

THE MISSING WEALTH OF NATIONS: ARE EUROPE AND THE U.S. NET DEBTORS OR NET CREDITORS?

Gabriel ZUCMAN
Paris School of Economics*

March 2, 2012[†]

Abstract

This paper shows that official statistics substantially underestimate the net foreign asset positions of rich countries because they fail to capture most of the assets held by households in offshore tax havens. Drawing on systematic anomalies in portfolio investment positions and a unique Swiss dataset, I find that 8% of the global financial wealth of households is held in tax havens, 6% of which goes unrecorded. Accounting for unrecorded assets turns the eurozone, officially the world's second largest net debtor, into a net creditor. It also reduces the U.S. net debt significantly. The results shed new light on global imbalances and challenge the widespread view that, after a decade of poor-to-rich capital flows, external assets are now in poor countries and debts in rich countries. I provide concrete proposals to improve international investment statistics and curb tax evasion.

Keywords: Tax havens, International investment positions, Global imbalances
JEL classifications: F32, H26, H87.

*A detailed data appendix is available online at <http://www.parisschoolofeconomics.eu/en/zucman-gabriel/>. All comments are welcome (zucman@pse.ens.fr).

[†]I am very grateful to my advisor Thomas Piketty for his continuous support and guidance. I thank the Editor, three referees, Jean-Edouard Colliard, Mihir Desai, Emmanuel Farhi, Nicolas Frémeaux, Lucie Gadenne, Pierre-Olivier Gourinchas, Gian Maria Milesi-Ferretti, Richard Sylla, Daniel Waldenström, Edward Wolff, seminar participants at the Paris School of Economics, NYU, Harvard, the IMF, the University of Copenhagen, the Graduate Institute (Geneva), and conference participants in Zurich (CEPR), Beijing (IEA), and Oslo (EEA). Part of this paper was drafted while I was visiting NYU; I am grateful to Jess Benhabib who made this visit possible.

I. Introduction

Anyone who has used data on international accounts of countries knows that they are inconsistent. At the global level, liabilities tend to exceed assets: the world as a whole is a net debtor (Lane and Milesi-Ferretti, 2007). Similarly, in the global balance of payments more investment income is paid than received each year. Since the problem was identified in the 1970s, the International Monetary Fund has commissioned a number of reports to investigate its causes (IMF, 1987; 1992). National statistical agencies and the IMF have put considerable resources into improving their data. Yet despite a great deal of progress, large anomalies remain. Many European equities, in particular, have no identifiable owner (Milesi-Ferretti et al., 2010).

A second puzzle has attracted considerable attention from economists and policymakers: since the end of the 1990s, capital has tended to flow from poor to rich countries. A large body of literature has endeavored to explain uphill capital flows, in particular the rise in China's net foreign assets.¹ After a decade of poor-to-rich flows, the U.S., the eurozone, and the rich world are now large net international debtors in the official statistics, which is contrary to the predictions of standard theoretical models (Kraay et al., 2005). Against this backdrop, many observers have grown accustomed to the view that external assets are in poor countries and debts in rich countries. In the public debate, the view that "China owns the world" has become particularly popular. Should it be correct, the implications for policymaking and open-economy modeling would be far-reaching.

My paper challenges this view. The negative net foreign asset position of the rich world, I argue, is an illusion caused by tax havens. International investment statistics fail to capture most of the assets held by households in tax havens: they overlook the equity and bond portfolios that households own through banks in Switzerland, Singapore, and similar tax havens. This coverage gap explains most of the long-standing statistical anomalies in global accounts. The funds held in tax havens are large: my computations find that around 8% of households' financial assets are held in tax havens, 6% of which

¹See Bernanke (2005), Prasad et al. (2006), Dollar and Kraay (2006), the papers in Clarida (2007), Caballero et al. (2008), Mendoza et al. (2009), Carroll and Jeanne (2009), Ma and Haiwen (2009), Obstfeld et al. (2010), Aguiar and Amador (2011), and Alfaro et al. (2011) among others.

go unrecorded. This unrecorded stock of assets is double the recorded net debt of the rich world (Figure I). Accounting for tax havens turns the rich world into a net creditor, as there is strong evidence to suggest that most unrecorded assets belong to residents of rich countries, especially to Europeans. Thus, despite a decade of global imbalances, external assets are still in rich countries overall. Back in the 1980s-1990s, the rich world used to have a large positive net position; over the last decade, it has eaten some of its claims away; but today, poor countries are still repaying their debts to rich countries. China does not own the world yet.

These findings shed new light on global imbalances and have direct implications for core issues in international macroeconomics. Accounting for tax havens turns the euro-zone, officially the world's second largest net debtor, into a net creditor. It also significantly improves the U.S. net foreign asset position. Now, the net foreign asset position is a key state variable in dynamic macroeconomic models.² Accurate net positions are essential to assess the merits of the different views put forward on the causes of global imbalances. They are vital to monitor financial stability. Large imbalances have fueled the feeling that rich countries live beyond their means and that a major adjustment is required. If indeed the rich world is a net creditor, the required international adjustment is smaller than commonly thought. Domestic imbalances and public finance issues may be more serious today for rich countries than global imbalances: rich countries taken as a whole are rich, but some of their wealthiest citizens hide part of their assets in tax havens in order to evade taxes, which contributes to making governments poor.

The paper has three main goals: to explain how the stock of unrecorded assets held in tax havens can be estimated reliably; to provide evidence as to the likely owners of assets in tax havens; and to address the implications for global imbalances of accounting for these assets.

To estimate the stock of unrecorded assets in tax havens, I first explain why these assets are bound to cause anomalies in international investment statistics, especially in portfolio securities data (Section II). Households do not open bank accounts in Switzer-

²See for instance the papers by Coeurdacier et al. (2010), Tille and van Wincoop (2010), and Devereux and Sutherland (2011).

land and Singapore to place their funds in low-yielding bank deposits. Through their bank accounts in tax havens, they invest in portfolio securities. But when a French household owns a U.S. equity through a Swiss bank, France underestimates its foreign assets, because Swiss banks do not exchange data with French statisticians. U.S. statisticians duly record a foreign liability: they are aware that a foreign resident owns a U.S. equity. Switzerland, which is simply a conduit, records nothing. Thus, more equity liabilities than assets are recorded worldwide, and equity liability figures published by the U.S. are greater than the holdings of U.S. equities reported by the rest of the world.

I exploit these anomalies to shed light on the wealth held by households in tax havens. Until recently, observable anomalies in portfolio statistics were hard to interpret because the statistics were insufficiently harmonized. My approach relies on high-quality stock data that have become available over the last few years thanks to the IMF Coordinated Portfolio Investment Survey (CPIS). I derive new estimates for non-CPIS participating countries in order to build the first ever fully comprehensive bilateral portfolio asset database (Section III). This database enables to precisely measure the wealth held by households in tax havens and to know where it is invested.

The comprehensive database reveals a set of large, persistent, and internally consistent anomalies (Section IV). Identifiable equity and bond assets fall short of liabilities each year. At the end of my sample (2008), the discrepancy amounts to \$4,500bn. The gap is particularly large for equities because a considerable fraction of the equities issued by Luxembourg, Ireland, and the Cayman Islands have no identifiable owner. These anomalies have a straightforward explanation, backed by an array of anecdotal evidence: through their accounts in Switzerland and similar tax havens, households invest in mutual funds incorporated in Luxembourg, Ireland, and the Cayman Islands, the three countries where most mutual funds are incorporated. Hence, I estimate, in 2008 households held in tax havens \$4,500bn – 6% of their financial assets – in the form of unrecorded portfolios of securities, the bulk of which were composed of mutual fund shares. In addition, they held in tax havens 2% of their financial assets in the form of bank deposits, which are partially recorded in international statistics.

Who owns the unrecorded portfolios of securities? To investigate this issue, I draw on a unique and previously unused Swiss dataset (Section V). For years, the Swiss National Bank has published the value of the portfolios held by foreigners in Swiss banks and it has provided valuable information on which countries' residents own Swiss bank accounts. Based on the Swiss National Bank's data, I estimate that one-third of the portfolios missing from the international statistics are held in Switzerland. Contrary to popular belief, the vast majority of Swiss bank accounts belongs to rich countries' residents. Around half belong to eurozone residents.

Based on this finding, I propose a number of scenarios as to how unrecorded assets in tax havens affect published international investment positions (Section VI). Under all plausible scenarios, accounting for tax havens turns the eurozone into a net creditor and substantially reduces the U.S. net foreign liabilities. In some severely indebted eurozone countries such as Greece and Spain, offshore assets may be as high as 30% of GDP. Japan and the developing countries are less concerned, possibly because in these countries tax rates are lower and simpler tax evasion technologies exist. After accounting for tax havens, net foreign asset positions are globally less dispersed than the official statistics suggest, a finding that has direct implications for past and future capital flows.

Unrecorded assets held in tax havens can explain all the portfolio data anomalies, but residual anomalies still remain in other international statistics (Section VII). There are more foreign direct investment assets recorded than liabilities and the world has recently started to run a large trade surplus. I argue that the residual anomalies most probably come from errors in the statistics on the developing countries. When accounting for unrecorded assets in tax havens and purging global accounts of all their other anomalies, the most likely scenarios still make the eurozone and the rich world net creditors.

In the conclusion, I make concrete proposals in order to improve international investment statistics (Section VIII). Improved statistics would not only help us better track essential aspects of the world economy, they would also make it possible to tax households' assets in tax havens, for instance through automatic exchange of bank information.

In addition to the large literature on global imbalances, this paper ties in with three

strands of the literature. First, it adds to the literature on the empirics of external wealth. International investment statistics are widely reputed to be particularly challenging: measurement errors are known to be substantial and the conceptual questions are huge. Hausmann and Sturzenegger (2007) and McGrattan and Prescott (2010) question the puzzling net debt of the U.S., stressing the role of unrecorded intangible capital. Curcuru et al. (2008) show that accounting for inconsistencies within the set of U.S. statistics is critical to computing accurate returns on cross-border investments.

Second, the paper contributes to the literature on tax havens and capital flight that developed in the 1980s (Dooley, 1988) with a focus on developing countries (Boyce and Ndikumana, 2001; Collier et al., 2001). Authors in this field draw on discrepancies within a country's balance of payments to capture potentially unrecorded outflows (see Roine and Waldenström (2009) for a recent application in Sweden). I depart 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: portfolio equities and bonds.

Last but not least, the paper is related to, and partly motivated by, the recent literature that studies the evolution of top income shares around the world (Atkinson et al., 2011) and the global distribution of wealth (Davies et al., 2011). So far, tax havens have been ignored by this literature.³ My macro-based estimate of the funds held in tax havens could be used as a first step to include these funds into micro-based estimates of income and wealth distributions.

II. Tax Havens Cause Anomalies in International Statistics

II.A. How Foreign Securities Should be Recorded in Principle

First, let's look at the basic statistical concepts that will be used throughout the paper. A country's foreign assets and liabilities are recorded in its international investment position

³An exception is Dell et al. (2007) who use Swiss tax data to put an upper bound on the amount of capital income earned in Switzerland by non-resident taxpayers. Tax data, however, are not an appropriate source in this case, because the bulk of income earned by foreigners in Switzerland is not declared to Swiss tax authorities.

(IIP). The IIP is the stock equivalent of the financial account of the balance of payments: the IIP shows the stock of existing cross-border investments at the end of each year, while the financial account of the balance of payments shows the flow of new investments that have occurred over the year.

On the asset side of the IIP, there are four broad categories of investments: direct investments (holdings of over 10%), portfolio investments (equity and debt securities that do not qualify as direct investment), other assets (mainly loans and deposits), and reserve assets (gold, deposits, and securities held by central banks). The same categories appear on the liability side of the IIP, except that there is no “reserve” line. In this paper, we will focus on the securities held as portfolio or reserve assets. We will denote A_{ij} the amount of securities issued by country j , owned by residents of country $i \neq j$, excluding all the securities held as “direct investment,” but including the fraction of i ’s reserve assets invested in securities. $A = \sum_i \sum_j A_{ij}$ is simply the stock of all traded equities and bonds whereby the issuer and the owner are in two different countries.⁴ At the end of 2008, as shown by Table I, cross-border securities amounted to \$40tr (65% of world GDP). Securities accounted for about one-half of all cross-border investments, which totaled \$90tr (146% of world GDP).

To measure A_{ij} , the data collection system of each country i covers some agents directly and others indirectly (IMF, 2002a). Banks, investment funds, and insurance companies are direct reporters. They provide data on their own holdings (i.e., on the foreign securities that are on their balance sheets) and on their clients’ holdings (i.e., on the foreign securities that are off their balance sheets, but that they can observe). Governments and nonfinancial corporations above a certain size threshold are also direct reporters. By contrast, households are indirectly covered, for practical reasons. Their holdings are reported by banks, investment funds, and insurance companies. Trusts, personal wealth-holding companies, and other small nonfinancial corporations are indirectly

⁴For instance, A includes the U.S. bonds held by French insurance companies (which are classified as portfolio assets for France and portfolio liabilities for the U.S.) and the U.S. bonds held by the Chinese central bank (which are classified as reserve assets for China and portfolio liabilities for the U.S.). But it excludes the equity holdings by U.S. multinational corporations in their Chinese subsidiaries (which are classified as direct investments in both countries).

covered as well. For the purpose of this paper, the best way to deal with them is to include them in the household sector. Thus, we can write A_{ij} as the sum of the foreign securities owned by the directly covered agents (a_{ij}) and by households (\tilde{a}_{ij}): $A_{ij} = a_{ij} + \tilde{a}_{ij}$. For instance, an equity issued by a U.S. (j) corporation and held by a household living in France (i) is part of \tilde{a}_{ij} .

Investors entrust their portfolios to domestic or to foreign banks for custody. Through to the 1960s, all securities existed in the form of paper certificates and certificates were deposited in safe places such as bank vaults. Keeping their clients' certificates safe was the custodians' job. Today, paper has been replaced by electronic records, but investors still use custodian banks as book-keepers and for other low valued-added services.⁵ Securities kept by custodian banks on behalf of third parties do not appear on the banks' balance sheets: securities custody is one of the oldest, simplest, and largest off-balance sheet businesses for banks. Let's denote the custodian's country of residence with a superscript letter:

$$A_{ij} = \sum_k A_{ij}^k = \sum_k (a_{ij}^k + \tilde{a}_{ij}^k) = \underbrace{[a_{ij}^i + \tilde{a}_{ij}^i]}_{\text{onshore}} + \underbrace{\sum_{k \neq i} (a_{ij}^k + \tilde{a}_{ij}^k)}_{\text{offshore}}$$

In most cases, a French resident who invests in U.S. equities will use a French custodian bank. We will say, in this case, that it uses an onshore custodian. In some cases it will use a foreign custodian bank, for instance in Switzerland. We will say that it uses an offshore custodian.

Offshore custodians provide high value-added financial services to wealthy households, such as investment advice and tax planning. They also provide opportunities to evade taxes. In non-haven countries, domestic custodians automatically report the investment income earned by their clients to the tax authorities. Such third-party reporting makes tax evasion impossible. By contrast, haven-based banks do not generally report any information to tax authorities, making tax evasion possible. Taxes can be collected only if taxpayers choose to self-declare the investment income they have earned offshore.⁶

⁵For a description of the securities custody industry, see Chan et al. (2007).

