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Offshore Financial Havens : Their Role in International Capital Flows

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Abstract: The purpose of this paper is to study the role of offshore financial havens in international capital flows. We examine the effects of being a tax haven, a money laundering centre or an offshore financial centre (OFC), which often overlap. We want to see whether these places are used as *entrepots* (which means temporary storage for funds) or as investment places or both. We mainly use two complementary data sets: bilateral cross-border asset holding and financial intermediation. One is a stock variable and the other one is a flow variable. We apply the gravity model to bilateral cross-border asset holding between 223 host countries and 67 source countries from Coordinated Portfolio Investment Survey (CPIS). We find that tax havens and OFCs attract more asset investment while money laundering centers scare potential investors away. We then use the flow variable of financial intermediation from UNdatabase and find value of financial intermediation is higher in OFCs and lower in money laundering centers. There is no significant relationship between tax haven and financial intermediation. Our results show that the role of offshore havens in facilitating illegal activities like tax evasion and money laundering is overstated in the previous studies. By allowing parameter shifting in the model, we also find the competitive advantages of offshore finance in facilitating tax avoidance or evasion and money laundering have been eroded due to recent years' global action against tax evasion and money laundering.

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Offshore Financial Havens[1]: Their Role in International Capital Flows

Sun Zhixiang

1. Introduction

Increasing fluidity of financial systems in conjunction with advancements in communication supports the seamless movement of assets and capital from place to place. The amount of capital flowing through the global economy has increased to an incredible size. At the same time, the number of jurisdictions offering financial services in an offshore context has increased consistently in 1980s and 1990s and their role in facilitating capital flows has drawn more and more attention. According to the rough estimates of economists, about half of the global capital flows through the offshore financial centers (OFCs). Calculations based on the data from Bank for International Settlement (BIS) suggest that, by the end of December 2003, the external position of offshore banks in terms of assets had reached US$1.9 trillion, compared with US$16 trillion of total bank assets. By the same date, external loans had reached US$1.5 trillion or 13 percent of the world cross border bank claims, as reported by the BIS. Offshore activity has grown to such an extent that it can no longer be considered marginal to the global economy. However, there are relatively few well-established empirical works on offshore finance due to the data availability problems and lack of theory behind it. We hope this paper can provide some evidence of the pattern of international capital flows through offshore financial centers. To the best of our knowledge this is the first paper to use financial intermediation and net export ratio of financial service to GDP to study the offshore financing issues.

OFCs can be used for legitimate reasons, taking advantage of several factors such as lower explicit taxation, simpler prudential regulatory frameworks that also reduce implicit taxation, minimum formalities for incorporation, the existence of adequate legal frameworks that safeguard the integrity of principal-agent relations, the

[1] By offshore financial havens, we refer to offshore financial centres, tax havens and money laundering havens, where offshore finance is usually carried out. The three are often overlapped.

proximity to major economies or to countries attracting capital inflows, the reputation of specific OFCs and the specialist services provided, freedom from exchange controls and means for safeguarding assets from the impact of litigation etc. OFCs can also be exploited for dubious purposes. OFCs attract funds partly because they promise anonymity and the possibility of tax avoidance or evasion. A high level of bank secrecy is almost invariably used as a selling point by OFCs some of which have been exploited for activities related to money laundering (Errico and Musalem, 1999). The absence of effective consolidated supervision by onshore supervisors proved to be the most important factor in permitting the exploitation of regulatory arbitrage offered in some OFCs through the transfer of assets and liabilities between offshore establishments and parent banks onshore. Devices that can be used to move earnings offshore include: the use of debt contracts, adjustment of transfer prices, and conversion of export income into tax haven income (Workman, 1982). In Asia (for example in Thailand), regulatory and fiscal advantages as well as lower borrowing costs, offered in some OFCs induced many Asian banks and corporations to tap international capital markets through offshore establishments (IMF working paper, 2001)

Global concerns focus more on lax regulation of OFCs and the illicit nature of some offshore business like tax evasion and money laundering. Rose and Spiegel (2007) showed that one attraction of moving assets offshore is the ability to pursue activities that are prohibited in other countries. Major institutional bodies within the onshore world have already expressed uneasiness at the opaque nature of many offshore financial services and transactions. Since the late 1990s, the OECD and Financial Action Task Force on Money Laundering (FATF) have initiated a series of programs to address unfair taxation practices, money laundering and inadequate financial regulation issues, especially after September 11 terrorist attacks (OECD, 2000b). In the 1998 report “Harmful tax competition: an emerging global issue”, the OECD council adopted guidelines for dealing with harmful preferential regimes in member countries. Under these guidelines, the harmful features of preferential regimes in member countries must be removed within 5 years (by April 2003). In May 1998 the G7 Finance Ministers approved an OECD plan which identifies jurisdictions offering low or zero tax rates, and set out to nullify this by using economic sanctions. In 2000, OECD committee identified 47 preferential tax regimes

in 9 overall categories as potentially harmful. It made its list of 35 jurisdictions that meet tax haven criteria of the 1998 report. The council also instructed the Committee to produce, an OECD list of uncooperative tax havens from the list of tax havens. The main criteria for this identification are transparency and effective exchange of information. All these countries or territories are urged to change their harmful practices to avoid economic sanctions or coordinated defensive measures. The moves toward increased information exchange are highly significant since banking secrecy is one of the fundamental requirements of offshore finance.

As responses to the criticism and pressure, since 2000, a lot of OFC governments have made commitment of information exchange and increased transparency of information in order to protect existing positive reputation and concomitant market advantage. Hampton and Christensen (2002) believe that the cumulative pressures for reform will significantly reconfigure the offshore finance industry. Offshore finance may return onshore to the large, functional financial centers such as London and New York. So one purpose of our paper is to find out whether these programs against lax regulation, lack of transparency, tax evasion and money laundering work effectively. If they have already shown their effects, then the attractiveness of OFCs, tax havens and money laundering centers should have declined.

The main objective of this paper is to find out the factors that affect international capital flows and the role of OFCs. We use two complementary dataset, bilateral cross-border asset holding from Coordinated Portfolio Investment Survey (CPIS) and financial intermediation value from UNdatabase. We also use the net export of financial services from Zorome (2007) to complement our analysis. We are most interested in the behaviors of tax avoidance, tax evasion and money laundering and their impact on the pattern of international capital flows. To study this problem, we add three indicators of OFC, tax haven and money laundering haven. Our logic is as follows: if these places are mainly used for the illegal purposes of tax evasion and money laundering, they will be most likely to be used as *entrepots* because users who want to hide the nature of the money will frequently move the money from place to place. Then the three indicators should be only significantly related to the value of financial revenue with no strong relationship with asset holding; if they are used for the purposes of tax avoidance and investment, it takes longer time to realize the

benefits and these three indicators should have positive relationship with cross-border asset holding.

Section 2 introduces the related concepts of offshore finance and reviews the existing theories and opinions. In section 3, we develop a simple model about the determinants of cross-border asset holding and conduct the corresponding empirical study. Section 4 examines the effects of related factors on the financial intermediation value and also on the net export of financial service. In section 5, we briefly analyze the welfare impact of offshore finance on the rest of the world. Section 6 concludes.

2. Related concepts and existing theories

2.1 Definition and development of offshore finance

Offshore finance is financial intermediation performed (primarily) for non-resident borrowers and depositors using the currency not issued by the local authority. Correspondingly, offshore financial centres are defined as jurisdictions that oversee a disproportionate level of financial activities by non-residents (Rose and Spiegel, 2007). Offshore financial centers offer regular commercial services, foreign currency trades and speculation on both the spot and forward markets, access to electronic funds transfer systems, asset protection by guaranteeing banking secrecy and anonymity, investment consulting, international tax planning and trade finance (Warf, 2002).

Offshore finance is essentially the efficient response of international banks to the policy changes by sovereign governments in many developed economies. These policy changes at the early stage include the Glass-Steagall Act of 1933 as a response to the banking crisis during the Great Depression, which barred commercial banks from entering the investment banking business, removal of foreign exchange restrictions on the conversion by nonresidents of current earning in Western Europe in 1958, the establishment of capital controls primarily by the United States in the late 1950s and also by many OECD countries in the 1960s, and the imposition of high taxes particular in some OECD countries. These policy changes which in many cases were intended to provide governments with more control over monetary policy and to

curb the balance of payment deficits encouraged a shift of deposits and borrowing to less regulated institutions (Zorome, 2007).

Euro market is the earliest offshore market. Originally, US banks invested in the Euro market to escape the Glass-Steagall Act and only traded in assets denominated in US dollars. Then they operated far beyond Europe, and traded in all financial assets outside of the currency issuing country. One of Euro market's prime advantages was its lack of national regulations in 1960s and 1970s. Further, the Euro market lacked any reserve ratio requirements until 1987, when the world's central bankers met at the Bank for International Settlements in Basel, Switzerland, to agree on global reserve standards (Warf, 2002). The shift of financial activities to Eurocurrencies gained considerable momentum after 1966, when U.S. money market rates rose above the interest rate ceiling on dollar deposits allowed by Regulation Q. The resulted credit crunch forced the U.S banks to seek funds in the Eurodollar market (Dufey and Giddy, 1984). Thus throughout the 1960s and the 1970s, the Eurocurrency market grew at a remarkable pace.

The OFCs and the Eurocurrency market share a common history, inasmuch as OFCs are merely the geographical extension of the Eurocurrency market outside Western Europe. In the early 1970s, the geographical location of the market shifted from being mainly Western European to worldwide. Banks, later, securities and insurance firms began setting up offshore branches in a number of jurisdictions in the Caribbean, Latin America and Southeast Asia. It is these jurisdictions that become known today as offshore financial centers (Zorome, 2007). In the late 1970s and 1980s, as the top financial centers such as London and Tokyo were undergoing far-reaching change in the way they functioned and in the spatiality of their operations, a series of new financial centers came to account for a significant portion of the world's cross-border bank claims. From the Bahamas to Luxembourg to Vanuatu, small and often marginal places became offshore financial centers: new and distinctive spaces corresponding to nodes in the circuits of offshore financial markets. So far there are 46 OFCs identified by IMF, most of which are located in those small, remote and clustered islands[1]. Roberts (1995) identified five major world clusters of offshore

[1]Three distinctive characteristics used to identify OFCs are: the primary orientation of business toward non-residents, the favourable regulatory environment and the low-or-zero-taxation schemes (Zorome, 2007).

finance, including the Caribbean (e.g. the Cayman Island, Bahamas, Panama); Europe (e.g. Isle of Man, Jersey, Luxembourg, Liechtenstein, Andorra, San Marino); the Middle East (Cyprus, Lebanon, Bahrain); Southeast Asia (Hong Kong, Singapore); and the South Pacific (Vanuatu). Some (e.g. Switzerland) have a long history of facilitating banking secrecy, while some (e.g. Bahamas, Liechtenstein) have sought to emulate. Others (e.g. Liberia, Panama) provided escape from regulations in various onshore jurisdictions. Some emerged because of interstate rivalries and novel interpretations of taxation laws.

