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# The Missing Wealth of Nations: Evidence From Switzerland, 1914-2010

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## Abstract

This paper draws on direct evidence from Swiss banks and on systematic inconsistencies in international accounts across countries to document the level of unrecorded wealth in tax havens, its nature and its evolution. I find that 8% of global household net financial wealth is held in tax havens, of which one third in Switzerland. The bulk of offshore assets are invested in equities, in particular mutual fund shares. For this reason, 20% of all cross-border equities have no identifiable owner in international statistics across the world. Taking into account tax havens alters dramatically the picture of global imbalances: with minimal assumptions, it is possible to turn the world's second largest debtor, the eurozone, into a net creditor. With stronger assumptions, the largest debtor, the U.S., can be made a balanced economy. Europeans are richer than we think, because a significant part of their wealth has historically been held where domestic national accountants and tax authorities cannot see it.

**Keywords:** Tax havens, External assets, Wealth distribution, Tax evasion.

**JEL classifications:** D31, F32, H26, H87, N24.

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\*This is a preliminary draft. All comments are welcome (zucman@pse.ens.fr).

# 1 Introduction

This paper attempts to incorporate tax havens in the analysis of wealth distribution. The first objective is to document the amount of household wealth held in tax havens, in a global and historical perspective. How can we measure it? How big is it? How does it affect our knowledge of the distribution of wealth and of its evolution, both within and across countries?<sup>1</sup>

The second objective is to understand what drives the relocation of wealth overseas. Are tax havens a necessary byproduct of globalization? What are the economic processes that allow us to understand their development? Will tax havens absorb an ever growing fraction of world wealth, and globalization make ultimately capital untaxable?

To gain insight on these questions, this paper makes two contributions. The first is a simple international accounting exercise. I explain, in a unified framework, how the existence of tax havens creates systematic, large and robust inconsistencies in international accounts across countries, and how these anomalies can be used to compute the global stock of private wealth held in tax havens.

The mechanism is straightforward, as the following example shows. When a French household has an investment account in Switzerland, and owns a U.S. equity through his offshore account, a double inconsistency arises. First, France underestimates its foreign assets, because its national accountants have no way to capture such offshore holdings. At the same time, U.S. accountants properly record a foreign liability: they are aware that the rest of the world owns a U.S. equity. Therefore, more cross-border liabilities are recorded globally than assets. Second, the U.S. Treasury records a foreign liability vis-à-vis Switzerland, though Switzerland is nothing more but a conduit, and as such records no foreign asset on the U.S. Therefore, the bilateral U.S.-Switzerland data are inconsistent.

I explain precisely each step of this argument, and put figures on it. Combining readily available data on foreign securities assets and liabilities for almost all countries with new estimates for the few countries with no data, I show that each year between 2001 and 2008, and for each asset class, global identified securities assets are lower than liabilities. The discrepancy is particularly large for equities (20%), less for bonds (6-10%), and important in absolute terms (more than USD 5,000bn in 2007). It has no other plausible explanation than the non-recording of households' offshore assets, suggesting that 8% of global household net financial wealth is held unrecorded in tax havens. And in 1974 – a time when Switzerland accounted for 1% of world GDP –, 30% of all foreign investments

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<sup>1</sup>“Tax havens are low-tax jurisdictions that offer businesses and individuals opportunities for tax avoidance” (Hines, 2008). In this paper, I will use the expression “tax haven” and “offshore financial center” interchangeably (the list of tax havens considered by Dharmapala and Hines (2009) is essentially identical to the list of offshore financial centers considered by the Financial Stability Forum (IMF, 2000), barring minor exceptions). The term “countries” will refer to nations, territories, colonies, etc.

in U.S. equities were recorded by the U.S. Treasury as being owned by Switzerland. The bulk belonged to unidentifiable persons using Swiss banks as conduit. This anomaly reveals the central role historically played by Switzerland in the cross-border wealth management market.

The second contribution of this paper is to link the global inconsistencies in international accounts to direct evidence from Swiss banks, and use the Swiss historical experience to shed light on what drives the development of tax havens. I show that as of today, 1/3 of the estimated stock of offshore assets can be traced back to Switzerland, and that contemporary direct evidence from Swiss official statistics are fully coherent with what one obtains by analyzing discrepancies in international accounts across countries. I construct a yearly series on the fortunes managed by Swiss banks spanning one century (1914-2010), by linking in a systematic way official national accounts and capital market statistics with Swiss banks' archive records, gathered by the two international committees for whom the Swiss bank secrecy has ever been lifted. To my knowledge, this is the first time that any such series is constructed for any country.

One advantage of looking at such long times series is that they allow to debunk a certain number of widely held views that remained untestable. The data do not support the view that Switzerland played the role of a safe haven during the wars, nor that Swiss bank accounts protected savers from the high inflation rates of the interwar and post-World War II periods. We observe huge inflows in Swiss accounts during the second half of the 1920s and during the 1930s, for which the most compelling explanation is pure and simple tax evasion. After a brief decline in the immediate aftermath of World War II, Switzerland experienced continuous and massive inflows of foreign funds until the mid-1980s. Since then, inflows seem to have stabilized.

The factors driving the relocation of wealth in Switzerland during the second half of the twentieth century seem to be more complex than in the 1920s-1930s. Gulf countries, where there is no income tax, have had important holdings since the 1970s, although around 60% of all foreign fortunes managed in Switzerland still belong to Europeans. In practice, the amount put in Swiss banks appears to be highly correlated with distance. At this stage, we cannot say much more: the growing complexity of financial structures used for holding offshore bank accounts makes more and more difficult to know precisely which countries' residents use Swiss banks.

Based on the finding that distance matters, I make several scenarios on who owns the estimated stock of global unrecorded offshore assets as of 2005. Given that the biggest cross-border wealth managements centers are in Europe (Luxembourg, the U.K. and its dependencies, in addition to Switzerland), reasonable estimates attribute between 35% and 55% of the missing stock of foreign claims to euro area countries. In most cases, this is enough for the eurozone to be a net international creditor, instead of the large net debtor portrayed by official statistics. This illustrates how taking into account overseas assets is

likely to be an essential part of the empirics of external wealth and global imbalances.

Why should macroeconomists care? Because reliable international accounts are a key tool for monitoring financial stability. The very large net external liabilities recorded by several European countries have prompted fears of an implosion of the eurozone and stand at the core of Europe's debt crisis. Against this backdrop, properly measuring external assets is essential. From a policy viewpoint, offshore tax evasion has gained importance in the aftermath of the financial crisis and of high-profile scandals across the world. But it is difficult to design policies and impossible to monitor their results if we have no quantitative idea of what they target.

The remainder of this paper is organized as follows. In section 2, I relate this work to the existing literature. Section 3 shows how discrepancies in international investment positions across countries can be used to estimate the global stock of households' assets managed offshore. Section 4 analyzes the Swiss experience. Section 5 applies the findings of the two previous sections to the distribution of external and domestic wealth. Section 6 concludes. A supplementary data appendix presents additional details on the data sources used in this research and series construction methodologies.

## 2 Related literature

### 2.1 External wealth and global imbalances

This paper is part of a new literature on the empirics of external wealth, pioneered by Lane and Milesi-Ferretti (2001), that documents the rise of cross-border positions, the widening of global imbalances, and the important role of offshore financial centers as conduit for international asset trade (Lane and Milesi-Ferretti, 2010). Though huge progress has been made in recent years, significant uncertainties remain on the distribution of foreign wealth between countries. That rich countries are on aggregate international debtors remains deeply puzzling, for it goes against the basic theory of the international allocation of capital. Is there a problem with the data?

First, Lane and Milesi-Ferretti (2007) make the key observation that cross-border recorded assets are significantly less than liabilities. This inconsistency has been a long-standing concern to the statisticians of the International Monetary Fund (IMF), who observe since the 1980s its flow counterpart, i.e. that more cross-border capital income is paid than received globally (Motala, 1997). There are many other inconsistencies in international accounts across countries; all of them have several possible explanations, described in various technical reports.<sup>2</sup> The first contribution of the present paper is to show how all the peculiarities in international accounts make a fully consistent whole, and how they can be used to infer reliably the stock of personal wealth held offshore,

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<sup>2</sup>See IMF (1987; 2001; 2002; 2003) and Bertaut et al. (2006).

an exercise which had not been undertaken before. I start from the observed anomalies, and show that large inconsistencies remain after providing simple corrections for all their identified causes *but* the fact that some individuals have unrecorded accounts in tax havens. In particular, it is well understood that some anomalies are due to incomplete country coverage,<sup>3</sup> so I derive and use new estimates of the bilateral cross-border securities assets for all countries with no or incomplete official data (most notably China, Middle Eastern oil exporters, and the Cayman Islands).

Second, there is a controversy on the external balance sheet of the U.S. Hausmann and Sturzenegger (2007) claim that U.S. foreign assets are drastically understated: in their view, since the U.S. investment income balance is positive, it must be that the U.S. has a positive net foreign asset position.<sup>4</sup> The present paper goes in the same direction (rich countries are likely to be richer than we think), but for different reasons. While Hausmann and Sturzenegger (and more recently McGrattan and Prescott (2010)) stress the role of unrecorded intangible capital (such as reputation, know-how, marketing expertise, etc.), this paper argues that rich countries (including the U.S.) miss a very standard form of foreign wealth, i.e. the portfolio assets held by their wealthy citizens in foreign banks.

## 2.2 Income distribution and tax evasion

This paper is also related to the literature on the distribution of income and wealth within countries and in the long run of history (Atkinson et al., 2010). This international research project, pioneered by Piketty (2003), uses tax records to produce homogenous series on the share of income and wealth accruing to the top fractiles.

By definition, the methodology used in these papers gives the distribution of top reported incomes/assets, not top economic incomes and assets. How does tax evasion interact with tax-based distributions? Why did the rise in top income shares did not apparently produce a rise in top wealth shares in the U.S. (Kopczuk and Saez, 2004)? Is it because it has become easier to conceal capital and capital income to tax authorities? Or is the correlation between the development of tax havens and the non-recovery of top wealth shares fortuitous?

We still know very little on these questions. Tax evasion is difficult to measure in general.<sup>5</sup> Even the highest quality audits cannot detect income earned on accounts in foreign countries with bank secrecy. What we learn from audits is mainly the extent of tax fraud by the self-employed, the recognition of which is unlikely to change much top income and asset shares. On the contrary, offshore private wealth may have much bigger

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<sup>3</sup>For instance, Milesi-Ferretti et al. (2010) show that a large amount of euro area portfolio liabilities have no recorded owners in the IMF Coordinated Portfolio Investment Survey, and conjecture that this is primarily due to its incomplete coverage.

<sup>4</sup>See Curcuru et al. (2008) for a critical assessment.

<sup>5</sup>See Slemrod (2007) for a review.

consequences, since (i) offshore accounts probably belong to very wealthy individuals, who play a key role in the long run evolution of income distributions; (ii) tax evasion on self-reported income tends to be significant (Kleven et al., 2010), and (iii) the probability of being detected is close to nil.

The most important effort so far to incorporate tax havens in distribution studies is a paper by Dell et al. (2007) that uses Swiss tax data to put an upper bound on the amount of capital income earned in Switzerland by non-resident taxpayers. This upper bound turns out to be one order of magnitude smaller than what I estimate in the present paper using bank data. A second attempt is by Roine and Waldenström (2009), who use inconsistencies in the Swedish balance of payments and national accounts to estimate the amount of unrecorded wealth held by Swedish residents overseas. In their upper bound scenario, this raises the top 1% wealth share by 50% (i.e. from 20% of domestic wealth to 30% of domestic wealth in 2004).

## 2.3 Capital flight

Roine and Waldenström (2009) follow an extensive and influential literature on capital flight that has developed in the 1980s (Cuddington, 1986; Dooley, 1988), with a focus on developing countries (Boyce and Ndikumana, 2001; Collier et al., 2001).<sup>6</sup> Authors in this field use discrepancies within a country’s balance of payments (BOP) to capture potentially unrecorded, illegal or destabilizing outflows. In particular, a negative “net errors and omissions” line in the BOP is seen as evidence of unrecorded transfers of assets abroad.

This paper departs from this approach by focusing on inconsistencies between countries rather than within countries, on stock positions rather than on flows, and on a well-identified kind of wealth, namely securities (equities, including mutual fund shares, and bonds). I hope to convince the reader that it is more compelling from a methodological viewpoint. First, errors and omissions can capture many things not related to capital flight, and, conversely, transfers of wealth overseas need not be captured by the “net errors and omissions” line.<sup>7</sup> The various components of a balance of payments are to a large extent determined jointly: many parts of the BOP are estimated, and the estimates can be chosen so as to minimize certain inconsistencies, while leaving some others.

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<sup>6</sup>Many reports that try to estimate the amount of wealth in tax havens use the methods developed by the 1980s capital flight literature, see for instance *Tax Havens and Development* (2009), a preliminary report from the Norwegian Commission on capital flight from developing countries, [http://www.regjeringen.no/upload/UD/Vedlegg/Utvikling/tax\\_report.pdf](http://www.regjeringen.no/upload/UD/Vedlegg/Utvikling/tax_report.pdf).

<sup>7</sup>For instance, the simplest way of moving assets abroad, i.e. carrying banknotes, is never recorded in the balance of payment (neither as a credit, nor as a debit), hence absent from net errors and omissions. Moreover, transfers of large sums of money in offshore banks are routinely recorded in the financial account of the BOP, both as credits and debits in the financial account. In practice, it is not possible to disentangle cross-border wire transfers that correspond to capital flight from routine operations of domestic financial institutions.

On the contrary, international accounts are established independently across countries; discrepancies between countries cannot be considered as statistical conventions. Second, given the structure of international securities markets, the value and ownership of any traded equity issued by country  $j$  and held by  $i$  should be recorded absolutely identically by  $i$ 's and  $j$ 's statisticians. I show that the discrepancies arising in this setting can be transparently interpreted.

## 2.4 Tax havens

Fourth, this paper is part of the positive literature on tax havens, that has mainly focused so far on how multinational corporations use preferential tax and legal systems, particularly through profit shifting in low tax countries.<sup>8</sup> Most results show that international tax avoidance by multinational corporations is widespread. Are tax havens as intensively used by rich individuals? Or have recent policy initiatives been successful at curbing personal tax evasion?

A burgeoning literature uses the European Union savings directive (the biggest cooperative effort so far to limit international tax avoidance on capital income) to analyze how offshore accounts react to increased taxation (Johannesen, 2010; Hemmelgarn and Nicodème, 2009; Klautke and Weichenrieder, 2010), with mixed results.<sup>9</sup> I add to this literature by showing that the Swiss bank accounts explicitly targeted by the directive have largely remained in Switzerland untaxed, suggesting that the directive has been ineffective so far.

## 2.5 Capital taxation

Finally, this paper relates to the literature on capital taxation in an open economy. If there exists a capital income tax, is it better to tax incomes generated by the capital physically located at home (source-based tax)? Or incomes earned by domestic residents on all their assets, domestic and foreign (residence-based tax)? Diamond and Mirrlees (1971) show that a small economy should not levy any source-based tax; on normative grounds, a residence-based tax is more appealing. But many point to the fact that a residence-based tax is not enforceable, because residents can move their assets offshore (Gordon, 1992; Griffith et al., 2008). And *de facto*, residence-based capital income taxes have been reconsidered, with many countries opting for a dual system, in which capital income is taxed at a flat rate and only labor income remains subject to a progressive tax schedule.

By providing quantitative evidence on households' offshore savings, this paper hopes

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<sup>8</sup>The first paper is by Hines and Rice (1994), followed e.g. by Desai et al. (2006) and Dischinger and Riedel (2010).

<sup>9</sup>See also Huizinga and Nicodème (2004).

to clarify the magnitude of one important element of the behavioral reaction to residence-based income taxes.

### 3 Estimating the amount of private wealth in tax havens

#### 3.1 Conceptual framework

First, let's recall the basic definitions and accounting concepts that will be used throughout the paper. A country's foreign assets and liabilities are recorded in its international investment position (IIP), which is the stock equivalent of the balance of payments (BOP). Holdings are classified according to the IMF (1993) guidelines, just as transactions are in the financial account of the BOP. On the asset side, compilers distinguish between direct investment (equity participations above 10%), portfolio investments (equity and debt securities held outside a direct investment relationship), other assets (loans, deposits, trade credit...), financial derivatives, and reserve assets (gold, special drawing rights, reserve deposits in the IMF, as well as foreign currencies – including foreign securities held by official monetary institutions). On the liability side, there is no “reserve” line.

Consider a world with  $1, \dots, i, \dots, n$  countries that all publish international accounts complying with the IMF guidelines and have the same data collection methods. These methods are the following (IMF, 2002). Each country's data collection system covers some agents directly and others indirectly. Direct reporters provide data on their own assets (i.e. foreign claims that are on their balance sheet), and possibly on their clients' assets (i.e. foreign claims that are off their balance sheet, but that they can observe). Most actors of the financial sector (especially banks, investment funds and insurance companies) are direct reporters, as well as the government, whereas households are only indirectly covered, for practical reasons. Nonfinancial corporations may be directly or indirectly covered, depending on their size and on national legislations.

Consider the amount  $A_{ij}$  of foreign securities issued by country  $j$ , owned by residents of country  $i \neq j$ , excluding securities held as “direct investment”, but including the fraction of  $i$ 's reserve assets invested in securities.  $A = \sum_i \sum_{j \neq i} A_{ij}$  corresponds basically to the stock of all traded securities for which the issuer and the owner reside in two different countries (for instance  $A$  includes all Chinese holdings of U.S. Treasury bonds, but excludes equity participations of a parent company on its foreign subsidiary, which are not traded). We can write  $A_{ij}$  as the sum of all securities owned by the directly surveyed agents ( $a_{ij}$ ) and the indirectly surveyed ( $\tilde{a}_{ij}$ ):

$$A_{ij} = a_{ij} + \tilde{a}_{ij}$$

Each category of agent entrusts all its securities to either domestic or foreign banks

for custody.<sup>10</sup> Securities held by custodian banks on behalf of third-parties (i.e. which are not part of their own trading portfolio) do not appear on their balance sheets: securities custody is one of the oldest, simplest, and biggest off-balance sheet business of banks.

Why would households want to entrust their portfolios to foreign custodians? Some banks (often called private banks) provide high value-added financial services (such as investment advice and tax planning), and compete worldwide to attract wealthy individuals' assets. One important service offered is a confidentiality service, which includes an option not to pay taxes. In most non-haven countries, domestic custodians automatically pass on relevant information to domestic and foreign tax authorities, in particular interests and dividends earned by their clients during the fiscal year. This third-party reporting makes evading residence-based capital income taxes impossible. Conversely, haven-based banks don't exchange information with tax authorities: tax evasion is possible.

Let us indicate the residence country of the custodian with a superscript letter:

$$A_{ij} = \sum_k A_{ij}^k = \sum_k (a_{ij}^k + \tilde{a}_{ij}^k) = [a_{ij}^i + \tilde{a}_{ij}^i] + \sum_{k \neq i} (a_{ij}^k + \tilde{a}_{ij}^k) \quad (1)$$

At the end of equation 1, the first term between brackets refers to claims of  $i$  on  $j$  held onshore, the second to claims of  $i$  on  $j$  held offshore. For instance, an indirectly-surveyed agent of country  $i$ , say a French household, can own a share issued by a resident of country  $j$ , say a U.S. auto industry, and use a custodian located in  $k$ , say a Swiss bank: this kind of claim is part of  $\tilde{a}_{ij}^k$ ; it is a foreign offshore asset of France.

Following the IMF guidelines, such a claim must be considered as an asset of France on the U.S. and a liability of the U.S. vis-à-vis France – the location of the custodian is conceptually irrelevant. The international accounting framework intends to capture the geography of cross-border investment positions, not the geography of custodians. Moreover, it is crucial to understand that by entrusting its U.S. equities to a Swiss custodian, the French household does not own any claim on Switzerland, and Switzerland has no liability vis-à-vis France.<sup>11</sup>

In practice, what do national accounts compilers record?

First, in country  $i$ , all assets belonging to direct reporters, whether held onshore or offshore, are well measured, absent any random noise. Moreover, capturing  $\tilde{a}_{ij}^i$ , the

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<sup>10</sup>Until the 1960s, all securities existed in the form of paper certificates whose owners wanted to put in a safe place, usually a bank vault. Keeping their clients' certificates safe was the custodians' job. Today, paper has almost everywhere been replaced by electronic records, but investors still use custodian banks to maintain the record of what they own and other low valued-added services (timely information on corporate events, proxy-voting at shareholders' meetings, etc.). For a complete description of the securities custody industry, see Chan et al. (2007).