⁶In 2009, G20 countries compelled tax havens to sign bilateral tax treaties providing for the ex-

International investment statistics work on the basis of the residence principle (IMF, 1993). The residence principle states that a security issued by the U.S. and held by a French resident through a Swiss bank must be recorded as an asset for France on the U.S. and a liability for the U.S. vis-à-vis France. The location of the custodian is irrelevant.

II.B. How Foreign Securities Are Recorded in Practice

In practice, offshore custody causes systematic errors in published statistics. To see why, consider what statisticians are able to measure.

First, in France (country i), all U.S. securities belonging to French banks, investment funds, and insurance companies are directly declared to French statisticians, whether they are held in France or offshore. Capturing U.S. securities held by households in France is easy too: French statisticians simply ask French custodians to report them. But when French households use Swiss custodians, their assets cannot be captured by surveying French banks. They go unrecorded in France: this is a blind spot for international statistics. The blind spot is well known among international statisticians, though they do not try to estimate it (see, for instance, European Central Bank, 2002, p. 8). Let's denote with a hat French statisticians' estimations. I assume that all foreign securities held by direct reporters are accurately measured along with all foreign securities held onshore by households:⁷

$$\forall k \quad \hat{a}_{ij}^k = a_{ij}^k \quad \text{and} \quad \hat{a}_{ij}^i = \tilde{a}_{ij}^i \quad (\text{H1})$$

Second, in Switzerland (country k), domestic banks are asked to report on the securities that they hold in custody. Swiss statisticians observe that Swiss banks hold some U.S. securities belonging to French residents in custody. In keeping with the residence principle, Swiss statisticians disregard these holdings when they compile Switzerland's

change of bank information. The treaties, however, provide for a particularly weak form of information exchange, "upon request information exchange," never for automatic information exchange as in non-haven countries. The volume of information exchanged by tax havens remains negligible; see Johannesen and Zucman (2012) for an analysis of the recent wave of tax treaties.

⁷Section IV.C. discusses how relaxing this assumption (H1) and assumption (H2) below affects the results.

international investment position. Table II shows that, in 2004, there were 2.4 times more foreign (i.e., non-Swiss) securities in custody in Swiss banks than recorded in the Swiss IIP. This means that two-thirds of the foreign securities in the Swiss banks vaults belonged to foreigners, while only one-third belonged to Swiss residents. By contrast, there were almost as many foreign securities in custody in French banks as recorded in the French IIP.

Lastly, in the U.S. (country j), statisticians easily measure the portfolio liabilities of the U.S. (L_j). Few agents issue securities – households do not – and this is standard balance sheet information. Identifying whether U.S. securities are held by U.S. or by foreign residents is relatively simple, because securities markets are highly centralized. In a nutshell, all traded securities issued by the U.S. are kept by the U.S. central securities depository, the ultimate book-keeper where all settlements take place. Most foreign-owned securities can thus be directly observed by U.S. statisticians.⁸ Accordingly, I assume that estimates of portfolio liabilities (\hat{L}_j) are accurate.

$$\hat{L}_j = L_j = \sum_i A_{ij} \tag{H2}$$

II.C. How Transfers of Funds to Tax Havens Are Recorded

The major international banks provide offshore custody services through their subsidiaries in tax havens. Banks in tax havens also provide brokerage services: they buy and sell securities on behalf of their clients. Further, they provide wire transfer services: they can receive funds from abroad and send funds abroad. To analyze how these operations are recorded in balance of payments statistics, let's consider the case of a French person who transfers funds from France to Switzerland.

There are basically two ways funds can be sent from France to Switzerland. The simplest way is a wire transfer. Following the double-entry bookkeeping system used

⁸See Bertaut et al. (2006) for more details. The centralization of securities markets is not specific to the U.S. An exception concerns what are known as eurobonds (bonds issued by domestic agents directly abroad in a currency other than the currency of the country in which they are issued), which are ultimately held in custody by one of the two international central securities depositories (one in Belgium, the other in Luxembourg).

in balance of payments accounting, a wire transfer from France to Switzerland must be recorded twice in the French balance of payments: both as an “other investment” credit (funds flow from a French bank to a Swiss bank) and an “other investment” debit (a French person purchases a Swiss asset, namely a Swiss bank deposit).⁹ In practice, an “other investment” credit will always be recorded – interbank flows of funds are easy to capture. But French statisticians may fail to record the balancing debit: trillions of cross-border wire transfers are made each year; identifying which transfers correspond to households purchasing Swiss bank deposits is extremely challenging. On that matter, practices differ across countries; some do a better job than others. If French statisticians fail to record a debit when a French individual transfers funds to Switzerland, then they will record negative “net errors and omissions” in order to balance total credits and debits.

Second, a French person can transfer funds to Switzerland by carrying banknotes, gold, or diamonds over the border. Such transfers will not be recorded anywhere in the balance of payments. Funds legally earned are unlikely to be massively transferred this way but funds illegally earned may well be, in which case the flows of funds to tax havens and the stocks of offshore assets will both go fully unrecorded in French statistics.

Once the funds are in Switzerland, let’s say that they are used to purchase U.S. equities. French statisticians will know nothing of this purchase: they will not be able to record any transaction. Swiss statisticians will observe that a French person sells a Swiss bank deposit, so they will record an “other investment” debit. They will also observe funds flowing from Switzerland to the U.S., so they will record an “other investment” credit. But they will notice that the buyer of the U.S. equities is not a Swiss person, so in keeping with the residence principle they will not record any equity purchase.

II.D. Tax Havens Cause Stock and Flow Anomalies

We can now see that we are bound to observe a series of inconsistencies in international investment statistics at the global level. First, tax havens cause two related anomalies in stock data.

⁹In the financial account of the balance of payments, credits denote a reduction in assets or an increase in liabilities, while debits denote an increase in assets or a reduction in liabilities.

Anomaly 1: *More cross-border liabilities than assets are recorded globally.*

Total cross-border security assets should equal liabilities, but the securities that households entrust to offshore custodians are recorded nowhere as assets. Because of tax havens, more security liabilities will be recorded than assets.

Anomaly 2: *For a given country, debtor-reported liabilities are greater than creditor-derived liabilities.*

The second anomaly is a corollary of the first one: when a French household owns a U.S. equity through a Swiss bank, this asset on the U.S. is recorded neither by France (wrongly) nor by Switzerland (rightly), but is duly recorded by the U.S. as a liability. Portfolio liabilities recorded by the U.S. will be greater than the sum of all U.S. security holdings recorded by the rest of the world.

Tax havens also cause anomalies in flow data.

Anomaly 3: *More cross-border dividends and interest are paid than received globally.*

Because position data are considered more reliable than financial flow data (Curcuru et al., 2009), statisticians compute dividends and interest income by applying representative yields to observed stock positions.¹⁰ If some securities are missing from stock statistics, the interest and dividends paid by these securities will be missing from the flow statistics. More cross-border investment income will be paid than received globally.

Anomaly 4: *More cross-border securities tend to be sold than purchased globally.*

When a French household buys a U.S. equity through a Swiss account, the U.S. records a sale but Switzerland does not record a purchase and France cannot record a purchase: more cross-border securities are sold than purchased globally.

Anomaly 5: *In individual countries' statistics, there are "net errors and omissions" or discrepancies between cumulated flows and stock positions.*

If a French person makes a wire transfer to her Swiss account but French statisticians fail to identify this transfer as such, there will be negative "net errors and omissions" in the French balance of payments. Even if French statisticians duly record outflows to tax havens, the French stock data, which are established independently from the flow data,

¹⁰See for instance BEA (2011, p. 42) for the case of the U.S.

will still miss the assets held offshore by households. There will be a discrepancy between cumulated flows and stock positions. The discrepancy will show up as an “other change” in the statistics that attempt to reconcile flow data (balance of payments) and stock data (IIP) as per the identity $\Delta Stocks = Flows + Valuation + OtherChange$.

The stock anomalies can be used to precisely measure the wealth held by individuals in tax havens. If asset data accurately capture the total assets of corporations, governments, and the onshore assets of households (assumption H1) and if liability data accurately capture portfolio liabilities (H2), then the global asset-liability discrepancy (Anomaly 1) reveals the value of the portfolios held by households in tax havens. Similarly, the debtor-creditor discrepancies (Anomaly 2) reveal what kinds of investments households make from their offshore accounts – whether they own U.S. bonds or shares of mutual funds incorporated in Luxembourg. Thanks to considerable improvements in portfolio stock data, we now have stock data that are close to meeting (H1) and (H2) perfectly. That is why, in the following, I focus on stock data to shed light on the funds held by households in tax havens. Although flow data are less harmonized and generally of lower quality, I will show that the flow data are consistent with what the stock data reveal.

III. A Comprehensive Dataset on Foreign Security Assets and Liabilities

The dataset used in this research consists of:

- Sixteen 238×238 $\hat{\mathbf{A}}_{ij}$ matrices that show the securities held by 238 creditors i on 238 debtors j . There is one matrix per year from 2001 to 2008 and per instrument (debt or equity). The 238 creditors and debtors considered are all the countries and territories of the world.¹¹
- Sixteen 238×1 \mathbf{L}_j vectors that show the security liabilities of 238 debtors vis-à-vis the rest of the world.

¹¹My list also include all international organizations (the IMF, the World Bank, regional development banks, etc.). They form one single synthetic “territory.”

III.A. Main Data Sources

The Coordinated Portfolio Investment Survey (CPIS) commissioned by the IMF is the main data source for the assets side. Conducted yearly since 2001, it presents the bilateral portfolio holdings of 74 countries (in 2008) on 238 debtors. It is rounded out by a survey of securities held as reserve assets, called SEFER, and by international organizations.

The CPIS is widely recognized as containing extremely high quality data. Leaving aside households' offshore assets, portfolio figures are easy to establish: securities markets are highly centralized; most countries have a long-standing tradition of monitoring custodians; and custodians observe all the securities held onshore. Security data are reliable: traded stocks and bonds have readily available market prices. There is usually no valuation issue.¹² Further, the IMF has launched the CPIS precisely to solve the long-standing anomalies in international investment statistics. The IMF has established comprehensive guidelines that have gone a long way towards harmonizing collection methods and spreading best practices (IMF, 2002a). In most leading countries, portfolio asset data are now based on security-by-security accounting. We therefore have every reasons to believe that the CPIS and SEFER accurately capture the assets of participating countries' corporations and governments as well as the onshore assets of households.

The main data source on the liabilities side is the updated and extended version of the External Wealth of Nations dataset constructed by Lane and Milesi-Ferretti (2007), which covers 178 economies. In the database, estimates of portfolio liabilities come from published IIPs or are derived by cumulating flows and adjusting for valuation effects. Aggregate liability figures for rich countries are generally considered as particularly reliable (Bertaut and Grier, 2004). Though some measurement error is possible for the developing countries, there is no reason why the error should go in a specific direction. The assumption that portfolio liability figures are accurate is likely to hold.¹³

The CPIS and External Wealth of Nations databases have one problem: their country

¹²The main valuation problem concerns asset-backed securities (ABS). When partial repayment of a debt security is possible, as is the case for ABS, some custodians keep track of the original principal, others only of what is remaining. However, the IMF (2002a) has provided clear guidelines to deal with this kind of issues. The guidelines also make clear what must be recorded as portfolio investments and what must be recorded as derivatives (ABS must be recorded as portfolio investments).

¹³The Appendix Section B.2 describes minor corrections made to the External Wealth of Nations data.

coverage is incomplete. Incomplete country coverage in the CPIS is problematic because it causes a discrepancy between debtor-reported liabilities L_j and creditor-derived liabilities $\sum_i \hat{A}_{ij}$ independently from tax havens. So in order to isolate the anomalies caused by tax havens from those caused by incomplete country coverage, I have filled in all the gaps in the CPIS. I have also derived new estimates for the portfolio liabilities of the few countries not covered by the External Wealth of Nations database. The resulting exhaustive database allows for a precise identification of the portfolios held by households in tax havens. The online Appendix extensively describes the raw sources used to make the imputations, presents all the computations line by line, provides consistency and robustness checks, and compares the results with other studies.

Incomplete country coverage, it turns out, does not raise great practical difficulties. First, the CPIS has an excellent coverage rate. It covers 93% of all cross-border securities at the beginning of my sample (2001) and 86% at the end (2008). To reach a 98% or more coverage rate throughout the period, we simply need to add data on four economies: China, Middle Eastern oil exporters, Taiwan, and the Cayman Islands.¹⁴ The remaining 150 non-CPIS participants have small to negligible holdings. Now, we have reasonably good information on the holdings of the four large non-CPIS reporters. This information comes from an array of independent sources: official international investment positions, quasi-official statistics, central bank reports, counterpart country data, and previous studies. Last but not least, non-CPIS countries and households with offshore accounts make strikingly different investments. Non CPIS-countries (e.g., China) invest overall a considerable fraction of their assets in public bonds, in particular in U.S. Treasury bonds. They do not invest much in mutual funds. Households with offshore accounts, on the other hand, invest mostly in shares of mutual funds. They do not invest much in bonds. Because my database distinguishes equities from bonds, isolating the offshore portfolios of households from those of non-CPIS reporters is easy. There is little risk of mistaking the holdings of China's central bank for those of French holders of Swiss accounts.

Below are the essential building blocs of my imputations.

¹⁴The Cayman Islands participates in the CPIS but excludes its large hedge fund industry.

III.B. Filling in the Coverage Gaps for Portfolio Assets

The first step is to fill in the gaps for the portfolio holdings – that is, the privately held securities – of the countries n that do not participate in the CPIS, such as Croatia, Morocco, Peru, or Taiwan. To do so, I start with their portfolio holdings P_n in the External Wealth of Nations database and use a gravity model to construct bilateral holdings P_{nj} . As shown by Portes and Rey (2005) and Lane and Milesi-Ferretti (2008), the gravity model fits cross-border portfolio flow and stock data well: private portfolio investment patterns are explained well by bilateral factors – such as distance and common language – and by investors’ country characteristics – such as per capita GDP.¹⁵ The bilateral data generated by the gravity model are certainly not as reliable as the official data of CPIS-reporting countries. But using the gravity model to estimate the portfolios of U.S. or Japanese securities held overall by the non-CPIS countries is reasonable, because on average the gravity model is accurate.¹⁶ For the purpose of the paper, we do not need more. In particular, we are not interested in the exact portfolio holdings P_{nj} of each non-CPIS country n , but only in the aggregate holdings $\sum_n P_{nj}$ of non-CPIS countries.

The largest offshore financial centers participate in the CPIS, but a handful of small offshore centers does not, such as Andorra, the British Virgin Islands, or Liechtenstein. For these offshore centers, there is no estimate of portfolio holdings P_n in the External Wealth of Nations database. The portfolio holdings of offshore centers belong mostly to mutual funds incorporated there. To approach these holdings, I use indirect sources (counterpart country data) cross-checked with direct sources (such as central bank reports). Non-CPIS offshore centers, I estimate, had around \$200bn in assets at the end of

¹⁵The gravity model has been used for similar imputation purposes by Lane and Shambaugh (2010). I estimate the same model as they do on the CPIS dataset for debt and equity separately; the results are presented in Appendix Table A9B. The model has a high explanatory power (with R^2 around 0.75), sufficiently high to provide sensible imputed values. The main difference compared with Lane and Shambaugh (2010) is that, to have a full breakdown of countries’ n assets, my model includes the assets held in offshore centers j . The model, it turns out, does a good job at explaining the investments of CPIS countries in offshore centers (see Appendix Table A9C). That is, when we restrict the CPIS data to the pairs of CPIS countries n and offshore centers j , distance, common language, former colony status, etc., are all significant determinants of bilateral investments: France invests more in securities (mostly mutual fund shares and asset-backed securities) issued by Luxembourg and Jersey; Japan more in those issued by Hong Kong and Singapore, etc.