2.2 Existing theories and opinions

2.2.1 Tax avoidance or evasion and money laundering

Seeking tax benefit is one of the most important reasons why people use OFCs. Many small islands that wanted to develop as OFCs began their offshore business by providing services for international banking corporations seeking to escape regulatory limitations of onshore places and to pursue tax benefits elsewhere. Bank secrecy laws, numbered bank accounts and a host of other barriers to the gathering of information can effectively impair even the most efficient auditor of the other countries (Workman, 1982). All the technology advancements and regulatory shelters provide the chances for taxpayer to relieve their tax burdens.

The first use of tax haven is for the tax evasion purpose. Tax evasion is regarded as an increasingly serious issue among the onshore economic entities, especially as electronic money has become the norm. Moreover, the jurisdictional question-who gets to tax-is vastly complicated. Digital counterfeiters can also take advantage of this situation, working anywhere and using the internet to spend currencies in any other places.

Tax havens are not only used for illegal purposes. They can be used legally, like tax mitigation and tax avoidance. It is important for us to differentiate tax evasion and tax avoidance or tax mitigation. Tax mitigation is the activity that people take to reasonably relieve their tax burdens and is regarded as people's legal right. Tax avoidance involves the arrangement of a taxpayer's affairs to take advantage of the loopholes in the law, like postponement of taxes, classification of income and tax

arbitrage. It is legal but immoral. Tax evasion, on the other hand, involves acts intended to misrepresent or to conceal facts in an effort to escape lawful tax liability. Tax mitigation is unambiguously legal while tax evasion is clearly illegal. Legality is the dividing line between evasion and avoidance, but in practice the line is often blurry because the law governing the transactions is unclear and tax authorities may inappropriately characterize particular cases (Slemrod and Yitzhaki, 2000).

Persons intending to evade taxes can use tax havens either to hide income or as part of a complex scheme intended to conceal the true nature of a transaction. This is why tax evasion is also regarded as a form of money laundering. Due to its illicit nature, tax evasion money is more likely to be moved from place to place in case tax authorities track it down. Liquidity of laundering money is important as much as secrecy. As money comes in and out very quickly, it should have little impact on the stock variables like countries' international investment position or cross-border asset holding. But of course, this will increase the financial service revenue of the host countries[1].

In contrast, persons intent on tax mitigation and avoidance are more likely to use tax havens through investment or reinvestment to take advantage of the tax benefits legally. Apparently, this will have big impact on the cross-border asset holding. We take as an example how U.S. taxpayers try to avoid tax and its impact on cross-border asset holding. The profits of foreign subsidiaries are only subject to US taxes when repatriated as dividends. So firms with tax-haven profits can earn interest on their residual U.S. tax liability for as long as they defer repatriation of those profits. Suppose the foreign subsidiary has after-foreign-tax earning equal to M. The after-U.S. tax present value of those earnings, if immediately repatriated, is $M(1-\tau)/(1-\tau^*)$, in which τ is the U.S. tax rate and τ^* is the foreign tax rate. If, instead, the subsidiary repatriated interest as earned but not the principle, the parent receives an after-all-tax annual payment of $Mr^*(1-\tau)$. The present value of this infinite stream, discounted at the domestic after-tax discount rate of $r(1-\tau)$, is $\sum_{j=1}^{\infty} M\frac{r^*(1-\tau)}{[1+r(1-\tau)]^j} = M\frac{r^*}{r}$. If $r^* = r$, then this present value equals M. Thus, the subsidiary should never repatriate its principle, which just equals the present value of

[1] In this paper, host countries are the places where capital flows into; source countries are the places where capital comes from.

the after-tax interest it generates. If $r^* < r$, then foreign reinvestment obviously becomes less attractive, but as long as $\frac{r^*}{r} > (1-\tau)/(1-\tau^*)$, the firm does better to reinvest its earnings abroad than it does to repatriated the earnings (Hines, Jr, and Rice, 1994). The kind of behavior certainly will increase the asset holding of American corporations in the tax havens. It is obvious that asset shifting for tax avoidance stays longer than that for tax evasion.

Money laundering is another issue that is frequently mentioned when people talk about offshore finance. By definition, money laundering involves hiding, moving and investing the proceeds of criminal conduct. FATF has described laundering as a three-stage process: the placement of funds into the financial system; the layering of funds to disguise their origin, perhaps by passing through several offshore and/or onshore jurisdictions; and the integration of the funds into the legitimate economy (Levi, 2002). Actually, money laundering has a long history. More than 3000 years ago, Chinese merchants hid their wealth for fear that rulers would take the profits and assets they had accumulated through trade. Economic and financial globalization has made the life of a launderer easier. The globalization of financial services companies' means that money placed in a bank branch in a less regulated jurisdiction is easily transferred internally within the organization to a branch in a more regulated jurisdiction. The high volume of legal funds circulating around the globe makes the movement of dirty money less conspicuous. Capital flight may take many forms, from smuggling to sophisticated financial deals spread out over a number of centers.

In recent years, many offshore financial centers are criticized for facilitating money laundering. The FATF was established by G7 in 1989 as a result of heightened concern over money laundering, especially regarding the proceeds of the illegal drugs trade and fiscal crime. FATF identified 15 jurisdictions as uncooperative countries and territories in 2000[1] and also stated that countermeasures would be developed against those areas that do not cooperate. As a response to such events, jurisdictions

[1] The criteria used by FATF relate to loopholes in financial regulation, excessive secrecy provisions, and inadequate resources for addressing the problem of money laundering. The listed countries and territories are the Bahamas, the Cayman Islands, the Cook Islands, Dominica, Israel, Lebanon, Liechtenstein, the Marshall Islands, Nauru, Niue, Panama, the Philippines, Russia, St. Kitts and Nevis and St. Vincent and the Grenadines.

on the blacklist have subsequently enacted legislations and regulations to remedy their identified deficiencies (Progress Report of FATF, 2001).

2.2.2 Regulatory environment

Offshore financial centers started to have an impact on international financial markets in the early 1970s. The maintenance of historic and distortionary regulations on the financial sectors of industrial countries during the 1960s and 1970s was a major contributing factor to the growth of offshore banking and the proliferation of OFCs. Specially, the emergence of the offshore inter-bank market during the 1960s and 1970s, mainly in Europe, can be traced to the imposition of reserve requirements, interest rate ceilings, restrictions on the range of financial products that supervised institutions could offer, capital controls, and high effective taxation in many OECD countries. Small island states have carved a competitive niche out of this environment by relaxing markedly their regulatory requirement, forming small 'black holes' in the topography of regulation through which large sums of money flow. For example, the creation of the Isle of Man's regulatory regime was seen by many private sector respondents as the building block supporting the continued growth of the offshore financial sector (Cobb, 2001).

As the digital revolution allowed global capital to circulate more freely and rapidly, the technological barriers to moving money declined dramatically. Accordingly, spatial variations in the nature and degree of regulation rose in importance. Even small differences in regulations concerning taxes or repatriated profits may be sufficient to induce large quantities of capital to enter or exit particular places. Thus, many small states have opted to attract finance capital by deregulating as much as possible, lifting controls over currency exchanges, investment, repatriated profits, and eliminating taxes in the hope that global money, with the world as its oyster, will select their locale.

Secrecy guaranteed by the legal system is another reason why people use offshore finance. It is self-evident that money launderers need complete confidentiality as they are usually criminals and their activities are illegal. It is also necessary for tax havens to afford some level of commercial secrecy to banking transactions in order to permit taxpayers to perpetrate tax evasion schemes. Most

nations, including non-tax havens, afford bank clientele some level of secrecy to protect individual privacy. However, many nations will not protect information from a legitimate inquiry of a foreign government, particularly when the inquiry is made under terms of a treaty. Most major tax havens, on the other hand, will not breach their wall of secrecy even when a major violation of another nation's laws may be involved. For money laundering havens, it's even harder to persuade government to make information exchange.

Banking secrecy has its origins in the common law of Great Britain. Common law secrecy derives from an implied contract between a banker and his client that the banker will treat this customer's affairs as confidential. In some OFCs, it is criminal to divulge any information about a client's account. Many present OFCs are ex-British Colonies and most of them have intensified the secrecy provision originated from common law (Hampton, 1994). So in our paper, we include the common law indicator to see its impact.

2.2.3 The effects of distance and technology

Recent advances in telecommunications render space and distance between offshore financial service provider and client largely irrelevant (Hampton and Abbott, 1999). However, from the stable negative sign of distance in the regression on cross border asset holding, Rose and Spiegel (2007) argue that although the role of distance in asset flows is less obvious than in goods flows, it still appears to be important in the data. Furthermore, they set up their model based on the assumption that distance increases the transaction cost proportionally. Portes and Rey (2004) also find the negative impact of distance on cross border asset trade and they also believe the geography of information is still the main determinant of the pattern of international financial transaction but their explanation is different. As asset is weightless, distance does not increase the transaction cost but increases the information asymmetry between domestic and foreign investors and affects the efficiency of transactions.

Those who promote the importance of face-to-face meeting argue that face-to-face contact is a necessary element of that center's competitiveness and such personal interaction is necessary both to create and maintain trust and confidence in the service

provider by service users (Warf, 2002). In this sense, distance is still a factor affecting transaction cost as traveling needs both time and money.

The ways of capital markets worldwide operate were profoundly affected by the digital revolution. Global money dances through the world's fiber optic networks in astonishing volumes. Banks, insurance companies and securities firms, all of which are generally information intensive in nature, have been at the forefront of the construction of extensive networks, particularly a skein of fiber optic lines. Electronic funds transfer systems, in particular, that form the nerve centre of the international financial economy, allow banks to move capital around at a moment's notice, arbitraging interest rate differentials, taking advantage of favorable exchange rate and avoiding political unrest (Warf, 2002). Electronic money may be exchanged an infinite number of times without leaving a trace, making it difficult for regulatory authorities to track down transactions both legal and illegal. The ascendancy of electronic money altered the impacts of financial instruments on local economies. Foreign investments, for example, have shifted increasingly from Foreign Direct Investment to intangible portfolio investments such as stocks and bonds, a process that reflects the securitization of global finance.

OFCs are used as nodes in a network by global custodians. Massive investments in telecommunications and data management technologies are essential to their competition in attracting global capital. For example, Panama's strategic position in Latin American financial markets is closely associated with its growing telecommunications infrastructure. The microelectronic revolution, the digitization of capital, and an emerging global telecommunications infrastructure centered upon fiber optics lines became increasingly vital to the liquidity of global capital and hence to the competitive position as an offshore financial center. Thus, in Panama, boosting the corporate telecommunications network was undertaken by the state in conjunction with its studied efforts to retain banks (Warf, 2002).

2.2.4 Other issues

The two main user categories of offshore finance are transnational corporations and the world's wealthiest individuals (Hampton, 2002). The global high net worth individuals use offshore international private banking services offered by the largest

banks. Typically, International Private Banking (IPB) for wealthy customers can involve multi-currency bank accounts and sophisticated asset management, often using complex structure of offshore companies and trusts, sometimes stretching across several OFCs (Hampton, 1996). Through IPB, banks are providing a convenient, confidential and comprehensive program of personal financial counseling, structured to meet the investment, banking and estate planning needs of wealthy individuals. The concentration of wealth must be correlated with the extent of inequality. So in this paper we also examine the effect of the inequality which is represented by Gini coefficient.