<sup>11</sup>Things are different if the French household buys a share of a Swiss mutual fund: then, this is an asset of France on Switzerland and vice versa. But the mutual fund share must then be entrusted to a custodian bank; if it is entrusted to a Swiss bank, then it is "offshore" and will be missed by French accountants.

securities held onshore by indirectly surveyed agents, is straightforward: IIP compilers just need to ask custodian banks to report them. Problems start when indirectly surveyed agents use foreign custodians, since their assets cannot be captured by surveying domestic banks anymore. This is a blind spot of national accounts. Let's denote with a hat domestic statisticians' estimations, and make the assumption that all direct reporters' assets and indirect reporters' onshore assets are accurately measured: for all  $k$ ,  $\hat{a}_{ij}^k = a_{ij}^k$ , and  $\hat{\tilde{a}}_{ij}^i = \tilde{a}_{ij}^i$ . Then, we have:

$$\hat{A}_{ij} = [a_{ij}^i + \tilde{a}_{ij}^i] + \sum_{k \neq i} a_{ij}^k = A_{ij} - \sum_{k \neq i} \tilde{a}_{ij}^k \quad (2)$$

Second, in country  $k$ , statisticians ask domestic banks to report on the stock of securities that they have in custody. They observe that foreigners use domestic banks to invest abroad. This is a foreign-foreign business, that takes place purely off-balance sheet on the domestic territory. By complying with the IMF guidelines, they fully disregard these holdings when compiling  $k$ 's international investment position.<sup>12</sup>

Table 1 applies the above framework to two countries: France and Switzerland. In 2004, France's total foreign securities assets recorded in its IIP ( $\hat{A}_i = \sum_{j \neq i} \hat{A}_{ij} = \text{USD } 1,606\text{bn}$ ) equaled roughly the value of all foreign securities in custody in French banks ( $\text{USD } 1,477\text{bn}$ ).<sup>13</sup> On the contrary, foreign securities managed by Swiss banks ( $\text{USD } 1,774\text{bn}$ ) were 2.4 times bigger than foreign securities recorded in the Swiss IIP ( $\text{USD } 746\text{bn}$ ). 2/3 of all foreign securities managed by Swiss banks belonged to foreigners, only 1/3 to clients of Swiss banks with a Swiss address.

Finally, in country  $j$ , statisticians mistakenly record holdings of  $i$  on  $j$  held through custodians in  $k$  as liabilities vis-à-vis  $k$  (that I write  $L_{jk}$ ). This is due to the way cross-border securities are settled. As a general rule, all traded securities issued by residents of any country  $j$  are ultimately held by  $j$ 's central securities depository (CSD).<sup>14</sup> Any entity involved in the trading of securities issued by  $j$  must have an account with  $j$ 's CSD. Now, because national regulations usually forbid foreigner to access domestic CSDs, foreign custodians use domestic sub-custodians to settle domestic securities transactions. For instance, if a French household owns a share of a U.S. company and uses a French

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<sup>12</sup>Some data collection systems do not even ask domestic custodians to report the amount of foreign securities held by foreigners, since this information is useless for the compilation of national accounts. Note also that it is the reason why even if tax havens published comprehensive national and international accounts, this would still fall short of giving us a complete picture of their activity.

<sup>13</sup>This was the product of two effects: 25% of France's recorded foreign assets were held by direct reporters offshore (mainly international bonds held in Luxembourg and Belgium); and 19% of all foreign securities managed by French custodians belonged to foreigners (3 of the 10 biggest global custodians are French).

<sup>14</sup>CSDs were created (often in the 1960s) in order to immobilize the securities certificates in one central place, avoiding the moving of massive quantities of paper between custodian banks. They keep the ultimate record of ownership. There is one but important exception to the rule that  $j$ 's CSD holds all securities issued by  $j$ : many international bonds are held in one of the two international CSDs, Euroclear Bank in Belgium and Clearstream in Luxembourg, irrespective of the country of their issuer.

custodian bank, the French bank will entrust the U.S. share to a U.S. sub-custodian that will have an account with the U.S. CSD. When surveying U.S. custodians, U.S. statisticians will record a foreign liability vis-à-vis France. But if the French household uses a Swiss custodian, they will be unable to look through it, and record a liability vis-à-vis Switzerland. This gives birth to the well-known custodial center bias in bilateral portfolio positions (Bertaut et al., 2006): too many liabilities are recorded by the U.S. vis-à-vis Switzerland, too little vis-à-vis France.<sup>15</sup>

Note, however, that whatever the custodian used by the investor, it is fairly easy for  $j$  to measure accurately its total foreign portfolio liabilities: relatively few agents issue securities (households don't), this is a standard balance sheet information, and the centralized settlement system means that most foreign-owned securities can be observed by surveying domestic custodians. So I will assume that  $\hat{L}_j = L_j$ . What is difficult is to identify the beneficial owner. Disregarding all errors at the bilateral level except for the custodial center bias, recorded portfolio liabilities of  $j$  vis-à-vis  $k$  are equal to all securities issued by  $j$  and in custody in  $k$ , irrespective of who owns them:

$$\hat{L}_{jk} = \sum_m A_{mj}^k \quad (3)$$

We can now see that cross-border securities custody provokes two inconsistencies in the global set of international accounts. The first one is the world securities asset gap. By definition, at the global level, total cross-border securities assets should equal liabilities. But in practice, following equations 2 and 3,

$$\sum_j \sum_{i \neq j} \hat{L}_{ji} - \sum_i \sum_{j \neq i} \hat{A}_{ij} = \sum_i \sum_{j \neq i} \sum_{k \neq i} \tilde{a}_{ij}^k = \Omega \quad (4)$$

As long as international accounts compilers accurately measure what they can, the discrepancy between global recorded securities liabilities and assets captures exactly the amount of securities held offshore by households (possibly through shell corporations, trusts, etc. which are indirectly surveyed as well), that I note  $\Omega$ .

The second inconsistency is the bilateral securities asset-liability imbalance. Combining equations 1, 2 and 3 yields:

$$\hat{L}_{jk} - \hat{A}_{kj} = \sum_{m \neq k} a_{mj}^k + \sum_{m \neq k} \tilde{a}_{mj}^k - \sum_{i \neq k} a_{kj}^i \quad (5)$$

Everything else equal,  $\hat{L}_{jk}$  is bigger than  $\hat{A}_{kj}$  if  $k$  is used as a custodian by foreign (non  $k$ ) agents. These agents can be directly surveyed in their home countries (French banks keep some of their U.S. bonds in custody in Luxembourg) or indirectly surveyed

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<sup>15</sup>The custodial center bias must be distinguished from the bigger transaction center bias: because a great deal of cross-border asset trade takes place through financial intermediaries located in London, the U.K. appears disproportionately in financial flow data; see Warnock and Cleaver (2003).

agents (French households use Luxembourgish banks). In both cases, cross-border custody artificially inflates the liabilities recorded by  $j$  vis-à-vis  $k$ . A third factor can go in the opposite direction and make  $\hat{L}_{jk}$  smaller than  $\hat{A}_{kj}$ : it occurs when directly surveyed agents of  $k$  entrust their securities to foreign custodians. When French banks entrust their U.S. securities to Luxembourgish banks, the U.S. records less liabilities vis-à-vis France than France records U.S. assets. Aggregating at the global level, the first and third effect offset each other, and we are left with the global asset gap  $\Omega$ .

Finally, note that  $L_j - \sum_{i \neq j} \hat{A}_{ij}$  gives the amount of private offshore wealth invested in  $j$  (i.e. the value of all securities issued by  $j$  that have no identifiable owners).

## 3.2 Data

To estimate  $\Omega$ , we simply need to collect the aggregate foreign securities assets and liabilities of all countries. To know where the missing wealth is invested, we need, in addition, a full bilateral breakdown of all countries' cross-border securities holdings.

I construct sixteen  $239 \times 239$  ( $\hat{A}_{ij}$ ) matrix that summarize the comprehensive global pattern of cross-border securities investments. Each matrix gives the recorded or estimated value of the foreign securities owned by 239 host countries (including one line for the securities held on aggregate by international organizations) and issued by 239 source countries. There is one matrix per year over 2001-2008 and per instrument (debt, equity).

The main data source is the Coordinated Portfolio Investment Survey (CPIS), organized under the auspices of the International Monetary Fund. Conducted yearly since 2001, it gives the bilateral portfolio holdings of 74 source countries (in 2008) on up to 239 hosts. The CPIS is complemented by a survey of the securities held by official monetary authorities as foreign exchange reserve and by international organizations. It is one of the most widely used dataset for the study of external wealth; the reader is referred to the CPIS guide (IMF, 2002), to previous studies using this dataset (for instance Lane and Milesi-Ferretti (2008)) and to Appendix A of this paper for further details.

The main weakness of the CPIS is its limited coverage. The Cayman Islands reports only the securities held by the non-bank sector, disregarding its very large mutual fund industry (more than 9,000 mutual funds registered in 2008); in practice, it is as if the Cayman Islands was not participating. And, importantly, China, Middle Eastern oil exporters, Taiwan, and the British Virgin Islands do not participate yet.

I supplement the CPIS by gathering all available information on the portfolio and reserve holdings of non-participating countries (and the Cayman Islands): published international investment position, the updated and extended External Wealth of Nations database compiled by Lane and Milesi-Ferretti (2007) (covering 178 countries), central bank reports, and liability surveys of counterpart countries.

The general method to fill the gaps is the following. When a reliable estimate of

aggregate securities holdings  $\hat{A}_i$  exists, I use it. I then use a gravity-like model of bilateral portfolio assets holdings to construct estimated bilateral private (i.e. non reserve) positions. The model is of the form:

$$\log(1 + A_{ij}) = \phi_j + \theta_t + \beta Z_{ijt} + \gamma X_{it} + \epsilon_{ijt} \quad (6)$$

where  $A_{ij}$  denotes private portfolio holdings of country  $i$  on country  $j$ ,  $\phi_j$  denotes host-country fixed-effects,  $\theta_t$  year fixed-effects,  $Z_{ijt}$  is a vector of bilateral controls, and  $X_{it}$  a vector of source-level controls.<sup>16</sup>  $X_{it}$  includes  $i$ 's population, latitude, GDP per capita, whether it is landlocked, and whether it is an offshore financial center (OFC).  $Z_{ijt}$  includes the *log* of distance, the *log* of the GDP gap and of the GDP per capita gap, the longitude gap (a proxy for time zone differences), as well as dummies indicating a common language, the existence of a colonial relationship, whether  $i$  and  $j$  are both industrial countries, and an interacted term  $OFC_i \times \phi_j$ . I estimate the model on the full CPIS dataset (including offshore centers, contrary to the previous literature), separately for debt and equity, and use its predictions to generate the missing bilateral private positions.

When there is no reliable  $\hat{A}_i$ , I estimate it in two steps. First, I compute  $i$ 's holdings of U.S. securities using the Treasury International Capital (TIC) survey of U.S. portfolio liabilities.<sup>17</sup> Second, when most assets are privately held, I estimate the share of the U.S. in  $i$ 's portfolio using the gravity-like model described above.

For instance, on December 31st, 2008, the U.S. recorded USD 213bn of equity liabilities vis-à-vis the Cayman Islands and 494bn of portfolio debt liabilities; the gravity-based model predicts a U.S. share of 46% for equities and 62% for debt, implying total Caymanian holdings of USD 1,253bn.<sup>18</sup> The model also predicts substantial investments of the Cayman Islands in the U.K., and important equity holdings on several offshore centers (the British Virgin Islands, Bermuda), reflecting the fact that many Caymanian funds invest in other offshore funds in master-feeder structures typical of the hedge fund industry.

When most foreign securities are publicly-held (as reserve assets or by sovereign wealth funds), the above procedure cannot be applied, because public investments patterns are markedly different than private patterns. This is the case for China and Middle Eastern oil exporting countries. For China, I compute  $\hat{A}_i$  as the sum of the portfolio assets reported in its IIP and of 85% of China's non-gold reserves (i.e., I assume that 15% of China's reserves are held as bank deposits). This estimate implies a U.S. share of

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<sup>16</sup>This model has been used for similar purposes by Lane and Shambaugh (2010), following Lane and Milesi-Ferretti (2008) who present both empirical and theoretical arguments for this procedure.

<sup>17</sup>For long term holdings, I use the monthly estimates of Bertaut and Tryon (2007); for short term debt, I use directly the Treasury data.

<sup>18</sup>In comparison, assets reported by the Cayman Islands in the CPIS amounted to only USD 50bn.

around 70% in China’s external portfolio, consistent with most informed guess. I assume that China invests its non-U.S. assets in the same way than the “average” central bank participating to the CPIS. For Middle Eastern oil exporters, I compute  $\hat{A}_i$  as  $k$  times their U.S. holdings (as seen from the TIC survey), where  $k=70\%$  in 2001 and declines by 2 percentage points per year, following the best available estimates. I allocate the non U.S. assets according to the predicted shares of the gravity model, on the assumption that Middle Eastern sovereign funds have “private-sector like” non U.S. investment patterns.<sup>19</sup>

Some of these imputations involve an element of judgement. This is inevitable, since the exercise consists in providing an estimate for *each* of the 238 countries and territories of the world, some of which publish almost no statistics. I strive to make the judgements as transparent as possible: in Appendix A, I describe line by line the raw sources, their reliability, and all adjustments made. For all non-trivial positions, I provide consistency and robustness checks using independent sources.<sup>20</sup> I also make global consistency checks. For instance, I verify that my global estimate for securities held as reserve assets by official monetary institutions is well in line with total non-gold reserves (reported by each country) minus reserve holdings held as deposits in BIS-reporting banks.

Things are easier for portfolio liabilities, since we don’t have to deal with reserve anymore, nor to provide any bilateral breakdown. I start from the portfolio liabilities reported in Lane and Milesi-Ferretti’s updated and Extended External Wealth of Nations, to which I add estimates for the small offshore centers not covered (using central bank reports, securities statistics from the Bank for International Settlement, the U.S. TIC asset survey, or when nothing is available, equating  $L_j$  to  $\sum_j \hat{A}_{ij}$ ) and the value of the securities issued by international organizations.

### 3.3 Results and analysis

Figure 1a shows that since 2001, total securities assets are each year less than liabilities. In 2008, the gap amounted to USD 4,490bn, i.e. 8% of world GDP and 11% of all cross-border securities. Figure 1b and 1c break the discrepancy between equity and debt. Around 2/3 of the discrepancy comes from equities; as a consequence, around 20% of all cross-border equity liabilities have no recorded counterpart asset each year. The corresponding figure is lower for bonds (6% in 2008, down from 10% in 2001).

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<sup>19</sup>The Abu Dhabi Investment Authority has recently published its “benchmark portfolio”: it is coherent with this assumptions, i.e. it is more tilted towards equity and emerging markets than known central bank reserves. Note that, by definition, the imputation procedure for Gulf countries captures only their onshore assets, since their (potentially large) U.S. holdings held in London, Switzerland or Hong-Kong are missed by the U.S. TIC. But this is exactly what we want.

<sup>20</sup>The biggest uncertainty is by far for the Cayman Islands: based on a survey of Caymanian funds conducted by the Cayman Islands Monetary Authority, I compute an upper bound that is USD 600bn bigger than my central estimate in 2008, and a lower bound USD 600bn smaller. For all other countries, there is much less uncertainty (e.g., +/- USD 200bn for China, and +/- 100 bn for the British Virgin Islands).

If the accounting framework described in section 3.1 holds, the gap captures exactly the value of all unrecorded securities held by households in offshore banks. By definition, it cannot come from incomplete country coverage. It may reflect deviations from the stylized accounting framework of section 3.1, or data errors (for instance imprecisions in my imputation for the countries with no official data), but this is unlikely to be a big part of the story, for three reasons.

First, leaving aside households' overseas holdings, foreign portfolio figures are one of the most easy to establish and reliable data in cross-border financial statistics, especially equity positions. Equity markets are very centralized: all shares issued by a country  $i$  are at some point in custody in  $i$ , in a small number of custodian banks. In most countries, there is an old and well-established tradition to survey custodians, for it is one of the key inputs used in the compilation of balance of payments. Further, most portfolio investments are traded on stock exchanges, therefore have accurate and readily available market prices. Since the end of the 1990s, the IMF and central banks across the world have made considerable efforts to improve data quality. At the national level, compilers opt more and more for security-by-security accounting, which reduces measurement errors and allows for extensive data quality checks. At the global level, the CPIS has contributed to harmonize methods and spread best practices across the world.<sup>21</sup>

Second, the gap in asset data has its exact counterpart at the flow levels in the world balance of payments, computed independently from the present study by the IMF (this world BOP includes all countries' reports plus IMF staff estimates for non-reporters). If some assets are missing, then the return they pay must be missing somewhere too. This is what we observe: each year, more cross-border capital income is paid than received in the global current account. In particular, portfolio and other income credits (non-direct investment interests and dividends received) are lower than debits (interests and dividends paid). For instance, in 2008, the portfolio and other income discrepancy amounted to  $D = \text{USD } 156\text{bn}$ , implying a rate of return on  $\Omega$  of  $r_{\Omega} = 156/4,490 = 3.5\%$ .<sup>22</sup> Second, there are always more securities sold than purchased: the portfolio investment balance of the world financial account is systematically positive (barring one exception in 1998). This was to be expected: when a French resident buys a U.S. equity through his Swiss account, the U.S. records a sale, but neither Switzerland nor France records any purchase. As long as

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<sup>21</sup>Admittedly, there remains some practical difficulties (mostly for bonds). It is not always easy to distinguish between a direct and a portfolio investment. When partial repayment of a debt security is possible (as is the case for asset-backed securities), some custodians keep track of the original principal, others only of what is remaining. Several operations can lead to under- or double-counting (repurchase agreements, securities lending, depository receipts, stripped securities). However in all cases, the IMF has provided clear guidelines through the CPIS (IMF, 2002).

<sup>22</sup>Note that the 156bn figure includes the discrepancy on "other income" (the flow equivalent of the "other asset/liability" line in the IIP, which includes mainly bank deposits), in addition to the discrepancy on securities. The discrepancy on bank deposits is probably close to zero, because national accounts compilers *de facto* exchange information on cross-border bank deposits through the Bank for International Settlement.

national accountants accurately measure what they can, the financial account's portfolio investment discrepancy captures exactly the value of all purchases through unrecorded offshore accounts. To see how this flow discrepancy fits with the stock discrepancy, we can write the change in the stock of offshore wealth between  $t - 1$  and  $t$  as:

$$\Omega_t - \Omega_{t-1} = I_t + VAL_t \quad (7)$$

where  $I_t$  is the net inflow in offshore investment accounts, and  $VAL_t$  the net capital gains on existing accounts. Table 2 breaks  $\Omega$  following equation 7. We see a very reasonable pattern: steady inflows, negative valuation effects during bear markets (2002, 2008), positive during bull markets; and reasonable yields  $r_\Omega$  in the range 2-5%, with a downwards trend.

Finally, and most importantly, the distribution of the gap between reported securities liabilities ( $L_j$ ) and creditor-derived liabilities ( $\sum_{i \neq j} \hat{A}_{ij}$ ) exhibits a very peculiar pattern. In 2008, as figure 2 shows, 90% of all countries exhibit no gap at all: the foreign liabilities of  $j$  (as estimated by  $j$ , or for some countries by myself) match exactly the sum of all holdings on  $j$  estimated independently by each foreign country  $i$  and by myself in a few cases. The aggregate discrepancy comes from a small set of countries: 10 countries explain 90% of the gap. We can distinguish two groups of countries for which  $L_j > \sum_{i \neq j} \hat{A}_{ij}$ . The first includes some of the main developed countries (the U.S., Japan, France, Italy). The second and more important group includes the three countries that hosted in 2008 a large mutual fund industry: Luxembourg (the world second largest investment fund center after the U.S.), the Cayman Islands (where most hedge funds are domiciled) and Ireland (that hosts traditional investment funds, hedge funds and many money market funds). In 2008, these three countries account for 53% of the total gap and 74% of the equity gap. In short, half of the global missing stock of securities corresponds to missing claims on investment funds domiciled in Luxembourg, Ireland and the Cayman Islands.

