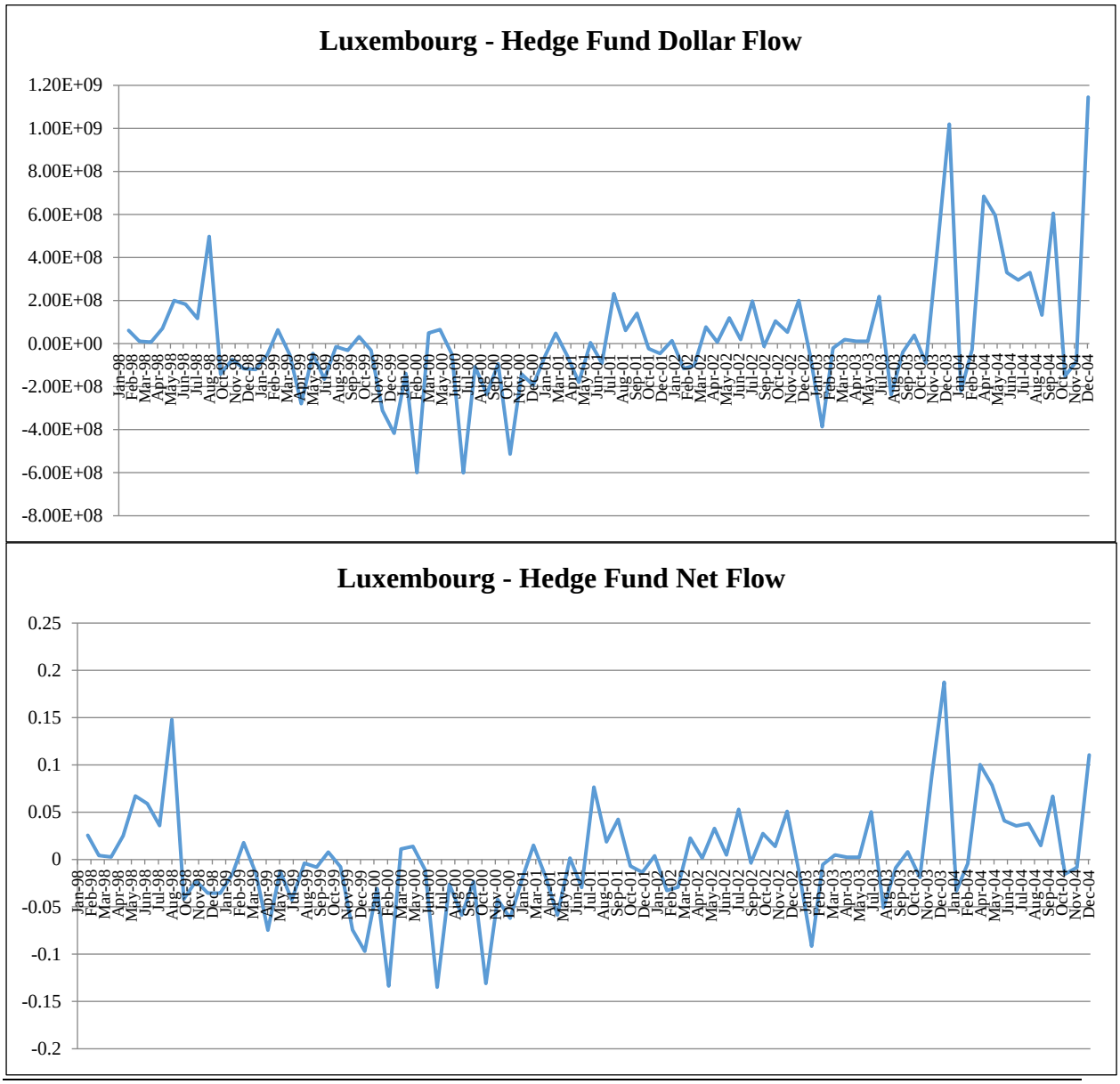


Figure 6: Luxembourg - Monthly Hedge Fund Dollar Flow and Net Flow



With regard to Hypotheses 1 and 2, we specify the following two sets of regression models in order to investigate whether capital flow structural changes occurred at the SBP:

Time Period 01/1998 to SBP_i: $DF_{i,m} = \gamma_1 + \gamma_2 DF_{i,m-1} + u_{1m}$ (R.1.A)

Time Period SBP_{i+1} to 12/2004: $DF_{i,m} = \delta_1 + \delta_2 DF_{i,m-1} + u_{2m}$ (R.1.B)