Nigh, Cho and Krishman (1986) found that the US business presence in a foreign country has a strong positive effect on US branch banking activity which is measured by the branch asset in host country. The openness of the host country to the establishment of new foreign bank branches does affect US branch banking involvement.

As offshore finance is fickle and extraordinarily mobile, any hint of political instability will send it somewhere else (Roberts, 1995). So we include the political stability index of both host countries and source countries. We also add other governance indicators like government effectiveness, rule of law and corruption control.

Most of the above issues can be summarized by Hampton's (1996) four spaces theory. Hampton used four spaces to analyze the growth of offshore finance and the emergence of a suitable environment for international money laundering. First, the secrecy space is one of prime attractions for users of OFCs. Second, the regulatory space, the banks that first moved 'offshore' into the Caribbean in the 1960s were able to exploit this regulatory space that had opened up between those jurisdictions and the larger mainland economies. Third, the political space, the nature of the relationship between offshore and its mainland onshore is an important determinant of its successfulness as an OFC. At present, the majority of OFCs are located either in the UK overseas territories or in the British Crown Dependencies. The fourth is the fiscal space, also known as the taxation system.

3. The determinants of cross-border asset holding

3. 1 Theoretical framework

In this section, we set up the theoretical framework based on the model of Coeurdacier and Martin (2007) to derive a gravity equation for international trade in assets. In their model, factors that decide the amount of cross border asset holding include population, income, expected return rate, market size and transaction cost. The deficiency of this model is that it does not contain the term of investment risk which is an essential factors in investment decision especially in the international market. To explicitly reveal the effect of the factors that affect investment risk, we introduce the term of variance of investment return rate. From this perspective, it is easy for us to think about using the mean-variance portfolio theory to analyze the factors that affect people's decision about asset investment overseas. It is natural to assume that people are rational and risk-averse. To make our analysis simpler, we also have the following assumptions: individuals in each country have the same utility function; each country just has one representative asset that is unrelated with each other; Individuals live for two periods.

According to mean-variance theory, the utility function of an individual in country j is

$U_{tj} = U(E(C_{tj}), V(C_{tj}))$, t=1 or 2; where $E(C_{tj})$ is the expected value of consumption in period t and $V(C_{tj})$ is the variance of the consumption. U increases in $E(C_{tj})$ and decreases in $V(C_{tj})$.

The total utility in the whole life is

$$U_j = U_{1j} + U_{2j} = U(c_{1j}) + \beta U(E(C_{2j}), V(C_{2j})) \text{, where } C_{2j} = \sum_{i=1}^{N} s_{ij}(1 + R_{ij})$$

$$U_j = U(c_{1j}) + \beta U(E(\sum_{i=1}^{N} s_{ij}(1 + R_{ij})), V(\sum_{i=1}^{N} s_{ij}(1 + R_{ij})))$$

$$= U(c_{1j}) + \beta U(\sum_{i=1}^{N} s_{ij}(1 + r_{ij}), \sum_{i=1}^{N} {s_{ij}}^2 {\sigma_{ij}}^2)$$

Where c_{1j} is the consumption in period 1, C_{2j} is the consumption in period 2[1], s_{ij} is the investment of individual of country j in country i, R_{ij} is the actual return individuals in country j get by investing in country i and is random, r_{ij} is the expected value of R_{ij}, and σ_{ij}^2 is the variance of R_{ij}, which here is used to represent the risks to invest in country i, β is the discount factor, and N is the number of host countries.

Individuals optimize their investment to maximize their utility. So the problem becomes $\max_{c_{1j}, s_{ij}} U(c_{1j}) + \beta U(\sum_{i=1}^{N} s_{ij}(1+r_{ij}), \sum_{i=1}^{N} s_{ij}^2 \sigma_{ij}^2)$,

s.t. $y_j = c_{1j} + \sum_{i=1}^{N} s_{ij}$; $s_{ij} \geq 0$; $c_{1j} \geq c_{0j}$; where y_j is the wealth of the individual in country j and c_{0j} is the minimum consumption in period one.

Although we can not get a closed form solution for this problem, we can see that s_{ij} is decided by y_j and factors that affect r_{ij} and σ_{ij}^2. To make things clearer, we take a extremely simple utility function as an example. Assume $U_{tj} = E(C_{tj}) - V(C_{tj})$

$$U_j = c_{1j} + \beta(\sum_{i=1}^{N} s_{ij}(1+r_{ij}) - \sum_{i=1}^{N} s_{ij}^2 \sigma_{ij}^2)$$

The Lagrangian function for this maximization problem is

$$L = c_{1j} + \beta \sum_{i=1}^{N} s_{ij}(1+r_{ij}) - \beta \sum_{i=1}^{N} s_{ij}^2 \sigma_{ij}^2 + \lambda_1(y_j - c_{1j} - \sum_{i=1}^{N} s_{ij}) + \sum_{i=}^{N} \lambda_{2i} s_{ij} + \lambda_3(c_{1j} - c_{0j})$$

We have the following result[2]:

$$s_{ij} = 0 \text{, when } y_j \leq c_{0j} - \frac{(1+r_{ij})\sum_{i=1}^{N} \frac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N} \frac{(1+r_{ij})}{2\sigma_{ij}^2};$$

[1] c_{1j} is chosen in period 1 and is actually known. C_{2j} is random and unknown in period 1.

[2] Detailed deduction can be found in the appendix B.

$$s_{ij} = \frac{(1+r_{ij})}{2\sigma_{ij}^2} - \frac{\sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2}}{\sigma_{ij}^2\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}} + \frac{y_j - c_{0j}}{\sigma_{ij}^2\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}},$$

$$\text{when } c_{0j} - \frac{(1+r_{ij})\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2} < y_j < \sum_{i=1}^{N}\frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2} + c_{0j};$$

$$s_{ij} = \frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2}, \text{ when } y_j \geq \sum_{i=1}^{N}\frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2} + c_{0j};$$

From the above result, it is not difficult to find the positive relationship between s_{ij} and r_{ij}, and negative relationship between s_{ij} and σ_{ij}^2. s_{ij} is a phase function of y_j.

Let y_j^* denote the point where $s_{ij} = 0$. According to Kuhn-Tucker condition, as s_{ij} can not be negative, any individuals have wealth lower than y_j^* will not invest in country i but we have to notice that y_j^* is affected by the conditions of country i and country j. So the total asset investment of country j in country i is $S_{ij} = N_j \int_{y_j^*}^{\infty} s_{ij} f(y_j) dy_j$, where N_j and $f(y_j)$ are the population and the income distribution density of country j, respectively. From this model we can see cross-border asset holding is also related to the source country's income distribution and intuitively, the more people earn, the more they invest overseas. The income distribution reveals the extent of wealth concentration. In this paper, we use Gini coefficient to approximate the extent of wealth concentration. Actually, another data set should be better than Gini Coefficient to reflect the effect of income distribution, which is income share held by highest 10% or 20%. However, we only found this data for OECD countries. Actually, Rose and Spiegel (2007) also checked the effect of Gini coefficient but did not report it in their paper. We expect S_{ij} have a concave relationship with Gini coefficient. This is because when income distribution is relatively equal, the increase in inequality will increase the percentage of people with wealth above y_j^*; on the other hand, when income distribution is very unequal, wealth

will be concentrated in a few people's wealth and increase in inequality will decrease the percentage of people with wealth above y_j^*.

Although we did not mention transaction cost in the model, actually, as R_{ij} return rate is actual return rate of investing in country i, tax and transaction costs are already deducted. All the factors that cause higher transaction cost reduce R_{ij} and thus r_{ij}.

From the above model, we can see factors that affect the total cross-border asset holding of country j in country i include population, income level and its distribution, investment return rate, and investment risk of the two countries. So now we are ready to set up our empirical estimation equation. As gravity model is repeatedly proved to be powerful in explaining bilateral trade and our data is bilateral, we here have the similar specification:

$$S_{ij} = M_i M_j r_{ij}^{\beta} \sigma_{ij}^{\theta}$$

where S_{ij} =asset holding of source country j in host country i;

M_i = the mass control of host country i, which is a function of GDP per capita, population, area and so on;

M_j = the mass control of source country j, which is a function of GDP per capita, population, area and so on;

r_{ij} =the expected return rate of investing in host country i which is affected by investment environment and transaction infrastructures of both source and host countries;

σ_{ij} =barriers for source countries to invest in host countries. We assume the following form[1]: $\sigma_{ij} = d_{ij}^{\delta_1} \exp(\delta_2 comlang + \delta_3 border + ...)$, where d_{ij} is the bilateral distance, *comlang* and *border* indicate whether the two countries share the same language and the same border, respectively. There are also other factors that affect

[1] This formula is used by Coeurdacier and Martin (2007) with the left hand side being transaction cost.

investment risk like political stability, government effectiveness, capital regulation, and so on.

This equation is very intuitive and is similar to the standard 'gravity' equation derived in the literatures of international trade in differentiated goods (David, Subramanian and Tamirisa, 2007).

3.2 Empirical study

3.2.1 Data description

OFCs are characterized by a proportionally high level of portfolio investment assets held by non-residents. They are home (legal domicile) to a large number of custodian entities which hold and manage securities on behalf of clients residing outside the OFC. From this perspective, cross-border asset holding is a good indicator for studying offshore financial activities. Data on international portfolio asset holdings have recently been published by the IMF. The IMF conducted the Coordinated Portfolio Investment Survey (CPIS) for the first time in 1997 and annually since 2001. The advantage of CPIS is that it provides the geographical breakdown of cross-border asset-holding which allows the use of gravity model.

The first CPIS involved 20 economies and the CPIS 2001 expanded to participation of 67 source economies including the offshore financial centers. In each case, the bilateral positions of the source countries in 223 destination countries/territories are reported. In this paper we use the 6-year panel from 2001 to 2006. The flaws of this data were already mentioned in the paper of Rose and Spiegel (2007), of which a large number of missing values is most salient.

Explanation of independent variables is presented below. Data sources can be found in Appendix A. We put in parentheses what these variables might affect.