If it not unrecorded household wealth that explains the gap between cross-border securities assets and liabilities, then there is a puzzle: why is the discrepancy so concentrated on equity claims issued by a few fund centers? A USD 1.5 trillion error by Luxembourgish and Irish accountants is most unlikely;<sup>23</sup> it is very unlikely as well that the gap reflects an error in my estimation of Chinese or Gulf countries investments: central banks and sovereign wealth funds do not invest in mutual funds, they manage directly their assets. What the data suggest is a circuit that we can schematize as follows, using specific country names for the sake of clarity (Switzerland can be replaced by any country performing similar cross-border wealth management activities, and Luxembourg by any other offshore fund center). Foreign clients of Swiss banks invest a significant part of

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<sup>23</sup>The figure for the Cayman Islands equity liabilities is my own estimate based on the survey of Caymanian funds undertaken by the Cayman Islands Monetary Authority.

their assets in Luxembourgish funds (and the funds in turn invest in U.S. equities, German bonds, etc.); these “Switzerland”-Luxembourg investments are accurately recorded by Luxembourg as equity liabilities, but no country records any holding on Luxembourg, hence the huge portfolio equity gap on the main offshore fund centers.<sup>24</sup>

From the point of view of any investor, buying Luxembourgish fund shares from a Swiss account is tax minimizing. First, offshore fund centers do not impose any withholding tax on cross-border payments: one receives on his Swiss account the full dividend paid by the funds. Second, any residence-based income tax can be evaded, since there is no automatic exchange of information between Swiss banks and foreign tax authorities. Third, European residents using Swiss banks are subject to the EU savings directive, but the withholding tax introduced by the directive can be avoided in many ways, for instance by interposing a non-European corporate entity between European individuals and their assets. This leaves two possible taxes: first, the corporate income tax paid by the firms in which Luxembourgish funds invest; second, the withholding tax imposed in source countries on cross-border interests and dividends payments to Luxembourg. Both can be avoided, for instance if the funds invest in withholding-tax-exempt foreign bonds (such as eurobonds). In short, investing in offshore mutual funds from a foreign bank gives an option to avoid or evade all forms of capital income taxation.

Note that, as figure 3a shows, only a very small fraction of  $\Omega$  (less than 5%) is invested in Switzerland (i.e. in securities issued by Swiss residents). This is because almost all capital income paid by Swiss residents (dividends paid by Swiss corporations, including Swiss funds, interests paid by Swiss banks, etc.) is subject to a 35% withholding tax. For a would-be tax evader, it makes investing in Swiss assets completely useless, since this “advance tax” can only be refunded when the related capital incomes are declared on tax returns, in the investor’s country.<sup>25</sup> The advance tax applies only to Swiss-source income, it does not apply to income paid by foreign entities (e.g. Luxembourgish funds) credited on a Swiss account.

The circuit described above has become more and more prevalent in recent years: as

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<sup>24</sup>Part of the gap on these offshore fund centers may also be due to a practically similar but somewhat simpler pattern. Units issued by investment funds are not necessarily entrusted to a bank for custody: they can be held in “self-custody” by households. For instance, U.K. residents can invest in Irish mutual funds without entrusting the shares to any bank. Since households are not directly surveyed, this creates a gap between offshore fund center liabilities and investors’ country assets that does not necessarily imply the use of an offshore bank. I conjecture that this “self-custody” problem could explain part of the Irish-U.K. equity gap documented by Lane and Milesi-Ferretti (2007) (Table 2 p. 234). The practical implications are the same than in a more complex U.K.-Switzerland-Ireland pattern: if there is no custodian, there is no third-party, hence no residence-based income tax enforceable.

<sup>25</sup>The advance tax is strictly applied, and almost impossible to avoid: only a few Swiss funds – that invest more than 80% of their assets in foreign securities – can be exempted. This is the reason why Switzerland does not host a big investment fund industry (most funds marketed in Switzerland are foreign, e.g. Luxembourgish). The advance tax, created in 1945, is how Switzerland enforces partially its own residence-based capital income tax, since there is no automatic exchange of information between Swiss banks and the Swiss tax administration.

figure 3a and 3b show, there has been a redistribution of where offshore assets are invested, from developed countries to offshore fund centers. The growth in the fraction of  $\Omega$  invested in offshore funds reflects to a large extent the growth of the offshore fund industry itself: in 2008, Ireland's, Luxembourg's and the Cayman Islands' portfolio equity liabilities (which essentially capture foreign investments in their mutual funds) accounted for 30% of all cross-border equity liabilities, up from 18% in 2001. The relocation of unrecorded investments towards offshore fund shares could partly explain why  $r_\Omega$  has declined: many funds pay no income but capitalize their gains. These reinvested earnings are not counted as income flow in the current account, hence not captured in the discrepancy between global investment income credits and debits.

The 2001-2008 evolution seems to be part of a broader movement, that started at the end of the 1970s. As figure 4a shows, 33% of all equity liabilities of the U.S. were recorded by the U.S. Treasury as being owned by a small set of tax havens in 2008 (Belgium-Luxembourg,<sup>26</sup> the Cayman Islands, Switzerland, Ireland, Bermuda, Hong-Kong, Singapore, Jersey, Guernsey, the Isle of Man, the Bahamas, Panama and the Netherlands Antilles). Although this figure has been quite stable since 1974 (with a maximum of 39% in 1974), there has been a marked redistribution of where investments come from (as seen from the U.S.) within this set of tax havens. In 1974 (figure 4b), 76% of U.S. equity liabilities vis-à-vis tax havens were vis-à-vis Switzerland (hence 30% of all U.S. cross-border equities were recorded by the Treasury as being owned by Switzerland). In 2008, Switzerland apparently plays a much smaller role among tax havens (17%), the lion's share accruing to Belgium-Luxembourg, the Caribbean offshore centers and Ireland (67%). It is important to understand that these Treasury figures only give information on the last element of the chain. They do not imply that Switzerland's role as a tax haven has declined; what they mean is that a growing fraction of foreign investments in the U.S. goes ultimately through Irish, Caribbean and Luxembourgish funds. From the data, we can conjecture that, in 1974, holders of Swiss accounts invested a substantial fraction of their assets directly in U.S. equities, and that in 2008, they invest the bulk of their assets in offshore mutual funds that in turn invest, e.g., in U.S. equities. Section IV gives support to this conjecture, and shows that Switzerland's share in the market for cross-border wealth management is bigger than what the raw U.S. Treasury data suggest (probably around 30-40% in recent years).

Just like 20% of cross-border equities are missing at the global level, a comparable proportion of all foreign equity investments in the U.S. cannot be traced to any ultimate owner. First, if we consider only foreign investments in the U.S. through Luxembourgish,

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<sup>26</sup>Luxembourg accounts in 2008 for 70% of the Belgium-Luxembourg total. The two countries are grouped together before 2000 in the Treasury statistics. The inclusion of Belgium leads to a slight overestimation of the share of foreign investments from OFCs, but on the other hand, I only consider a partial sample of OFCs (those for which annual year-end data are available in Bertaut and Tryon (2007)).

Caymanian and Irish (LCI) funds alone, we can decompose the U.S. equity liability vis-à-vis LCI,  $\hat{L}_{US,LCI}$ , as follows:

$$\hat{L}_{US,LCI} = \frac{E_{LCI,US}}{A_{LCI}} \left[ \sum_i \hat{A}_{i,LCI} + (L_{LCI} - \sum_i \hat{A}_{i,LCI}) \right] \quad (8)$$

where  $\sum_i \hat{A}_{i,LCI}$  denotes all recorded foreign equity investments in LCI mutual fund shares, the difference between parentheses is equal to all unrecorded investments in LCI funds, and the bracket is multiplied by the share of U.S. equities (E) in LCI fund assets ( $A_{LCI}$ ). This formula assumes, for simplicity, that LCI funds invest similarly whether the money invested in them is recorded or unrecorded in the residence country of the investor. It also assumes that all equity investments from Luxembourg, the Cayman Islands, and Ireland are undertaken by mutual funds. Table 3 shows the result of this simple decomposition in 2008. Only through Luxembourgish, Irish and Caymanian funds, almost 10% of all foreign equity investments in the U.S. cannot be traced to any owner, simply because more than one half of all assets managed by these offshore funds have unidentifiable owners.

Second, we can apply equation 5 to the U.S.-Swiss pair ( $j=U.S.$ ,  $k=Switzerland$ ). Under the assumption that all Swiss-owned U.S. equities are held in Switzerland, and that non-Swiss direct reporters do not use Swiss custodians to keep their U.S. equities (or that both effects offset each other), equation 5 reduces to:

$$\hat{L}_{jk} - \hat{A}_{kj} = \sum_{m \neq k} \tilde{a}_{mj}^k \quad (9)$$

i.e., the gap between U.S.-recorded equity liabilities vis-à-vis Switzerland and Swiss-recorded U.S. equity assets reflects exactly the amount of unrecorded U.S. shares held by foreigners in Swiss banks. A straightforward comparison between the CPIS data for Switzerland and the U.S. Treasury figures show that each year since 2001,  $\hat{L}_{jk}$  is around 2.5 times bigger than  $\hat{A}_{kj}$ , i.e. around 60% of all U.S. equity investments recorded as being owned by Switzerland by the U.S. cannot be traced to any owner. This represents 3-4% of all foreign equity investments in the U.S.

To sum up, a simple international accounting exercise shows that  $\Omega=USD$  4,500bn of securities had no identifiable owner as of December 2008, 31st. The global securities gap is large, persistent, and has no other plausible explanation than the non-recording of households' investment accounts in tax havens. One half of households' unrecorded portfolios are invested in mutual funds located in offshore financial centers. Therefore, we cannot know who owns around 50% of the large stock of equities issued by Luxembourg and the Cayman Islands and 70% of all Irish equity liabilities. The other half is invested in equities and bonds issued by the main industrial countries. The main offshore fund centers play a rapidly growing role in the channelling of (recorded and unrecorded) cross-border

investments. Complex, multi-country asset management structures introduce first-order inconsistencies and gaps in international accounts globally, that make a consistence whole, and give an option for individual investors to avoid virtually any kind of capital taxation, given the current state of national and international legislations.

This exercise has three limits. First, one has to keep in mind that  $\Omega$  does not include all households' offshore assets: it only covers the fraction of their wealth invested in securities. Though portfolio holdings are the bulk of the wealthy's financial assets, households also have bank deposits, insurance contracts, shares in non-corporate business,<sup>27</sup> in addition to real assets. Some of these assets may be held in tax havens. This paper has much less to say on this point. I focus on securities portfolios because it is the only form of wealth for which using discrepancies in international accounts makes sense. In particular, the discrepancy method cannot be applied to bank deposits, because national accountants *de facto* exchange information on cross-border bank accounts through the Bank for International Settlement.<sup>28</sup> Accordingly, offshore bank deposits are now well integrated into domestic national accounts.<sup>29</sup> On the opposite, it is because there is no equivalent to the BIS statistics for securities accounts that there remains a discrepancy between securities assets and liabilities.

The second limit is that using discrepancies in cross-border securities statistics gives only limited evidence on the location of the banks where the missing wealth is held. The third and most important limit is that it does not tell us anything on who uses offshore custodians and why.

The following section takes on these shortcomings.

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<sup>27</sup>In the U.S., on aggregate, bank deposits add up to 16% of households and non-profit organizations gross financial assets, versus 38% for securities; the rest is mainly claims on pension funds—27%—and equity in non-corporate business—15%. In France, wealth tax records show that the ratio securities/bank deposits is sharply increasing with wealth and as high as 5 for the top wealth percentile.

<sup>28</sup>All countries with significant financial centers send to the BIS the amount of cash that foreigners put in their banks, broken down by country. The BIS does not disseminate bilateral data (e.g. bank deposits of U.S. residents in the Cayman Islands), only aggregate data (bank deposits of U.S. residents in all BIS-reporting countries). The IMF has been advocating the use of the BIS data by national accounts compilers since the 1990s, hoping that it would contribute to eliminate the world current account deficit. The U.S. proceeded to the substitution of BIS data for U.S. sources at the beginning of the 1990s, quickly followed by many other countries.

<sup>29</sup>But the BIS dataset has a major shortcoming: it does not allow to single out households' holdings. For instance, an Irish hedge fund using a Cayman-based bank as prime broker will have a bank account in the Cayman Islands; this is counted by the BIS as an Irish offshore deposit in the Cayman Islands, and cannot be distinguished from bank accounts opened by foreign households in the Cayman Islands. Data from the Bank of France show that the bulk of foreign non-bank deposits in French banks belong to financial corporations.

## 4 Foreign wealth in Switzerland: 1914-2010

### 4.1 Decomposing the fortunes managed by Swiss banks

The composition and evolution of the indirectly estimated stock of offshore portfolio wealth  $\Omega$  can be observed directly in Switzerland. To see this, let's break the amount of securities  $W$  in custody in Swiss banks as follows:

$$W = S + F = S^D + S^F + F^D + F^F \quad (10)$$

where  $S^D$  denotes Swiss securities owned by domestic residents,  $S^F$  Swiss securities owned by foreigners ( $S = S^D + S^F$ ),  $F^D$  foreign securities held by domestic residents, and  $F^F$  foreign securities held by foreigners ( $F = F^D + F^F$ ). We are mainly interested in  $F^F$ : these are the typical custodial holdings of an offshore financial center (i.e. foreign-foreign claims), most likely to be missed by national accountants around the world.

We can estimate each component of equation 10 from an official, high-quality, and well documented Swiss dataset. Since December 1998, the Swiss National Bank publishes  $W$  monthly, based on a very comprehensive survey of Swiss-domiciled custodians (the monthly survey covers 95% of  $W$ , an exhaustive survey is conducted yearly).<sup>30</sup> The SNB dataset gives the full  $W = S^D + S^F + F^D + F^F$  decomposition, and additional breakdowns by sector of the owner (household, financial institution, corporation), currency of the security, nature of the security (equity, bond, commercial paper, mutual fund shares, structured products, other). These series are truly unique: to the best of my knowledge, no other country in the world publishes similar statistics on a regular basis and with a comparable level of details. I am not aware of any other paper that uses them systematically to document the amount of foreign wealth in Switzerland.

The striking fact is that, in 2008,  $F^F$  has exactly the same composition than  $\Omega$ , as table 4 shows. The foreign portfolios held by foreigners in Swiss banks look exactly like the missing wealth of nations derived in section III, although both have been established by completely different methods, relying on fully independent sources. Equities make up two thirds of  $\Omega$  and  $F^F$ , bonds one third, and most equities are actually mutual fund shares (50% of  $F^F$ , 48% of  $\Omega$  if we consider that all missing equity claims on Luxembourg, Ireland and the Cayman Islands are mutual fund shares). And the dynamics match as well: just like for  $\Omega$ , we observe a growing shift of  $F^F$  from bonds towards mutual fund shares over 2001-2008. I see these simple facts as the most compelling evidence in favor of the discrepancy method described in section III.

This is also reassuring, since  $F^F$  makes up a substantial fraction of  $\Omega$ : at year-end

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<sup>30</sup>The results of the monthly survey are published in the SNB's *Monthly Statistical Bulletin* (<http://www.snb.ch/en/iabout/stat/statpub/statmon/stats/statmon>, series  $D5_1$ ,  $D5_{1a}$ ,  $D5_1$ ,  $D5_{1b}$ ,  $D5_2$  and  $D5_{2b}$ .) The results of the yearly survey are published in SNB's *Banks in Switzerland* (<http://www.snb.ch/en/iabout/stat/statpub/bchpub/stats/bankench>, series 38a, 38b, 38c).

2008, the value of all foreign securities managed in Switzerland and belonging to foreign residents amounted to USD 1,544bn, i.e. 34% of  $\Omega$ . This share has remained high over the 2001-2008 period, fluctuating between 30% and 40%; it is consistent with all available anecdotal evidence suggesting that Switzerland plays a key role in the market for cross-border wealth management.

Two caveats are worth mentioning regarding the exact share of  $\Omega$  managed in Switzerland. First, recall that in the accounting framework of section III, if  $k$  is Switzerland, then  $F^F = \sum_{j \neq k} \sum_{i \neq k} (a_{ij}^k + \tilde{a}_{ij}^k)$ . I.e.,  $F^F$  is not exactly equal to the fraction of  $\Omega$  managed by Swiss banks ( $\sum_{j \neq k} \sum_{i \neq k} \tilde{a}_{ij}^k$ ); it also includes foreign securities held in Switzerland by foreigners that are directly surveyed in their home countries ( $\sum_{j \neq k} \sum_{i \neq k} a_{ij}^k$ ). There is no precise way to correct this problem. On a priori grounds,  $\sum_{j \neq k} \sum_{i \neq k} a_{ij}^k$  is negligible for equities, in particular for mutual fund shares: given the way equity settlement systems work, it makes very little sense for foreign financial institutions to entrust their foreign shares to Swiss banks. We see, from the 2004 survey of French custodians (Table 1), that such holdings are negligible in France; there is no reason that they should be any higher in Switzerland. There is probably a small issue for bonds: in 2008 there was USD 260bn of foreign bonds listed in Switzerland, hence probably in custody there; it is likely that directly-surveyed foreigners owned a fraction of them. But even if they owned all of them, this would still make only 17% of  $F^F$ .

Second, the distinction between Swiss-owned and foreign-owned securities is not clear-cut. A foreigner can use a Swiss intermediary (e.g. fiduciary, notary, etc.) and his holdings will be recorded as Swiss-owned. Although anti-money laundering rules prohibit banks from ignoring the identity of the beneficial owners of the funds they manage, banking statistics are still established on the basis of the reported address. This means that  $F^F$  may actually understate the amount of foreign securities held by foreigners in Switzerland. Again, there is no direct way to correct this problem, but on a priori grounds it is unlikely to be very big. The typical financial structures used by individuals for holding offshore accounts often involves several (sometimes many) intermediate entities located in different countries. The probability that the last intermediary is Swiss is rather thin. Overall, we have all reasons to think that  $F^F$  is a very good proxy for the fraction of  $\Omega$  managed in Switzerland.

These uncertainties set aside, it seems that Switzerland's market share has declined since the 1970s. Remember that as of 1974, 76% of all U.S. equity liabilities vis-à-vis tax havens were vis-à-vis Switzerland. In 1983, the last year for which we have reasonable data,  $F^S/F$  equalled 20%, i.e. only 20% of all foreign securities managed by Swiss banks belonged to Swiss residents. Assuming, for simplicity, that the same was true in 1974, this means that around 80% of all U.S. equities "owned" by Switzerland belonged in reality to foreigners. Therefore, if the U.S. data are representative, Switzerland's share

in the market for cross-border wealth management was at least  $0.8 \times 0.76 = 61\%$ ,<sup>31</sup> versus 30-40% in the 2000s. What are the reasons for this decline, and which countries have gained market shares are important questions, on which the present paper has little to say. With the information technology revolution, it has certainly become easier to entrust one's assets to a foreign bank, thus fostering competition between tax havens. But to my knowledge, other countries widely considered to have a significant cross-border wealth management business (Luxembourg, the U.K. and its dependencies, Singapore, Hong-Kong, and the Caribbean OFCs)<sup>32</sup> do not publish any data on their banks' custodial holdings, so quantitative evidence are still hard to get on this point.

In addition to providing checks for the accuracy and validity of the computations of the missing stock of households' portfolios, the Swiss case offers unique evidence on offshore bank deposits – for which the discrepancy method derived in section III could not be used. In particular, the SNB dataset allows to isolate tax-related cross-border bank deposits (likely to be held by individuals) from other cross-border deposits (likely to be held by financial institutions, or cross-border workers and non-financial corporations). To my knowledge, this is, again, a unique feature of Switzerland's bank and capital markets statistics.

The identification comes from the fact that there exists two different kinds of bank accounts in Switzerland: “normal” bank deposits, and so-called fiduciary deposits. “Normal” deposits are simply cross-border on-balance sheet liabilities of Swiss banks that can be used as medium of exchange and store of value. Fiduciary deposits, on the other hand, can only be used as store of value: they involve a fixed maturity date (usually between 1 and 12 months), i.e. they are basically short term financial investments, very similar to short term debt claims. In practice, fiduciary deposits are collected by Swiss banks, and lent to foreign banks. From a legal point of view, all interests are considered to be paid directly by the foreign banks to the deposit owners, the Swiss banks acting only as “fiduciaries”. This legal feature allows fiduciary deposits to escape the 35% tax withheld at source on all capital income paid by Swiss residents: fiduciary deposits are completely untaxed in Switzerland, just like foreign securities held in custody. They are similarly recorded as off-balance sheet items.<sup>33</sup>

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<sup>31</sup>This computation disregards any mutual fund intermediation (there has never been an important fund industry in Switzerland because of the 35% advance tax, and the offshore fund industry was almost non existent in the early 1970s). The 61% is a lower bound because U.S. equities managed in other tax havens did not necessarily belong entirely to foreigners (i.e. some U.S. equities managed in Singapore belonged to residents of Singapore, etc.).