¹⁶The model predicts well the aggregate investments of CPIS-countries in each developed economy, see Appendix Table 16. At the level of individual countries, the model reproduces well the full investment patterns of the U.S., Japan, and France, see Appendix Tables A17 and Figures A2-A7.

2008.¹⁷ The British Virgin Islands, in particular, had \$136bn. The uncertainty involved (\$50bn) is negligible compared to my estimate of households' unrecorded offshore assets (\$4,500bn). I then apply the gravity model to construct bilateral holdings P_{nj} .¹⁸

Lastly, the Cayman Islands only reports to the CPIS on its banks' portfolio holdings, disregarding its large hedge fund industry. To account for the Cayman Islands' hedge funds, I employ two convergent methods.¹⁹ First, for the 2005-2008 years, I rely on high quality surveys of Caymanian hedge funds recently published by the Cayman Islands' Monetary Authority. Second, for the 2001-2008 period, I start with the Cayman Islands' holdings of U.S. securities observed from the U.S. and use the gravity model to estimate the share represented by U.S. securities in the Cayman's portfolio, which allows me to derive the total holdings of the Cayman Islands. I then use the model to allocate the rest of the Cayman Islands' portfolio. For the 2005-2008 years, the two methods yield similar results, with total Caymanian holdings of \$1.25tr at the end of 2008.

III.C. Filling the Reserve Coverage Gaps

The CPIS presents portfolio assets. In order to obtain all the security assets identifiable globally, we need to add in securities held as reserves, that the SEFER aims to capture. The list of SEFER participants is confidential, but we do know that the CPIS and SEFER coverages overlap considerably.²⁰ I assume that they overlap perfectly, leaving China, Middle Eastern oil exporting countries, and smaller sovereign investors to deal with.

China is the largest non-CPIS reporter, but its holdings are actually well known.²¹ First, we know China's total reserves. The only uncertainty relates to their composition.

¹⁷See Appendix Section A.6 and Table A9.

¹⁸The model does a good job at explaining the investment patterns of the 22 CPIS-participating offshore centers (which include the Bahamas, Bermuda, Guernsey, Jersey, and Luxembourg). That is, when we restrict the list of CPIS participating countries to offshore centers, we see that distance, common language, former colony status, etc. are all significant determinants of bilateral investments: Bermuda's mutual funds and insurance companies tend to invest in the U.S. and U.K.; Luxembourg funds tends to invest in France and Germany, etc., see Appendix Table A9C. So using the model to approximate the investment patterns of Andorra or the British Virgin Islands is reasonable.

¹⁹See Section A.2 and Table A6 of the Appendix for detailed discussions.

²⁰The IMF (2002b, p. 3) reports that "a total of 70 countries and jurisdictions [were] participating in the 2001 CPIS and were, except for one country and some non-reserve holding jurisdictions, participating in the 2001 SEFER."

²¹See Appendix Section A.4 and Table A7.

On average, central banks invest 75% of their assets in securities and 25% in bank deposits, but Wooldridge (2006) notes that the share of securities is probably higher in China. Accordingly, I assume that China's central bank invests 85% of its non-gold reserves in securities. This assumption means that there is a \$100-200bn uncertainty on the size of China's portfolio, but this uncertainty is negligible compared to my estimate of the funds held by households in tax havens. Next, we know where China's central bank invests. From both official Chinese sources and U.S. Treasury sources, we know that it invests around two-thirds of its portfolio in U.S. bonds. Further, in 2010 a quasi-official Chinese newspaper revealed the allocation of China's reserves: most of its non-U.S. assets are in eurozone countries, and the remainder in the U.K. and Japan. The non-U.S. assets of China's central bank look exactly like the non-U.S. assets of SEFER-reporting central banks.

Middle Eastern oil exporters are widely thought to invest abroad through offshore banks in Switzerland or London, which makes it hard to trace their holdings (Milesi-Ferretti et al., 2010). Against this backdrop, I choose to include all Middle Eastern oil exporters' offshore assets in my unrecorded household offshore wealth total.²² The right way to estimate their onshore assets is to use counterpart country data. Starting with oil exporters' holdings of U.S. securities as seen from the U.S., I make assumptions regarding the share of U.S. securities in their portfolio. The many geographical breakdown estimates published in recent years share two convictions: the U.S. share is high and it has declined in the 2000s.²³ The assumption for 2001 of a 70% share of U.S. assets and a regular decline of two percentage points per year fits the available estimates best. I allocate the non-U.S. investments of Middle Eastern oil exporters according to the shares predicted by the gravity model.

For all other non-SEFER participants, I start with the non-gold reserves that they report to the IMF (\$863bn in 2008). In keeping with Wooldridge (2006), I then make the

²²Part of the Gulf countries' offshore assets may not belong directly to private person, but to sovereign wealth funds. Yet the distinction between private and public wealth is not always clear, so I simplify matters by taking the view that all the offshore holdings of Middle Eastern oil exporters can be considered as ultimately privately held – an assumption that we will have to keep in mind in Section VI when we study how unrecorded offshore assets affect published net foreign asset positions.

²³See Section A.5 of the Appendix for a discussion of these studies and full references.

reasonable assumption that non-SEFER central banks have the same investment patterns as SEFER-central banks: they invest 75% of their holdings in securities, of which more than half in the U.S., 10-15% in Germany, etc.²⁴

III.D. Filling the Coverage Gaps for Liabilities

The External Wealth of Nations database does not cover the portfolio liabilities of several offshore centers, most notably the Cayman Islands, Bermuda, the Bahamas, the British Virgin Islands, Jersey, and Guernsey. I use three kinds of sources: (i) domestic sources, such as central bank reports, (ii) counterpart country data, and (iii) the Bank for International Settlements (BIS) international debt data.²⁵

Example: (i) Based on data from the Cayman Islands' Monetary Authority, I estimate that Cayman-based hedge funds had \$1.0tr in equity liabilities at the end of 2008. (ii) The U.S. recorded \$61bn of equity assets on corporations domiciled in the Cayman Islands other than mutual funds, which provides a lower bound for the Cayman non-fund equity liabilities. (iii) The BIS indicates that the Cayman Islands issued \$1.1tr in international bonds. My estimate of the Cayman Islands' portfolio liabilities comes to \$2.2tr.

IV. Estimates of the Unrecorded Portfolios Held in Tax Havens

Now that we have a comprehensive database on identifiable assets and liabilities, we can use the anomalies in portfolio statistics to study households' offshore portfolios.

IV.A. Total Value of the Unrecorded Portfolios Held in Tax Havens

Figure II shows that each year, there are less security assets than liabilities identifiable worldwide (Anomaly 1). In 2008, for instance, total identifiable security liabilities $\sum_i L_i$ amounted to \$40tr. But identifiable security assets $\sum_i \hat{A}_i$ reached \$35.5tr only. There was a \$4.5tr discrepancy $\Omega = \sum_i L_i - \sum_i \hat{A}_i$.

²⁴See Appendix Tables A9 and A15.

²⁵See Appendix Sections B.3 and B.4 and Tables A10 and A11.

Figures III and IV plot the discrepancy for equities and bonds separately. Strikingly, each year 20% of all cross-border equities have no identifiable owner – a considerable anomaly for a type of asset in principle easy to record. Bonds are less affected: equities account for two-thirds of the overall discrepancy Ω . Therefore, a global overview of portfolio positions suggests that individuals held unrecorded portfolios worth $\Omega = \$4.5\text{tr}$ in tax havens at the end of 2008, of which two-thirds were invested in equities and one-third in bonds. At the end of 2008, the global net financial wealth of households (i.e., bank deposits, equities, bonds, and insurance contracts of households minus households' debts) was $\$74\text{tr}$.²⁶ Unrecorded portfolios held in tax havens accounted for 6% of the net financial wealth of households.

This estimation based on stock data is fully consistent with the flow data. The global asset-liability discrepancy has its exact counterpart at the flow level in the world balance of payments computed by the IMF independently from the present study. The IMF world balance of payments displays two striking anomalies. First, more cross-border investment income is paid than received each year (Anomaly 3). In 2008, the discrepancy amounted to $D = \$156\text{bn}$.²⁷ To see how this flow anomaly fits in with the stock anomaly, denote r_Ω the yield on the missing portfolios Ω (i.e., the flow of missing dividends and interest divided by the stock of missing securities). A missing flow of $\$156\text{bn}$ implies a yield of $r_\Omega = 3.5\%$ on the stock of missing securities, consistent with the yield observed on recorded cross-border securities.²⁸

Second, barring one exception in 1998, there are more securities sold than purchased in the world balance of payments (Anomaly 4). To see how this flow anomaly fits in with the stock anomaly, write the change in the stock of unrecorded portfolios Ω between $t - 1$ and t as:

$$\Omega_t - \Omega_{t-1} = I_t + VAL_t \tag{1}$$

²⁶This figure comes from the pioneering work of Davies et al. (2011) who provide the first comprehensive estimate of the level and distribution of world wealth in 2000. A report by Credit Suisse (2010) builds on the methodology developed by Davies et al. (2011) to provide yearly estimates for the 2000-2010 period; the $\$74\text{tr}$ figure for 2008 comes straight from Credit Suisse (2010).

²⁷See Appendix Table A21.

²⁸See Appendix Table A22.

where I_t denotes the net unrecorded purchases of securities from offshore accounts, and VAL_t the net capital gains on existing offshore portfolios. Table III breaks Ω down as per equation 1. A reasonable pattern emerges: steady inflows, negative valuation effects during equity bear markets, positive valuation effects during bull markets, and reasonable yields r_Ω throughout the period.

IV.B. Where the Unrecorded Portfolios Are Invested

What kinds of investments do the holders of Swiss accounts make? This is revealed by the difference between debtor-reported liabilities, L_j , and creditor-derived liabilities, $\sum_i \hat{A}_{ij}$ (Anomaly 2).

The owners of unrecorded portfolios invest in two groups of countries, as shown by Figure V. Unsurprisingly, the first group includes some of the main developed countries: in their offshore accounts, individuals own securities issued by the U.S., Japan, France, etc. The second and more important group includes the three countries that host a large mutual fund industry: Luxembourg (the world’s second largest investment fund center after the U.S.), the Cayman Islands (where most hedge funds are domiciled) and Ireland (which hosts hedge funds and a large number of money market funds). Take the case of Luxembourg (j). At the end of 2008, mutual funds incorporated in Luxembourg had around $L_j=\$2\text{tr}$ in equity liabilities. However, only $\sum_i \hat{A}_{ij}=\$1.1\text{tr}$ in equity assets on Luxembourg were identifiable worldwide: $\$900\text{bn}$ of Luxembourg mutual fund shares had no identifiable owner. Likewise, a considerable fraction of Irish and Caymanian fund shares had no identifiable owner.

The missing claims on Luxembourg and the other offshore mutual fund centers have a straightforward explanation. Through their Swiss accounts, French residents own shares of mutual funds incorporated in Luxembourg. These “Switzerland”-Luxembourg investments are accurately recorded by Luxembourg as equity liabilities, but no country records any claim on Luxembourg. The vast majority of the mutual funds distributed in Switzerland are incorporated in Luxembourg and Ireland.²⁹ The holding of mutual fund shares

²⁹In January 2012, for instance, of the 8,000 funds registered for distribution in Switzerland, 4,600 were incorporated in Luxembourg and 1,200 in Ireland (<http://www.swissfunddata.ch>). Most hedge

by foreigners through their Swiss accounts is bound to create the statistical anomalies that we observe in the data. These anomalies are robust: they have been documented by Lane and Milesi-Ferretti (2007) and the European Central Bank (2009) in the case of Luxembourg and Ireland, and suggested by Lane and Milesi-Ferretti (2011) in the case of the Cayman Islands.

The discrepancy between the size of the offshore fund industry and the low level of claims reported on the three major offshore fund centers has grown sharply over the years 2001-2008. In 2001, as shown by Figure VI, most of the missing equities were equities issued by the U.S. and other rich countries. In 2008, by contrast, more than three-quarters of the missing equities were mutual fund shares issued by the three major offshore fund centers. In other words, in 2001 the holders of unrecorded accounts in tax havens invested most of their wealth in U.S., Japanese, and French equities; in 2008, they invested most of their wealth in Luxembourg, Irish, and Caymanian fund shares.

Investing in a Luxembourg fund through a Swiss account makes perfect sense for a French tax evader: Luxembourg does not tax cross-border payments, so the tax evader receives the full dividend paid by the fund on his or her Swiss account, and French personal income tax can be evaded, since there is no automatic exchange of information between Swiss banks and the French tax authority. Conversely, a French tax evader has to go through each step of the France-Switzerland-Luxembourg circuit to evade taxes. Investing in a Luxembourg fund through a French bank does not save on taxes. Investing in a Swiss mutual fund through a Swiss bank is also useless, because capital income paid by Swiss corporations is subject to a 35% advance tax withheld at source by Switzerland.³⁰

IV.C. Discussion of Assumptions

If asset figures accurately reflect the securities held by corporations and governments and those held onshore by households (H1), and if portfolio liability figures are accurate (H2),

funds are not registered, hence not covered by these statistics.

³⁰The advance tax can only be refunded when individual taxpayers self-declare their income on their tax returns. The advance tax does not apply to income paid by foreign corporations (e.g., Luxembourg mutual funds) and credited to a Swiss account. This fact explains why the vast majority of investment funds distributed in Switzerland are foreign funds and not Swiss funds, and why less than 5% of the missing assets are invested in securities issued by Switzerland (Figure V).

then anomalies in global portfolio data reflect exactly the value of the portfolios held by households in tax havens: 6% of households' financial assets are held unrecorded in tax havens, half of which are invested in mutual funds incorporated in Luxembourg, Ireland, and the Cayman Islands. Despite huge progress in data quality, (H1) and (H2) may not be fully met. A few words are called for as to how relaxing these assumptions affects the results.

First, asset surveys conducted for the CPIS do not always strictly follow the IMF guidelines. The U.S., for instance, does not currently count short positions as negative assets or liabilities, so reported asset and liability positions are slightly too high. The same problem probably exists in other countries. But the recording of short positions cannot explain why there are so many missing fund claims on Luxembourg, Ireland, and the Cayman Islands, and comparatively not so many on the U.S. and the U.K.

Second, new financial activity is sometimes hard to capture. In the U.S., some hedge funds and private equity funds have been unaware of their reporting duties. This coverage gap may explain part of the missing claims on the Cayman Islands.³¹ The Bureau of Economic Analysis and the Federal Reserve Board are working on improving their coverage of U.S. hedge funds. Looking forward, these data improvements will make it possible to identify which part of the missing claims on the Cayman Islands is due to the imperfect coverage of U.S. hedge funds and which part is due to individuals investing in hedge funds from tax havens. In any case, the officially reported net foreign asset position of the U.S. is currently underestimated.