$dist_{ij}$ =distance between country i and country j *(informational asymmetry and transaction cost);*

$inba_i$ =international internet bandwidth in host country i, which is defined as the maximum amount of data per unit time that can be transmitted from one node to the

other. We use this variable to stand for the extent of the telecommunication development *(Transaction efficiency)*;

$openness_i$ =export-to-GDP-ratio + import-to-GDP-ratio of host country i *(informational asymmetry);*

ofc_i =1 if host country i is an offshore financial center and 0 if not (*investment environment*);

$taxhaven_i$ =1 if host country i is a tax haven and 0 if not (*investment environment*)[1];

$moneyl_i$ =1 if host country i is money laundering haven and 0 if not (*investment environment*)[2];

$comlang_{ij}$ =1 if country i and country j use the same language and 0 if not *(informational asymmetry);*

$border_{ij}$ =1 if country i and country j share the common border and 0 if not *(informational asymmetry);*

$comcol_{ij}$ = 1 if country i and country j were colonized by the same country and 0 if not *(informational asymmetry);*

$island_i$ =1 if host country i is an island and 0 if not *(mass control);*

$landl_i$ =1 if host country i is landlocked and 0 if not *(mass control);*

$area_i$ =the area of host country i *(mass control);*

[1]The 1998 IMF report describes four key factors to determine whether a jurisdiction is a tax haven: first, whether the jurisdiction imposes no or only nominal taxes; second, whether there are laws or administrative practices that prevent the effective exchange of information for tax purposes with other governments; third, whether there is lack of transparency; whether there is an absence of a requirement that the activity be substantial. According to these criteria, the 2000 report lists 35 nations or territories as tax havens (The review process, OECD 2000).

[2] There are totally 29 nations or territories listed by FATF as money laundering havens that do not criminalize laundering or that have serious deficiencies in their banking regulation (Joseph Kahn, 2000).

$area_j$ =the area of source country j *(mass control);*

$polstab_i$ =the political stability index of host country i *(investment risk);*

$goveff_i$ =the government effectiveness of host country i *(Investment environment);*

$regqual_i$ =regulation quality of host country i *(Investment environment);*

$rulelaw_i$ =rule of law in host country i, the extent to which agents have confidence in and abide by the rules of society (*Investment environment*);

$corrupcontr_i$ =corruption control in host country i, which measures the extent to which public power is exercised for private gain, including petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The higher this indicator is, the more corrupt the government is (*Investment environment*);

$commonl_i$ =1 if host country i uses common law legal system and 0 if not (*secrecy of investment*);

gr_i = GDP growth rate in host country i (*investment environment*);

$gr2_i$ = square of gr_i

gr_1_i = GDP growth rate of last year in host country i;

gr_12_i = square of gr_1_i;

$gini_i$ =Gini coefficient of host country i, which we use as an income distribution indicator;

$gini2_i$ =square of $sgini_i$;

Variables of source country j have corresponding meanings.

3.2.2 Estimation of bilateral cross-border asset holding

The specific estimation equation is stated below:

$$\ln(S_{ij}) = \alpha_0 + \alpha_1 \ln(gdppc_i) + \alpha_2 \ln(pop_i) + \alpha_3 \ln(gdppc_j) + \alpha_4 \ln(pop_j) + \alpha_5 \ln(area_i) + \alpha_6 \ln(area_j) + \beta_1 \ln(inba_i) + \beta_2 inba_j + \beta_3 openness_i + \beta_4 openness_j + \beta_5 taxhaven_i + \beta_6 taxhaven_j + \beta_7 moneyl_i + \beta_8 moneyl_j + \beta_9 \ln(dist_{ij}) + \beta_{10} comlang_{ij} + \beta_{11} border_{ij} + \beta_{12} comcol_{ij} + \alpha_7 island_i + \alpha_8 island_j + \alpha_9 landl_i + \alpha_{10} landl_j + \beta_{13} polstab_i + \beta_{14} polstab_j + \beta_{15} goveff_i + \beta_{16} goveff_j + \beta_{17} regqua_i + \beta_{18} regqua_j + \beta_{19} rulelaw_i + \beta_{20} rulelaw_j + \beta_{21} corrupcontr_i + \beta_{22} corrupcontr_j + \beta_{23} commonl_i + \beta_{24} commonl_j + \beta_{25} ofc_i + \beta_{26} ofc_j + \tau_2 t2 + \tau_3 t3 + \tau_4 t4 + \tau_5 t5 + \tau_6 t6 + \varepsilon_{ij}$$

We estimate this equation with conventional OLS, with year-specific fixed effect. We add time dummies to control for aggregate shocks such as a world business cycle, movement in the world interest rate, global capital market shocks or other global events. We do not introduce country-pair fixed effect as doing so will greatly reduce the degree of freedom. Besides, we believe distance and other variables which are constant over all observations for a given country pair will pick up most of the fixed effects. We did not adopt the fix-effect "within" estimation results, either. Although this method provides more consistent estimates by controlling for the influences from omitted country-specific factors, one drawback of this fixed effect approach is that since the fixed effect estimator exploits variation over time, the estimation for time-invariant factors such as distance, area, land border, and the common language cannot be obtained. Random effects panel estimation is not theoretically appropriate for our data, which are not drawn randomly from a larger population. Thus, our estimation just simply pooled the time-series and cross-section data.

We performed 4 estimations and results are tabulated together in Table 1. h or s in parenthesis indicates whether the variable is of host country or source country. We use the robust variance estimates, as Breusch-Pagan test suggests heteroscedasticity problem in normal OLS estimation. Model1 is just as the above specification. In model2, we added GDP growth rate and Gini coefficients. Observing our data, we can find data of cross-border asset holding include a lot of zero observations which will be randomly dropped in log-linear model. Random dropping will probably lead to bias or inconsistency problems. To cope with this problem, we did another two corresponding estimations model3 and model4 with 0 and too small values replaced with 0.01. This method was also used in Rose and Spiegel (2007) to solve the problem of zero values in log-linear model.

Table1 Bilateral cross border asset holding (h: host country; s: source country)

Variable	model1	model2	model3	model4
lgdppc (h)	1.29***	1.35***	.795***	.787***
lpop (h)	.732***	.78***	.735***	.766***
lgdppc (s)	1.98***	2.38***	1.18***	1.58***
lpop (s)	.788***	1***	.489***	.524***
larea (h)	.192***	.178***	.133***	.126***
larea (s)	.0449**	-.0561*	.0941***	.202***
linba (h)	.0538***	.0523**	.276***	.232***
linba (s)	.0549**	-.0627*	.0816***	-.0799***
openness (h)	.00426***	.0049***	.0008*	.00207***
openness (s)	.00627***	.00705***	.00398***	.00501***
ofc (h)	.653***	.591***	1.02***	.679***
ofc (s)	.761***	.746***	1.43***	1.32***
taxhaven (h)	1.26***	1.15***	0.0158	.576***
taxhaven (s)	.689***	1.17***	0.0694	2.15***
moneyl (h)	-.425***	-.22*	-.261***	-.309***
moneyl (s)	1.16***	.705***	-0.00141	-.704***
ldist	-.893***	-.941***	-1***	-1.14***
comlang	.699***	.825***	.774***	.586***
border	.876***	.79***	1.2***	1.03***
comcol	1.28***	1.63***	.565***	.585***
island (h)	.205***	.158***	.277***	.206***
island (s)	.423***	.343***	.354***	.168***
landl (h)	.084**	-0.026	-0.012	-0.0226
landl (s)	.09***	0.0565	.127***	.182***
polstab (h)	-.00614***	-.00499**	.0107***	.0123***
polstab (s)	0.00058	-0.00027	-.00717***	-.0156***
goveff (h)	0.00117	.00949**	-.00619**	.00724**
goveff (s)	-.0517***	-.0393***	-.0245***	0.00853
regqual (h)	.0276***	.0346***	.0202***	.0234***
regqual (s)	0.00515	-0.00249	.0148***	0.00454
rulelaw (h)	-0.00508	-0.00756	-0.00449	-.0107***
rulelaw (s)	.0499***	.0373***	.0347***	0.00031
corrupcontr (h)	-.00998***	-.0234***	.00436*	-.00558*
corrupcontr (s)	-0.00735	0.00941	-.00738*	0.0132*
commonl (h)	-.274***	-.314***	-.217***	-.314***
commonl (s)	-0.094	-0.0654	-.537***	-0.119
t2	0.0604	.185**	.131**	0.0701
t3	-.196***	0.00063	-.2***	-0.0355
t4	-.613***	-.369***	-.668***	-.298***
t5	-.804***	-.63***	-1.21***	-.829***
t6	-.743***	-.623***	-.856***	-.515***
gini (s)		0.0343		.0446*
gini2 (s)		-0.00026		-.00073**
gr (h)		-.041***		-.105***
gr2 (h)		-0.00113		.00194***
gr_1 (h)		-.058***		-.0706***
gr_12 (h)		.00402***		.0018***
gr (s)		-0.018		-0.00038
gr2 (s)		.00343**		-1.90E-05
gr_1 (s)		0.0141		-0.00519
gr_12 (s)		.0056***		-0.00139*
_cons	-36.7***	-44.1***	-24.1***	-27.8***
Adjusted R^2	0.613	0.652	0.625	0.651
rmse	2.26	2.18	2.94	2.88
N	12691	8572	28444	19263

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

On the whole, most estimates are satisfactory. All the estimations explain more than 60% of the variance. We tried to add more explanatory variables like corporate tax rate, capital gain tax rate and income tax rate, and so on; however, as our model involves too many pairs of countries, data collection becomes the most difficult problem. Adding other variables greatly shrinks the sample size and makes the estimation unstable. So we give up this attempt and only use the variables in Table1.

All these estimations deliver some sensible estimates. For instance, all the mass controls have positive coefficients, which means higher population and GDP per capita in either host or source countries encourage greater cross border asset holding. Especially that higher GDP per capita in source countries increases asset holding is consistent with our model. Geography matters in the sense that shared land border, language, and colonizer raises cross-border asset holding, while long distance lowers cross-border asset holding. Given other conditions, islands and land locked countries or territories are more likely to be involved in cross-border asset transaction. All these effects are sensible and statistically significant at conventional significant levels.

As for the effect of distance, we want to say more. With technological advances such as internet, the cost to obtain information about possible suppliers on the other side of the globe has declined substantially. Today it is virtually costless to call anywhere in the world using internet long-distance facilities, whereas the cost of a 3-min telephone call from New York to London today is less than $1, comparatively in 1930 it was $244.65. So intuitively, distance is less a barrier now than before. Besides, financial asset is weightless and most transactions today are done without moving the real money.

However, our estimation still shows a negative effect of distance on cross-border asset holding. This result is almost the same as that of Rose and Spiegel (2007) and that of Portes and Rey (2005). Rose and Spiegel (2007) attribute the negative effect to transaction cost which they think is positively and proportionately related to distance. Their conclusion is that although the costs of shifting assets offshore have fallen over time, they remain non-trivial. In contrast, Portes and Rey think that as asset is weightless, asset shifting is costless and the negative effect of distance is not due to the increase in transaction cost but the information asymmetry it causes. Information asymmetry is positively correlated with distance: the cost of traveling is higher for

long distances; cultural differences are likely to be stronger, and business links weaker. Actually, our regressions also find some evidence of the effect of information asymmetry. As previously said, Breusch-Pagan test suggests heteroscedasticity problem in normal OLS estimation. Although we change to the robust standard error estimates, we still find a striking relationship between the residuals and distance.