<sup>32</sup>See for instance BCG's Global Wealth 2009, “Delivering on the Client Promise”, exhibit 17 p.31.

<sup>33</sup>And just like for securities, this way of doing things puts the coherence of global international positions at risk: the deposits are not counted as assets by the Swiss banks; neither are they by the foreign depositors, who are not surveyed in their home countries. But they are counted as cross-border liabilities by the foreign banks in which the funds are invested. However, following an influential report on the measurement of capital flows (IMF, 1987), the IMF dealt with the problem by asking Switzerland to report an IIP including the fiduciary assets. However it failed to ask (or to obtain) that the same be done for securities custody, which raise the exact same problem, though on a much bigger scale.

Since the end of the 1970s, fiduciary deposits  $D$  account for around 80% of all cross-border bank accounts in Switzerland.<sup>34</sup> In 2008, they also represent 31% of  $F^F$  (Table 4), i.e. around 24% of offshore assets held in Switzerland were bank deposits (disregarding insurance contracts for which we have no data). The ratio  $D/(D + F^F)$  is declining (except in 2008), from more than 40% in the first half of the 1990s (when interest rates on fiduciary deposits were high), to less than 30% after 2003 (when interest rates were much lower). As of 2008, the overall structure of  $D + F^F$  corresponds to one of the most commonly advised “conservative” asset allocation (1/4 cash, 1/4 bonds and 1/2 equities).

If we assume that the same cash/securities allocation holds in other cross-border wealth managements centers, then one has to multiply  $\Omega$  by 1.31 to obtain an estimate of total bank deposits plus securities held offshore, i.e. around USD 6,000bn in 2008. This is 8% of the global net household financial wealth estimated by Davies et al. (2009).<sup>35</sup> It is also interesting to compare the value of households’ offshore bank and investment accounts to the total wealth (financial plus non-financial, i.e. including housing, land, etc.) owned by the world top fractiles. Total offshore wealth accounts for 8% of the global top 1%’s wealth, and 18% of the top 0.1%’s.<sup>36</sup> If we assume that all unrecorded offshore holdings belong to the top 0.1%, it means that in 2008, 4.3 millions adults, that had wealth above USD 3mn, owned, on average, 16% of their wealth in foreign banks.

## 4.2 The Swiss Historical Experience

What drives the development of tax havens? In which periods do we observe an increase in the amount of foreign fortune entrusted to Swiss banks? Are inflows linked to wars, to episodes of political instability in neighboring countries, to the evolution of tax rates, to the development of capital markets, to globalization? To shed light on these questions, I now turn to historical evidence.

To start, I apply, as far as possible the  $W = S + F = S^D + S^F + F^D + F^F$  decomposition to twentieth century Switzerland.

How do we know  $W$  before 1998? For almost all the twentieth century, this was a secret jealously kept by Swiss banks. Two related events changed dramatically the situation at the end of the 1990s.

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<sup>34</sup>For all details on fiduciary deposits, including a line by line reconciliation between the BIS locational banking statistics and SNB’s data on Swiss bank deposits, see Appendix C.

<sup>35</sup>Davies et al. (2009) provide data for 2000, but two of the four authors have updated their dataset to cover the full 2000-2010 decade, in a work for Credit Suisse (see Credit Suisse *Global Wealth Report*, october 2010).

<sup>36</sup>The share of the top 1% (40.1% at market exchange rate in 2000) comes from Davies et al. (2009). The top 0.1% share is my own estimate, based on the assumption of a Pareto distribution of world wealth. If the Pareto distribution holds in the top 1% (which is a very reasonable approximation), the share of the top 10% within the top 1% is given by  $0.1^{1-1/a}$  where  $a$  is the Pareto-Lorenz coefficient. I assume that the Pareto-Lorenz coefficient is constant in the top 5% of the world wealth distribution. A share of 40.1% for the top percentile and of 70.7% for the top 5% implies a value for  $a$  of 1.54, hence a top 0.1% share of 17.8%.

First, an International Committee of Eminent Persons, chaired by Paul Volcker, was established in 1996 to investigate the dormant accounts belonging to victims of nazi persecutions and their heirs in Swiss banks. This committee was granted unlimited access to the banks' private archives for the period 1933-1945. The investigations were conducted during 3 years by 650 accountants. The 254 biggest Swiss banks of the time were covered; the remaining banks were small, domestically-oriented, with probably little or no wealth management activities. Thanks to the Volcker's Committee, we have a very accurate, bank-level dataset on  $W$  for year-end 1945 (see Perrenoud et al. (2002, Table 14 p. 618), reproduced in this paper's Appendix C).

Then, in 1996 too, an Independent Commission of Experts, chaired by the Swiss historian Jean-François Bergier, was established to investigate the role of Switzerland during the Second World War. It was granted access to the bank's private archive too, but on a more extended time frame. In particular, the Bergier commission was able to establish several series on the securities held in custody by the Swiss "big banks" of the twentieth century,<sup>37</sup> spanning the 1907-1971 period (Perrenoud et al., 2002, Tables 15-20, p. 620-626). Note that the banks took great care to establish precisely the value of the securities they managed, because they used this information to compute the custody fees they charged. Bonds were counted at their nominal value and equities at market value. In 1945, the big banks managed 62% of  $W$ . Taking into account coverage gaps, the Bergier dataset gives a very reasonable estimate for the amount of securities managed by the big banks during the 1914-1956 period.

From these raw data, the method for constructing the 1914-2010  $W$  series is the following. For the period 1998-2010, I simply use the official SNB monthly data, with a very minor adjustment to take into account the partial sample size. For the period 1914-1956, I start from the total securities managed by the big banks. I then use detailed official information on the income earned by the banks to estimate what share of  $W$  was managed by the big banks.<sup>38</sup> Banks earn two types of income: interest income (on their lending operations), and commission income (for the provision of non-credit related financial services), that I write  $y^c$  (lower cases denote bank-level data, upper cases national aggregates). During the 1914-1956 period, securities custody and brokerage was by far the biggest source of commission income for Swiss banks, even for the biggest ones. Disregarding other sources of commission income,  $y^c = cw + vt$  where  $c$  is the custody fee

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<sup>37</sup>The term "big bank" refers to the classification of the Swiss National Bank. In 1944 they were 7: Swiss Bank Corporation (SBS), Credit Suisse, Swiss Volksbank, Union Bank of Switzerland, Banque fédérale, Banque Leu and Commercial Bank of Basel (BCB). In 1945, SBS took over BCB, and Union Bank of Switzerland took over Banque fédérale; Credit Suisse took over Banque Leu in 1990 and Swiss Volksbank in 1993; and Union Bank of Switzerland and SBS merged to form UBS in 1998, leaving only UBS and Credit Suisse at the end of the 1990s. During the 1946-1998 period, the big banks took over 134 other banks.

<sup>38</sup>The SNB publishes since 1906 the banks' income statement, on aggregate and broken down by category of bank, in *Banks in Switzerland*.

rate,  $w$  the value of the securities held in custody,  $v$  the value of all transactions made by the bank's client during the year, and  $t$  the fixed transaction fee rate. Assuming that  $v = kw$  where  $k$  is constant across banks, then  $y^c$  is proportional to  $w$ . Importantly, minimal values for  $c$  and  $t$  were fixed by a cartel agreement between 1918 and 1993<sup>39</sup> (the "Convention IV" of the Swiss Bankers' Association), and the Convention's rates were *de facto* applied by most banks, so we can reasonably assume that  $y^c/w$  was similar across banks. We know the aggregate amount of  $y^c$  for the big banks on the one hand and for the whole Swiss banking sector on the other. So for 1914-1956, I simply multiply the value of all securities held by the big banks by their share in total commission income. This share is remarkably stable between 1934 and 1954, fluctuating between 57% and 62%.<sup>40</sup> This method predicts for 1945 an aggregate  $W$  fully consistent with what the Volcker commission found independently.

The 1956-1998 period is the most problematic: from the Bergier commission, we only have three data points for Union Bank of Switzerland (1957, 1958 and 1971), 7 for Credit Suisse (1957-1962 and 1971) and nothing more; this is too sketchy for any meaningful estimation of  $W$  based on the big banks' custodial holdings. I use instead a simple updating equation based again on commission income flows:

$$W_{t+1} = \frac{\hat{Y}_{t+1}^c}{\hat{Y}_t^c} W_t$$

where  $\hat{Y}_t^c$  is total commission income earned by cantonal, regional and private banks. The rationale for restricting  $Y^c$  to this set of banks is twofold. First, these are the banks for which commission income has remained mostly composed of custody and brokerage fees: they are not very active in the provision of other fee-generating financial services, such as merger and acquisitions, securitization, etc. Regional and cantonal banks have mostly Swiss clients, while private banks are specialized in the wealth management business for foreigners. Second, these banks don't have foreign subsidiaries; this is important because all income figures published by the SNB include indistinguishably the income earned by the Swiss banks and by their foreign subsidiaries (until the 1970s this was negligible, but today the big banks have large foreign subsidiaries).<sup>41</sup> The good news is that applying the updating equation from 1956 onwards allows to reproduce exactly the value of  $W$  in 1998 computed completely independently by the SNB. Overall, even if the

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<sup>39</sup>For instance in 1933,  $c_{min}=0.05\%$  (for both Swiss and foreign securities) and  $t_{min}=0.01\%$  (for both bonds and stocks).

<sup>40</sup>Before 1934, we only know the total income (interest plus commission) by category of bank. The share of the big banks in the aggregate gross profits of the Swiss banking sector has been extremely stable between 1914 and 1956, fluctuating very little around 45% (the big banks had a higher market share for wealth management than for credit operations, since cantonal and regional banks were very active on the local credit market). Accordingly, for 1914-1933, I assume that the big banks managed a fixed share of  $W$ , equal to their 1934 share.

<sup>41</sup>Securities custody figures, on the other hand, always refer to Swiss custodians only.

yearly values for the 1956-1998 period should be taken with care, we have a homogeneous (based on market price, year-end values for all Swiss-based custodians) and reasonably accurate  $W$  series.

To break  $W$  following equation 10 before 1998, I use various capital markets, national and international accounts statistics.  $S$  is simply equal to the amount of debt and equity securities issued by Swiss borrowers; this information comes from various issues of Switzerland’s statistical yearbook,<sup>42</sup> and of historical capital and stock market time series produced by the Swiss National Bank, some of which have recently been published online.<sup>43</sup> Since the beginning of the twentieth century, the SNB has always monitored closely the issuance of equity and debt securities by Swiss borrowers; surveys of the amount of Swiss-issued securities outstanding have been conducted regularly, and we have Swiss stock and bond indices as early as 1910.

$F$  is computed as  $W - S$ . We can check that the implied  $F$  is accurate by comparing it to the value of all “Swiss” portfolio investments in the U.S. as recorded by the Bureau of Commerce and the U.S. Treasury ( $\hat{L}$ ) during the twentieth century (since 1974, data come from the U.S. Treasury International Capital system; for 1914-1945, data come from Wilkins (2004)). By definition,  $F = F^D + F^F = \hat{L}\phi^{-1}$  where  $\phi$  is the fraction of securities managed by Swiss banks invested in U.S. securities. Over 1914-2010,  $\phi$  appears to be very constant, between 10-20%. This is consistent with the U.S. share in the world economy during the twentieth century (somewhat smaller, which could be due to a slight geographical bias of “Swiss” investments towards Europe).  $\phi$  reaches its century peak in 1941 (21%), when Europe was at war and capital looked for safe places, and its century low (8%) at the end of the 1980s, which is consistent with evidence, documented in Figure 4b, of a growing use of offshore funds as intermediaries in “Swiss-U.S.” investments. All in all, we have two fully independent and convergent sources backing my  $F$  series.

The final step is the  $F = F^D + F^F$  decomposition.  $F^F$  is unobservable, so I compute  $F^D$ , the amount of foreign portfolio claims held by Swiss residents, and compute  $F^F$  as  $F - F^D$ . For 1983-2010,  $F^D$  comes straight from Switzerland’s international investment position. In the 1980s,  $F^F$  made up 3/4 of  $F$ , i.e. only one quarter of all foreign securities managed by Swiss banks could be traced back to Swiss residents (versus a bit more than one third in 2010). Going back before 1982 is impossible: there was no custody survey before 1981, hence no way to estimate either Swiss-owned portfolios or income flows in accordance with international accounting standards (i.e. only incomes earned by Swiss residents). All estimates of Switzerland’s income balance before 1981 should be taken with a great dose of skepticism.

We can nonetheless track the development of Switzerland as a cross-border wealth

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<sup>42</sup>See *Annuaire Statistique de la Suisse/Statistisches Jahrbuch der Schweiz*, 1891-2009, Zurich, Verlag des Art. Many information contained in the Statistical Yearbooks are reproduced in time series form in Siegenthaler (1996).

<sup>43</sup>[http://www.snb.ch/en/iabout/stat/hisztz/id/statpub\\_hisztz\\_actual](http://www.snb.ch/en/iabout/stat/hisztz/id/statpub_hisztz_actual)

management center over the twentieth century by comparing  $F$  and Switzerland's household wealth  $H$ . To understand the kind of information  $\hat{\psi} = F/H$  conveys, consider a country  $i$  with a representative household, a corporate sector with zero net wealth and no government. The household invests its wealth in a domestic or in a foreign asset to maximize returns and diversify risks. Given the expected risks-returns pairs, it allocates a share  $\psi$  of its wealth in foreign bonds and stocks. For given risks and returns,  $\psi$  reflects simply the household's risk aversion. By definition,  $\hat{\psi} > \psi$  means that the country is an offshore financial center: it holds more foreign securities in custody than what belongs to his residents. Although  $\psi$  is not observable,  $\hat{\psi} > 1$  unambiguously characterizes  $i$  as being an offshore financial center.<sup>44</sup> Any movement in  $\psi$  reflects either a change in relative risk-returns between domestic and foreign assets, shocks to asset holdings (e.g. wars) or shifts in preferences. In normal times, we can assume that  $\psi$  is constant over the short/medium run; therefore, short run variations in  $\hat{\psi}$  capture foreign inflows of funds, rerouted abroad.

Figure 5a plots the decennial averages of  $\hat{\psi}$ , using for the denominator the Swiss household wealth figures computed by Dell et al. (2007) from wealth tax returns.<sup>45</sup> We can distinguish five steps in the Swiss historical experience.

Until the mid-1920s,  $\hat{\psi}$  fluctuated between 5-15%, i.e. it was well in line with the size of the Swiss economy. Switzerland had accumulated in 1914 a very reasonable amount of foreign claims ( $\hat{\psi}=15\%$  in 1914), quite comparable to the French level (in 1913, net foreign financial assets were 14% of French household wealth).<sup>46</sup> The war, the depreciation of foreign currencies relative to the Swiss Franc, and inflation almost completely wiped out Switzerland's foreign securities holdings; in 1924, I estimate that  $\hat{\psi}$  was down to 2%. France experienced the exact same evolution, with a ratio of net foreign assets to domestic private wealth of 2% in 1925. Until 1925, what the Swiss data show is the shared experience of all developed European countries.

Starting in 1925,  $F$  rises very rapidly, reaching 20% of  $H$  in 1926, 50% in 1930 and 60% in 1937. Such levels of custodial holdings are unprecedented and unique for the time. This increase cannot be attributed to Swiss residents. First, during the 1930s, the Swiss trade balance is consistently negative (it will remain negative until 1945), and this deficit cannot be offset by the income balance, since Switzerland's foreign claims have been eaten away in the after war period. So the Swiss current account is negative. Second, a sudden

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<sup>44</sup>The only exception is if highly leveraged domestic agents are very active in the foreign securities markets, i.e. if banks buys foreign securities instead of making loans.

<sup>45</sup>Note that these figures do not include exactly all household wealth, since, in particular, most pension and insurance assets are tax-exempt. I did not try to upgrade  $H$  in order to take into account tax-exempt assets; the raw material appears to be too limited to make consistent corrections across the century. On the contrary, wealth tax data have the great advantage to be available since 1913 and are homogeneous.

<sup>46</sup>see Piketty (2010), Appendix A, Table A16, col. (3). Both figures are not fully comparable: the Swiss figure includes only portfolio assets, i.e. excludes foreign direct investments, as well as all foreign liabilities of Switzerland.

decline in Swiss residents' home bias of such a magnitude, just before and during the Great Depression, makes little sense: during the 1930s, the Swiss economy was actually in better relative shape than most foreign countries (Swiss national income decreased by 6% in real terms between 1930 and 1936, whereas U.S. real GDP declined by almost 30% between 1929 and 1933).

In fact, Switzerland becomes a significant offshore center in the mid 1920s, a fact confirmed by a wealth of anecdotal evidence. The number of safe box deposits lent by Credit Suisse follows the same pattern than  $\hat{\psi}$ : it doubles between 1924 and 1936, with in particular a 9% increase in 1930, 21% in 1931, 9% in 1932 and 12% in 1936 (Perrenoud et al., 2002, Table 21 p.627). A high profile tax evasion scandal involving the Commercial Bank of Basel shakes France in 1932 (Guex, 2006). In 1941, when the U.S. Treasury conducts the first 20th century exhaustive census of foreign holdings in the U.S., it is obvious to contemporaries that the recorded Swiss holdings vastly exceeds what Swiss residents really own (Wilkins, 2004, p.477).

The immediate after-war period sees a decline in  $\hat{\phi}$ . This is a time of crisis. Just like in the aftermath of World War I, high inflation abroad erodes the value of foreign securities relative to domestic Swiss wealth. But there is also a specifically Swiss crisis: in 1945, two of the seven big banks (Banque fédérale and Commercial Bank of Basle) are insolvent and taken over. Since 1941, U.S. assets managed by Swiss banks are frozen. They can only be unfrozen if Switzerland certifies that they don't belong to Axis countries; uncertified assets are seized. In the immediate aftermath of the war, there is considerable pressure on Switzerland from neighboring countries that want to recoup their residents' offshore assets. France, for instance, demands that Switzerland freeze its residents' holdings. In the U.S., many think that no Marshall plan would be needed if Europeans countries could recoup their offshore assets; they advocate greater cooperation between the U.S. and Europe on that matter (Schaufelbuehl, 2009).

Eventually, Switzerland manages to escape the crisis while safeguarding its bank secrecy laws. And in the beginning of the 1950s starts the fourth phase of Switzerland's history as an offshore center: a continuously rising  $\hat{\psi}$  until the mid-1980 (from 20% in 1950 to 200% in 1985). During almost 4 consecutive decades,  $\hat{\psi}$  grows at the same pace than during the 1925-1935 decade. Adding fiduciary deposits make the 1970s and 1980s decades even more spectacular<sup>47</sup> (figure 5b).

Finally, since the middle of the 1980s,  $\hat{\phi}$  displays no trend, although exchange rates fluctuations entail significant year to year variations. In 2008,  $\hat{\phi}=200\%$ , just like in 1985, and over the period it varies between 150%-250%.

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<sup>47</sup>All fiduciary deposits are invested abroad, and around 4/5 are owned by clients with a foreign address. The remaining 1/5 may be held by foreigners with as Swiss address.

### 4.3 Interpreting the evidence

What do we learn from the Swiss historical experience?

First, the development of tax havens does not seem to be monotonically linked to globalization. Though rarely formulated explicitly, this view seems to underlie most contemporary analysis of financial flows. Offshore centers are considered as pure intermediaries, performing the routine and uninteresting tasks necessary to the functioning of a complex, globalized economy with large-scale cross-border business. What History suggests, on the contrary, is that there can be a lot of international asset trade without offshore centers. Switzerland played a very minor role on the eve of World War I, at the height of the first globalization, a time when cross-border positions were quantitatively as important as today: in 1914, the aggregate position of the net creditors and the net debtors reached 14% of world GDP, just like at the end of the 2000s (Obstfeld and Taylor, 2004). In fact, the Swiss cross-border wealth management sector developed at first during a time when globalization was receding. In the nineteenth and early twentieth century, the City of London and to some extent Amsterdam may have played, in part, the role that modern offshore centers do, attracting foreign funds and investing them abroad. But the U.K. and Netherlands were important investors *per se*; from the long-run series on foreign investments in the U.S., they do not show up disproportionately as Switzerland does since the end of the 1920s and as other tax havens do today.