Time Period 01/1998 to 12/2004: $DF_{i,m} = \alpha_1 + \alpha_2 DF_{i,m-1} + u_m$ (R.1.C)

Time Period 01/1998 to SBP_{i+1}: $NF_{i,m} = \kappa_1 + \kappa_2 NF_{i,m-1} + u_{1m}$ (R.2.A)

Time Period SBP_i to 12/2004: $NF_{i,m} = \mu_1 + \mu_2 NF_{i,m-1} + u_{2m}$ (R.2.B)

Time Period 01/1998 to 12/2004: $NF_{i,m} = \beta_1 + \beta_2 NF_{i,m-1} + u_m$ (R.2.C)

where $DF_{i,m}$ represents dollar flow as calculated in (1) and $NF_{i,m}$ represents net dollar flow as calculated in (2). The *u*s represent the error terms. SBP_i represents the SBP for country *i*.

Regressions (R.1.A), (R.1.B), (R.2.A), and (R.2.B) assume that the regressions in the two time periods are different, i.e., the intercept and the slope coefficients are different. The pooled regression (R.1.C) and (R.2.C) assume that there is no difference between the two time periods. In other words, they assume that the intercept and the slope coefficient remain the same over the entire time period; that is, there is no structural change. If there is no structural change, then $\gamma_1 = \delta_1 = \alpha_1$, $\gamma_2 = \delta_2 = \alpha_2$, $\kappa_1 = \mu_1 = \beta_1$, and $\kappa_2 = \mu_2 = \beta_2$.

The Chow (1960) test can be used to test for structural changes when the SBP is known. In this case, however, the theoretical SBP might not be the actual SPB. First, investors might have got wind of the TIEAs before the actual signing date and withdrawn their investments early. Second, some hedge fund managers imposed prolonged lockup periods on investors, so investors might not have been able to withdraw funds as quickly as they would like. Therefore, the actual SPB would be unknown.

The Quandt-Andrews Breakpoint Test, meanwhile, can be used to test for one or more unknown SPBs for a specified equation.

5. RESULTS

The results from the Quandt-Andrews Breakpoint Test are shown in Table 3. Andrews (1993) recommends setting a trimming parameter which equals 15%. As a result, the first and last 7.5% of the observations are excluded. We report the values of the three test statistics and their corresponding *p*-values: the Supremum or Maximum statistics, the Exp statistics and the Ave statistics (Andrews, 1993; Andrews & Ploberger, 1994; Quandt, 1960). The SBP is only significant if two or three of the test statistics are significant.

The Quandt-Andrews Breakpoint Test result for hedge fund dollar flows shows that significant structural changes occurred in five of the six countries tested, namely the British Virgin Islands, the Cayman Islands, Guernsey, Bermuda, and Luxembourg. All three test statistics (MaxF, ExpF, AveF) are significant for these five countries. Therefore, Hypothesis 1 is supported. Structural changes in hedge fund dollar flows occurred as a result of the use of TIEAs.

The Quandt-Andrews Breakpoint Test result for hedge fund net flows shows that significant structural changes occurred in three out of the six countries tested, namely the Cayman Islands, Guernsey, and Luxembourg. All three test statistics (MaxF, ExpF, AveF) are significant for these countries. Therefore, Hypothesis 2 is partially supported. Structural changes in hedge fund net flows occurred as a result of the use of TIEAs.

Table 3 reveals that structural breaks in each of the six tax haven countries' hedge fund dollar flows occurred in 2003, which is after their theoretical SBP (the month of signing their TIEA). As we mentioned earlier, offshore hedge funds are relatively young compared to onshore hedge funds, and fewer offshore hedge funds existed before 1998. Therefore, the offshore hedge funds in our sample tend to have more new investors. The average lockup period is two years for new investors. This limits capital outflow. Our results confirm this. In Table 1, we saw that the structural breaks in the six tax haven countries' hedge fund dollar flows occurred about 20 months after their theoretical SBPs.

On the other hand, the structural breaks in the six tax haven countries' hedge fund net flows occurred mostly in 2000 or early 2001 (except for Luxembourg), which is before their theoretical SBPs. From equation (2), we know that the net flow captures the change in size due to net capital flow. In this case, net flow is better at capturing investors' reactions to TIEAs. Since investors may know about the TIEAs before the date on which the agreements are signed, the SBPs in the six tax haven countries' hedge fund net flows should occur before their theoretical SBPs. Our results show that the structural break in the tax haven countries' hedge fund net flows (with the exception of that of Luxembourg) occurred about 20 months before the dates on which their TIEAs were signed.