Third, published liability figures may be overestimated. Take a French person who owns French equities via a Swiss bank. From the viewpoint of international investment statistics, these equities are not cross-border claims. However, they will be recorded by French statisticians as liabilities for France. In this case, the use of offshore banks by households does not bias asset data downwards but liability data upwards. However, such round-tripping does not affect the paper's argument. The use of tax havens by

³¹At the end of 2008, the U.S. recorded just \$35bn in assets on Caymanian hedge funds (Department of the Treasury et al., 2009, Table 30 p. 71) while the funds had issued more than \$1tr in foreign equity liabilities.

households still causes a discrepancy between globally recorded assets and liabilities, and the discrepancy still directly reflects the portfolios held by households in tax havens.

Lastly, there is some uncertainty surrounding my imputations. Yet the uncertainty is one order of magnitude smaller than the missing portfolios Ω =\$4.5tr. Errors in the imputations for China and Middle Eastern oil exporters cannot explain why so many claims on Luxembourg, Ireland, and the Cayman Islands have no identifiable owner, because central banks and sovereign wealth funds do not invest massively in mutual funds.³² The precision of the gravity model used to fill the gaps in the CPIS does not affect Ω : the asset-liability discrepancy is based on estimates of total assets and liabilities only, not on estimates of bilateral investment patterns. The precision of the gravity model affects where the missing portfolios are invested: if the gravity model overestimates Taiwanese investments in the U.S. and underestimates Taiwanese investments in France, then the owners of unrecorded accounts in tax havens own more U.S. securities and less French securities than I have found.

It is naturally impossible to have a fully accurate estimate of unrecorded assets held in tax havens. The key intuition of the paper is that given the quality achieved by portfolio investment statistics, the use of tax havens by households is by far the most likely explanation for the large statistical anomalies that remain today. My estimate that 6% of the financial wealth of households is held unrecorded in tax havens benefits from decades of improvements in international statistics. It should be seen as a reasonable order of magnitude that future statistical improvements will enable to refine. The order of magnitude is based on a transparent methodology and it is robust to relaxing key assumptions. The estimate is internally consistent at both flow and stock levels. It is remarkably stable over time (see Figure 1) despite huge variations in potentially confounding factors such as the surge in China's and oil exporters' assets, and the development of the Cayman Islands' hedge fund industry. Most importantly, my estimate is backed by direct evidence from Switzerland, the world's largest tax haven.

³²It makes no sense for central banks or sovereign funds to invest in mutual funds (except for some hedge funds and private equity funds) since they already pay wealth managers to design a suitable investment strategy. The largest or second largest sovereign wealth fund, Norway's, discloses its portfolio on a security-by-security basis. It has virtually no assets on Luxembourg, Ireland, and the Cayman Islands.

V. Offshore Wealth in Switzerland

Anomalies in international investment statistics suggest a simple pattern: households own mutual fund shares through unrecorded accounts in Switzerland, Singapore, and similar tax havens. Switzerland publishes high-quality statistics that confirm this pattern. Further, Swiss statistics provide evidence as to who owns unrecorded accounts in tax havens, a point on which anomalies in international investment statistics are silent.³³

V.A. Consistency Between Swiss and Global Offshore Portfolios

Swiss banks hold in custody Swiss securities belonging to Swiss residents, Swiss securities belonging to foreigners, foreign securities belonging to Swiss residents, and foreign securities belonging to foreigners. Switzerland is the only tax haven that publishes the value of the foreign securities held by foreigners through its banks, which I denote Ω^s . In the framework of Section II, Switzerland s is the only tax haven k for which we have information about the a_{ij}^k – the portfolios of U.S. or Luxembourg securities (j) held by residents of France or Italy (i) through Swiss banks ($k = s$). Specifically, we know Ω^s which is equal to $\sum_i \sum_j a_{ij}^s$ (with $i \neq s$ and $j \neq s$).

The Swiss National Bank (SNB) has published the Ω^s series monthly since 1998 based on a comprehensive survey of Swiss-domiciled custodians. The monthly survey covers 95% of all custodial holdings. The SNB conducts a full survey yearly.³⁴ Custodial holdings are broken down by type – equity, bond, commercial paper, mutual fund share, structured product, other – and currency. I am not aware of any other paper that uses this unique dataset to document the amount of offshore wealth in Switzerland.

In all likelihood, the foreign securities held by foreigners through Swiss banks belong to households. It makes little sense for foreign banks, insurance companies, or investment

³³In principle, one could use Anomaly 5 (net errors and omissions, and “other changes” in the flow-stock reconciliation accounts) to shed some light on which countries are most affected by tax havens. However, using Anomaly 5 is fraught with difficulty because of the high complexity, generally lower quality, and lack of harmonization of balance of payments data. Readers interested in net errors and omissions and flow-stock inconsistencies are referred to Section D.4. for detailed discussions.

³⁴The results of the monthly survey are published in the SNB’s *Monthly Statistical Bulletin* (<http://www.snb.ch/en/i/about/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 the SNB’s *Banks in Switzerland* (<http://www.snb.ch/en/i/about/stat/statpub/bchpub/stats/bankench>, series 38a, 38b, 38c).

funds to entrust their non-Swiss securities to Swiss banks: doing so does not secure any tax or regulatory advantage. From the 2004 survey of French custodians (Table II), we see that such holdings are small in France, although some of the biggest global custodians are French. There is no evidence that Swiss banks provide significant custody services for foreign corporations. By contrast, there is considerable evidence from newspaper investigations, industry reports, and high-profile tax scandals that Swiss banks provide significant custody services for foreign individuals. Ω^s is thus a good proxy for households' offshore portfolios managed by Swiss banks.³⁵

At the end of 2008, the portfolios managed by Swiss banks (Ω^s) represented one-third of households' offshore portfolios (Ω), consistent with industry reports that rank Switzerland as the number one offshore wealth management center.³⁶ Table IV shows that the offshore portfolios managed by Swiss banks look exactly like the globally unrecorded portfolios Ω , although both have been established by completely different methods, relying on fully independent sources. Equities account for two-thirds of the globally unrecorded portfolios and two-thirds of the Swiss-managed portfolios, bonds account for one-third, and most equities are mutual fund shares. The dynamics match as well: over 2001-2008, clients of Swiss banks increasingly placed their assets in mutual fund shares.³⁷ These simple facts confirm that the anomalies in international investment statistics accurately reflect the portfolios held by households in tax havens.

V.B. From Unrecorded Offshore Portfolios to Total Offshore Wealth

The foregoing discussion has centered on a particular kind of household wealth: portfolio securities. In tax havens, however, households can hold not only securities, but also bank

³⁵Note that the SNB provides a breakdown of Ω^s by owner sector (private customers, commercial customers, and institutional investors). But this breakdown is misleading: the SNB does not see through intermediate wealth-holding structures used by individuals with a Swiss account. The SNB counts the securities of a French individual who uses a sham Panamanian holding company as belonging to the foreign "institutional investors" sector. This is a first-order issue: few individuals have an account in Switzerland with their own personal address; most Swiss bank clients use intermediate wealth-holding structures (see Section V.C. below). A second problem goes in the opposite direction: if a French resident uses a Swiss intermediary (e.g., notary) to manage her portfolio, the SNB will record her holdings as Swiss-owned and they will hence not appear in Ω^s .

³⁶The Boston Consulting Group (2009) estimates that 35% of households' offshore assets are held in Switzerland.

³⁷See Appendix Table A23.

deposits. That is, they can open an investment account (portfolio securities) or a simple bank account (deposit). Switzerland provides unique information on the importance of offshore bank deposits.

Contrary to what happens for portfolios, offshore deposits do not go completely unrecorded in the international statistics. The major financial centers tell the Bank for International Settlements (BIS) how much deposits foreigners have placed in their banks. In principle, French statisticians can use the BIS data to estimate the value of French residents' offshore bank deposits. The IMF has been advocating the use of the BIS data since the 1990s. U.S. statisticians substituted BIS data for U.S. sources at the beginning of the 1990s. Not all countries do so, however. Further, the BIS does not separate out household deposits from corporate deposits, so it is impossible to identify the value of households' offshore deposits using the BIS data.

Swiss banks provide a unique kind of deposit owned by households only, in the form of what are known as fiduciary deposits. Fiduciary deposits cannot be used as a medium of exchange: they are useless for corporations. Swiss banks invest the funds placed in fiduciary deposits in foreign money markets on behalf of their clients. Legally speaking, all interest is considered to be paid by foreigners to the depositors, with the Swiss banks acting merely as "fiduciaries." Thus, fiduciary deposits are not subject to the 35% Swiss advance tax: they are completely untaxed in Switzerland, just like foreign securities held in custody in the country. Fiduciary deposits are *the* Swiss bank account: around 80% of bank deposits held by foreigners in Switzerland are fiduciary deposits; non-fiduciary deposits belong to corporations or cross-border workers.

The second column of Table IV breaks down the offshore wealth of households managed by Swiss banks into portfolios and fiduciary deposits. In 2008, fiduciary deposits accounted for one-quarter of the total. The composition of offshore wealth managed by Swiss banks corresponded to one of the most commonly recommended conservative allocation of assets: one-quarter deposits, one-quarter bonds, and one half equities. In order to give a rough estimate of the global offshore wealth of households, I assume in the first column of Table IV that the same allocation of deposits/securities exists in

other tax havens too. Global offshore wealth then amounted in 2008 to \$4.5tr (securities) plus \$1.4tr (deposits). The resulting \$5.9tr figure represents 8% of households' financial wealth. Of this 8%, at least 6% (securities) were unrecorded and at most 2% (deposits) were recorded in international investment statistics.³⁸

While this paper is the first in the academic literature to estimate the wealth held by households in tax havens, a number of studies have provided estimates before, usually based on interviews with wealth managers. The most detailed industry report puts the amount of household offshore wealth at \$6.7tr in 2008 (Boston Consulting Group, 2009, p. 31). Cap Gemini and Merrill Lynch (2002, p. 11) put it at \$8.5tr in 2002. The Tax Justice Network (2005) has a \$11.5tr figure for 2005 and Palan et al. (2010, p. 5) write that “the global rich held in 2007 approximately \$12 trillion of their wealth in tax havens.” My estimate (\$5.9tr in 2008) is therefore at the low-end of the scale. Note that I focus on financial wealth only, whereas households can also use tax havens to hold real assets, such as works of art or real estate. I also disregard foreign direct investments – e.g., shares in closely held firms incorporated offshore – because there is no way to quantify these holdings with the data at my disposal. Finally, my estimate excludes the wealth of individuals who live in tax havens.³⁹

V.C. Who Owns Swiss Bank Accounts?

The last and most important contribution made by the Swiss data is to provide unique evidence as to the likely owners of unrecorded fortunes in tax havens. Since 1976, the SNB has published a full country breakdown of the owners of fiduciary deposits.

Country breakdowns are difficult to interpret at first glance. As Figure VII shows, the SNB records a large and growing fraction of Swiss fiduciary deposits as belonging to tax

³⁸Securities go entirely unrecorded. Deposits are only partially recorded, for two reasons. First, not all statisticians use the BIS data on cross-border bank deposits as inputs to their statistics. More importantly, the BIS data under-estimate the offshore deposits of French or German residents, because they do not see through the intermediate wealth-holding structures that the holders of offshore accounts use. The Swiss bank deposits held by French resident through sham Panamanian corporations are assigned to Panama in the BIS data. This is a first-order concern (see Section V.C. below). In practice, it is not possible to know what fraction of households' offshore bank deposits is captured in international statistics.

³⁹Whether these elements can explain the difference between my estimate and previous studies is a question that I leave for future research.

havens, most notably Panama, Liechtenstein, the British Virgin Islands, the Bahamas, and the Cayman Islands. The SNB records such holdings because it does not see through sham corporations used by households. If a French person opens an account in the name of a sham entity incorporated in Panama, then the SNB assigns the funds to Panama. Using sham corporations as nominal owners of Swiss accounts has a long tradition, dating back to at least the end of the Second World War (Schaufelbuehl, 2009). Once you understand the purposes that sham corporations serve, it becomes clear that most fiduciary deposits assigned to tax havens in the SNB's statistics belong to residents of rich countries, in particular to Europeans.

A sham corporation adds a layer of secrecy between the owner of a Swiss account and his holdings, making it harder for tax authorities to investigate cases of tax evasion. When tax evaders combine numerous sham corporations in multiple tax havens, foreign authorities have practically no way to find out who is the beneficial owner of a Swiss account. Sham corporations are less useful to residents of countries where there is no income tax or where tax administrations have no resources to investigate offshore tax evasion. Sham corporations also help Europeans evade taxes. The European Union has adopted the Savings Directive in a move to curb tax evasion: since 2005, Swiss and other offshore banks must withhold a tax on interest earned by European Union residents.⁴⁰ But the directive only applies to accounts opened by European households in their own name, not to accounts that belong to sham corporations. Sham corporations are a straightforward way of eschewing the EU Savings Directive.

Figure VII shows that there is a perfect negative correlation between the share of fiduciary deposits held by Europeans and the share of fiduciary deposits assigned to tax havens. European depositors have shifted their deposits to sham corporations over time. They reacted particularly strongly to the introduction of the EU Savings Directive in July 2005: between December 2004 and December 2005, Europe's share of Swiss fiduciary deposits declined by 10 percentage points while tax havens gained 8 percentage

⁴⁰In July 2011, the tax rate was set at 35%. Tax havens keep one-quarter of the tax revenue and transfer the remaining three-quarters to the European country where the account owner is resident. This withholding tax allows tax havens to avoid automatic exchange of bank information, which is the EU standard.

points.⁴¹ In a recent book, a Swiss journalist documents how Swiss bankers created sham corporations on a large scale during the summer of 2005 to help their European clients circumvent the Directive (Zaki, 2010).

The U.S. Internal Revenue Service (IRS) provides additional evidence that rich countries' residents use sham corporations extensively. In 2009, the IRS released case studies of tax evasion by U.S. residents in a big Swiss bank.⁴² In almost all cases, U.S. tax evaders own their Swiss accounts through sham entities incorporated in Panama, the British Virgin Islands, and Hong Kong. Many of them transferred their accounts to sham corporations in the 1990s or 2000s. In many IRS cases, the sums involved are huge, attaining \$100 million for a single family in a single bank.

Let's assume that in 2004, before the EU Savings Directive, if a country owned 10% of the fiduciary deposits not assigned to tax havens, it also owned 10% of the deposits assigned to tax havens. Let's also assume that Gulf countries do not use sham corporations, which is plausible since they have no capital income tax. Then the rich world owned 62% of Swiss fiduciary deposits in 2004.⁴³ Similarly, the Boston Consulting Group (2009) estimates that around 60% of Swiss offshore accounts belong to Europeans and Americans. Contrary to popular belief, there is no indication that African dictators or rich Asian investors own the bulk of Swiss accounts.

VI. Implications of Tax Havens for International Imbalances

Anomalies in international investment statistics reveal that at least 6% of households' financial assets are held unrecorded in tax havens. Swiss data show that most unrecorded assets managed in Switzerland belong to residents of rich countries, in particular to Europeans. The goal of this section is to study how accounting for households' offshore assets affects our understanding of international imbalances – both stock position imbalances and flow imbalances, commonly referred to as “global imbalances.”