The development of the Swiss offshore sector in the interwar period appears to be essentially tax related. The first globalization was tax-free; capitalists earned almost the full return on their stocks and bonds, whether domestic or foreign. In most European countries, progressive income taxation appeared in the aftermath of World War I. This was an abrupt transition: in France, the highest marginal tax rate, that was only 2 percent in 1915, stabilized at more than 60 percent during the interwar period (Piketty, 2003). In 1925, a widespread fear of a capital levy drove interest rates up in France (Hautcoeur and Sicsic, 1999); that same year, according to my  $F$  series, the value of all foreign securities managed by Swiss banks was multiplied by 6. We know from the Bergier commission who were the foreign clients of Credit Suisse (then the second biggest bank) in 1945. More than a third of all securities managed by Credit Suisse belonged to foreign residents, of which almost one half to French, one third to other European countries, and one sixth to the rest of the world.

Tax evasion is the only compelling economic mechanism that can explain the pattern of  $F$  during the interwar period. It is often argued that Switzerland allowed wealth-holders to protect their assets from inflation and currency depreciation. But this mechanism cannot account for the boom in the amount of *foreign* securities managed by Swiss banks: these securities were, like similar foreign securities held onshore, subject to inflation risk. In the 1920s and 1930s, foreigners certainly bought Swiss bonds, which, because

Switzerland had not fought World War I, did not experience much real depreciation over the medium run.<sup>48</sup> But by all accounts, foreign holdings of Swiss bonds were actually very limited. First of all, the supply of Swiss bonds itself was limited: in the 1920s-1930s, the Swiss confederation remained relatively little indebted (federal public debt was 20-30% of national income during the 1925-1935 decade). Second, available price data show that the return on the Swiss public debt was not significantly lower than in other European countries, suggesting that the demand was not stronger than elsewhere. In 1937, when  $\hat{\psi}$  reaches its local maximum, the return on Swiss Confederation bonds was 3.41%; comparable returns were 3.04% in Sweden, 3.31% in the U.K., 3.33% in Belgium and in the Netherlands.<sup>49</sup> There is no evidence that foreigners rushed on Swiss bonds. On the contrary, there is ample evidence that foreigners essentially held foreign securities through their Swiss accounts: since 1930, there are approximately as much foreign securities than Swiss securities in custody in Swiss banks, whereas Swiss securities were 4 times bigger in 1914.

A second widely held view gets no support from the data, namely the claim that Switzerland provided a safe haven during the wars, in particular for the victims of nazi persecutions during World War II. During both wars,  $F$  declines in absolute term and relative to Swiss household wealth. To some extent, this undoubtedly captures a price effect, i.e. the fall in asset values entailed by war destructions abroad, and more generally the war economies. But available evidence (e.g. wealth/income ratios in France, see Piketty (2010)) show that the biggest asset price declines took place in the immediate aftermath of the wars, following inflation and anti-capital policies. At least in the case of France, these phenomenons appear to be much more important than war destructions *per se*. Accordingly, it seems unlikely that the noticeable fall of  $F$  and  $\hat{\psi}$  during the 1914-1918 and 1939-1945 periods could mask strongly rising inflows offset by huge asset price declines. The data simply suggest that there was little or no inflow during the wars. This interpretation is confirmed by the evolution of the number of safe-box deposits opened at Credit Suisse and UBS, which declines slightly from 1939 (19,645) to 1944 (17,785).

If interwar inflows seem to be clearly tax related, it is much harder to identify a unique, clear-cut economic mechanism behind the evolution of Switzerland's wealth management business in the post World War II period. What is clear, again, is that inflows are unlikely to be driven by inflation: Switzerland has consistently prevented foreign purchases of Swiss assets, in order to avoid the Swiss franc from appreciating too much. In the 1960s and 1970s, in particular, the SNB implemented negative nominal interest rates on foreign deposits in Swiss francs. Switzerland has always welcomed foreign fortunes, but only

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<sup>48</sup>Switzerland, however, did mobilize its army during the war; the public debt increased sixfold between 1914 and 1919 and the consumer price index doubled (before declining continuously in the 1920s and stabilizing in the 1930s, 30% above its pre-war level).

<sup>49</sup>See Switzerland Statistical Yearbook, 1937, "Rendement moyen d'obligations dans quelques pays, depuis 1929" p.490.

those invested in foreign securities or fiduciary deposits. This is the essence of what an offshore financial center does: providing an attractive ground for purely foreign-foreign transactions, while preventing potentially destabilizing interactions between the offshore sector and the domestic economy. This kind of services does not protect from inflation.

Inflation set aside, there remains many plausible explanation for the boom of Switzerland’s wealth management business. Is Switzerland receiving the “dividend of neutrality”, i.e. are inflows linked to fear of new wars, to political instability in source countries? Is there a strong case in favor of the tax evasion hypothesis? Do Swiss banks provide high value added financial and advisory services that are lacking in source countries?

The good news for scholars is that there exists an official dataset that could possibly allow to provide some answers to these important questions. The SNB publishes, since 1976, a full country breakdown of the owners of fiduciary deposits. To the extent that all countries have the same aggregate preferences over portfolio choices (i.e. invest similarly in bank deposits and securities), this tells us who owns the whole stock of offshore wealth managed by Swiss banks.

The bad news is that country breakdowns are very difficult to interpret. As Figure 6 shows, a huge and growing fraction of all foreign fiduciary deposits in Swiss banks are recorded as belonging to tax havens, most notably Panama, the British Virgin Islands, the Bahamas, and the Cayman Islands. This is because the SNB does not “look through” intermediate structures used for holding a Swiss account. If an account is opened by a trust located in the British Virgin Islands and whose beneficial owner is a U.S. resident, then the corresponding assets are counted as belonging to the BVI.<sup>50</sup>

So what information does the geographical breakdown of fiduciary deposits provide? Suppose that we are interested in estimating the following cross-sectional relationship:

$$\log(f_i) = \alpha + \beta X_i + \epsilon_i \tag{11}$$

where  $f_i$  is the value of the fiduciary deposits held by residents of country  $i$  in Swiss banks in a given year. Rose and Spiegel (2007) show how we can derive such a relationship from equilibrium theory, with  $i$ ’s residence-based capital income tax rate and distance to Switzerland included in  $X_i$  (the former expected to enter positively and the latter negatively). Now what we observe is  $\tilde{f}_i = (1 - k_i)f_i$  where  $k_i$  is the propensity of country  $i$ ’s residents to use intermediate structures in tax havens for their offshore holdings in Swiss banks. If  $k_i$  is correlated with  $X_i$ , then OLS estimates of equation 11 are biased. On a priori grounds, we have serious reasons to think that  $k_i$  is positively correlated with  $i$ ’s tax rate, since using shell intermediaries minimizes the probability for a tax evader to

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<sup>50</sup>Moreover, even holdings recorded vis-à-vis non-haven countries need not give a fully reliable information; e.g. holdings of the U.K. may include holdings of trusts created in the U.K. but controlled by non-U.K. residents; similarly, many “Swiss owned” fiduciary deposits actually have foreign beneficial owners.

be caught. This means that equation 11 can only be estimated by instrumental variables. Now, finding a variable correlated with tax rates but truly uncorrelated with  $k_i$  is not obvious; I leave this for future research.

In spite of this problem, the country-level fiduciary dataset is far from useless. It suggests several interesting patterns.

First, it shows one important difference in the country origins of the funds compared to 1945, namely the importance of Middle East oil exporters' assets. This suggests that the economic mechanisms behind the development of the Swiss cross-border wealth management business in the last 3 decades of the twentieth century are more complex than in the interwar period. Gulf countries have no income tax at all, so tax avoidance cannot explain why they held 15-20% of all Swiss fiduciary deposits until the end of the 1980s. Swiss banks must provide other services unavailable domestically. One conjecture is that they provide among other an insurance service, valuable to foreign countries who hold a large amount of foreign claims. Using offshore banks allows to own foreign investments anonymously: this is a protection against the risk of expropriation, an important element of the political economy of global imbalances.

Second, the fiduciary deposits dataset makes clear that distance matters. Assume that  $k_i$  is only an increasing function of  $i$ 's tax rate, then if distance is negatively correlated with tax rates, OLS estimates of equation 11 provide a lower bound for the effect of proximity to Switzerland on  $f_i$ . Now, a country's distance to Switzerland and its top marginal income tax rate are de facto slightly negatively correlated: in the pooled cross-section (excluding tax havens), a 1% increase in the distance to Switzerland is associated with a 0.05% decrease in the top income tax rate (with a standard error of 0.01). And in a simple bivariate cross-sectional regression of  $\log(f_i)$  on the  $\log$  of distance, the coefficient is always negative and significant: a one percent decrease in distance to Switzerland is correlated with an increase of at least 0.5% of the amount of wealth put in Swiss banks; the correlation is much bigger in some years. Of course many other factors affect  $f_i$ , some of which are correlated with distance. But whatever the reason for the correlation, the point is that proximity to Switzerland still matters significantly, even in recent years.

Third, the huge and rising share of deposits formally owned by shell structures in small tax havens gives credit to the tax avoidance hypothesis. Multi-layered, multi-country holding structures are useless for investors that only use Swiss banks for the higher quality, less costly, or unique financial services they provide. On the opposite, the strong reaction of European deposits to the introduction of the EU savings directive in 2005 suggests that these schemes are essentially used for tax minimizing purposes. As figure 6 shows, Europe's share in total foreign fiduciary deposits declined by 10 percentage points between December 2004 and December 2005, while tax havens gained 8 percentage points, other regions kept a fairly stable share (and the total value of foreign-owned fiduciary deposits gained 24% in Swiss francs). This suggests that the main effect of the directive

was to prompt European depositors to interpose a non-European shell entity between their accounts and themselves, which is a straightforward way to avoid the withholding tax introduced by the directive. There is plenty of anecdotal evidence suggesting that shell entities in small tax havens are basically used to avoid taxes or legislations that apply in the investors' home countries. Recent historical research has shown that the practice of creating such shell entities on a significant scale started during World War II and in its aftermath, as a way for Axis countries to circumvent U.S. legislations on asset freezing, and then for Switzerland to escape the French pressure to disclose French holdings in Swiss banks (Wilkins, 2004; Schaufelbuehl, 2009). Recently, the U.S. Internal Revenue Service has released several case studies of tax evasion by U.S. residents in a big Swiss bank.<sup>51</sup> Almost all cases exhibit the same pattern: accounts opened initially in the name of the U.S. investor, and then in the name of an intermediate sham entity with an address in Panama, the Bahamas, the BVI, Liechtenstein or Hong-Kong. This is exactly what figure 6 shows. The fact that at least 60% of all fiduciary deposits are held through intermediate sham entities suggests that tax or regulatory avoidance remains a major motive for holding a Swiss bank account.

## 5 Applications

The goal of this section is to show how tax havens interact with wealth distributions. A precise imputation of the stock of  $\Omega$  to its owners is impossible; rather, I start from reasonable assumptions and conduct various sensitivity analysis. I also provide bounds whenever possible.

### 5.1 External wealth of nations

How does unrecorded wealth in tax havens affect our knowledge of global imbalances? I provide below several scenarios for 2005, within the frame of Lane and Milesi-Ferretti's (2007) External Wealth of Nations database, which is the standard dataset for international investment positions.

In 2005, the eurozone was the world's second largest net international debtor, with a USD 1,131bn negative net foreign asset position (11% of euro-area GDP). Now, on a priori grounds, we expect euro area countries to be the most heavily affected by unrecorded offshore wealth, for five reasons.

First, European residents probably own the bulk of offshore assets managed in Switzerland. In 1980, Europeans owned 40% of all foreign-owned Swiss fiduciary deposits, Middle Eastern countries 15%, tax havens 30%, and the rest of the world 15%. If we make tax havens' holdings transparent under the conservative assumption that  $k_i$  equalled 0 for

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<sup>51</sup><http://www.irs.gov/newsroom/article/0,,id=110092,00.html>

Middle East countries and was constant across countries for the rest of the world, then Europeans actually owned 62% of foreign fiduciary deposits. For a start, it is reasonable to assume that in 2005, euro area residents owned around 60% of  $\Omega^s$ , the fraction of  $\Omega$  managed in Switzerland.

Second, the biggest fraction of the missing securities in 2005 had been issued by euro-area countries (most notably Luxembourg and Ireland, which accounted for 1/3 of  $\Omega$ ). To the extent that owners of offshore accounts exhibit a certain degree of home bias (or at least invest more in securities issued by closer countries<sup>52</sup>), we expect the missing euro area securities to be held relatively more by European residents.

Third, we have seen that the amount of wealth held in Switzerland is significantly correlated to distance. Though we don't know where  $\Omega - \Omega^s$  is managed, it is likely that a significant part of it is in Europe. 30% of the 42 offshore financial centers listed by the Financial Stability Form (IMF, 2000) are located in Europe. Some of them are widely regarded as important cross-border wealth management centers, most notably Luxembourg, and to a lesser extent Liechtenstein, Monaco and the Channel Islands, in addition to Switzerland. The FSF does not list the U.K. as an offshore center, though it may also manage a fraction of  $\Omega - \Omega^s$ . All industry reports suggest that the European continent is still the biggest player in the cross-border wealth management market.

Fourth, tax havens have historically been used essentially by Europeans. In addition to the 12 European OFCs listed by the FSF, 19 non-European OFCs have historical links with the U.K., are still dependencies or the U.K. or of the Netherlands. The biggest Caribbean OFCs, for instance, are U.K. overseas territories (Anguilla, Bermuda, the BVI, and the Cayman Islands). Singapore was a British colony until 1963, and Hong-Kong a U.K. dependent territory until 1997. And at least initially, Europeans were the main clients of offshore banks: in 1945, more than 90% of all securities managed by Switzerland, by far the biggest cross-border wealth management of the time, belonged to Europeans.

Finally, in the euro area, all countries have civil law legal systems; foreign bank accounts in countries with bank secrecy is the main capital income tax avoidance technology available. In common law countries, by contrast, trusts provide a competing technology. Just like foreign bank accounts, trusts allow assets to be separated from their owners from the view point of the domestic tax authority; they also provide asset protection and privacy services comparable to what offshore accounts do. Even though both technologies can be combined, we expect, all else equal, civil law countries' residents to hold relatively more assets offshore than, say, U.S. or U.K. residents.

Table 5a shows what the euro-area's net foreign asset position becomes under various assumption on its share of  $\Omega^s$  (y-axis) and  $\Omega - \Omega^s$  (x-axis). With 50% of  $\Omega^s$  and 20% of  $\Omega - \Omega^s$ , the euro area moves from a big net debtor position to a balanced one; under

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<sup>52</sup>The role of distance in cross-border securities positions has been widely documented, see e.g. Lane and Milesi-Ferretti (2007).

reasonable scenarios (say with 60% of  $\Omega^s$  and 40% of  $\Omega - \Omega^s$ ), it turns out to be a big international creditor.

To turn the U.S. into a net creditor requires much stronger assumption, because U.S. net international liabilities were in 2005 almost twice bigger than euro area countries' (more than USD 2tr, i.e. 17% of U.S. GDP). With a share of  $\Omega^s$  equal to 30% and a share of  $\Omega - \Omega^s$  between 60-70%, the U.S. IIP is roughly balanced. While not completely impossible in theory, these are extreme assumptions: we need to assume that U.S. residents use sham intermediaries for holding Swiss accounts on a much bigger scale than Europeans, even after the EU savings directive, and they that are the main users of offshore banks located outside Switzerland.

One important caveat applies to the above computations. If one adds the full  $\Omega$  to the asset side of the world IIP, as computed from the External Wealth of Nations database, then the world moves from having a negative net foreign asset (NFA) position, as described by Lane and Milesi-Ferretti (2007), to having a positive one. In effect,  $\Omega$  is somewhat bigger than the world net foreign asset discrepancy computed by Lane and Milesi-Ferretti (2007). For a small part, this is due to different data choices (detailed in Appendix A). But for the biggest part, this is due to other discrepancies in international accounts that are not linked to private offshore wealth, but rather to complex, independent data issues that fall outside the scope of this paper. In particular, in the External Wealth of Nations database, the world has a positive net foreign direct investment position – more FDI assets are recorded than liabilities. Since some countries estimate FDIs at market values, and other at book values, inconsistencies are inevitable.<sup>53</sup> Moreover, since 2004, more exports are recorded globally than imports in the IMF-computed world balance of payments, with a gap reaching 0.5% of world GDP (figure 7).<sup>54</sup> Cumulated over time, the very large trade discrepancy has contributed, in recent years, to a decrease of the world NFA discrepancy (many IIPs and many parts of IIPs are still computed by cumulating flows), while my estimate of  $\Omega$  has kept rising (except in 2008). This is why I focus on 2005, the last year for which IIPs were probably not contaminated by the trade discrepancy.

As a matter of fact, the NFA discrepancy is the product of many, complex, and largely independent data deficiencies. In section III, I have argued that the securities discrepancy has a clear-cut economic interpretation. Others discrepancy, to my knowledge, do not. However, we should not ignore the possibility that some countries (including euro area

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<sup>53</sup>More generally, FDIs raise huge practical data challenges: there is no centralized system for FDIs comparable to what exists for securities, and international accounts compilers have started only very recently to spread good practices and harmonize data across countries, through a “Coordinated Direct Investment Survey”. The first wave of the CDIS was conducted in 2009 (versus 1997 for the CPIS), and at the time of this paper, its results had not been included in any dataset.

<sup>54</sup>A very serious conjecture is that this large anomaly comes from under-recorded imports in developing countries, in particular in China: as Fisman and Wei (2004) show, China’s imports from Hong-Kong are significantly undervalued, a gap linked to tariff rates.

countries and the U.S.) *over*-estimate some of their foreign assets (e.g., because they use book values for FDIs when market values are lower), or under-estimate some of their foreign liabilities (e.g., because they estimate part of their IIPs by cumulating over-estimated current account balances). So in Table 5b and Table 6b, I redo Table 5a and 6a computations, but impose the additional constraints that the world IIP is completely balanced. On the y-axis, I make assumptions on the fraction of the gap between  $\Omega$  and the NFA discrepancy that can be imputed to euro area countries or to the U.S. If we are agnostic, then it is reasonable to assume that 20-25% of the gap comes from the eurozone and a similar fraction from the U.S. (this corresponds to their share of cross-border liabilities in total international liabilities). If we believe that euro area and U.S. accounts are of higher quality than on average (i.e. that most of the gap between  $\Omega$  and the NFA discrepancy comes from things like the under-recording of imports in China, or a systematic underestimation of developing countries' FDI liabilities at market value), then we must look at lower figures. On the x-axis in Table 5b, I fix the eurozone's share of  $\Omega^s$  at 60% and make its share of  $\Omega - \Omega^s$  vary between 10% and 90% (i.e. 29% corresponds to a share of  $\Omega^s$  of 60% and of  $\Omega - \Omega^s$  of 10%, etc.). In Table 6b, I simply make the share of  $\Omega$  owned by U.S. residents vary between 10 and 90%.

The finding that the eurozone is a net creditor when we take into account its citizens' offshore assets is robust to adding the constraint that the world IIP balances completely. The most plausible scenarios make the eurozone a balanced or slightly creditor economy. If it owns 60% of all offshore assets in Switzerland, 40% of all offshore assets in the rest of the world, and if 25% of the gap between  $\Omega$  and the External Wealth of Nations world's NFA discrepancy is due to errors in euro area accounts, then the eurozone had a positive USD 59bn position in 2005. The world second largest debtor was in fact a net creditor. On the contrary, the U.S. has a zero net position only if we assume that U.S. accounts are perfectly accurate on all dimensions except for the non-recording of their residents' offshore holdings, and that U.S. residents own 60% of the global stock of offshore assets.

It is widely acknowledged that there exists significant uncertainties on net asset positions: given the high gross/net positions ratios, this is inevitable. This paper goes beyond this point: it suggests two scenarios in which net external positions are dramatically altered, in a way that is more consistent with basic theoretical expectations. The first and most likely scenario goes like this: euro area countries are substantially richer than we think once we include their residents' unrecorded offshore holdings; all data are equally imperfect on all other dimensions across countries; but when we take everything into account, the eurozone turns out to be a slight net creditor, which is consistent with its high saving rates, low growth and low rate of return. In the second, more extreme and speculative scenario, developing countries under-estimate strongly their foreign liabilities (in particular FDIs); taking into account offshore assets makes the eurozone an important net creditor, and the U.S. a much less indebted economy. The puzzling net debt of the

developed world disappears.

## 5.2 Within country distribution of wealth

How does the stock of unrecorded offshore assets affect our knowledge of within country income and wealth distributions? Does the existence of tax havens imply that inequalities are strongly under-stated?