Figure 1 Relationship between residuals and log of distance

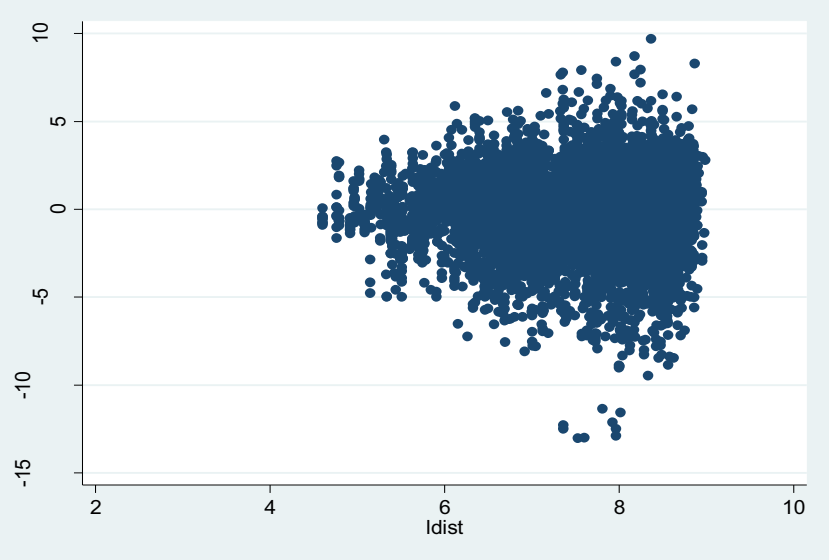

Figure 1 implies that the volatility of the error terms increases in log of distance. This means the heteroscedasticity problem is not pure but impure, caused by some omitted variables that are positively related with distance. Portes and Rey use bilateral telephone call traffic as a direct measure of information transmission and found that when added to the regression, this variable is significant, well signed and reduces the coefficient of distance. This confirms the idea that distance is more related to information asymmetry rather than transaction cost. When distance increases, people in the source countries know less and less about the host country so the information asymmetry increases. Information asymmetry will increase investment uncertainty and thus investment risk people perceive. As people generally are risk averse, under the same expected return, people will invest less. This result means the estimated coefficient of distance in our model is biased. In this paper, we also tried to use data of bilateral telephone call traffic to approximate information asymmetry; however, data is not available for the period from 2001 to 2006.

Nowadays, e-money dances from place to place without real money moved, so the impact of telecommunication infrastructure on asset transaction cost becomes more important. Furthermore, telecommunication affects people's ability to search for information and transaction efficiency. Here, we use international internet bandwidth to represent the condition of telecommunication infrastructure. The internet bandwidth is a measure of the capacity of information carrying. Higher bandwidth implies better telecommunication conditions. From Table1, we see international internet bandwidth is significantly and positively related to cross border asset holding, which implies that the advancement of telecommunication technology is one of the most important factors that affects international capital flows and countries with better telecommunication infrastructure are more competitive in attracting asset investment.

Higher openness index which is measured by the trade-to-GDP-ratio means higher connection with the rest of the world, so it reduces the informational asymmetry and leads to higher cross border asset holding. The result would be better if we could get the bilateral export and import data between two countries. Anyway, our estimation still reveals the effect. From Table1, we can see openness in both host countries and source countries is positively and significantly related to cross-border asset holding.

The most important result in our estimation is about tax haven and money laundering. Our result about these two indicators are quite different from the result of Rose and Spiegel (2007) which shows that both tax haven and money laundering indicators of host countries have positive and significant effects on cross border asset holding while that of source countries not. And their conclusion is that both tax havens and money laundering centers attract more investment by facilitating illegal and bad behaviors and countries identified as tax havens and money launderers are more likely to be OFCs, encouraging tax evasion and nefarious activity in the neighboring source countries; a primary motivation for investors in moving assets offshore is circumventing domestic tax laws or other illegal activities. Actually, we replicated their model using data of 2001 and 2002 and got the same results as theirs. The result does not change even when we use six years' data from 2001 to 2006. One possible reason for the differences is the inclusion of time fixed effect in our paper because in Rose and Spiegel (2007) the time fixed effect is not obvious for just two

years' data; however, when we drop the time dummies in our model, we still get the similar result as Table 1. Another possible reason is that we include more explanatory variables. When we use data of only 2001 and 2002, our results about OFC, tax haven and money laundering indicators do not change much from Table 1. So our conclusion is that the difference is mainly caused by the different variables included.

Our result of all the four estimations shows that coefficients of tax haven in both host countries and source countries are positive and strongly significant at 1% significance level. This means tax havens attract investment and at the same time also invest more overseas. This is sensible as cross border capital flow are more likely to be attracted by foreign countries' preferential tax policy. The positive coefficient of tax haven indicator of the source is also sensible, as usually tax havens are specialized places in financial service with comprehensive financial expertise. When international capital flows in, experts will make reinvestment to maximize their profits.

As for money laundering, the result is even more impressive. The coefficient of money laundering indicator of host countries is negative and that of the source countries is positive. This means if a country is known as a money laundering center, it will get less investment and have more capital outflow. At the first sight, this result seems unreasonable. The prevailing idea is that money laundering havens attract capital inflows due to its lax regulation and strict protection of banking secrecy. However, we think our result is sensible because the bad reputation of money laundering centers may scare the investors away. Especially in recent years when global efforts in fighting against money laundering has been intensified. When a place is famous for its role in facilitating money laundering, it will draw more eyes from both the international institutions and other countries' regulation committees. Even the money launderers for the illegal purposes do not dare to put their money in such places for a long time.

OFC indicators in the model show very good result. Countries indicated as an offshore financial center get more investment in their asset and invest more in other countries. As we already include tax and money laundering haven indicators in our model, OFC indicator is more likely to capture the impacts of other characteristics of offshore finance rather than tax issues or money laundering. Offshore financial centers not only provide preferential fiscal and regulatory environment which attract

investment but also are endowed with a pool of financial expertise which offer them great advantage in international financial intermediation. Due to their specialization in financial industry, they play an important role in global capital flow.

Estimates of governance indicators are not very stable. On the whole, our estimation shows that good governance in the host countries attracts investment while bad governance in the source countries drives capital to flow out. Although our estimation about the effect of the political stability is not very stable, political stability is always regarded as an important factor in people's decision of international investment. Bad corruption control in host countries has a negative impact since it indicates a bad investment environment. In the real world, money comes from briberies are more likely to be shifted offshore. It is estimated in 1999, corrupt political leaders stashed away US$20 billion in Swiss bank accounts, where secrecy is guaranteed (The *Economist*, 16 January 1999). However, our model does not show strong evidence of this. A reasonable explanation can be that action against corruption in corrupt countries is less effective.

Banking secrecy guarantees the confidentiality of clients' information. This is very important especially for those who use offshore finance for illegal purpose. As common law of Great Britain has the origin for banking secrecy, we include common law indicator in our model. However, we find the effect is negative. One possible explanation is that common law indicator is not sufficient to reveal the extent of banking secrecy. Another possible explanation is the global requirement for the information exchange. A jurisdiction too strict in banking secrecy may suffer from economic sanction imposed by other countries, like the U.S. or the European countries. Actually, OFCs always face the problem of balancing between secrecy and transparency. Should their laws and regulations offer too much secrecy, the center may suffer as reputations as a haven for illegal funds, a force that may discourage legitimate investors. Conversely, should the center prove too transparent to auditors and international watchdogs, even investors with legal assets may be frightened off. So it has to balance between confidentiality and transparency in order to lure investors and at the same time remain sufficiently legitimate in the eyes of the global banking (Warf, 2002).

Our model in section 2.1 implies that income distribution in the source countries should have an impact on investment overseas. Previous studies also declare that offshore finance is more likely to be used by the well-educated and wealthy people. So here we use the Gini coefficient to examine this effect. The Gini coefficient is a measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution. A low Gini indicated more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution and more money is in the hands of the minority wealthy people. Gini coefficient is included in estimations model2 and model4. Although coefficients in model2 are not significant, coefficients of the first-order of Gini coefficient are positive while that of second-order are negative. This means bilateral cross-border asset holding first increase in the source countries' Gini coefficients and then decrease after a given point. This concave relationship has been predicted in our theoretical analysis in section 3.1. Investment of source country j in host country i should increase in the extent of inequality when it is very low and decrease in it when it is too high. We didn't add the Gini coefficient of host countries for two reasons. First, we do not think the income distribution of host countries matters. Second, as the data of Gini coefficient of host countries has a lot of missing values, including it in the estimation will greatly reduce our sample size.

Estimates of the GDP growth rates show very interesting results. We include the GDP grow rate and its first-order lag in our estimation model2 and model4. We use them to indicate the condition of investment environment and expect that of host countries should have a positive effect. Our results show that both current grow rate and its lag have negative signs but their squares have positive signs. This means GDP growth rate has a positive relationship with cross border asset holding only after a given point. Some people may concern about the correlation between Gini coefficient and GDP. Our data show that this concern is not necessary as the correlation coefficient is only 0.057.

3.2.3 Dynamic effects

Time fixed effects are very significant and more importantly, all coefficients of the time dummies show negative signs and on the whole, become smaller and smaller

as time passes. This is quite important because it means given other factors unchanged, the cross border asset holding is decreasing during these years. This may be caused by three factors: competition among host and source countries, financial reforms carried out in industrial countries and global cooperative effort against tax evasion, money laundering and lax financial regulation.

By the end of the 1990s, some major industrial countries began to make similar incentives available on their home territory. For example, the U.S. established in 1981, in major U.S. cities, the so-called International Banking Facilities (IBFs). Later, Japan allowed the creation of the Japanese Offshore Market (JOM) with similar characteristics. At the same time, supervisory authorities, and to some extent tax authorities were adopting the principle of consolidation which reduced the incentives for banks to carry on business outside their principal jurisdiction. As a result, the relative advantage of OFCs for conventional banking has become less attractive to industrial countries, although the tax advantages for asset management appear to have grown in importance (IMF background paper, 2000). Errico and Musalem (1999) already predicted that offshore banking might lose appeal for the financial institutions of advanced economies, operating in liquid, increasingly competitive, and well-regulated financial centers. As a recent result of distortionary regulatory framework being dismantled in favor of competition under prudential supervision, and capital account convertibility being increasingly embraced, the distinction between onshore and offshore banking has become progressively blurred in industrial countries.

The second reason is that since the late 1990s, the OECD countries and other international institutions have taken out a series of measures against tax evasion and money laundering. In 2000, OECD identified over thirty countries as engaging in the harmful tax evasion practices. Countries on the lists were given deadlines to change their policies in order to avoid economic sanctions. The G7 have also pursued initiatives against money laundering practices, including the founding the Financial Action Task Force. All the jurisdiction put on the blacklist of uncooperative tax haven of OECD or the blacklist of uncooperative countries and territories of FATF not only suffers from the bad reputation but also possible economic sanction from other countries.

The declining coefficients of time dummies implies that either industrial countries' policy changes or global effort in combating tax evasion and money laundering has curbed international capital flows. To study the effects on offshore havens, we allow the parameter shifting in the estimation. The part that we are interested in is presented in Table2[1] in which tt is the interaction of tax haven indicator and time indicator, mt is the interaction of money laundering indicator and time indicator and ofct is the interaction of OFC indicator and time indicator.