⁴¹See Johannesen (2010) for an analysis of the reaction of Swiss bank deposits to the directive.

⁴²<http://www.irs.gov/newsroom/article/0,,id=110092,00.html>.

⁴³See Appendix, Table A26. The list of rich countries considered is the same as for Figure I, except that it excludes Switzerland, along with Luxembourg and Cyprus (two tax havens).

VI.A. The Eurozone and the Rich World are Probably Net Creditors

In the official statistics, the eurozone is largely indebted vis-à-vis the rest of the world, with net liabilities of 15-20% of GDP since 2006 – close to the level of net debt recorded by the U.S. The net liabilities of the eurozone are a puzzle largely unaddressed by the literature so far. Like Japan, the eurozone is a low growth, high saving, aging economy which does not issue the world’s reserve currency: according to most theoretical models, it should be a net creditor. Measurement errors, it turns out, can fully explain its puzzling net debt. Eurozone residents own 40-50% of the unrecorded portfolios managed in Switzerland, the world’s leading tax haven where one-third of all offshore wealth is managed. To investigate how unrecorded portfolios affect the eurozone’s net foreign asset position, we have to make assumptions as to who owns the unrecorded portfolios managed in other tax havens such as Luxembourg, Singapore, and the Cayman Islands. As Table V shows, if eurozone residents own 25% of the unrecorded portfolios managed elsewhere than in Switzerland, the eurozone is balanced. If eurozone residents own 50% of all unrecorded portfolios, the eurozone is in actual facts a sizable net creditor. In all plausible scenarios, accounting for tax havens turns the world’s second largest net debtor into a net creditor.

Stronger assumptions are called for to turn the U.S., officially the world’s largest net debtor, into a net creditor. As Table VI shows, if U.S. residents own 15% of Swiss-managed offshore portfolios and 75% of those managed elsewhere, the U.S. is balanced. A more reasonable scenario attributes 20% of all offshore portfolios to the U.S.: say 15 % of Swiss-managed portfolios and 25% of those managed elsewhere. Under this scenario, the net foreign asset position of the U.S. is significantly better than in the official data: -12% of GDP on average over 2001-2008 as opposed to -18% in the official statistics.

A benchmark scenario where the eurozone owns half of unrecorded portfolios and the U.S. owns 20% considerably improves the net assets of the world’s two most indebted economies. It turns the rich world into a net creditor. The benchmark scenario is consistent with all available evidence as to which countries’ residents most likely own assets in tax havens. It is hardly surprising that residents of rich countries own most offshore

wealth, since they own 80% of recorded world wealth (Davies et al., 2011). The most thorough industry report estimates that 42% of all offshore wealth belongs to Europeans and 60% to residents of rich countries (Boston Consulting Group, 2009). Most of the unrecorded assets are Luxembourg, Irish, and Caymanian fund shares, and there are good reasons to believe that these fund shares belong in the main to Europeans (especially Luxembourg fund shares) and Americans (especially Caymanian fund shares).⁴⁴ Japanese residents do not seem to use tax havens extensively – they own less than 1% of Swiss bank deposits – plausibly because capital income is much less taxed in Japan than in other developed economies.⁴⁵ Developing countries have offshore accounts too, but as the Swiss data and industry reports suggest, probably not more than 30% of all offshore wealth: about 10% for oil exporters, and 20% for non-oil developing countries.⁴⁶

My benchmark scenario is conservative: it allocates the unrecorded portfolios of securities (6% of households' financial wealth) to its likely owners, but assumes that households' offshore bank deposits (2% of households' financial wealth) are perfectly recorded in international statistics. Yet we know that a fraction of households' offshore bank deposits goes unrecorded too. Most Swiss accounts are held through sham corporations, and the Bank for International Settlements assigns the Swiss bank deposits owned by French residents through sham Panamanian corporations to Panama instead of France. Hence, French statisticians miss these deposits when they use the BIS data to compile the international investment position of France. Accounting for the unrecorded offshore bank deposits of households would improve even further the net foreign asset positions of Europe and the U.S.

If indeed the eurozone is a net creditor and the U.S. less indebted than in the offi-

⁴⁴Felettigh and Monti (2008) document that about half the foreign equity holdings recorded by Italy are in Luxembourg. The European Central Bank (2009) considers that most of the missing assets on Luxembourg and Ireland probably belong to eurozone residents. Lane and Milesi-Ferretti (2007, Table 2 p. 234) document that Irish statisticians recorded five times more U.S. investments in Irish equities than U.S. statisticians in 2004, so it is likely that U.S. residents own a significant fraction of the missing claims on Ireland as well.

⁴⁵In 2005, the OECD reports that the net personal tax rate on dividends was 22% in Germany, 32% in France, as opposed to 10% in Japan, and 18% in the United State

⁴⁶Middle Eastern countries own 10% of Swiss bank deposits and non-oil developing countries 25%, see Appendix Table A26. The assumption that Middle Eastern oil exporters own 10% of the globally unrecorded portfolios implies total portfolio holdings for Middle Eastern countries well in line with the literature, see Appendix Table A8.

cial statistics, then in one important aspect – net foreign asset positions – international imbalances are small once we account for the funds held by households in tax havens. They are small, in particular, compared to the imbalances in the distribution of personal wealth. The funds held in tax havens are huge compared to the recorded net foreign asset positions of leading economies, much less so compared to the wealth of the world’s richest persons. If the assets in tax havens belong entirely to the richest 1% of the world, then my computations imply that the richest 1% hold around 15% of their total financial wealth in tax havens.⁴⁷ This is certainly not spectacular. Yet accounting for these mere 15% is enough to affect the distribution of net foreign asset positions dramatically.

VI.B. Implications for Global Imbalances

Accounting for tax havens also has implications in terms of understanding the dynamics of past and future capital flows.

Statisticians have always been unable to capture households’ offshore portfolios. This means that the rich world’s net foreign assets have always actually been greater than reported in the official statistics. Accounting for tax havens improves both the current and past net positions of Europe and the U.S. Figure 1 shows that, over the 2001-2008 period, households’ unrecorded assets were remarkably stable at around 8% of world GDP. In all likelihood the rich world was a sizable net creditor in the 1980s and 1990s. It is possible, in particular, that the U.S. was a net creditor or at least balanced through to the end of the 1990s (the U.S. went into the red in 1986 according to the official statistics). This fact is important to assess whether long-standing, structural differences across countries, such as financial market development, or recent cyclical factors, such as U.S. economic policies, are the most important determinants of global imbalances.

Accounting for tax havens is also helpful in thinking about the prospects for the eurozone. Some eurozone countries such as Spain and Greece have officially recorded net external liabilities (public plus private) of about 100% of GDP. For these countries,

⁴⁷The world’s top 1% owns around 50% of households’ recorded financial assets – it held 40% of the world’s financial and non-financial wealth in 2000 (Davies et al., 2011) but financial assets are much more unequally distributed than non-financial assets such as housing.

the external adjustment cannot be made by means of exchange rate changes if they stay in the eurozone. The adjustment rather entails painful current account surpluses. All else equal, the more negative the external position, the larger the required future surpluses. But in Greece and Spain, where tax evasion is substantial, offshore assets may account for up to 30% of GDP.⁴⁸ Measuring the offshore assets held by the residents of the severely indebted eurozone countries is critical to understanding the magnitude of the required external adjustment and to designing appropriate policies. Taxing offshore assets is an important element in the required fiscal adjustment. Both issues go hand in hand: offshore assets cannot be taxed if they are not measured.

VII. Remaining Anomalies in International Statistics

Tax havens can explain virtually all the anomalies in portfolio investment data: why there are always more liabilities than assets recorded at the global level and why more investment income is paid than received, which is the key driver of the current account deficit that the world has tended to run up (Motala, 1997). However, two noticeable anomalies remain in the international statistics. First, contrary to the phenomenon found for portfolio securities, in foreign direct investment statistics, more assets can be identified than liabilities (Lane and Milesi-Ferretti, 2007, Figure 2 p. 232). Second, in a spectacular reversal of past trends, the world started running up a current account surplus in 2004. The surplus has been driven by the trade balance: since 2004, recorded exports have exceeded imports (Figure VIII).⁴⁹ Although there is no reason why the FDI and trade anomalies should be linked with households' offshore assets, they could affect the claim made in this paper that the eurozone and the rich world are actually net creditors. A brief discussion of their likely sources is thus in order.

FDI data raise huge challenges. Direct investments are decentralized, unlike portfolio holdings which are ultimately centralized in custodian banks and central security deposi-

⁴⁸If, as my computations indicate, 8% of households' financial wealth is held in tax havens and around half belongs to eurozone residents, then offshore assets account for more than 20% of eurozone GDP. Swiss data suggest that Greek holdings in Switzerland are as high as 10% of GDP; if Switzerland manages one third of all offshore fortunes, Greek holdings in tax havens could reach 30% of GDP.

⁴⁹For long-run series on the world current account, see Appendix Tables A19-A21, and Figure A1.

tories. Statisticians have only recently started spreading best practices and harmonizing data across countries by means of a Coordinated Direct Investment Survey (CDIS) conducted for the first time in 2009. Most importantly, direct investments have no observable market value, because they do not usually take the form of traded securities. Developing countries compile FDI statistics on a book value basis, while most rich countries try to infer market values based on the market prices of portfolio investments. Because asset prices rose more in developing countries than in rich countries in the 2000s, much of the direct investment discrepancy may come from the fact that the book values recorded by the developing countries for their direct investment liabilities vis-à-vis the rich world are too low. The developing world may be more indebted than we think.

The trade discrepancy also most likely comes from errors in developing countries' statistics. There is no particular reason to believe that exports are overestimated in rich countries. In fact, the U.S. Census Bureau (1998) has argued that U.S. goods exports have tended to be systematically underestimated, by as much as 10%. In contrast, there is substantial evidence that the developing world underestimates its imports: Fisman and Wei (2004) have shown that China's imports from Hong Kong are systematically under-reported for tax reasons. Now, most developing countries' IIPs are still compiled by cumulating current account flows. If developing countries' current account balances are overestimated, then their net foreign assets are also overestimated. Once again, the developing world may be more indebted than we think.

The FDI anomaly means that the global net foreign asset discrepancy (the world's puzzling net debt) is a little smaller than my estimate of households' unrecorded assets Ω between 2001 and 2004:⁵⁰ when we add Ω to the net foreign asset discrepancy, the world turns into a slight net creditor. Since 2005, the world net foreign asset discrepancy has shrunk, driven by the large world current account surplus,⁵¹ while my estimate of households' unrecorded offshore assets has grown.

If the FDI and trade discrepancies are due purely to errors in developing countries'

⁵⁰See Appendix Table A30 for a line-by-line reconciliation of Ω and the world net foreign asset discrepancy.

⁵¹In 2009, after the period covered by this study, the IMF recorded for the first time that the world net foreign asset discrepancy was around 0.

statistics, then they do not affect the results of this paper: when the world IIP is purged of all its errors, the rich world and the eurozone are net creditors, and the developing world is a net debtor. If each country contributes to the FDI and trade discrepancies in proportion to the size of its international balance sheet – a worst case scenario given the available evidence – the central conclusions of this paper still hold. The eurozone remains a net creditor – albeit smaller – and the rich world is balanced.⁵²

VIII. Conclusion: Two Proposals to Improve Official Statistics and Curb Tax Evasion

This paper takes a serious look at the enormous data challenges that tax havens pose for international investment statistics. The main finding is that accounting for households' offshore holdings makes international investment positions much more balanced. Unrecorded holdings in tax havens are double the net foreign debt of the rich world, and available evidence suggests that these holdings belong in the main to residents of rich countries, in particular to Europeans. Under most plausible scenarios, the eurozone turns out to be a net international creditor and the U.S. net position is significantly better than in the official statistics. Contrary to conventional wisdom that views Europe and the U.S. as severely indebted economies, the rich world is still overall likely to be a net international creditor. Despite a decade of poor-to-rich capital flows, international imbalances are still small, at least along the stock dimension.

Accurate net foreign asset data are crucial to many research and policy issues. They form a key input for the analysis of patterns in capital flows and for monitoring financial stability. The larger international imbalances, the greater the risk of a disorderly adjustment, such as an abrupt depreciation of the U.S. dollar (Blanchard et al., 2005; Obstfeld and Rogoff, 2005; Gourinchas and Rey, 2007). Better international investment positions would improve our ability to track fundamental aspects of globalization and to monitor financial stability. All of this calls for major changes to be made to the way

⁵²See Appendix Tables A31-A32.

international investment data are compiled.

Two simple reforms would make for substantial improvements. First, statistics showing that 60% of Swiss fiduciary deposits are owned by a small set of unpopulated tax havens are unhelpful. Cross-border banking data on the household sector should be compiled on a beneficial ownership basis. A bank deposit owned in Switzerland by a French individual through a sham Panamanian corporation should not be recorded as a Panamanian deposit, but as a French deposit. Now, the fundamental principle of anti-money laundering regulations is that bankers need to know at all times who are the beneficial owners of the funds they manage, even if the funds are held via a long chain of intermediate entities. Banks should be asked to use this information to compile cross-border banking data on the household sector. It would not require much extra work, since the information already exists within the banks.

Second, countries should exchange data on portfolio securities held offshore by households. All international financial centers should report to the Bank for International Settlements on the value of the securities held in custody by foreign residents in their banks – just as they do today for bank deposits. Custodial surveys have a long history and they do not raise any great practical problems. The reform would not violate any bank secrecy provisions. But it would only work if custodial holding data were also established on a beneficial ownership basis. A portfolio of U.S. equities held in Switzerland by a French individual through a sham Panamanian corporation should be recorded by Swiss banks as a French portfolio holding – and the information sent to the BIS.

The combination of both reforms would enable international statisticians to fill the long-standing gaps in portfolio investment data. As this paper has argued, this would radically change the international investment positions of rich countries.

Statistics on the offshore assets of households would also make it possible to tax households' offshore wealth. There exists indeed a simple solution to close the tax gap. Policymakers could ask tax havens to publish statistics on the funds managed by their banks on behalf of foreigners, by country of account holders and on a beneficial ownership basis. Policymakers would then ask tax haven banks to withhold taxes on the income

earned by foreigners. The U.S. would ask the Cayman Islands to withhold taxes on all income earned by Americans through Caymanian banks – and to remit the proceeds of the tax to the IRS. Thanks to the existence of statistics on the funds held by Americans in the Cayman Islands, the Cayman Islands would be compelled to remit the exact amount of taxes due. This solution would preserve bank secrecy since no personal information would be exchanged.

An even simpler solution to fight tax evasion is automatic exchange of information. U.S. authorities could ask Caymanian banks to automatically exchange information on all income earned by their American clients. Surprisingly, although the U.S. and the European Union have taken steps to curb tax evasion, G20 countries do not collectively push for automatic exchange of information. They have rather agreed upon a much weaker standard – on request information exchange – which in practice is ineffective (Johannesen and Zucman, 2012). Yet automatic information exchange exists within most leading countries: it does not pose any great practical difficulties.

Whatever the preferred solution, statistics on the funds held by households in tax havens are required to close the tax gap. Absent such statistics, tax haven banks will always have the possibility to help their clients eschewing withholding taxes or information exchange mechanisms as they have done in the past, for instance by helping them hide their identity through sham wealth-holding corporations. Accurate statistics on the offshore assets of households, on the contrary, would make offshore tax evasion impossible.