Table 7 exhibits some illustrative scenarios for the euro-area. In 2005, the total net wealth of euro area's households amounted to USD 42tr. In line 1 of Table 7, I make simple assumptions on the distribution of recorded wealth. I assume that the top 10% owned 62% and the top 1% 24%, which are the contemporary values computed by Landais et al. (2011) for France. I assume that the distribution of recorded wealth is Pareto with a constant Pareto-Lorenz coefficient  $a$  in the top decile. The values for the top decile and percentile shares imply a value for  $a$  of 1.7. I then make various assumptions on the share of  $\Omega$  owned by euro area residents (y-axis). Table 7 shows how each fractile's share evolves when we attribute to it various fractions of  $\Omega$ . If, say, 50 % of  $\Omega$  belongs to the richest 0.1% euro area households, their share of European wealth increases by 4 percentage points compared to the baseline Pareto scenario, from 9% to 13%.

This is certainly not negligible: any study of the very rich should definitely take into account that they probably hold a significant fraction of their wealth in various countries, a fact that is unlikely to be captured by most available datasets. The globalization of wealth management activities raises important challenges for the estimation of the distribution of very top wealth shares. However, note that it is unlikely to affect much the top deciles or even the top 5% share: since recorded wealth is already very concentrated, offshore assets are bound to have a rather limited effect. For instance, even if 100% of  $\Omega$  belonged to the richest 10% of euro area households, their share of total European wealth would only increase by 3 percentage points compared to the baseline scenario, from 62% to 65%. This contrasts with the first order effects of unrecorded offshore assets on global imbalances. It is not surprising: in most countries, net foreign positions are still relatively small compared to domestic wealth.<sup>55</sup>

Second, we can ask how the relocation of wealth in tax havens interacts with what we know of the evolution of top income and asset shares over time. This is clearly more difficult, since we only know  $\Omega$  since 2001. So I make only one simple, upper bound scenario for France. Figure 8 plots the raw French top 1% income share, as estimated by Piketty (2003) and Landais (2008) from tax returns. I then show how this share is modified if we add back all incomes earned on all foreign securities and fiduciary deposits managed by Swiss banks (under the assumption of a constant 5% return).<sup>56</sup> If all foreign

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<sup>55</sup>In 2005, the euro area's recorded net foreign asset position was less than 3% of household wealth.

<sup>56</sup>Foreign securities and fiduciary deposits are a slight upper bound for the value of all foreign fortunes managed by Swiss banks, since Swiss residents own an (uncertain) fraction of  $F$ .

fortunes managed by Swiss banks belonged to French residents, there would be the same level of inequality in France than in the U.S. (a top income share of around 20%), and France would be back to the level of inequality of the early twentieth century. This is clearly an upper bound (in 1945, 18% of Credit Suisse custodial holdings belonged to identified French residents), and is essentially suggestive of the depth of the gap that exists today between continental European countries and the U.S. Figure 8 also shows that, despite substantial inflows, the relocation of wealth in Switzerland cannot account for the huge decline of the top income share during the interwar period.

## 6 Conclusion

This paper has developed new methods and presented new series to document for the first time the relocation of personal wealth in tax havens in a global and historical perspective. The main finding is that around 8% of global net household wealth is held unrecorded in offshore banks, of which one third in Switzerland. There is a body of evidence that euro area residents own a large share of these assets, suggesting that the euro area is a net international creditor, instead of the large net debtor portrayed by official statistics.

The globalization of wealth management activities has far-reaching consequences for empirical economists and policy makers. It makes international statistics more and more difficult to interpret and inconsistent, which hampers our ability to track key aspects of globalization, such as the direction of global imbalances, or which countries invest in the U.S. and why. Ultimately, it limits our ability to monitor financial stability. It challenges tax collection on the wealthiest. In a world of growing imbalances, there will necessarily be a demand for transparency on who invests where, that will not be satisfied if the current structure of global capital market stays the same. Therefore, tax havens raise major challenges for the future.

The evidence presented in this paper are not exhaustive. The analysis is restricted to a subset of all possible forms of wealth held in tax havens. Much more remains to be done to understand fully what drives the relocation of wealth abroad. Most importantly, this paper does not deal with socially optimal policies. The fact that a large amount of wealth is held unrecorded in tax havens is certainly a bad news for statisticians, and probably for tax authorities, but whether it is bad from the point of view of social welfare remains open. In order to deal with this question, one would have to take explicitly into account the private value of all services provided by tax havens, as well as their dynamic effects on the level and the structure of taxes in source countries and on the competitiveness of domestic financial sectors. These are important questions to design socially optimal policies. I hope that the empirical findings presented in this paper will contribute to stimulate future research in these areas.

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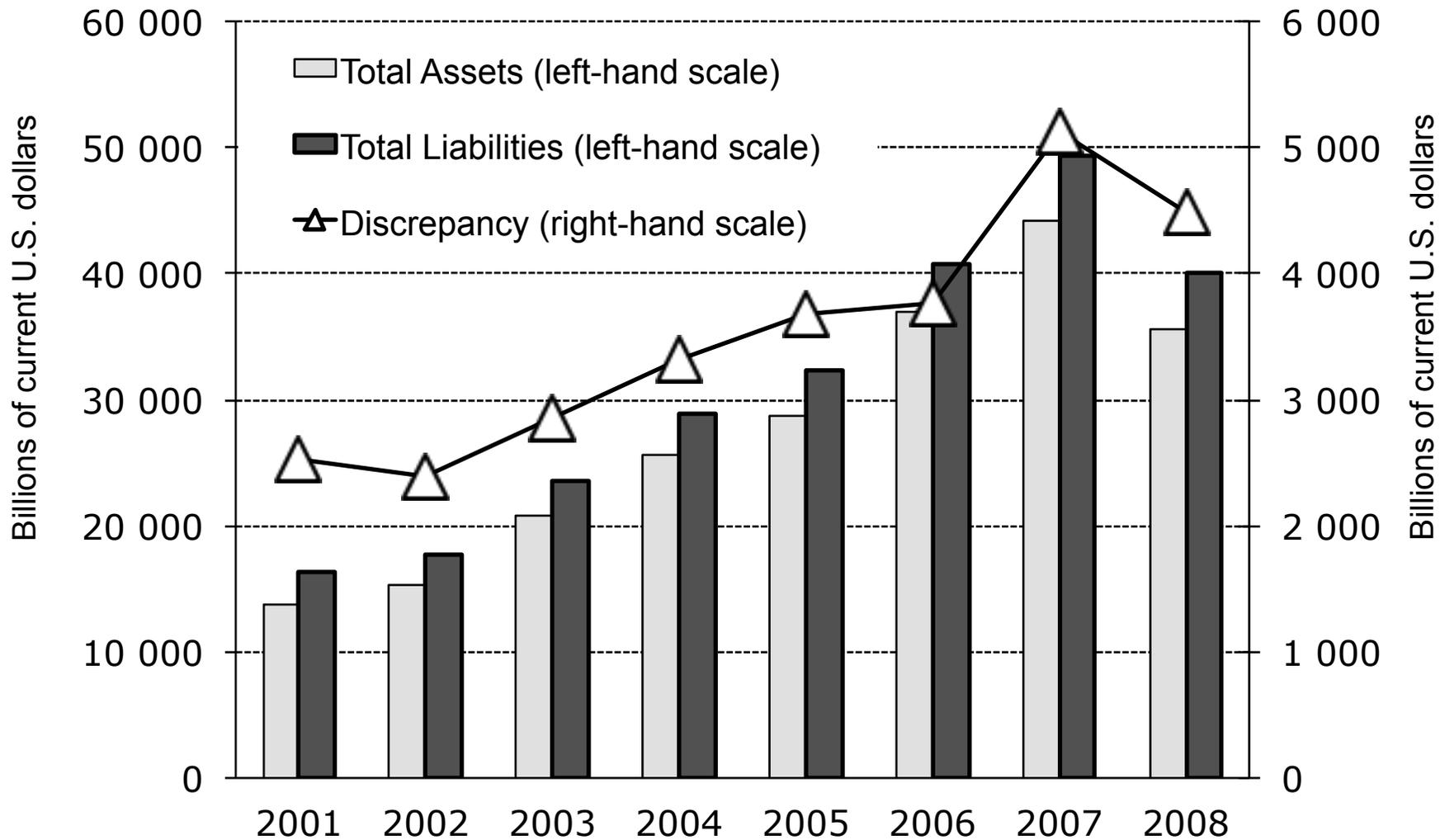
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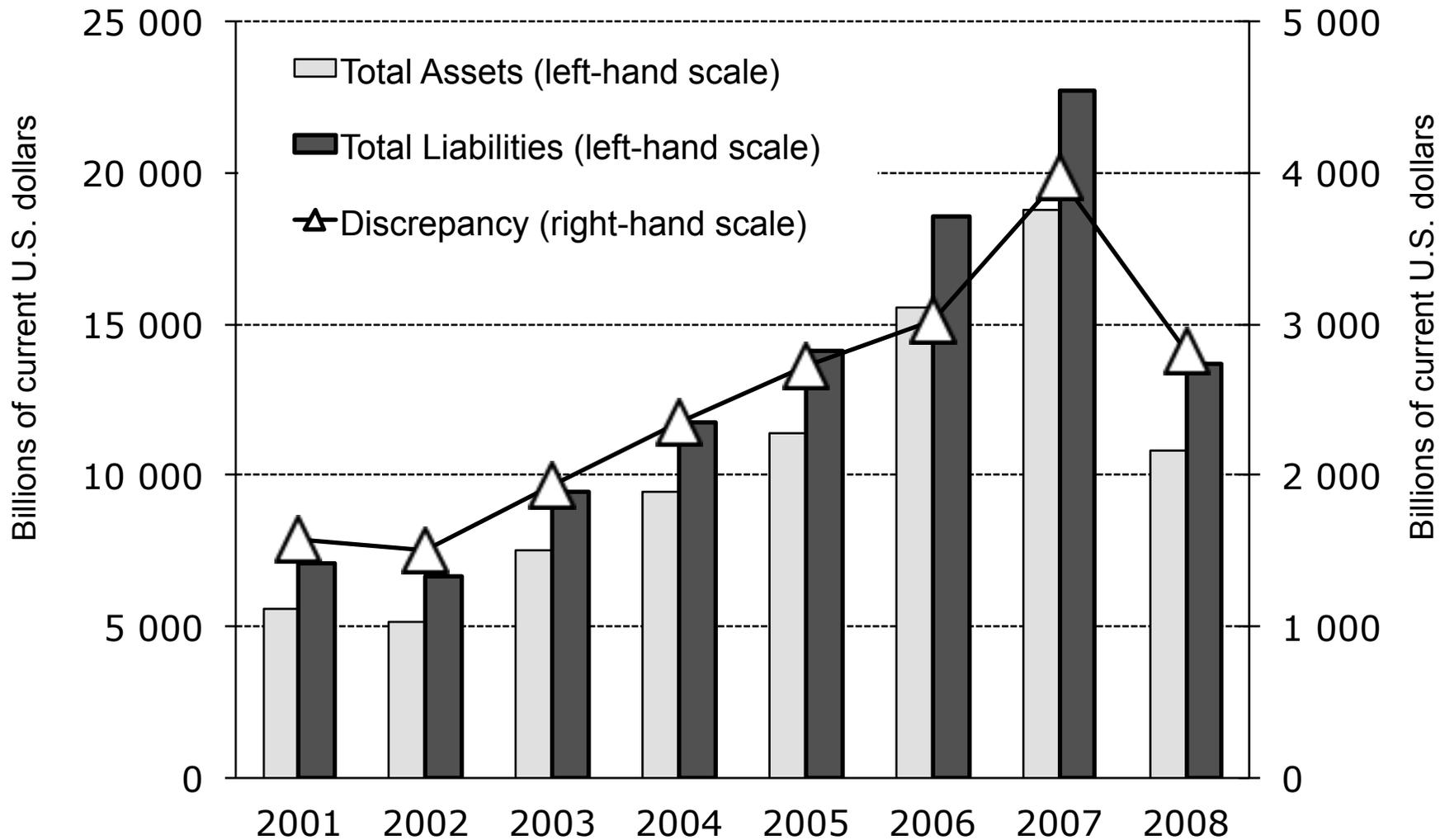
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**Figure 1a: Foreign Securities Assets and Liabilities of All Countries, 2001-2008**



**Figure 1b: Foreign Equity Assets and Liabilities of All Countries, 2001-2008**



**Figure 1c: Foreign Debt Securities Assets and Liabilities of All Countries, 2001-2008**

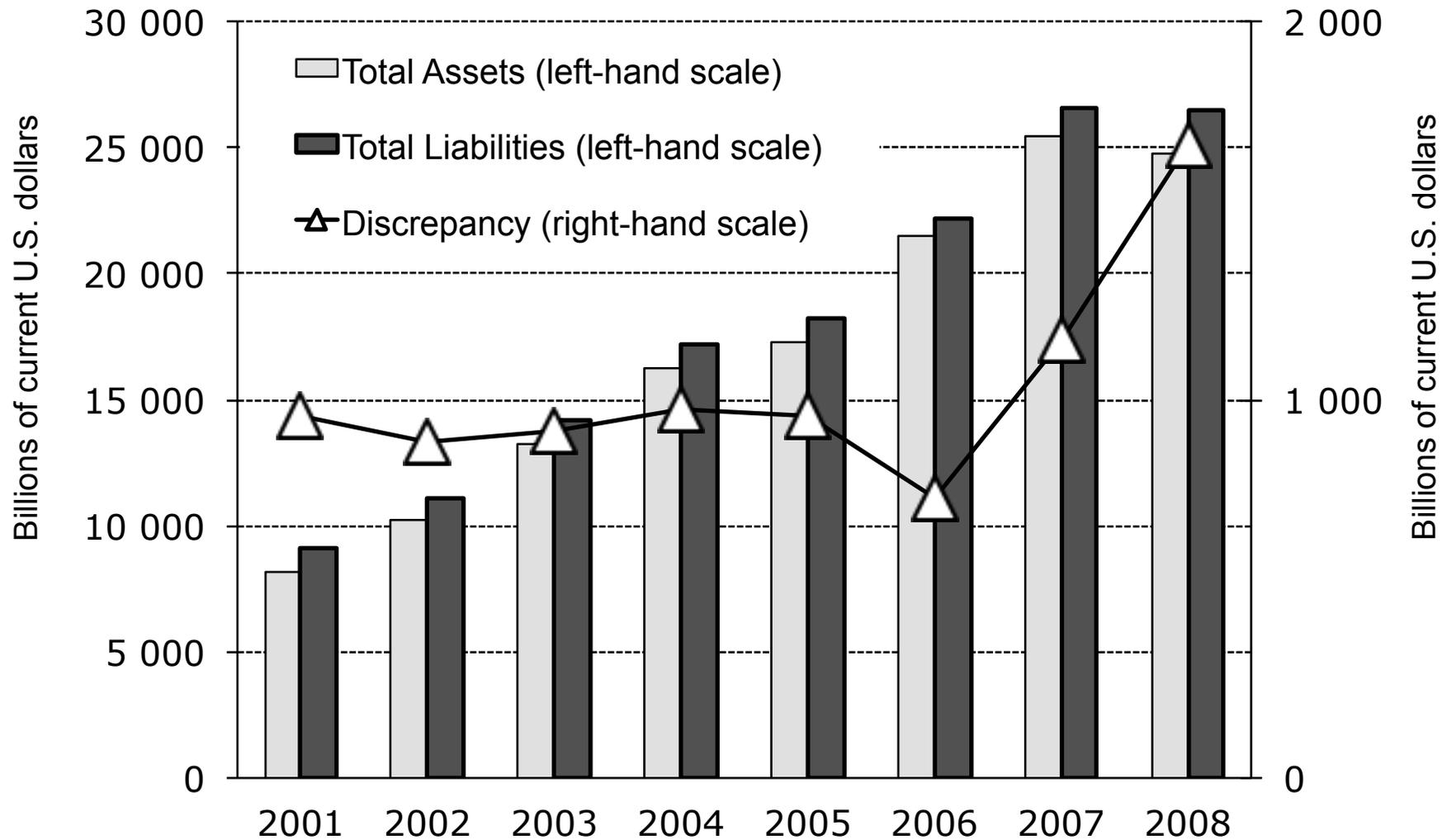
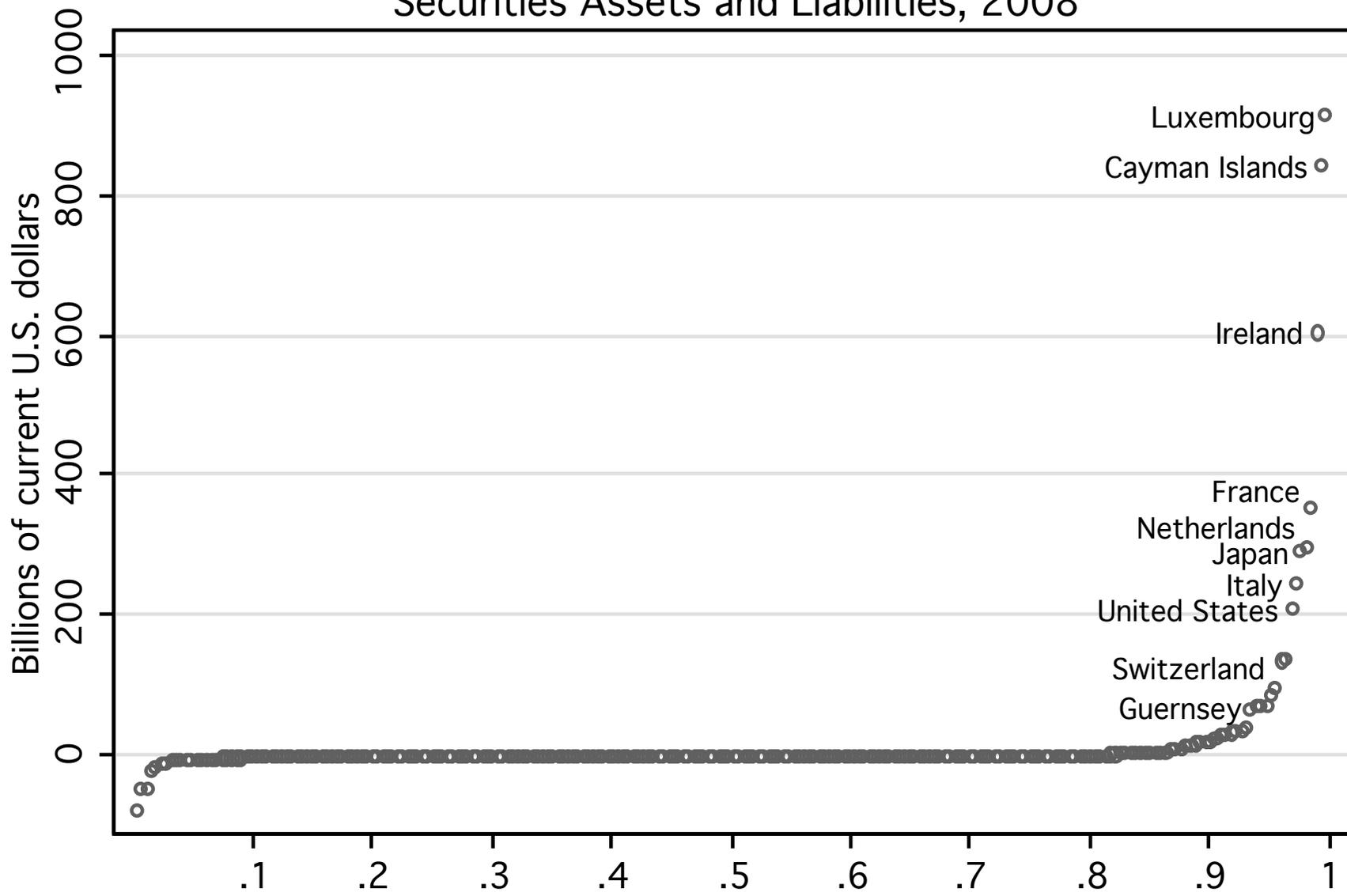
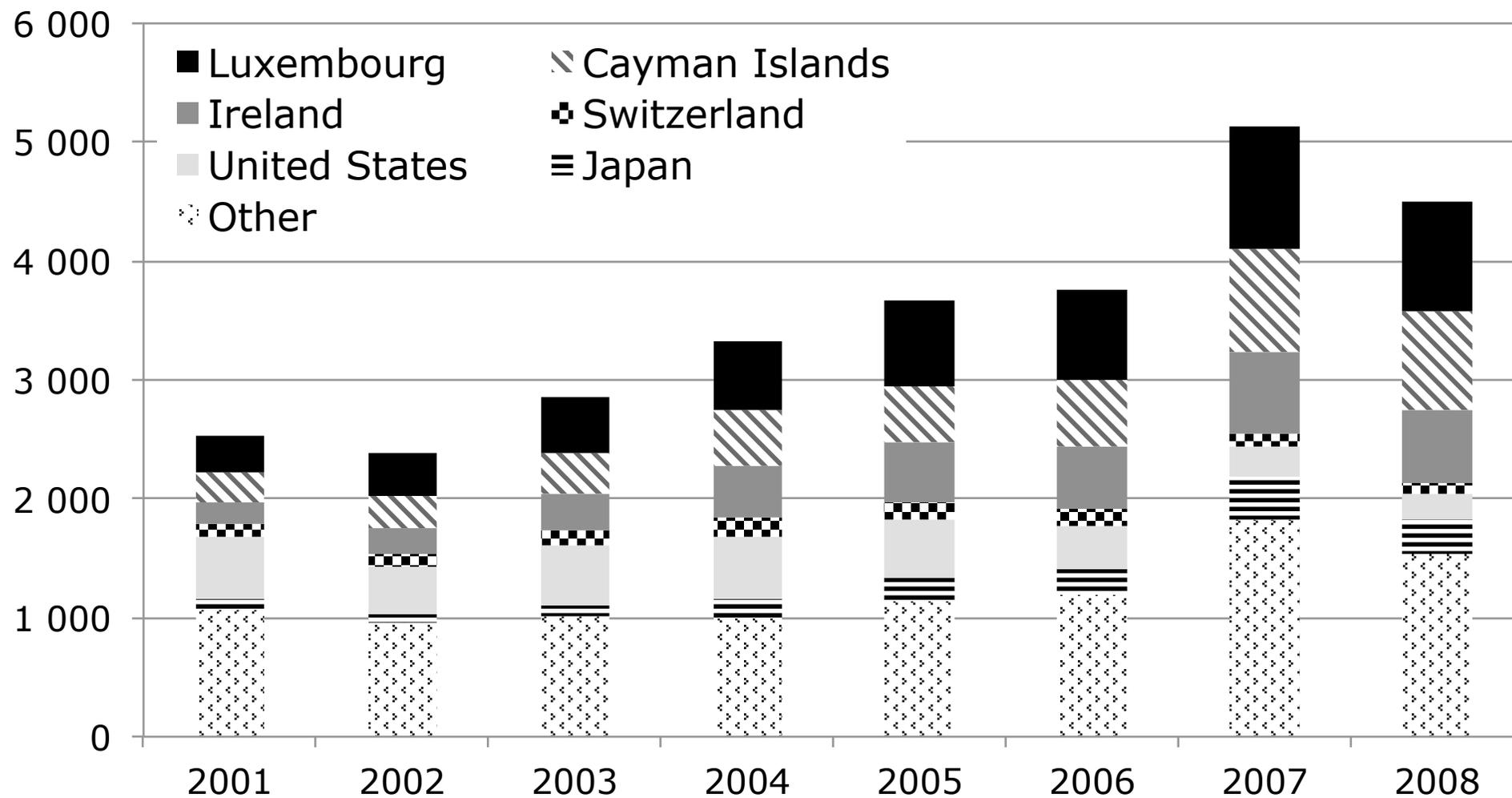