Table2 cross-border asset holding: allowing parameter shift

Variable	model21	model22
ofc (h)	.485***	.658***
ofct2 (h)	-0.203	-0.0137
ofct3 (h)	0.199	.634***
ofct4 (h)	0.275	.676***
ofct5 (h)	.632***	.47**
ofct6 (h)	1.17***	1.34***
ofc (s)	.967***	.731***
ofct2 (s)	-.35**	.534***
ofct3 (s)	-.294*	1.18***
ofct4 (s)	-.301*	.662***
ofct5 (s)	-0.127	.843***
ofct6 (s)	-.491*	.966***
taxhaven (h)	1.9***	.644***
tt2 (h)	0.326	0.233
tt3 (h)	-.975**	-1.38***
tt4 (h)	-1.11***	-1.19***
tt5 (h)	-1.5***	-.971***
tt6 (h)	-1.95**	-1.43*
taxhaven (s)	1.3***	2.3***
tt2 (s)	-0.33	-2***
tt3 (s)	-0.641	-1.92***
tt4 (s)	-.981**	-3.39***
tt5 (s)	-.912**	-2.27***
tt6 (s)	0	0
moneyl (h)	-.715***	-.368*
mt2 (h)	-0.177	-0.212
mt3 (h)	.618**	0.41
mt4 (h)	.501*	0.193
mt5 (h)	.476*	0.132
mt6 (h)	0.57	0.651
moneyl (s)	0.00713	0.21
mt2 (s)	1.03***	0.27
mt3 (s)	1.09***	0.317
mt4 (s)	1.56***	-.609***
mt5 (s)	1.54***	-.739***
mt6 (s)	4.21***	4.24***

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Satisfactorily, Table2 shows that the importance of tax havens is declining which is reflected by the declining coefficients of the interaction term of tax haven and time

[1] The complete result can be found in appendix C. See table 2B.

dummies. The coefficients of the interaction term of money laundering indicator and time dummies are increasing as time passes which implies that countries indicated as money laundering centers are seeing more and more capital outflow. However, the coefficients of the interactions of ofc and time dummies do not show declining trend. According to different functions, there are three types of OFCs. Primary OFCs are large international full service centers with advanced settlement and payments systems, operating in liquid regional markets where both the sources and uses of funds are available. Secondary OFCs differ from primary OFCs in that they intermediate funds in and out of their region, according to whether the region has a deficit or surplus of funds. Booking OFCs do not engage in the regional intermediation of funds, but rather serve as registries for transactions arranged and managed in other jurisdictions. Most tax and money laundering havens belong to the second and third types. So coefficients related to tax and money laundering are more likely to capture the effects on the second and third type OFCs while coefficient of OFC indicators captures the effect on the first type, primary and functional OFCs.

Combined with the previous studies, our conclusion about this issue is that global cooperation against tax evasion and money laundering has already showed its impact. According to Michael Levi (2002), money laundering costs allegedly rose from 6 to 8 percent at the beginning of the 1980s to up to 20 percent by the mid-1990s. This confirms the prediction of Hampton and Christensen (2002) that initiatives against tax evasion and money laundering practices will significantly reconfigure the offshore finance and push capital to the big and functional financial centres or back "onshore". Our result shows that although tax havens and money laundering havens are losing their attractiveness gradually, offshore finance still has its own advantages. This also confirms the idea that offshore finance is not only used for the dubious things.

3.2.4 Multilateral approach

We now corroborate our key findings from the bilateral cross border asset holding with a multilateral approach. The dependent variable is the total amount of asset investment in host country from all the source countries. Regression functions have the similar specification as the bilateral one but there are some changes. We use the indicator of world main languages to reflect the language effect. As for distance,

we replace it with the relative distance *rdist* which measures the relative distance of the countries to the rest of the world. *rdist* is GDP-weighted-distance first proposed by Wei (1996). It is computed in the following way: $rdist_i = \sum_j \frac{dist_{ij} Y_j}{\sum_j Y_j}$, where j is the number of source countries. As time fixed effect is not very obvious in these estimations, we do not include time dummies in this estimation.

Table3 Total cross border asset investment in host countries

Variable	modelh1	modelh2	modelh3	modelh4
lgdppc	1.22***	1.29***	1.29***	1.42***
lpop	.938***	1***	1.17***	1.22***
larea	.162***	.118**	.127**	0.0805
linba	.191***	.146***	.222***	.192***
openness	.0054***	.00937***	.00514***	.00902***
ofc	0.3	0.357	0.509	0.568
taxhaven	1.32***	1.04**	1.71***	1.54***
moneyl	0.325	0.155	0.603	0.256
lrdist	.953**	.846**	1.14**	.94*
island	-0.0635	-.208*	-0.137	-.263*
landl	-.287***	-.377***	-.499***	-.539***
polstab	-0.00576	-.0153***	-0.00481	-0.00946
goveff	.0295***	.0378***	0.0152	.0234*
regqua	.0345***	.0203***	.0654***	.0484***
rulelaw	-0.00237	0.0135	-0.0166	-0.0035
corrupcontr	-.0171*	-.0205**	-0.0146	-.0245**
commonl	-0.222	-0.305	-0.276	-.663***
gr		-.0621**		-.0489*
gr2		-0.00066		-0.00035
gr_1		-.0385*		-.0573**
gr_12		.00359**		-0.00053
English		0.16		.543**
French		0.0358		-0.0802
Spanish		.385*		0.321
Portugese		-0.221		-0.086
Arabic		-1.28***		-1.01***
German		-0.525		-0.47
Dutch		-0.469		-1.06*
Chinese		-1.58***		-1.61***
_cons	-31.4***	-30.9***	-37.6***	-36.2***
Adjusted R^2	0.816	0.833	0.791	0.806
rmse	1.8	1.72	2.32	2.23
N	789	776	863	848

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Table3 confirms most of the findings in the bilateral estimation of Table1. For example, GDP per capita, population, higher internet bandwidth, and openness increase the asset investment in host countries. A jurisdiction is attractive for investment if it provides tax benefits and has good political environment. There are also some differences from Table1. Indicators of money laundering and OFC are not

significant any more. One possible explanation is that OFC and money laundering indicators are highly correlated with the tax haven indicators. The correlation between OFC indicator and tax haven indicator is as high as 0.81. The effects of OFCs and money laundering havens are captured by the tax haven indicator. Another reason can be that the multilateral model is not as good as the gravity model in studying this problem, as the aggregate data can easily hide some information that can be revealed in the gravity model.

The most striking result in Table3 is that distance has a positive coefficient in multilateral estimation, which means when a country is far from the rest of the world the investment from the rest of world is higher. It seems contradictory as we have already shown in Table1 distance has a negative effect on cross-border asset holding, but it is consistent with the fact that a lot of the tax havens or offshore financial centers are located in the remote and small islands[1]. According to the rough estimation of the economists, nearly half of the world's capital flows through remote and small places (*BBC news, 6 May 2008*).

But how can we explain the two seemingly contradictory results? We use an extreme but simple example to illustrate how this happens. Assume there are two host countries (H1 and H2) and two source countries (S and B). Here S is the smaller source country and B is bigger country. They are geographically distributed as following:

Source / Host	S	B
H1	100	10000
H2	10000	100

This means H1 is closer to the smaller economy and far from the bigger economy while H2 is closer to the bigger economy and far from the smaller economy.

[1] For the relationship between relative distance and OFC indicators, see Figure 2 and Figure 3 in appendix C. The positive relationship is not very obvious but we still can see some successful OFCs like Nauru, Marshall Island, Samoa, Vanuatu, etc. are far away from the rest of world. Relationship between relative distance and tax haven or money laundering haven is similar.

To make our analysis simple, we assume the following simple gravity function: $S_{ij} = H_i^{\alpha_1} S_j^{\alpha_2} dist_{ij}^{\beta}$, where H_i here stands for the host country i's economic factors that have impact on the asset investment from other countries and it can be either H_1 or H_2; S_j is the source countries' economic factors that have impact on their investment in other countries and it can be either S or B.

For the multiple problem, we assume $TS_i = H_i^{\theta} rdist_i^{\gamma}$, where $rdist_i$ is the GDP-weighted distance from host country i to two source countries.

So we have the following functions:

$$S_{11} = H_1^{\alpha_1} S^{\alpha_2} dist_{11}^{\beta}$$

$$S_{12} = H_1^{\alpha_1} B^{\alpha_2} dist_{12}^{\beta}$$

$$S_{21} = H_2^{\alpha_1} S^{\alpha_2} dist_{21}^{\beta}$$

$$S_{22} = H_2^{\alpha_1} B^{\alpha_2} dist_{22}^{\beta}$$

Where is α_1 and α_2 are positive and β is negative.

$$\begin{aligned} TS_1 &= S_{11} + S_{12} \\ &= H_1^{\alpha_1} S^{\alpha_2} dist_{11}^{\beta} + H_1^{\alpha_1} B^{\alpha_2} dist_{12}^{\beta} \\ &= H_1^{\alpha_1} (S^{\alpha_2} + B^{\alpha_2}) \left(\frac{S^{\alpha_2}}{S^{\alpha_2} + B^{\alpha_2}} dist_{11}^{\beta} + \frac{B^{\alpha_2}}{S^{\alpha_2} + B^{\alpha_2}} dist_{12}^{\beta} \right) \end{aligned} \quad (1)$$

And

$$\begin{aligned} TS_2 &= S_{21} + S_{22} \\ &= H_2^{\alpha_1} S^{\alpha_2} dist_{21}^{\beta} + H_1^{\alpha_1} B^{\alpha_2} dist_{22}^{\beta} \\ &= H_2^{\alpha_1} (S^{\alpha_2} + B^{\alpha_2}) \left(\frac{S^{\alpha_2}}{S^{\alpha_2} + B^{\alpha_2}} dist_{21}^{\beta} + \frac{B^{\alpha_2}}{S^{\alpha_2} + B^{\alpha_2}} dist_{22}^{\beta} \right) \end{aligned} \quad (2)$$

As we assume $dist_{11} = dist_{22} < dist_{12} = dist_{21}$ and $\beta < 0$, $TS_1 < TS_2$ if $H_1 \le H_2$; it is also possible for TS_1 to be bigger than TS_2 when $H_1 > H_2$ but H_1 must be big

enough to offset the disadvantage caused by the remoteness to the big country. So although $rdist_1 > rdist_2$, it is possible for *TS* to be positively related to *rdist* while the relationship between distance and bilateral asset holding is negative. This means other factors like preferential tax policy can easily remedy the disadvantage of the remoteness and marginality. There is one thing we would like to point out. The relation between distance and asset holding in gravity model is causal while that in the multilateral model is just factual.

4. The determinants of financial intermediation

About the relationship between financial intermediation and cross-border asset holding, Zorome (2007) makes the following statement. Exports of financial services are generally matched by underlying capital flows from partner countries, which in turn, affects the assets and liabilities position. Based on accounting identity, every cross border capital flow is matched by a change in the assets and liabilities positions of the countries involved. These positions (stocks) are the result of past external transactions measured at current market price. In tracking these positions for various countries, one would expect countries or jurisdictions with the biggest stocks of assets to have been the ones that registered the largest flows of financial services over time and as a result, exported the most financial services to nonresidents for a given period.