References

- Aguiar, M. and Amador, M. (2011). Growth in the shadow of expropriation. *Quarterly Journal of Economics*, 126:651–697.
- Alfaro, L., Kalemli-Ozcan, S., and Volosovych, V. (2011). Sovereigns, upstream capital flows and global imbalances. NBER Working Paper 17396.
- Atkinson, A., Piketty, T., and Saez, E. (2011). Top incomes in the long run of History. *Journal of Economic Literature*, 49(1):3–71.
- BEA (2011). *U.S. International Transactions Accounts*. Bureau of Economic Analysis, Washington, D.C.
- Bernanke, B. (2005). The global saving glut and the U.S. current account deficit. Sandridge Lecture, Virginia Association of Economics.
- Bertaut, C. C. and Grier, W. L. (2004). Recent developments in cross-border investments in securities. *Federal Reserve Bulletin*, 90(1):19–31.
- Bertaut, C. C., Grier, W. L., and Tryon, R. W. (2006). Understanding U.S. cross-border securities data. *Federal Reserve Bulletin*, pages A59–A75.
- Blanchard, O., Giavazzi, F., and Sa, F. (2005). International investors, the U.S. current account, and the Dollar. *Brookings Papers on Economic Activity*, 1:1–49.
- Boston Consulting Group (2009). Global wealth report, “Delivering on the client promise”.
- Boyce, J. and Ndikumana, L. (2001). Is Africa a net creditor? New estimates of capital flight from severely indebted sub-Saharan African countries. *Journal of Development Studies*, 38(2):27–56.
- Caballero, R. J., Farhi, E., and Gourinchas, P.-O. (2008). An equilibrium model of “global imbalances” and low interest rates. *American Economic Review*, 98(1):358–393.

- Cap Gemini and Merrill Lynch (2002). World wealth report, available online at http://www.capgemini.com/m/en/t1/pdf_2002_World_Wealth_Report.pdf.
- Carroll, C. D. and Jeanne, O. (2009). A tractable model of precautionary reserves, net foreign assets, or sovereign wealth funds. NBER Working Paper 15228.
- Chan, D., Fontan, F., Rosati, S., and Russo, D. (2007). The securities custody industry. Occasional Paper Series 68, European Central Bank.
- Clarida, R. H., editor (2007). *G7 Current Account Imbalances: Sustainability and Adjustment*. University of Chicago Press.
- Coeurdacier, N., Kollmann, R., and Martin, P. (2010). International portfolios, capital accumulation and foreign assets dynamics. *Journal of International Economics*, 80(1):100–112.
- Collier, P., Hoeffler, A., and Patillo, C. (2001). Flight capital as a portfolio choice. *World Bank Economic Review*, 15(1):55–80.
- Credit Suisse (2010). Global wealth report.
- Curcuro, S. E., Dvorak, T., and Warnock, F. E. (2008). Cross-border returns differentials. *Quarterly Journal of Economics*, 123(4):1495–1530.
- Curcuro, S. E., Thomas, C. P., and Warnock, F. E. (2009). Current account sustainability and relative reliability. In Frankel, J. and Pissarides, C., editors, *NBER International Seminars on Macroeconomics 2008*. University of Chicago Press.
- Davies, J. B., Sandström, S., Shorrocks, A., and Wolff, E. N. (2011). The level and distribution of global household wealth. *Economic Journal*, 121(551):223–254.
- Dell, F., Piketty, T., and Saez, E. (2007). Income and wealth concentration in Switzerland over the 20th century. In Atkinson, A. and Piketty, T., editors, *Top income over the twentieth century: A contrast between continental european and english-speaking countries*, pages 472–500. Oxford University Press.

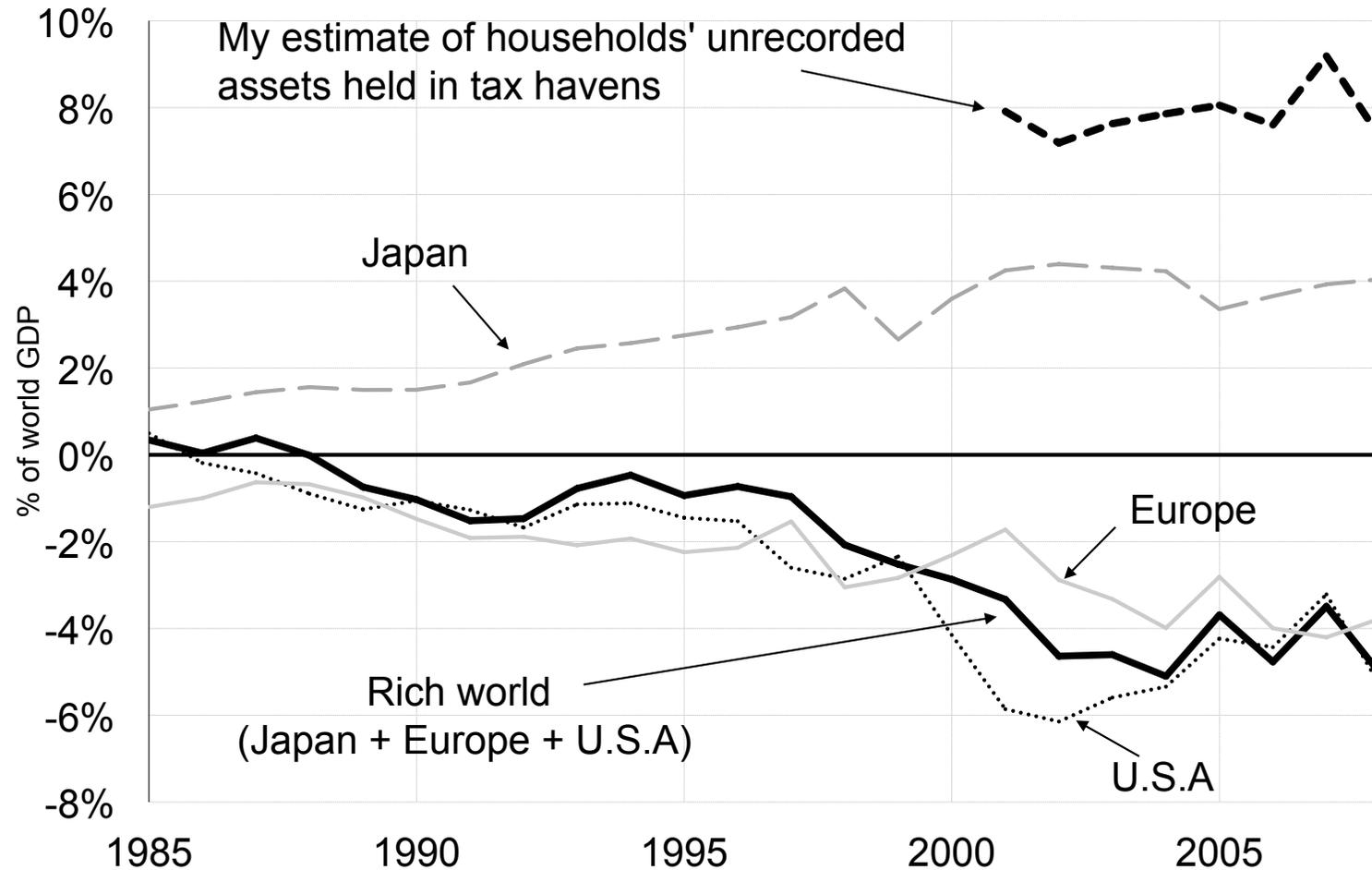
- Department of the Treasury, Federal Reserve Bank of New York, and Board of Governors of the Federal Reserve System (2009). Report on U.S. portfolio holdings of foreign securities as of December 31, 2008.
- Devereux, M. B. and Sutherland, A. (2011). Country portfolios in open economy macro-models. *Journal of the European Economic Association*, 9(2):337–369.
- Dollar, D. and Kraay, A. (2006). Neither a borrower nor a lender: Does China’s zero net foreign asset position make economic sense? *Journal of Monetary Economics*, 53:943–971.
- Dooley, M. P. (1988). Capital flight: A response to differences in financial risks. *IMF Staff Papers*, 35:422–436.
- European Central Bank (2002). Task force on portfolio investment collection systems, final report. Technical report, ECB, Frankfurt.
- European Central Bank (2009). Methodological changes in the compilation of the euro area balance of payments and international investment position. Technical report, ECB.
- Felettigh, A. and Monti, P. (2008). How to interpret the CPIS data on the distribution of foreign portfolio assets in the presence of sizeable cross-border positions in mutual funds. Evidence for Italy and the main euro-area countries. Banca d’Italia Occasional Paper.
- Fisman, R. and Wei, S.-J. (2004). Tax rates and tax evasion: Evidence from “missing imports” in China. *Journal of Political Economy*, 112(2):471–496.
- Gourinchas, P.-O. and Rey, H. (2007). International financial adjustment. *Journal of Political Economy*, 115(4):665–703.
- Hausmann, R. and Sturzenegger, F. (2007). Global imbalances or bad accounting? The missing dark matter in the wealth of nations and its implications for global imbalances. *Economic Policy*, 22:469–518.

- IMF (1987). Report on the world current account discrepancy. Technical report, International Monetary Fund, Washington, D.C.
- IMF (1992). Report on the measurement of international capital flows. Technical report, International Monetary Fund, Washington, D.C.
- IMF (1993). *Balance of Payments Manual, 5th edition*. International Monetary Fund, Washington, D.C.
- IMF (2002a). *Coordinated Portfolio Investment Survey Guide*. International Monetary Fund, Washington, D.C., 2nd edition.
- IMF (2002b). Report on the coordinated portfolio investment survey. Technical Report BOPCOM-02/10, International Monetary Fund, Washington, D.C.
- Johannesen, N. (2010). Tax evasion and Swiss bank deposits. EPRU Working Paper 2010-05.
- Johannesen, N. and Zucman, G. (2012). The end of bank secrecy? An evaluation of the G20 tax haven crackdown. mimeo.
- Kraay, A., Loayza, N., Servén, L., and Ventura, J. (2005). Country portfolios. *Journal of the European Economic Association*, 3(4):914–945.
- Lane, P. R. and Milesi-Ferretti, G. M. (2007). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *Journal of International Economics*, 73(2):223–250.
- Lane, P. R. and Milesi-Ferretti, G. M. (2008). International investment patterns. *Review of Economics and Statistics*, 90(3):538–549.
- Lane, P. R. and Milesi-Ferretti, G. M. (2011). Cross-border investment in small international financial centers. *International Finance*, 14(2):301–330.
- Lane, P. R. and Shambaugh, J. C. (2010). Financial exchange rates and international currency exposures. *American Economic Review*, 100(1):518–540.

- Ma, G. and Haiwen, Z. (2009). China's evolving external wealth and rising creditor position. BIS Working Paper 286.
- McGrattan, E. R. and Prescott, E. C. (2010). Technology capital and the US current account. *American Economic Review*, 100(4):1493–1522.
- Mendoza, E. G., Rios-Rull, J.-V., and Quadrini, V. (2009). Financial integration, financial deepness and global imbalances. *Journal of Political Economy*, 117(3):371–410.
- Milesi-Ferretti, G. M., Stobbe, F., and Tamirisa, N. (2010). Bilateral financial linkages and global imbalances: A view on the eve of the financial crisis. IMF Working Paper.
- Motala, J. (1997). Statistical discrepancies in the world current account. *Finance and Development*, 34(1):24–25.
- Obstfeld, M. and Rogoff, K. (2005). Global current account imbalances and exchange rate adjustments. *Brookings Papers on Economic Activity*, 1:67–123.
- Obstfeld, M., Shambaugh, J. C., and Taylor, A. M. (2010). Financial stability, the trilemma and international reserves. *American Economic Journal: Macroeconomics*, 2(2):57–94.
- Palan, R., Murphy, R., and Chavagneux, C. (2010). *Tax Havens: How Globalization Really Works*. Cornell Studies in Money. Cornell University Press.
- Portes, R. and Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics*, 65:269–296.
- Prasad, E., Rajan, R. G., and Subramanian, A. (2006). Patterns of international capital flows and their implications for economic development. In *Proceedings of the 2006 Jackson Hole Symposium*, pages 119–158. Federal Reserve Bank of Kansas City.
- Roine, J. and Waldenström, D. (2009). Wealth concentration over the path of development: Sweden, 1873-2005. *Scandinavian Journal of Economics*, 111(1):151–187.

- Schaufelbuehl, J. M. (2009). *La France et la Suisse ou la force du petit. Evasion fiscale, relations commerciales et financières (1940-1954)*. Presses de Sciences Po, Paris.
- Tax Justice Network (2005). The price of offshore, available online at http://www.taxjustice.net/cms/upload/pdf/Price_of_Offshore.pdf.
- Tille, C. and van Wincoop, E. (2010). International capital flows. *Journal of International Economics*, 80(2):157–175.
- U.S. Census Bureau (1998). Understatement of export merchandise trade data, available online at <http://www.census.gov/foreign-trade/misc/expunder.html>.
- Wooldridge, P. D. (2006). The changing composition of official reserves. *BIS Quarterly Review*, pages 25–38.
- Zaki, M. (2010). *Le secret bancaire est mort, vive l'évasion fiscale !* Favre, Lausanne.