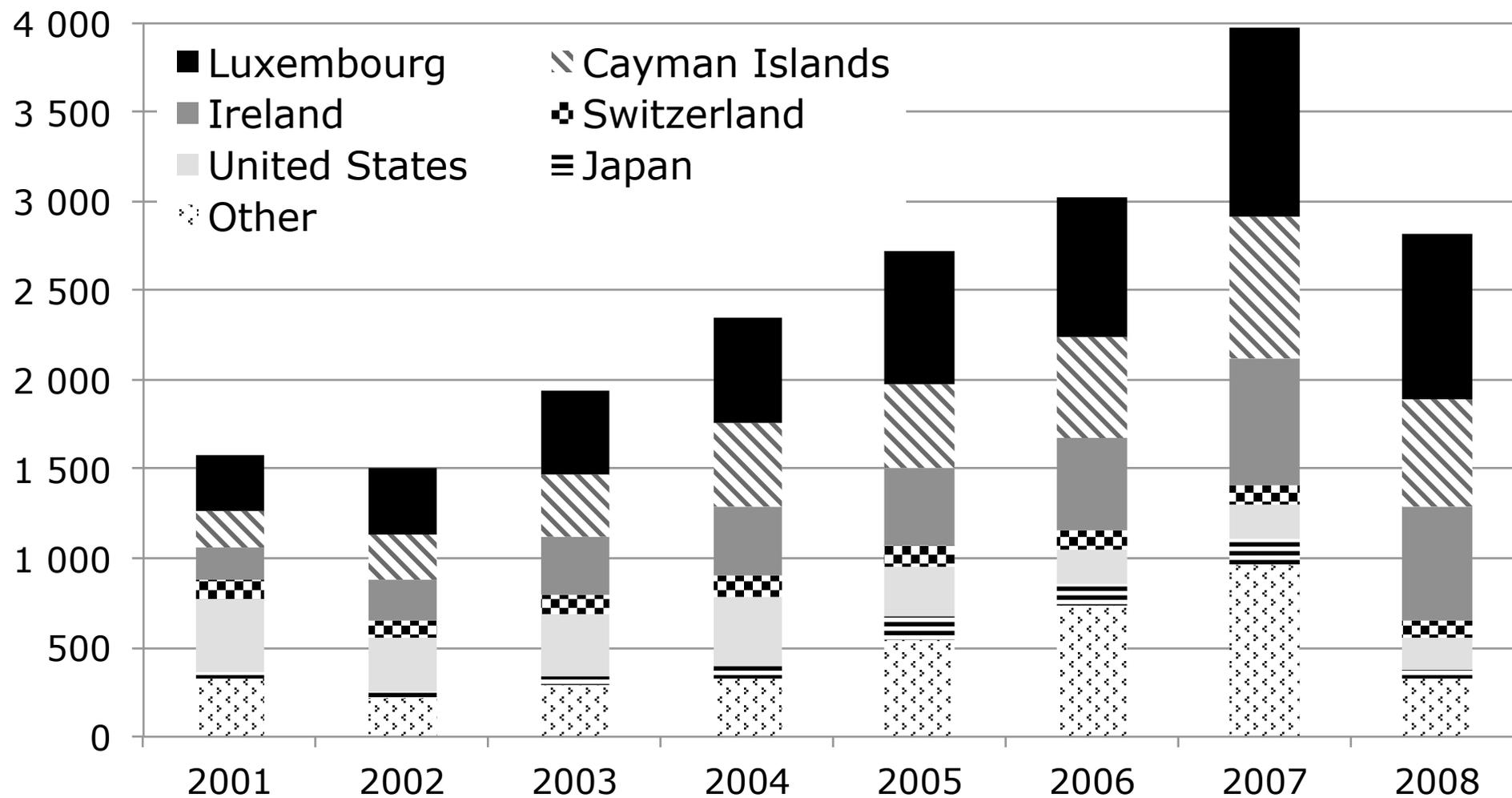
Figure 2: Distribution of the Discrepancy Between Securities Assets and Liabilities, 2008



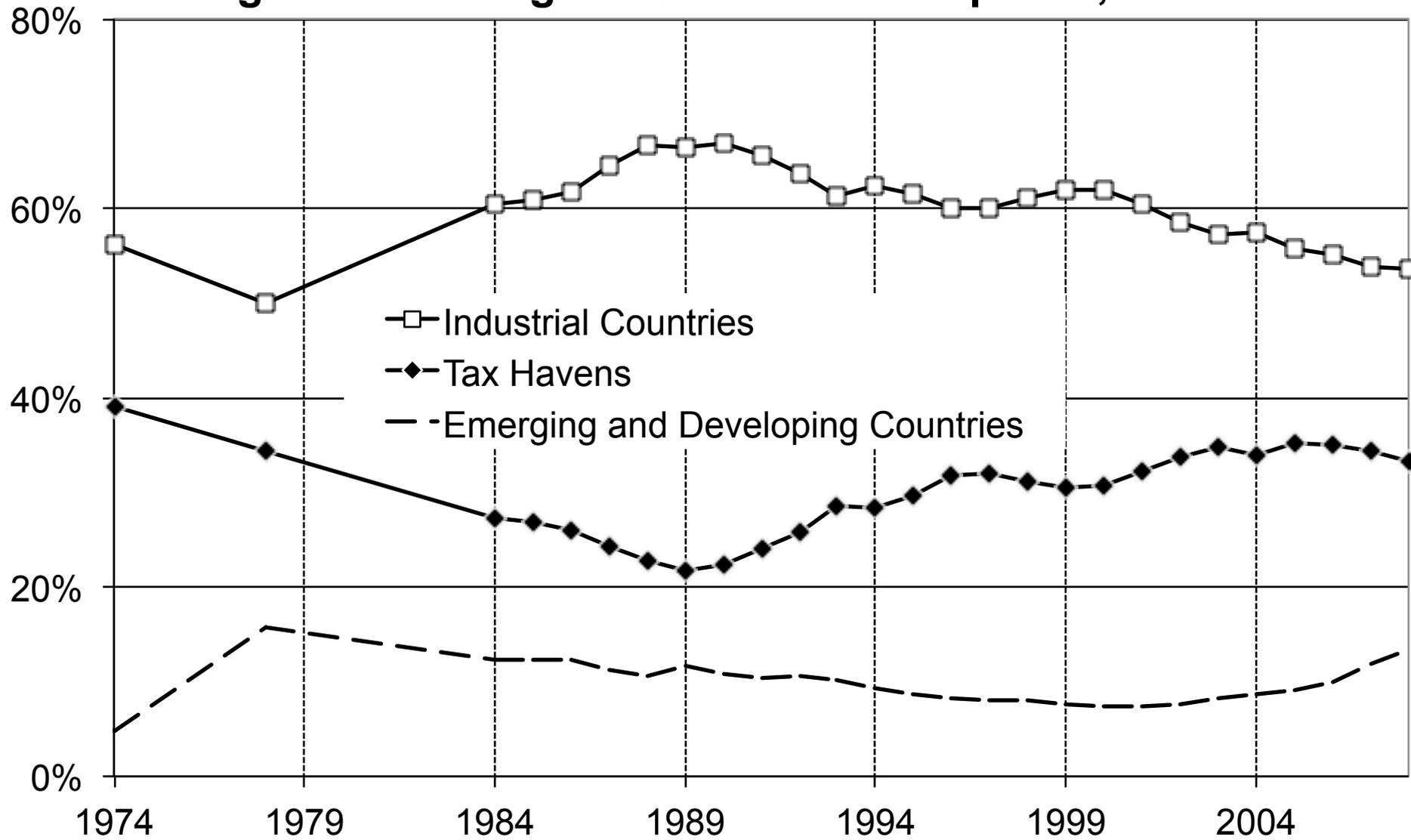
**Figure 3a: Country of Issuers of the Missing Securities, 2001-2008,  
bn of U.S. dollars**



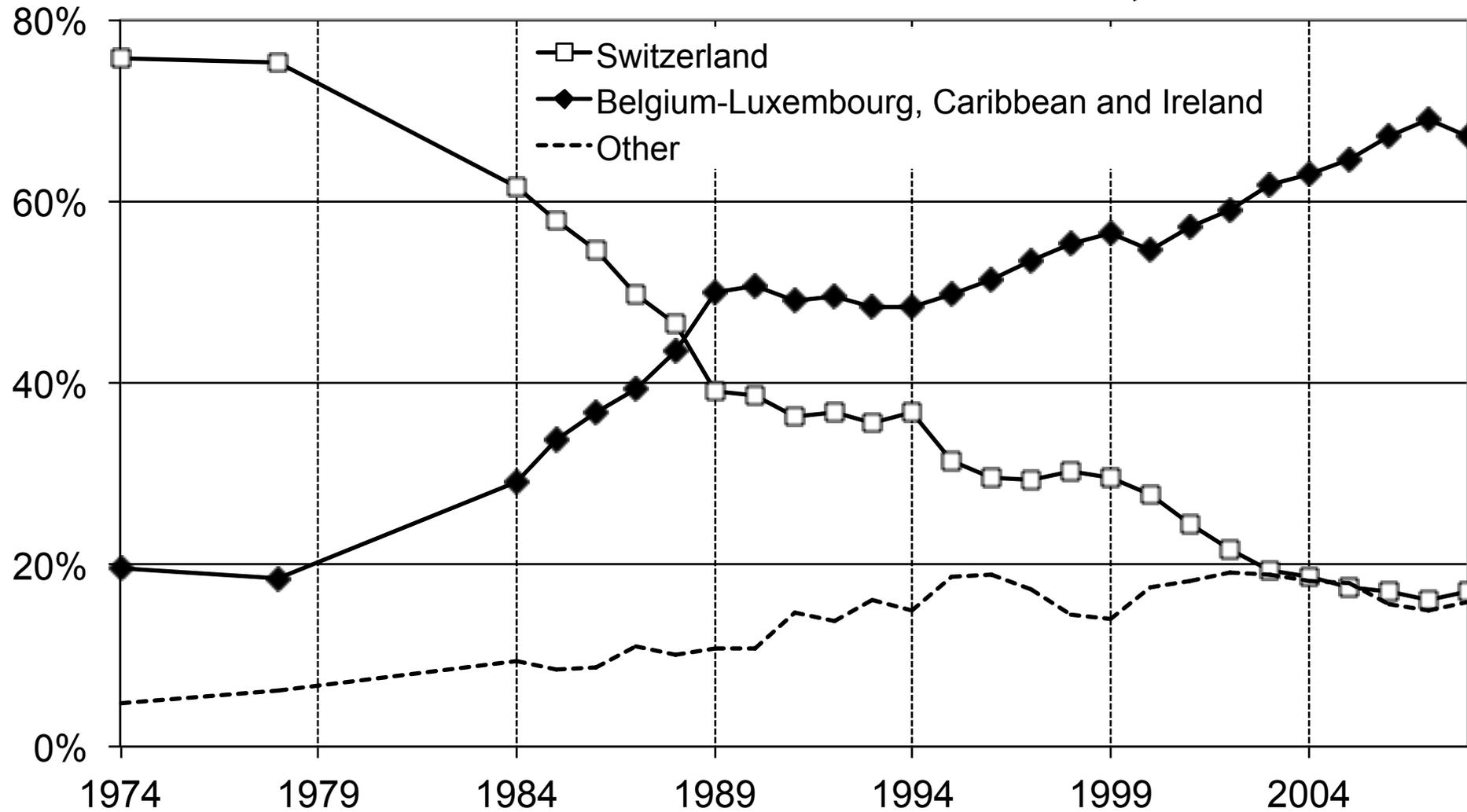
**Figure 3b: Country of Issuers of the Missing Equities, 2001-2008,  
bn of U.S. dollars**



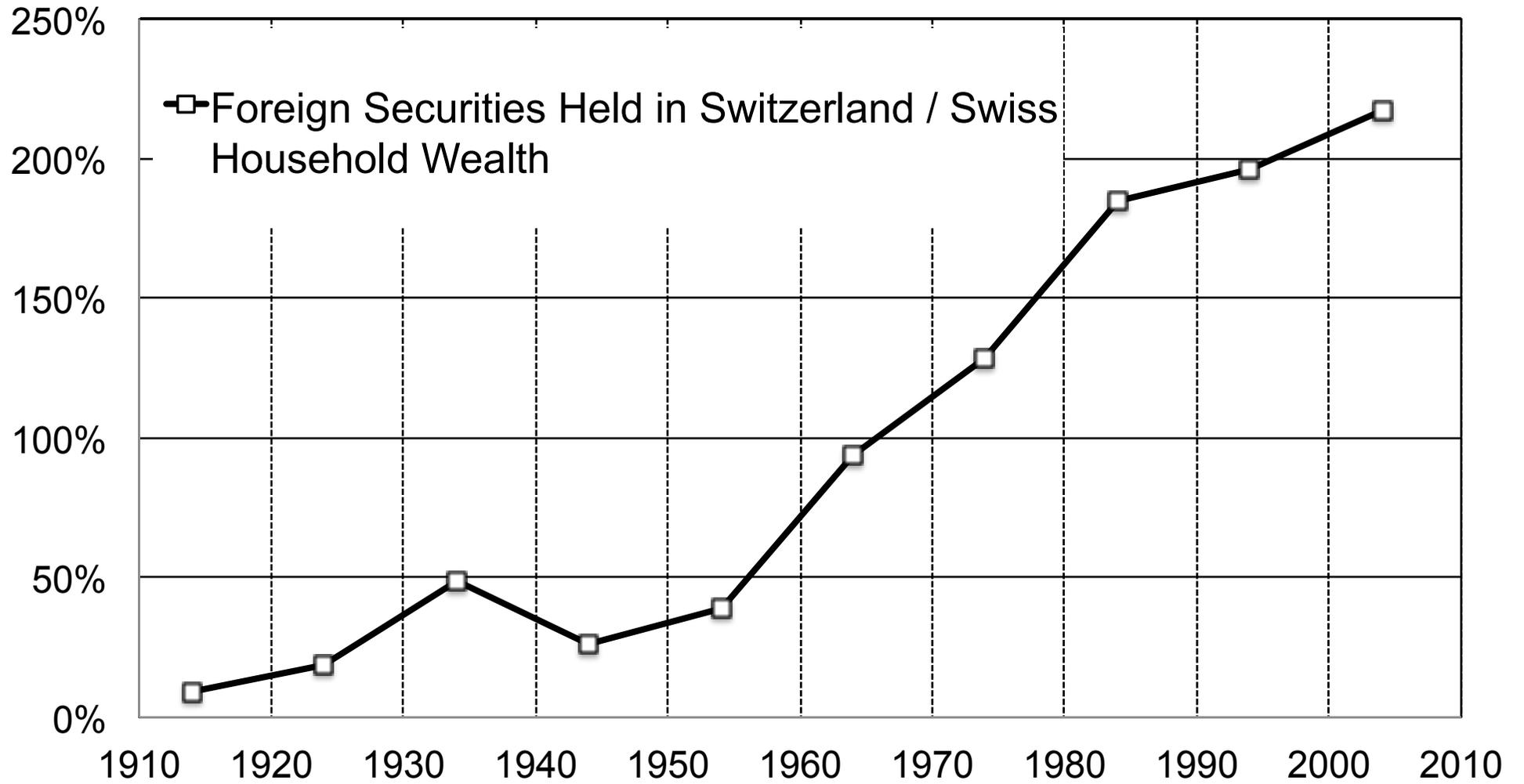
**Figure 4a: Foreign Holders of U.S. Equities, 1974-2008**



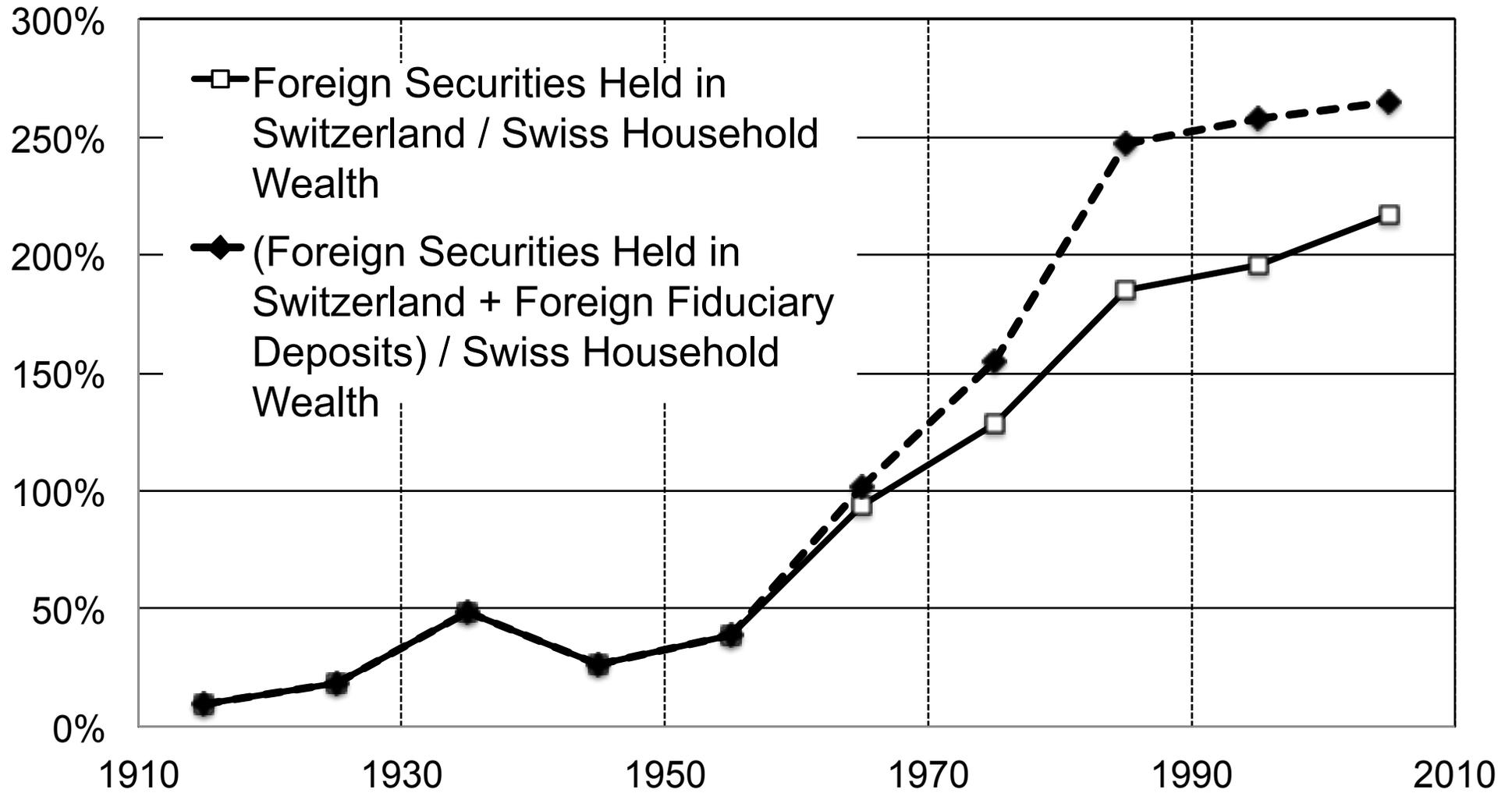
**Figure 4b: Share of Various Tax Havens in U.S. Equity Liabilities Recorded vis-à-vis Tax Havens, 1974-2008**