However, we do not agree the above statement completely. If capital flows for the investment purpose, then the above statement holds; but if capital flows only for temporary purpose like money laundering or speculation, then capital will come and go very quickly without affecting the stock magnificently but increasing the revenue from financial services. If tax havens, money laundering centers or offshore financial centers are used as investment places, the three indicators should have positive relationship with cross-border asset holding. If they are used only as an *entrepot* for temporary storage of funds, then financial intermediation or export of financial service should be higher if a place is tax haven, money laundering center or offshore financial center while cross border asset holding should not be obviously affected.

So here we use financial intermediation value and net export of financial service to complement our analysis of cross-border asset holding. Data of financial

intermediation used here is a sub-item of value added in UN database, of which we use five years from 2001 to 2005. As for net export ratio of financial services, it is got from Zorome (2007). Net export ratio is a good indicator which can well reflect the definition that financial activity in OFCs is mainly provided to non-residents. However, we only have one year's data which only includes 88 countries of 2003.

We did three estimations. Estimation fin is the log-linear estimation of financial intermediation; fin_ratio is the estimation of financial intermediation over GDP ratio; and exp_ratio is the estimation of the net export ratio of financial service to GDP. The result is tabulated in Table4. The independent variables are the same as in bilateral and multilateral estimation. We do not include the time dummies as they are not jointly significant.

Table4 financial intermediation and net export ratio of financial service

Variable	fin	fin_ratio	exp_ratio
Lgdppc	-0.0127	-20.1***	1.02*
lpopulation	.769***	-3.07	0.544
Larea	.0816*	6.36**	-0.079
Linba	.26***	-3.8	-0.434
openness	0.00124	.294***	.0157**
Ofc	.904***	27.2	2.41**
taxhaven	0.421	-10.7	-0.106
Moneyl	-.507*	-54.2***	-1.11
Island	.333***	22.6***	0.241
Landl	-0.0644	-17***	1.05**
Polstab	0.00161	-.73**	-0.0232
Goveff	.025**	1.97***	0.0322
Regqua	-0.0083	-0.213	-0.0306
Rulelaw	0.00298	1.18*	-0.00816
corrupcontr	0.0109	-1.15**	0.0313
Commonl	-0.128	-29**	-1.32
English	0.205	-9.24	0.397
French	-0.255	-1.23	-0.117
Spanish	.427**	-14.9	0.13
Portugese	2.24***	109***	0.465
Arabic	.513*	-33.8**	-1.1
German	0.228	4.22	-2.04
Dutch	0.265	-17.5	-1.22
Chinese	-0.361	-72.7**	-3.26*
_cons	3.89***	106	-14.8*
Adjusted R^2	0.862	0.315	0.149
Rmse	0.898	56.2	2.2
N	299	299	88

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Zorome (2007) defines an OFC as a country or jurisdiction that provides financial services to non-residents on a scale that is incommensurate with the size and the financing of its domestic economy. This implies an OFC jurisdiction should have

a bigger financial sector and export more financial service to other countries. From Table4, we see the evidence of this definition. Estimations fin and exp_ratio show that OFC jurisdictions generate higher financial intermediation and export more financial services to other countries. Estimation fin_ratio also shows positive effect although not significant.

We did not see positive and significant coefficients of tax haven as in the bilateral and multilateral estimation of cross-border asset holding. This implies people intended to gain tax benefit use tax haven as an investment place rather than an *entrepot* that is only for the temporary storage of fund. Like in the cross-border asset holding model, money laundering centres lose financial business due to their bad reputation.

Political indicators are not as significant as in the asset holding model but on the whole, it is still the case that good governance guarantees the development of financial sector. The reason for less significance can be that business of financial intermediation is more likely to take advantage of the bad political environment or legal loopholes to facilitate money laundering or tax evasion. This effect partly trades off the attractiveness of good governance. Common law indicator still has negative effect or insignificant effect.

Now we can combine our analysis with the model of cross-border asset holding. We said tax avoidance is more likely to increase the investment in the host countries than tax evasion while tax evasion is more likely to increase the revenue from financial intermediation or the export of financial service. As tax haven indicator is positive and significant in the asset holding model while insignificant in the financial intermediation model, we conclude that tax havens are more used for tax avoidance rather than tax evasion. OFC indicator captures factors that affect financial sector like regulation, political condition, and geographical features rather than tax haven or money laundering as we have already controlled tax haven and money laundering effects in our model. So the positive and significant coefficient of OFC indicator means that the success of OFCs also depends on their regulation, specialization in providing financial service, their good and stable political environment besides the preferential tax environment. Intuitively, money laundering centres should get more revenue from facilitating money laundering activities; however, we did not find any

evidence in this paper. To the contrary, money laundering centres drive the financial business away due to their bad reputations. This happens because identification of money laundering havens is not based on the amount of money laundered in these places but only on their law and regulation systems. Actually, it is a fallacy to single out any one place as "the money laundering capital of the world." Authorities in America even disagree on whether most illegal money is laundered offshore or within the United States. Some small islands have different tax regimes that could be exploited for the illegal tax evasion purpose, but these differences alone do not make such locations more likely to be involved in laundering than so called onshore centers (Workman, 1982). However, countries or territories identified as money laundering haven suffer from their bad reputation, losing business of both investment and financial intermediation.

5. Welfare analysis of offshore finance

The welfare impact of offshore finance is controversial. Some argue that offshore interface plays a major role in flight of capital, global financial crisis, transfers of wealth, increasing poverty and social inequalities. It provides a safe haven for the proceeds of political corruption, illicit arms dealing and the global drugs trade, thus contributing to the spread of global crime and facilitating the plunder of public funds by corrupt elites (Prem Sikka, 2003). The use of elaborate and typically aggressive tax avoidance structures also increases the administrative burden of revenue collection. Whilst the tax avoidance industry is clearly damaging to the interests of developed countries, harmful tax practices are an even greater problem for economies in transition and developing countries. In the absence of powerful and sophisticated tax authorities like the US Internal Revenue Service, it is relatively easy for trans-national corporations, national business and political elites to erode the potential tax base (Christensen and Kapoor, 2004). The use of offshore tax havens by global corporations is depriving developing countries of some US$50 billion of tax revenues each year, large enough to free them from foreign aid, rising debt and poverty. This disables local governments to eradicate poverty, fight environmental degradation, and make vital investments in social services and economic infrastructure upon which human welfare and sustainable economic development depend (Sikka, 2003).

On the other hand, some people say the notion that offshore financial centres are damaging the legitimate interests of OECD nations through tax competition has no sound foundation in economic theory. Competition in tax matters is beneficial and world welfare enhancing which weeds out inefficient taxes (Dwyer, 2000). Tamas and Takats (2008) show that tax rate cut can broaden the tax base and increase tax compliance, thus increasing governments' tax revenue. Rose and Spiegel (2007) believe that proximity to OFCs is pro-competitive and promotes the efficiency of financial sector in the neighbouring countries, which is regarded as the unintended positive consequence. Tax havens and offshore finance centres also justify their existence by claiming to provide a role as conduits for investment assets entering the international capital markets (Christensen and Hampton, 2000).

As for money laundering, it is good in no way. This is why money laundering havens draw so much attention from the global financial institutions. Money laundering has devastating social consequences and is a threat to national security because it provides the fuel for drug dealers, terrorists, arms dealers, and other criminals to operate and expand their criminal enterprises.

Anyway, there are more voices criticizing the tax and money laundering havens than supporting and the pressure on them is increasing. It is natural to ask why these havens exist. Small countries, with small domestic financial sectors and limited natural resources, may choose to develop offshore business and become an OFC for a number of reasons. These include income generating activities and employment in the host economy, gaining access to international capital markets, attracting needed foreign technical expertise and skills, introducing an element of competition in domestic financial system and government revenue through licensing fees, etc. Indeed the more successful OFCs, such as the Cayman Islands and the Channel Islands, have come to rely on offshore business as a major source of both government revenues and economic activity (IMF, 2001).

Another question is that given the strong power of the onshore countries and dependency of the small economics on them, why they let these havens exist. Joan Susan, on the *economist* radio broadcast (June, 2007), said small offshore financial centres exist because big countries allow them to exist. If big countries really want to shut down their business, they could. But these countries choose not to do that. Sikka

(2003) also believes major nations certainly have powers to shackle tax havens. For example, after the September 11th, 2001 attacks on New York, the US government wanted information on the financial links of Osama Bin Laden and his organisation. The trail pointed to the Bahamas. When a Bahamas bank refused to open its records, the U.S. had it cut off from the world's wire transfer systems and the bank changed its mind within hours.

However, although most of the havens were well known in banking circles, wealthy nations had not agreed to identify them publicly. One concern is diplomatic protocol. Some countries, like Israel and Russia, have long been spared serious scrutiny because of their influence. Sometimes governments themselves use offshore financial centres, for example, to trade with other countries when it is not politically correct to do so or to protect themselves against the possibility of sanctions being imposed, as when Iranian assets were frozen in the United States (Dwyer, 2000).

Another concern is that some smaller island nations and territories are under the protection of their former colonial masters like Britain and France (Kahn, 2000). Many OFCs are British Crown Dependencies, or former colonies, and are generally protected by Western hegemons with major capital markets. As Hampton (1996) said the political space, the nature of the relationship between the offshore and its mainland onshore, is one of the most important determinants of the success to become an OFC. Combined with our analysis about the distance effect in section 3.2, we say the political relationship is more important than the geographical location. For example, Bermuda, Cayman Island, British Virgin Island and Turk and Caicos Islands, which used to be Crown Colonies, have successfully developed as OFCs. They are far away from U.K., but they are under the protection of the U.K. government. Although in recent years the United Kingdom has clearly come under pressure from its European partners to 'do something' about its dependent territories (Dwyer, 2000), the UK government has sought to pressurise them to reform their system of financial regulation and present a respectable face to the world rather than curb their role in facilitating flight of capital and global tax avoidance (Sikka, 2003).

6. Conclusion

This paper explores two data sets. One is cross-border asset holding, which is stock variable and the other is financial intermediation, which is flow variable. These two complementary data sets well reflected the motivation of international capital flows. Capital flows into OFCs not mainly for the tax evasion and money laundering purpose. OFCs attract investment and generate more revenues due to their lax and flexible regulation, good governance, stable political environment and most importantly their specialization in providing financial services. We conclude that the criticism on offshore financial centres for their notorious role in facilitating tax evasion and money laundering is overstated.

We also find that relaxing financial regulation in industrial countries and global efforts in regulating offshore finance have greatly eroded the competitive advantage of tax havens. Money laundering havens suffer from their bad reputations and this situation become worse as global cooperation against money laundering intensified. In contrast, other big and functional OFCs still have their own advantages like specialization in providing financial services. Like what Bryan Hunter – a manager of a law firm based in Cayman Islands – said, successful offshore financial centres uphold global transparency and cooperation standards and enable market efficiency and competition. It's time for offshore financial centres to focus more on improving their specialization in financial sectors.