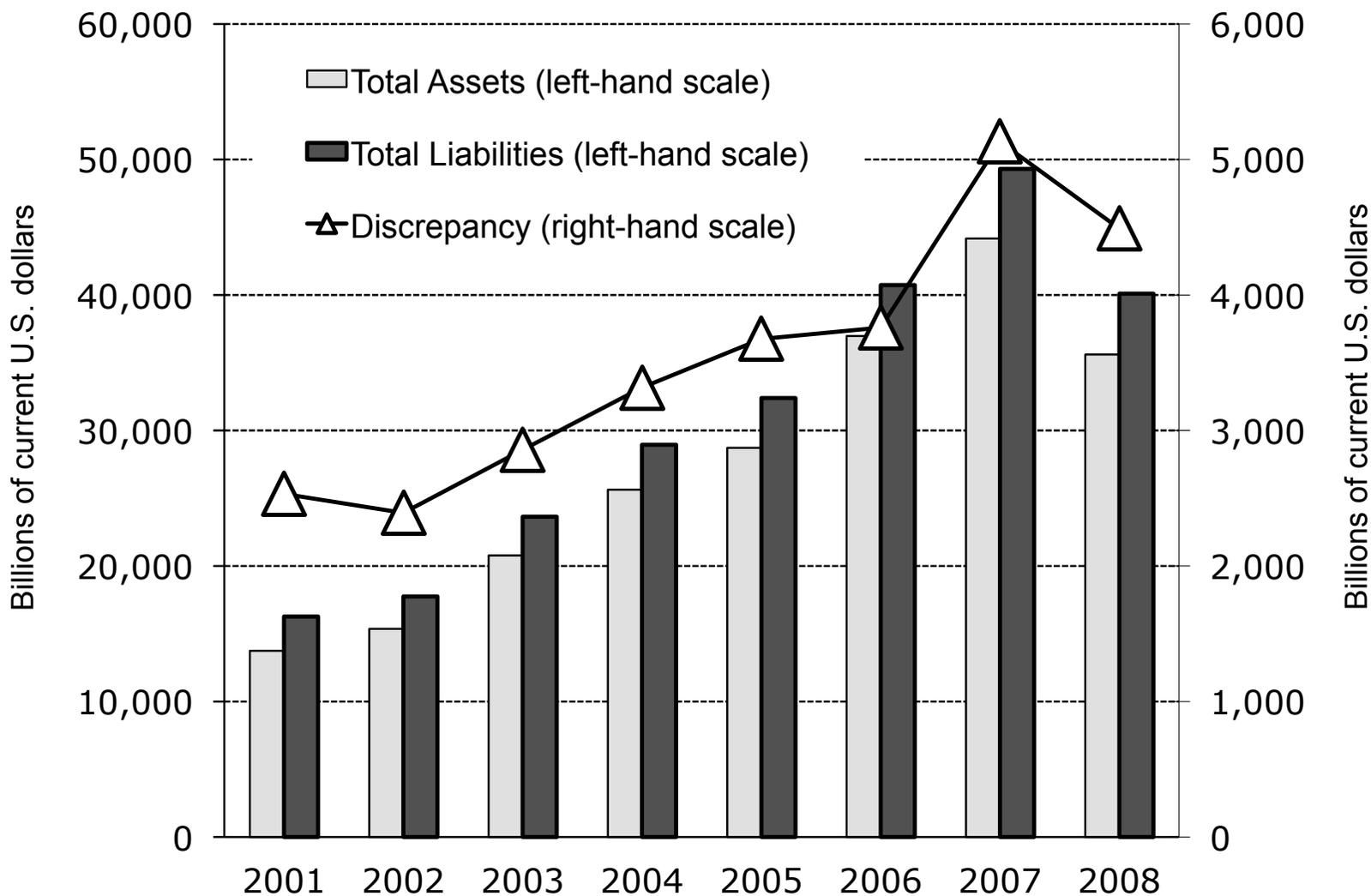
Figure I: Unrecorded Assets Held in Tax Havens Are Double the Recorded Net Debt of the Rich World



Note: The figure charts the value of unrecorded household assets held in tax havens along with the officially recorded net foreign asset positions of Japan, the U.S., and Europe. In 2008, by my estimate, unrecorded household assets amounted to 7.3% of world GDP. Total household financial assets stood at 120% of world GDP (Davies et al., 2011) so unrecorded household assets amounted to 6% of total household financial assets. Europe includes the 16 members of the eurozone as at the end of 2010, five additional European countries (the UK, Norway, Sweden, Denmark and Switzerland), and three non-European countries (Australia, New Zealand, and Canada).

Source: Appendix Tables A3 and A27.

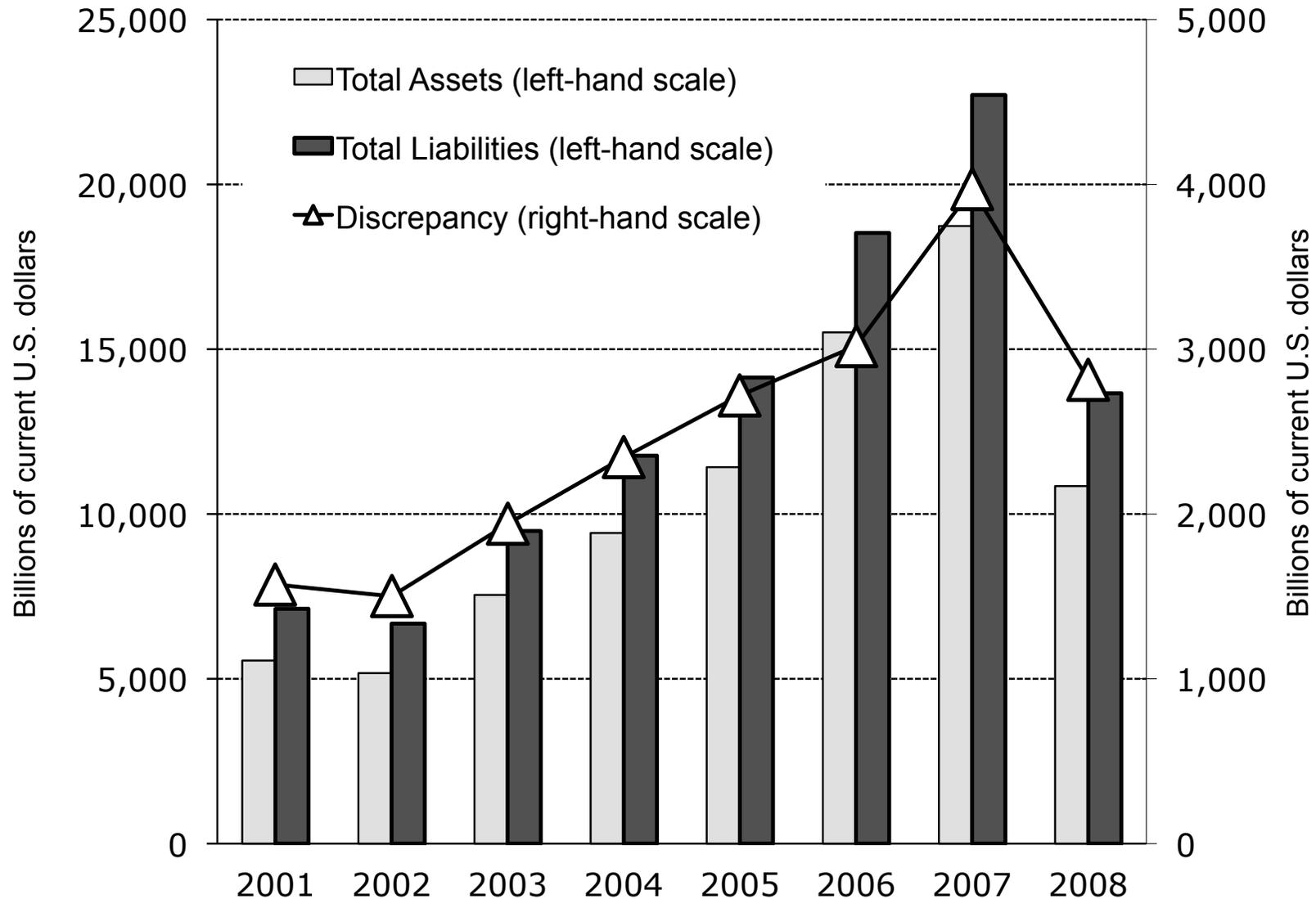
Figure II: Each Year, Less Security Assets Are Recorded Than Liabilities



Note: This figure charts the security assets and liabilities identifiable worldwide. Securities include all equities and bonds classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations.

Source: Appendix Table A3.

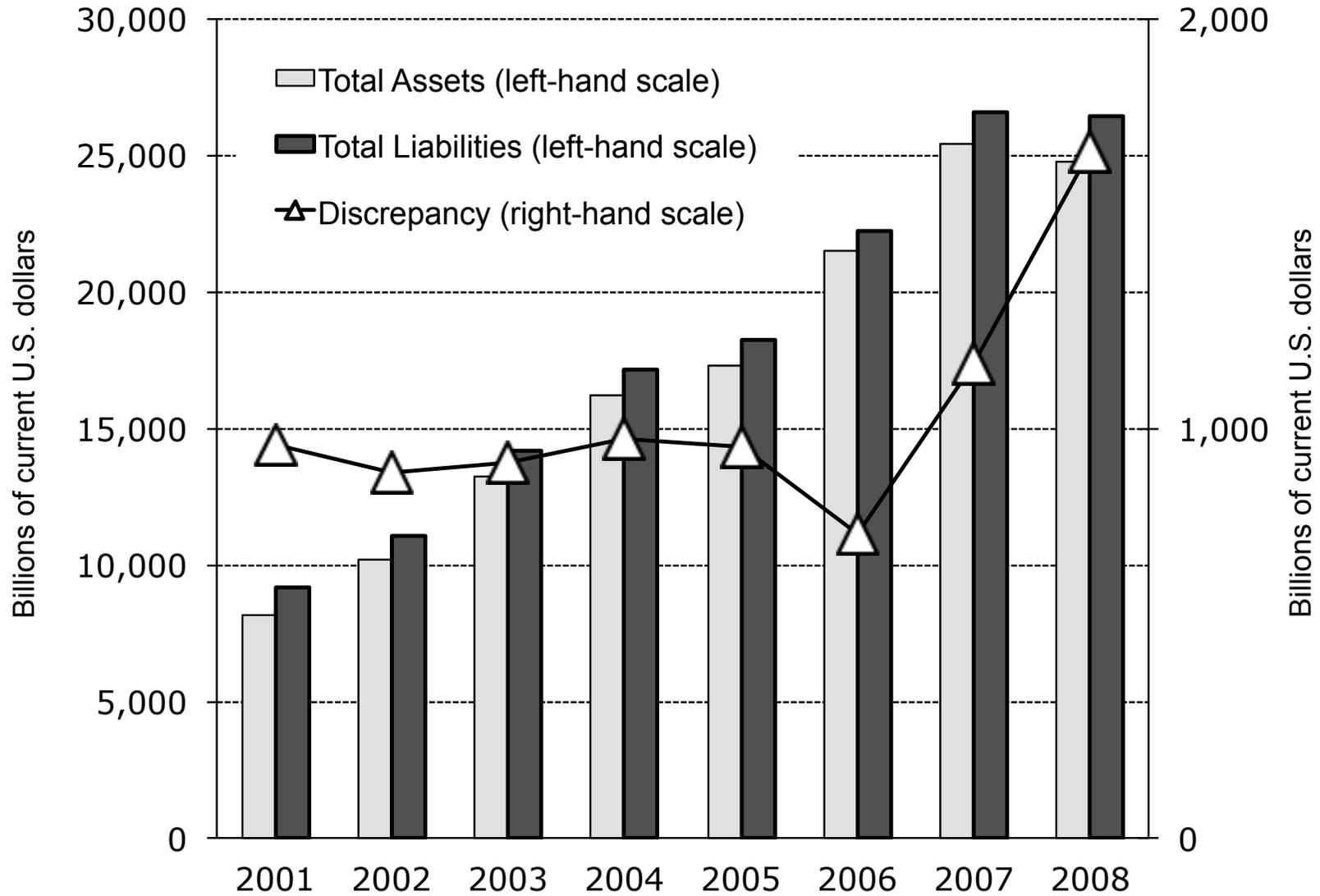
Figure III: Each Year, Less Equity Assets Are Recorded Than Liabilities



Note: This figure charts the equity assets and liabilities identifiable worldwide. Equities include all equities classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations.

Source: Appendix Table A3.

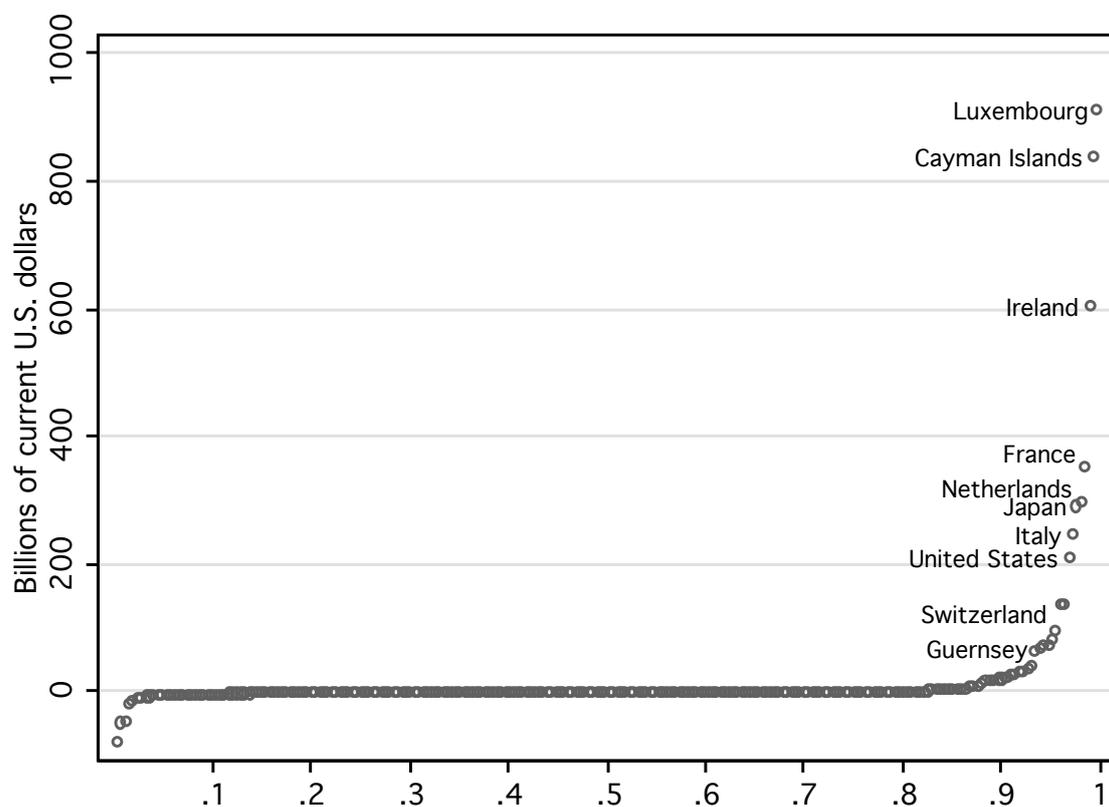
Figure IV: Each Year, Less Bond Assets Are Recorded Than Liabilities



Note: This figure charts the bond assets and liabilities identifiable worldwide. Bonds include all debt securities classified as portfolio investments or reserves. The totals cover 237 countries and territories along with international organizations.

Source: Appendix Table A3.