Table 3: Quandt-Andrews Breakpoint Test Results

Panel A: Quandt-Andrews Breakpoint Test Results for Fund Dollar Flow

DF	MaxF-stats	P-value	ExpF-stats	P-value	AveF-stats	P-value	SBP
BAH	6.261	0.3783	1.3683	0.3561	1.8420	0.4348	2003M11
BVI	12.980**	0.0274	4.8240**	0.0098	7.1547**	0.0080	2003M10
CI	13.059**	0.0265	4.3146**	0.0161	5.7438**	0.0216	2003M06
GUE	38.379***	0.0000	15.6761***	0.0000	12.5530***	0.0004	2003M03
BER	12.608**	0.0321	4.8285**	0.0097	7.5067**	0.0063	2003M10
LUX	31.980***	0.0000	12.0329***	0.0000	8.1731***	0.0041	2003M11

Panel B: Quandt-Andrews Breakpoint Test Results for Fund Net Flow

NF	MaxF-stats	P-value	ExpF-stats	P-value	AveF-stats	P-value	SBP
BAH	2.991	0.8896	0.5463	0.8261	0.9603	0.7999	2000M03
BVI	8.192	0.1910	2.1894	0.1467	3.5840	0.1117	2000M04
CI	9.957*	0.0963	2.7560*	0.0800	3.9493*	0.0839	2000M03
GUE	14.478**	0.0143	5.1248**	0.0073	7.8606**	0.0050	2001M01
BER	2.287	0.3095	1.2268	0.4144	2.2866	0.3095	2000M11
LUX	13.755**	0.0196	3.9284**	0.0237	5.0503**	0.0361	2003M11

The results from the Quandt-Andrews Breakpoint Test are shown in Table 3. Panel A shows the Quandt-Andrews Breakpoint Test results for fund dollar flow and Panel B shows the same for net dollar flow. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively. P-value is calculated using Hansen's (1997) method. US = United States, BAH = Bahamas, BVI = British Virgin Islands, CI = Cayman Islands, GUE = Guernsey, BER = Bermuda, LUX = Luxembourg, SBP = Structural Breakpoint.

In Table 4, we compare the mean and standard deviation of hedge fund dollar flow and net flow both before and after the structural break.

As mentioned earlier, we expect the hedge fund flows from the four tax haven countries that signed TIEAs with United States to be no different than the hedge fund flows of the two tax haven countries that did not sign TIEAs. Hypothesis 3 is supported by Table 4, which shows that the average hedge fund dollar flows and standard deviations in all six tax haven countries increased after their SBPs. Furthermore, the average hedge fund net flows, which are better at capturing investors' behavior than dollar flows, also increased in all six tax haven countries after their SBPs. Therefore, both Hypotheses 3 and 4 are supported. We now turn our attention to difference-in-difference tests. Table 5 shows the initial difference test for tax havens versus non-tax havens.

The dependent variable is monthly dollar flows for country *i* during month *m*, calculated as $DF_{i,m} = AUM_{i,m} - AUM_{i,m-1}(1+R_{i,m})$. The independent variables are lagged monthly dollar flows for country *i* during month *m* ($LAG\_DF_{i,m,}$), *Sign* is the indicator variable controlling for the period after the country signed the TIEA, and *TAXHAVENS* is the indicator variable controlling for countries that are designated as tax haven countries. The model is estimated with Ordinary Least Squares (OLS) regression with fixed effects for the year. The non-tax haven countries are the United States, France, Ireland, and the Netherlands. We conducted a Wooldridge test for autocorrelation in the panel data set and the results suggest no autocorrelation (F = .912; *p*-value= .3424). We did an additional test for heteroskedasticity (Modified Wald Test) in the fixed effects regression which resulted in a rejection of the null of homoskedasticity. Therefore, we used robust standard errors to correct for this issue. We also tested between the random effects model and fixed effects model using the Hausman test. The results supported the use of a fixed effects model. Overall, the results still support our conclusion that the tax haven countries experienced an increased flow of funds after signing TIEAs.