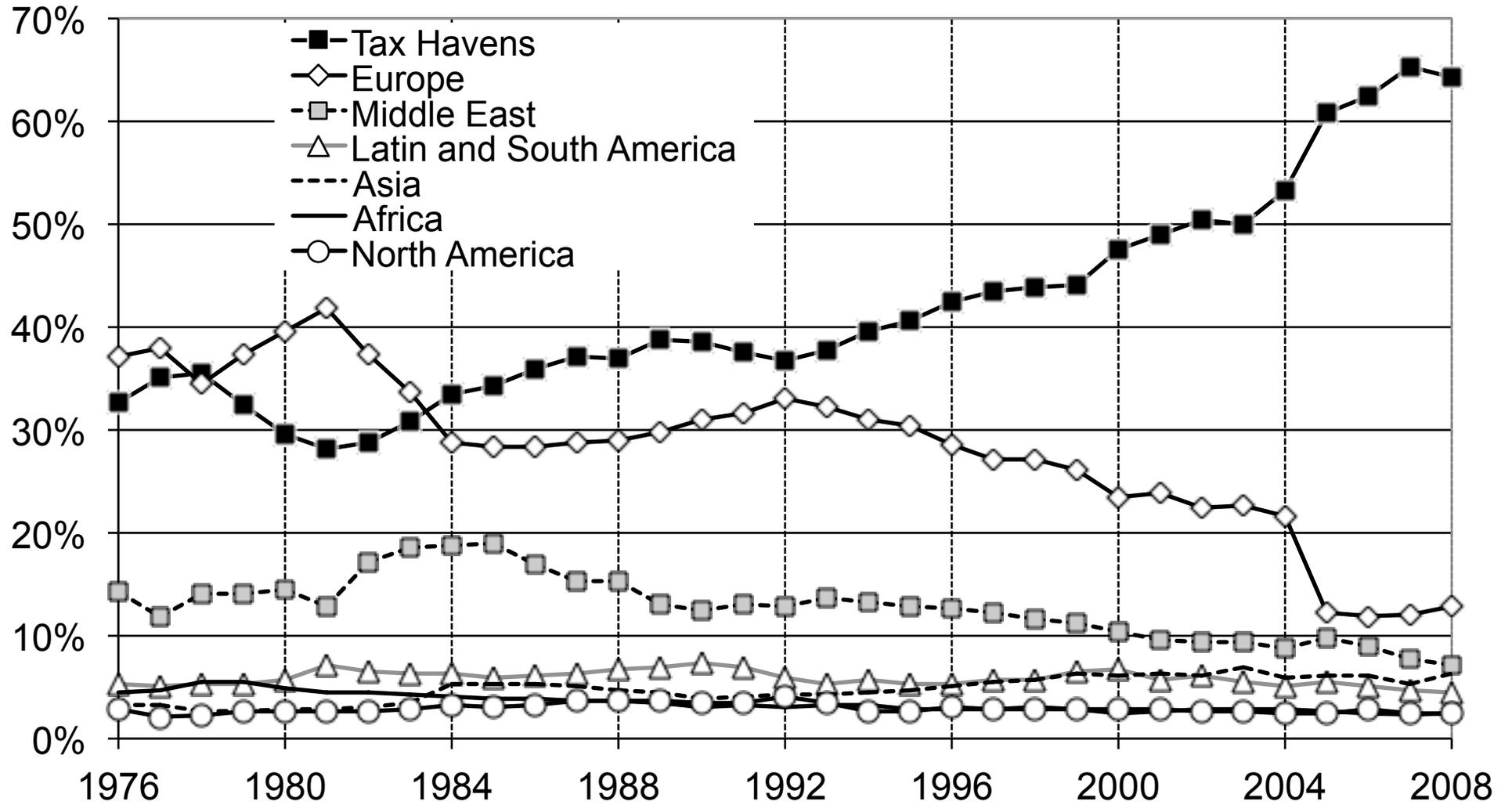
**Figure 5a: Ratio of Foreign Securities Held in Switzerland to Swiss Household Wealth, 1914-2010, Decennial Averages**



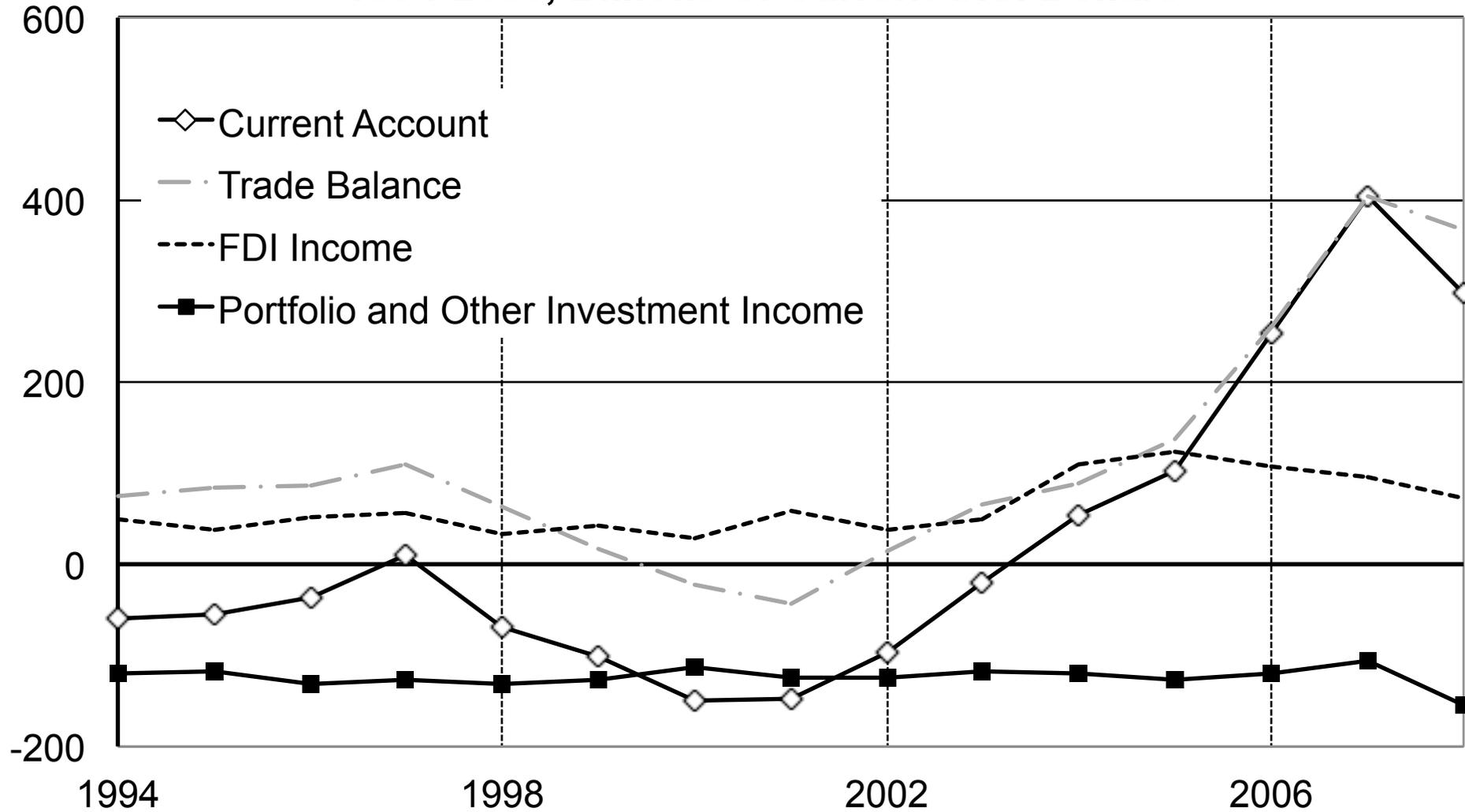
**Figure 5b: Ratio of Foreign Securities and Fiduciary Deposits to Swiss Household Wealth, 1914-2010, Decennial Averages**



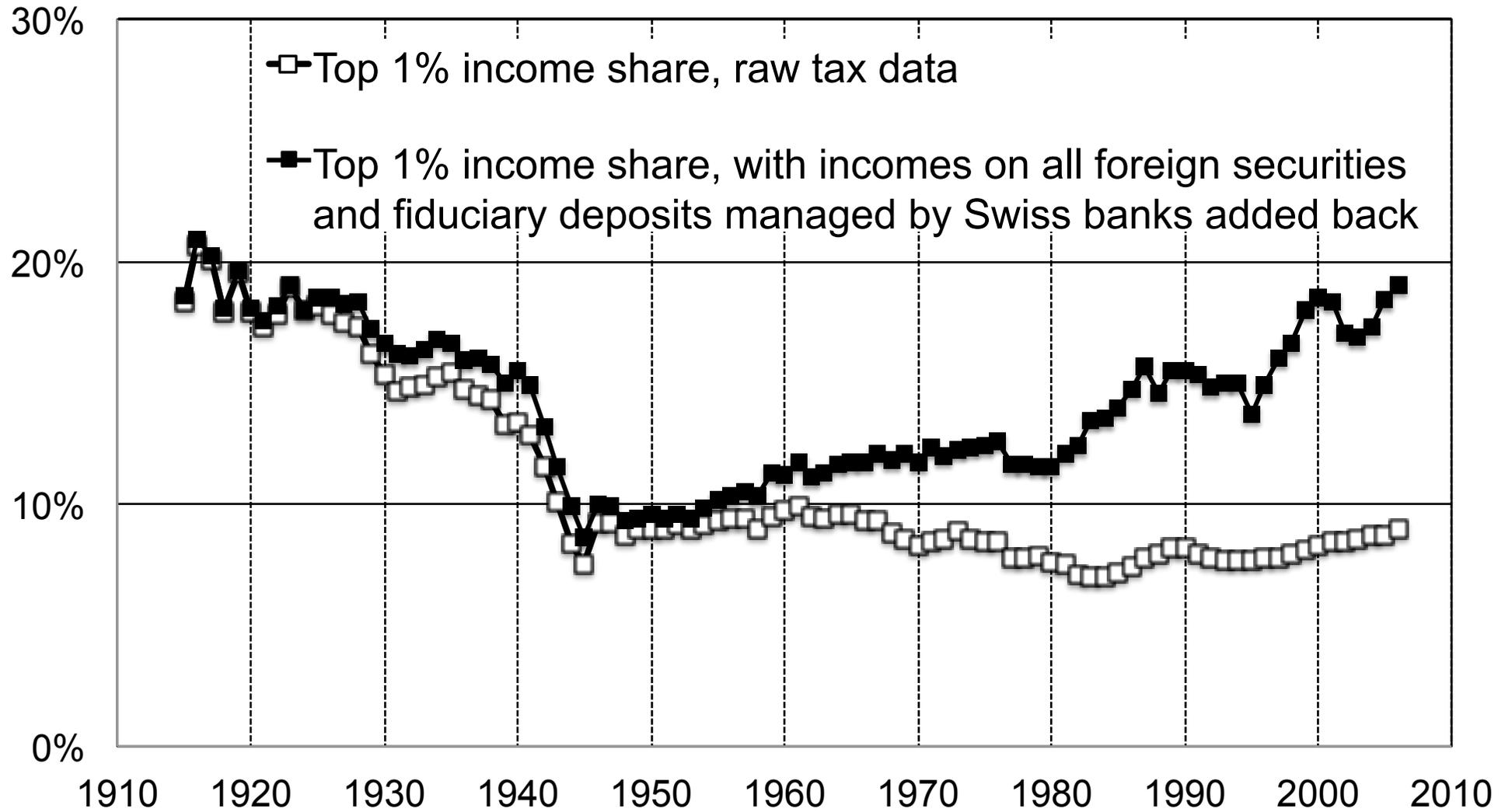
**Figure 6: Country Breakdown of Foreign Fiduciary Deposits in Swiss Banks, 1976-2008**



**Figure 7: The World Current Account Discrepancy, 1994-2008, Billions of Current U.S. Dollars**



**Figure 8: Top 1% Income Share in France, 1915-2006**



**Table 1: Decomposition of France's and Switzerland's Foreign Securities, 2004, bn of U.S.D.**

	[1]	[2]	[3]	[4]	[5]	[6]
	Foreign securities owned by domestic residents onshore	Foreign securities owned by domestic financial institutions offshore	Foreign securities owned by domestic households offshore	<b>Recorded foreign securities assets: [1]+[2]</b>	Foreign securities owned by foreigners in domestic banks	<b>Foreign securities managed by domestic banks: [1]+[5]</b>
	$a_i^i + \tilde{a}_i^i$	$\sum_{k \neq i} a_i^k$	$\sum_{k \neq i} \tilde{a}_i^k$	$\hat{A}_i$	$\sum_{k \neq i} \sum_{j \neq i} A_{kj}^i$	
Source	Custody survey	Direct reporting		International investment position	Custody survey	Custody survey
<b>Panel A: France</b>						
Long-term securities	1 198	408	unknown	<b>1 606</b>	278	<b>1 477</b>
<i>Equities</i>	327	116	<i>unknown</i>	443	67	394
<i>Bonds</i>	871	292	<i>unknown</i>	1 164	211	1 083
<b>Panel B: Switzerland</b>						
Long term securities	612	134	unknown	<b>746</b>	1 162	<b>1 774</b>
<i>Equities</i>	321	18	<i>unknown</i>	339	627	949
<i>Bonds</i>	291	116	<i>unknown</i>	407	535	826

**Table 2: Decomposition of the Estimated Stock of Offshore Wealth, 2001-2008, bn U.S.D.**

	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
[1] Stock ( $\Omega$ )	2 532	2 392	2 858	3 316	3 676	3 760	5 131	4 490
[2] Inflows ( $I$ )	38	164	153	240	230	116	189	364
[3] Valuation ( $VAL$ )	<i>n.a.</i>	-304	313	218	130	-31	1 182	-1 006
[4] Return ( $D$ )	126	124	118	121	128	121	106	156
[5] Rate of return ( $r_{\Omega}$ )	5,0%	5,2%	4,1%	3,6%	3,5%	3,2%	2,1%	3,5%

**Table 3: Unidentified Investments in U.S. Equities through Irish, Luxembourgish and Caymanian Funds, bn U.S.D.**

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<i>j</i>	Creditor-derived equity liabilities $\sum_i \hat{A}_{ij}$	Reported equity liabilities $L_j$	Discrepancy [2]-[1]	Discrepancy, % of equity liabilities ([2]-[1])/[2]	Share of fund assets invested in U.S. equities $\frac{E_{j,US}}{A_j}$	U.S. equities with no identifiable owner [3]x[5]	As a % of U.S. foreign equity liabilities $\frac{[6]}{L_{US}}$
Ireland	253	889	636	72%	6%	35	2%
Luxembourg	1 151	2 081	930	45%	7%	61	3%
Cayman Islands	506	1 106	600	54%	17%	102	5%
<b>Total</b>	<b>1 910</b>	<b>4 076</b>	<b>2 166</b>	<b>53%</b>	<b>9%</b>	<b>198</b>	<b>9%</b>

Table 4: Offshore Wealth, World and Switzerland, year-end 2008, bn of U.S.D.

	World	Switzerland
Offshore securities	4 490	1 544
Bonds	37%	35%
Equities	63%	65%
<i>Mutual Fund Shares</i>	48%	50%
Offshore bank deposits	1 389	478
Total offshore wealth	5 879	2 021
World financial wealth = 73 625		
Total wealth of the world top 0.1% = 31 873		

**Table 5a: Euro Area's Net Foreign Asset Position (% of Euro Area GDP), For Various Allocations of  $\Omega$**

		Share of $\Omega$ - $\Omega^s$ belonging to euro area residents								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
Share of $\Omega^s$ belonging to euro area residents	45%	-3%	-1%	2%	4%	6%	9%	11%	13%	15%
	50%	-2%	0%	2%	5%	7%	9%	12%	14%	16%
	55%	-1%	1%	3%	5%	8%	10%	12%	14%	17%
	60%	-1%	1%	4%	6%	8%	11%	13%	15%	17%
	65%	0%	2%	4%	7%	9%	11%	14%	16%	18%
	70%	1%	3%	5%	7%	10%	12%	14%	16%	19%
	75%	1%	4%	6%	8%	10%	13%	15%	17%	19%

**Table 5b: Euro Area's Net Foreign Asset Position (% of Euro Area GDP), With World IIP Balanced**

		Share of $\Omega$ belonging to euro area residents								
		29%	35%	41%	47%	54%	60%	66%	73%	79%
Share of NFA discrepancy due to euro area errors	0%	-1%	1%	4%	6%	8%	11%	13%	15%	17%
	5%	-2%	0%	3%	5%	7%	9%	12%	14%	16%
	10%	-3%	-1%	2%	4%	6%	8%	11%	13%	15%
	15%	-4%	-2%	0%	3%	5%	7%	10%	12%	14%
	20%	-5%	-3%	-1%	2%	4%	6%	8%	11%	13%
	25%	-6%	-4%	-2%	1%	3%	5%	7%	10%	12%
	30%	-7%	-5%	-3%	-1%	2%	4%	6%	9%	11%

**Table 6a: U.S. Net Foreign Asset Position (% of U.S. GDP), For Various Allocations of  $\Omega$**

		Share of $\Omega$ - $\Omega^s$ belonging to U.S. residents								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
Share of $\Omega^s$ belonging to U.S. residents	0%	-15%	-13%	-11%	-9%	-7%	-5%	-4%	-2%	0%
	10%	-14%	-12%	-10%	-8%	-6%	-4%	-2%	-1%	1%
	20%	-13%	-11%	-9%	-7%	-5%	-3%	-1%	0%	2%
	30%	-11%	-10%	-8%	-6%	-4%	-2%	0%	2%	3%
	40%	-10%	-8%	-7%	-5%	-3%	-1%	1%	3%	5%
	50%	-9%	-7%	-5%	-4%	-2%	0%	2%	4%	6%
	60%	-8%	-6%	-4%	-3%	-1%	1%	3%	5%	7%

**Table 6b: U.S. Net Foreign Asset Position (% of U.S. GDP), With World IIP Balanced**

		Share of $\Omega$ belonging to U.S. residents								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
Share of NFA discrepancy due to U.S. errors	0%	-14%	-11%	-8%	-5%	-2%	1%	4%	7%	10%
	5%	-15%	-12%	-9%	-6%	-3%	0%	3%	6%	9%
	10%	-15%	-12%	-9%	-7%	-4%	-1%	2%	5%	8%
	15%	-16%	-13%	-10%	-7%	-4%	-1%	1%	4%	7%
	20%	-17%	-14%	-11%	-8%	-5%	-2%	1%	4%	6%
	25%	-18%	-15%	-12%	-9%	-6%	-3%	0%	3%	6%
	30%	-19%	-16%	-13%	-10%	-7%	-4%	-1%	2%	5%