Although most people think the offshore havens play a bad role in the global economic system, wealthy countries have not yet come into agreement to shut them down due to some political concerns.

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Appendix A: data sources

Distance, language, border, island, landlocked, area, tax haven, money laundering, and common law: http://faculty.haas.berkeley.edu/arose.

International internet bandwidth: International Telecommunication Union. It is defined as total capacity of international Internet bandwidth in Mega Bits Per Second

(Mbps). If capacity is asymmetric (i.e., more outgoing than incoming or more incoming than outgoing), the outgoing capacity is provided.

GDP, population, export and import:

http://ddpext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=135.

GDP growth rate and financial intermediation:

http://data.un.org/Browse.aspx?d=SNA&f=group_code%3a201%3bitem_code%3a13

Gini coefficient: http://www.wider.unu.edu/research/Database/en_GB/database/

Political stability, governance effectiveness, regulation quality, rule of law and corruption control: Governance Matters 2008, which is available at: http://info.worldbank.org/governance/wgi/index.asp.

Appendix B: Kuhn-Tucker Conditions

Lagrangian Function:

$$L = c_{1j} + \beta\sum_{i=1}^{N} s_{ij}(1+r_{ij}) - \beta\sum_{i=1}^{N} {s_{ij}}^2{\sigma_{ij}}^2 + \lambda_1(y_j - c_{1j} - \sum_{i=1}^{N} s_{ij}) + \sum_{i=}^{N} \lambda_{2i}s_{ij} + \lambda_3(c_{1j} - c_{0j})$$

First order condition:

$$\frac{\partial L}{\partial c_{1j}} = 1 - \lambda_1 + \lambda_3 = 0 \qquad (1)$$

$$\frac{\partial L}{\partial s_{ij}} = \beta(1+r_{ij}) - 2\beta s_{ij}{\sigma_{ij}}^2 - \lambda_1 + \lambda_{2i} = 0 \qquad (2)$$

$$y_j = c_{1j} + \sum_{i=1}^{N} s_{ij} \qquad (3)$$

$$\lambda_{2i}s_{ij} \geq 0; \lambda_{2i} \geq 0 \qquad (4)$$

$$\lambda_3(c_{1j} - c_{0j}) \geq 0; \lambda_{3\geq 0} \qquad (5)$$

We have three cases to consider:

Case 1: $\lambda_{2i} = 0$, $s_{ij} > 0$ and $\lambda_3 = 0$, $c_{1j} > c_{0j}$

Then $\lambda_1 = 1, s_{ij} = \dfrac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2}$, and $c_{1j} = y_j - \sum_{i=1}^{N} \dfrac{\beta(1+r_i)-1}{2\sigma_i^2}$.

To ensure $c_{1j} > c_{0j}$, y_j must be bigger than $\sum_{i=1}^{N} \dfrac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2} + c_{0j}$.

To ensure $s_{ij} > 0$, $\beta(1+r_{ij})$ must be bigger than 1.

In this case, s_{ij} is unrelated with y_j.

Case 2: $\lambda_{2i} = 0$ and $\lambda_3 > 0, c_{1j} = c_{0j}$

Then $s_{ij} = \dfrac{\beta(1+r_{ij})-\lambda_1}{2\beta\sigma_{ij}^2}$;

$$y_j - c_{0j} = \sum_{i=1}^{N} \frac{\beta(1+r_{ij})-\lambda_1}{2\beta\sigma_{ij}^2};$$

$$\lambda_1 = \frac{\sum_{i=1}^{N} \dfrac{\beta(1+r_{ij})}{2\beta\sigma_{ij}^2} - (y_j - c_{0j})}{\sum_{i=1}^{N} \dfrac{1}{2\beta\sigma_{ij}^2}};$$

$$s_{ij} = \frac{\beta(1+r_{ij}) - \dfrac{\sum_{i=1}^{N} \dfrac{\beta(1+r_{ij})}{2\beta\sigma_{ij}^2} - (y_j - c_{0j})}{\sum_{i=1}^{N} \dfrac{1}{2\beta\sigma_{ij}^2}}}{2\beta\sigma_{ij}^2} = \frac{(1+r_{ij})}{2\sigma_{ij}^2} - \frac{\sum_{i=1}^{N} \dfrac{(1+r_{ij})}{2\sigma_{ij}^2}}{\sigma_{ij}^2 \sum_{i=1}^{N} \dfrac{1}{\sigma_{ij}^2}} + \frac{y_j - c_{0j}}{\sigma_{ij}^2 \sum_{i=1}^{N} \dfrac{1}{\sigma_{ij}^2}};$$

To ensure $s_{ij} > 0$, y_j must be bigger than $c_{0j} - \dfrac{(1+r_{ij})\sum_{i=1}^{N} \dfrac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N} \dfrac{(1+r_{ij})}{2\sigma_{ij}^2}$;

Case 3: $\lambda_{2i} > 0$, $s_{ij} = 0$.

This happens when $y_j < c_{0j} - \frac{(1+r_{ij})\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2}$.

In conclusion, when $y_j < c_{0j} - \frac{(1+r_{ij})\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2}$, $s_{ij} = 0$;

When $c_{0j} - \frac{(1+r_{ij})\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}}{2} + \sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2} < y_j < \sum_{i=1}^{N}\frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2} + c_{0j}$,

$s_{ij} = \frac{(1+r_{ij})}{2\sigma_{ij}^2} - \frac{\sum_{i=1}^{N}\frac{(1+r_{ij})}{2\sigma_{ij}^2}}{\sigma_{ij}^2\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}} + \frac{y_j - c_{0j}}{\sigma_{ij}^2\sum_{i=1}^{N}\frac{1}{\sigma_{ij}^2}}$;

When $y_j > \sum_{i=1}^{N}\frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2} + c_{0j}$, $s_{ij} = \frac{\beta(1+r_{ij})-1}{2\beta\sigma_{ij}^2}$

So s_{ij} is phase function of y_j.

Appendix C

Table 2B Allowing parameter shifting (h: host country; s: source country)

Variable	model21	model22
lgdppc (h)	1.29***	.784***
lpop (h)	.729***	.728***
lgdppc (s)	2.03***	1.19***
lpop (s)	.801***	.47***
larea (h)	.188***	.134***
larea (s)	.0493***	.0924***
linba (h)	.0621***	.279***
linba (s)	.0427*	.0952***
openness (h)	.00404***	0.00062
openness (s)	.00659***	.0042***
ofc (h)	.485***	.658***
ofct2 (h)	-0.203	-0.0137
ofct3 (h)	0.199	.634***
ofct4 (h)	0.275	.676***
ofct5 (h)	.632***	.47**
ofct6 (h)	1.17***	1.34***
oftc (s)	.967***	.731***
ofct2 (s)	-.35**	.534***
ofct3 (s)	-.294*	1.18***
ofct4 (s)	-.301*	.662***
ofct5 (s)	-0.127	.843***
ofct6 (s)	-.491*	.966***
taxhaven (h)	1.9***	.644***
tt2 (h)	0.326	0.233

tt3 (h)	-.975**	-1.38***
tt4 (h)	-1.11***	-1.19***
tt5 (h)	-1.5***	-.971***
tt6 (h)	-1.95**	-1.43*
taxhaven (s)	1.3***	2.3***
tt2 (s)	-0.33	-2***
tt3 (s)	-0.641	-1.92***
tt4 (s)	-.981**	-3.39***
tt5 (s)	-.912**	-2.27***
tt6 (s)	0	0
moneyl (h)	-.715***	-.368*
mt2 (h)	-0.177	-0.212
mt3 (h)	.618**	0.41
mt4 (h)	.501*	0.193
mt5 (h)	.476*	0.132
mt6 (h)	0.57	0.651
moneyl (s)	0.00713	0.21
mt2 (s)	1.03***	0.27
mt3 (s)	1.09***	0.317
mt4 (s)	1.56***	-.609***
mt5 (s)	1.54***	-.739***
mt6 (s)	4.21***	4.24***
ldist	-.89***	-1.01***
comlang	.724***	.751***
border	.875***	1.2***
comcol	1.28***	.622***
island (h)	.213***	.287***
island (s)	.398***	.363***
landl (h)	.0818**	-0.0085
landl (s)	.0807**	.134***
polstab (h)	-.00606***	.0112***
polstab (s)	0.00034	-.00962***
goveff (h)	0.00181	-.00601**
goveff (s)	-.0569***	-.0279***
regqua (h)	.0279***	.0202***
regqual (s)	.00866**	.0153***
rulelaw (h)	-0.00555	-0.00471
rulelaw (s)	.0518***	.038***
corrupcontr	-.0106***	.00403*
corrupcontr	-0.00851	-.0076*
commonl (h)	-.28***	-.225***
commonl (s)	-.138*	-.521***
t2	0.12	0.0435
t3	-.219***	-.438***
t4	-.662***	-.722***
t5	-.938***	-1.31***
t6	-1.05***	-1.37***
_cons	-37.2***	-23.5***
Adjusted R^2	0.617	0.629
rmse	2.25	2.92
N	12691	28444

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

Figure 2

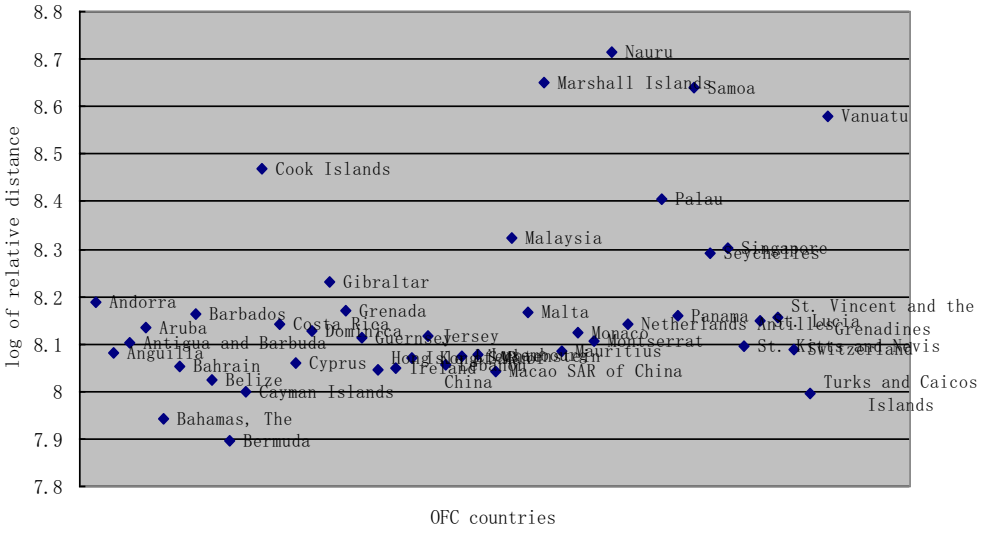

Figure 3