Table 4: Mean and Standard Deviations of Hedge Fund Flows Before and After SBPs

Panel A: Average Monthly Dollar Flows Before and After SBPs

DF	SBP	Ave DF Before SBP (in millions of dollars)	Ave DF After SBP (in millions of dollars)		Std. Dev. Before SBP (in millions of dollars)	Std. Dev. After SBP (in millions of dollars)	
BAH	2003M11	-11.7	125	↑	153	171	↑
BVI	2003M10**	29.6	1020	↑	762	858	↑
CI	2003M06**	848	6880	↑	2260	8030	↑
GUE	2003M03***	2.77	257	↑	64.6	234	↑
BER	2003M10**	76.6	733	↑	414	888	↑
LUX	2003M11***	-44.7	364	↑	184	419	↑

Panel B: Average Monthly Net Flows Before and After SBPs

NF	SBP	Ave NF Before SBP	Ave NF After SBP		Std. Dev. Before SBP	Std. Dev. After SBP	
BAH	2000M03	-0.0135	0.0064	↑	0.0554	0.0390	↓
BVI	2000M04	-0.0186	0.0132	↑	0.0573	0.0352	↓
CI	2000M03*	-0.0041	0.0288	↑	0.0442	0.0390	↓
GUE	2001M01**	-0.0206	0.0328	↑	0.0351	0.0555	↑
BER	2000M11	-0.0039	0.0153	↑	0.0491	0.0256	↓
LUX	2003M11**	-0.0098	0.0502	↑	0.0476	0.0601	↑

Table 4 shows the mean and standard deviations of hedge fund flows before and after SBPs. Panel A shows the average monthly dollar flow before and after the SBP whereas Panel B shows the net dollar flow before and after SBP. Both Panel A and B show the standard deviation of the funds flow before and after the SBP. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively. SBP = Structural Break Point, DF = Dollar Flow, NF = Net Flow. US = United States, BAH = Bahamas, BVI = British Virgin Islands, CI = Cayman Islands, GUE = Guernsey, BER = Bermuda, LUX = Luxembourg.

Table 5 provides results evaluating the difference model that incorporates both tax haven and non-tax haven countries to provide comparisons between the dollar flows. The model is statistically significant at the .001 level with an F-value of 142.08. The adjusted R-square is .0083, suggesting that the model only explains a small amount of the variance of the dollar

flow. Evaluating the independent variables specifically, we find that the *TAXHAVEN* variable is statistically significant at a .01 level with a t-value of 2.79. The coefficient is positive, suggesting that countries classified as tax havens are associated with positive dollar flows relative to their non-tax haven counterparts. The *Sign* variable takes a value of 1 at the point where a tax haven country signs a TIEA with the United States. The variable is positive and statistically significant coefficient with a t-value of 6.12 and a p-value smaller than .001.

Table 5: Difference Test: Tax Haven Versus Non-Tax Haven Countries

Panel A: Number of Observations

Number of Observations Read	53058
Number of Observations Used	51195
Number of Observations with Missing Values	1863

Panel B: Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1032943	197189	5.24	<.0001
LagDF	1	0.08478	0.00493	17.19	<.0001
Sign	1	2499942	408558	6.12	<.0001
TAXHAVENS	1	1017046	364510	2.79	0.0053

Table 6 shows the fixed effects for country and year. In Panel A, we estimate regression parameters for tax haven versus non-tax haven countries. In Panel B, we use only tax haven countries. The dependent variable is monthly dollar flows for country *i* during month *m*, calculated as $DF_{i,m} = AUM_{i,m} - AUM_{i,m-1}(1 + R_{i,m})$. The independent variables are lagged monthly dollar flows for country *i* during month *m* ($LAG\_DF_{i,m}$), *Sign* is the indicator variable controlling for the period after the country signed the TIEA, and *TAXHAVENS* is the indicator variable controlling for countries that are designated as tax havens. The model is estimated with OLS regression with fixed effects for the year.

$$DF_{i,m} = \alpha + \beta_1 LAG\_DF_{i,m-1} + \beta_2 SIGN + \beta_3 TAXHAVEN + \beta_4 Fixedeffect_{Year\ \&\ Country} + \varepsilon_1 \quad (9)$$

The results in Panel A, which is the main test for fixed effects, suggest that tax haven countries do not have statistical differences in dollar flows when compared to non-tax haven countries in our sample period. This is supported by the statistically insignificant coefficient for *TAXHAVEN*. The *Lag_DF* is statistically significant at the .001 level, suggesting that the lag fund flows variable has a positive association with the fund flow. Lastly, *SIGN* coefficient is positive and statistically significant at the .05 level. This suggests that countries that signed TIEAs experienced positive fund flows. When reducing the sample to only include tax haven countries that signed and that did not sign agreements (Panel B), the results suggest a positive and statistically significant variable for the lag dollar flows. However, the results also suggest that tax haven countries that signed TIEAs experienced negative dollar flows, as supported by

a negative statistically significant coefficient at the .10 level. We attribute this to negative initial reactions to the tax agreements from investors.

Table 6: Fixed Effects for Country and Year

Panel A: Parameter Estimates: Tax Haven Versus Non-Tax Haven Countries

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	779067.30	2115655	0.37	<.0001
Lag_DF	1	0.036	0	7.530	0.0000
SIGN	1	1141032.000	518947	2.200	0.0280
TAXHAVENS	1	-901528.500	2456567	-0.370	0.7140

Panel B: Parameter Estimates: Tax Haven Countries

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1226524	1545450	0.79	0.427
Lag_DF	1	0.145736	0.006617	22.03	0
SIGN	1	-2080612	1086660	-1.91	0.056

Summarizing our findings, we note that there is no significant performance increase in any of the countries tested that might lead to increased investment incentives in the hedge fund industry. This suggests that, although the introduction of TIEAs caused structural breaks in the six tax haven countries' hedge fund flows with some initial negative outflows, it was not enough to offset the other potential attractions of investing in these offshore tax havens. We discussed this above when formulating Hypotheses 3 and 4. Part of the explanation may be that some investors are affected by the new agreements whereas others are not. For example, tax-exempt institutional investors, such as pension funds or endowment funds, will keep on investing in these countries regardless of the TIEAs because these agreements have minimal effects on them. This finding confirms that of Agarwal and Naik (2005), in which a shift in hedge fund investor type is noted. They point out that:

> In the early 1990s, the typical investor was a high net-worth individual investor who invested in macro funds, which then took levered bets on currencies and other assets. Today, the typical investor is an institutional investor, for example a pension fund, which invests in hedge funds for diversification reasons, seeking investment vehicles with low correlation with other traditional asset classes such as equities and bonds (Agarwal & Naik, 2005, p. 106).

This shift of investor type largely accounts for the fast growth of offshore hedge funds. This supports our argument that there is in an increase in the dollar flow following the signing of a TIEA, but our conclusion is moderated when we take only take into account tax havens (Table 6, Panel B) where the results are significant at the .10 level, indicating an initial outflow from countries that signed the agreements.

6. CONCLUSIONS

The United States, the European Union, and other OECD countries make significant efforts to ensure that various parties pay appropriate taxes. Recently, tax havens have received increased attention, especially those that provide tax efficiency in respect of financial institutions. Many studies point out that offshore hedge funds have been growing significantly faster than onshore hedge funds due to their tax and regulatory advantages. In this essay, we empirically analyze the effect that the introduction of TIEAs may have on hedge fund flows in order to assess their potential impact on the hedge fund industry.

The results show that the introduction of TIEAs caused structural changes in both hedge fund dollar flow and net flow in the six tax haven countries that we studied (the Bahamas, the British Virgin Islands, the Cayman Islands, Guernsey, Bermuda, and Luxembourg). The structural break in hedge fund dollar flows occurred about 20 months after their theoretical SBPs (the month of signing the TIEA). This is largely due to the two-year lockup period restrictions for new investors. On the other hand, hedge fund net flow, which captures the change in size due to net capital flow, shows that the structural break occurred 20 months before the TIEAs were signed. Investors are aware that TIEAs will be signed before the actual signing date and act on this information. We also examine whether the hedge fund flows of the countries that signed TIEAs differed from those of the countries that did not sign them. The results are more nuanced. When we compare fixed effects for tax havens versus non-tax havens, the initial results hold. Although TIEAs causes structural changes in tax haven countries' hedge fund dollar flows and net flows, it is not enough to offset the other benefits of investing in these countries because both the dollar and net flows of these countries increased after their SBPs. We conjecture that this is due to less uncertainty and that a different class of investors took the place of the investors that shifted their funds due to the introduction of the TIEAs. Overall, the fixed effects analysis supports the same conclusion. However, when we analyze the fixed effects using only tax haven countries, the results show outflows (statistically significant at the .10 level). Our results have the following implications. First, they show that investors anticipate tax changes and change their strategies accordingly. This may result in lower tax collections due to an increase in shifting of investable funds. Second, they show that the introduction of TIEAs resulted in increases in both cash flow and net cash flow, suggesting that the design of the tax regulation may have a positive effect on the industry itself. This could boost tax collections while simultaneously promoting industry growth.

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