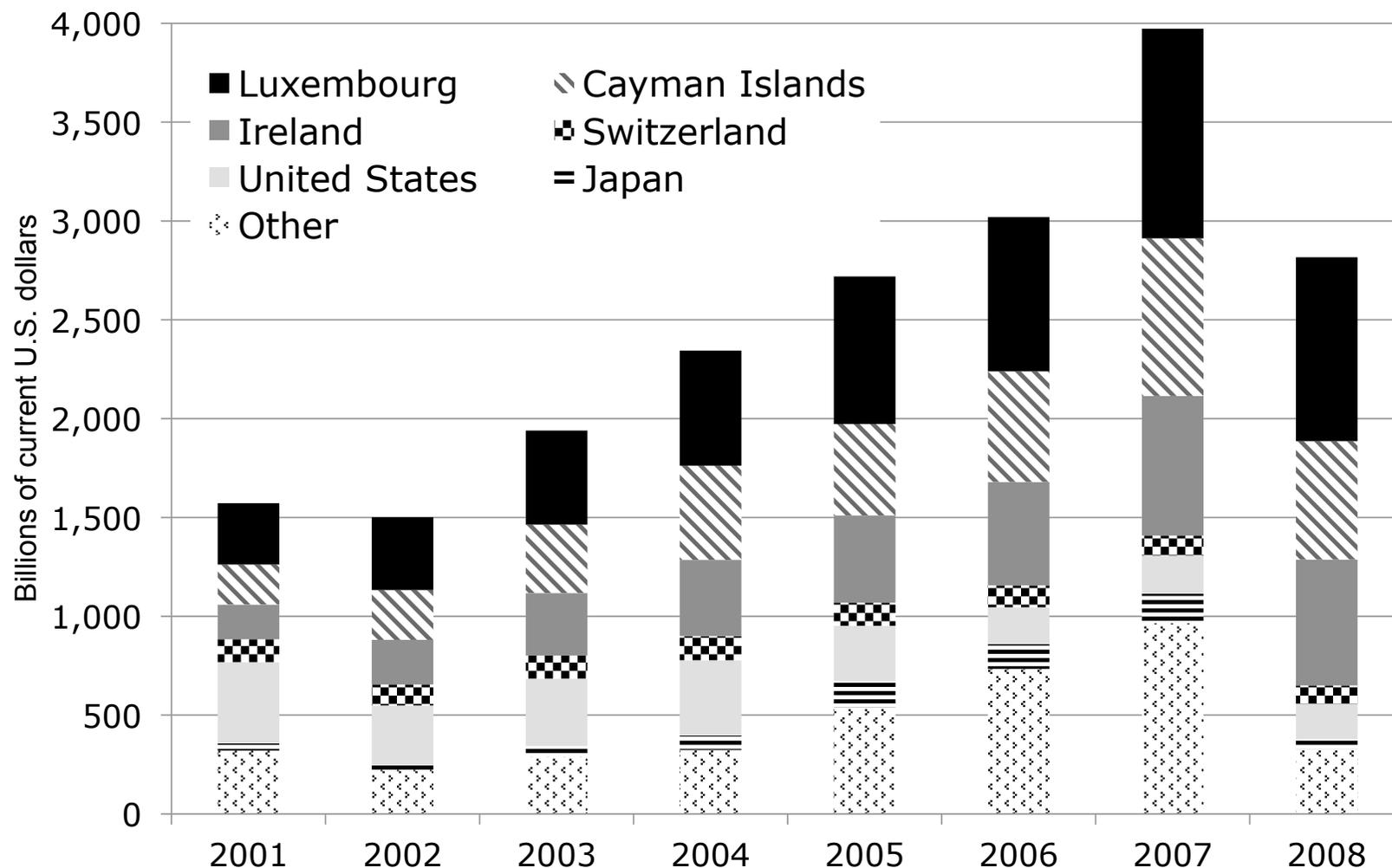
Figure V: The Owners of Unrecorded Accounts in Tax Havens Invest Mostly in Luxembourg Mutual Funds



Note: This figure shows where households that own portfolio securities through their bank accounts in tax haven invested in 2008. They invested in two groups of countries: the leading developed countries (France, Netherlands, Japan, Italy, U.S., etc.) and the three offshore centers that host large mutual fund industries (Luxembourg, Cayman Islands, and Ireland). Each dot is equal to the difference between the portfolio liabilities issued by a country j (L_j) and the sum $\sum_i \hat{A}_{ij}$ of the holdings of securities issued by j recorded by 236 countries i and international organizations. For 90% of the world's countries, $L_j = \sum_i \hat{A}_{ij}$. But for some countries there is a large discrepancy. In 2008, for instance, Luxembourg issued \$2,450bn in portfolio liabilities but only \$1,550bn of assets on Luxembourg were identifiable worldwide: the owners of unrecorded accounts in tax havens owned \$2,450bn-\$1,550bn=\$900bn in securities issued by Luxembourg, which are essentially mutual fund shares.

Source: Appendix Tables A13 and A14.

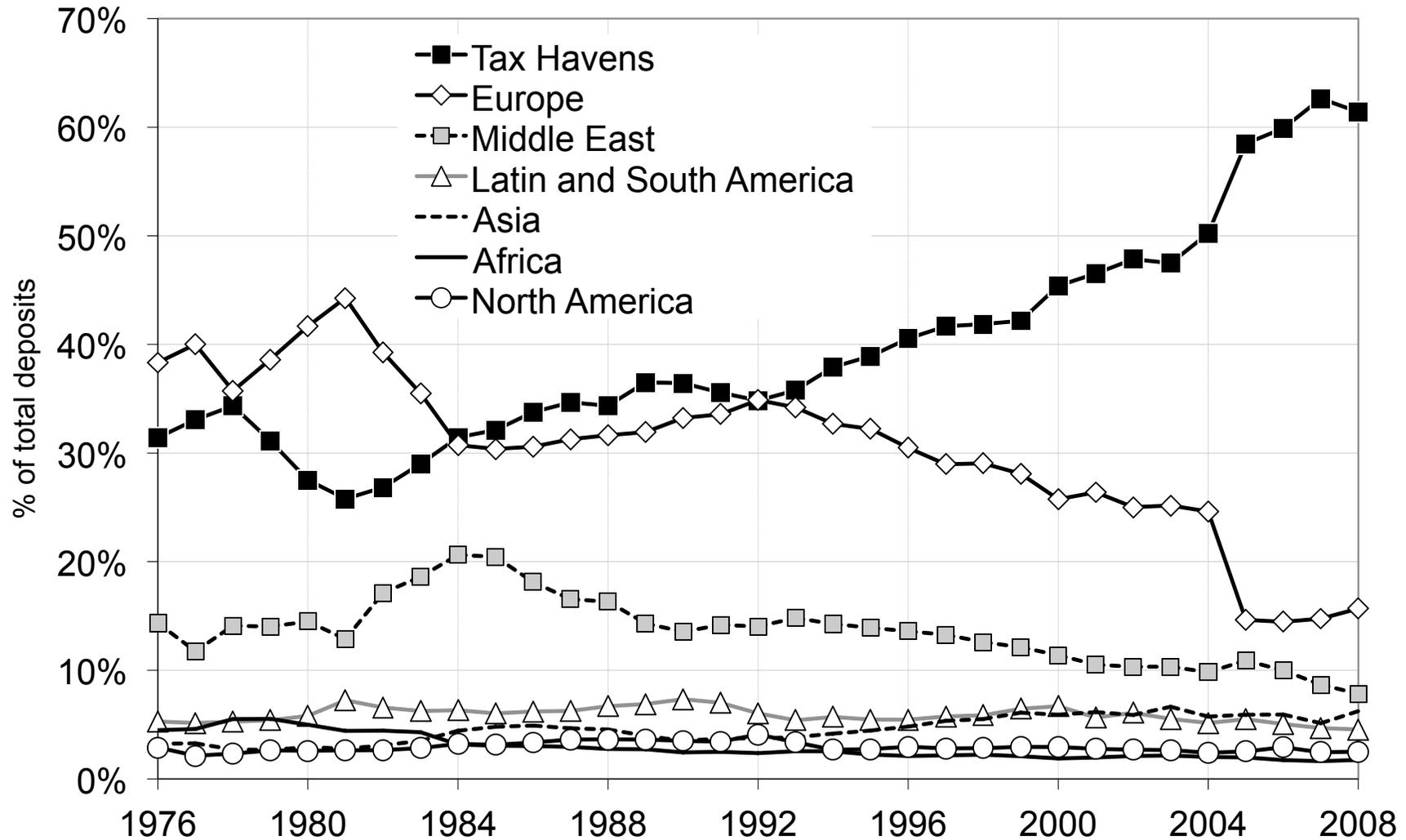
Figure VI: The Owners of Unrecorded Accounts in Tax Havens Invest Increasingly in Mutual Funds



Note: This figure shows where households that own equity securities through their bank accounts in tax havens invested each year between 2001 and 2008. In 2001, households held \$1,550bn in equity securities through their accounts in tax havens, of which \$400bn were U.S. in securities, \$300bn were in equities issued by other rich countries, etc. In 2008 they held \$2,800bn in equity securities, of which \$900bn were in Luxembourg mutual fund shares, \$600bn in Irish mutual fund shares, etc.

Source: Appendix Table A3.

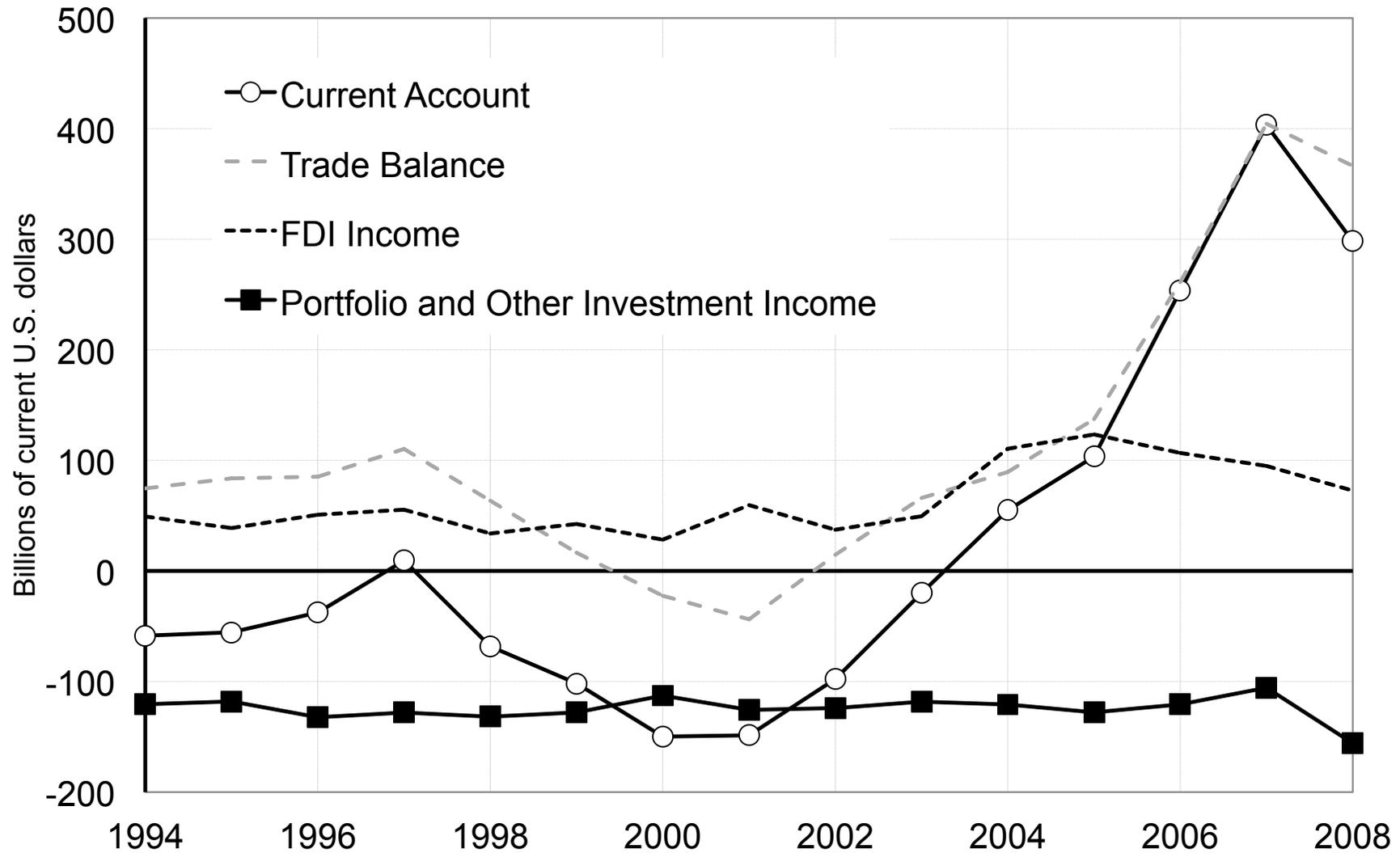
Figure VII: Most Swiss Accounts Probably Belong to Europeans



Note: This figure shows which countries' residents own Swiss bank fiduciary deposits, as reported by the Swiss National Bank (SNB). The SNB does not see through the sham corporations with addresses in such places as Panama or the British Virgin Islands used by European, U.S., and other rich countries' households as nominal owners of their accounts. This explains the high share of deposits assigned to tax havens.

Source: Appendix Table A25.

Figure VIII: The World Now Runs a Large Trade Surplus



Note: This figure charts the statistical anomalies in the world's balance of payments, which includes data for all countries and territories. Each year, more portfolio and other investment income is paid than received, the flow counterpart of missing assets in international investment positions. Since 2003, the world has been running a large trade surplus, driving a large current account surplus.

Source: Appendix Table A21.

Table I: Securities Form the Bulk of Cross-Border Wealth (Year-End 2008)

	Trillion \$	% of world GDP
World GDP	61	100%
Cross-Border Wealth	90	146%
Securities	40	65%
<i>Of which: Bonds</i>	26	43%
<i>Of which: Equities</i>	14	22%
FDI	18	29%
Other (loans, deposits)	32	52%

Note: This table presents the amount of cross-border wealth globally, by category of asset. Securities include all “portfolio investments” and the fraction of “reserve assets” invested in equity and bonds. FDI stands for foreign direct investment. Derivatives are excluded because they are not measured yet in all leading economies. Source: IMF Balance of Payments Statistics and the updated and extended version of the External Wealth of Nations database constructed by Lane and Milesi-Ferretti (2007).

Table II: Most Foreign Securities Held in Custody in Swiss Banks Belong to Foreigners

	[1]	[2]	[3]	[4]	[5]	[6]
(End of 2004 values in billions of US\$)	Foreign securities owned by domestic residents onshore	Foreign securities owned by domestic financial institutions offshore	Foreign securities owned by domestic households offshore	Foreign securities assets recorded in the IIP: [1]+[2]	Foreign securities entrusted by foreigners to domestic custodians	Foreign securities held in custody by domestic banks: [1]+[5]
<i>Data collection method</i>	<i>Custody survey</i>	<i>Direct reporting</i>	<i>none</i>		<i>Custody survey</i>	
Panel A: France						
Long-term securities (bn\$)	1,198	408	unknown	1,606	278	1,477
<i>Equities</i>	<i>327</i>	<i>116</i>	<i>unknown</i>	<i>443</i>	<i>67</i>	<i>394</i>
<i>Bonds</i>	<i>871</i>	<i>292</i>	<i>unknown</i>	<i>1,164</i>	<i>211</i>	<i>1,083</i>
Panel B: Switzerland						
Long-term securities (bn\$)	612	134	unknown	746	1,162	1,774
<i>Equities</i>	<i>321</i>	<i>18</i>	<i>unknown</i>	<i>339</i>	<i>627</i>	<i>949</i>
<i>Bonds</i>	<i>291</i>	<i>116</i>	<i>unknown</i>	<i>407</i>	<i>535</i>	<i>826</i>

Source: France: Bank of France, International investment position and *Bulletin de la Banque de France*, No. 136. Switzerland: Swiss National Bank, International investment position and *Banks in Switzerland*.

Table III: The Anomalies Caused by Unrecorded Assets in Tax Havens Are Internally Consistent

	2001	2002	2003	2004	2005	2006	2007	2008
[1] Stock (Ω)	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] Interest and dividends (D)	126	124	118	121	128	121	106	156
[5] Yield ($r_{\Omega}=D/\Omega$)	5.0%	5.2%	4.1%	3.6%	3.5%	3.2%	2.1%	3.5%

Note: This table reports on the estimated stocks and flows of unrecorded offshore portfolios in billions of of US\$ unless otherwise stated. Inflows are the net purchases of securities from unrecorded offshore accounts. Valuation denotes the capital gains/losses on unrecorded offshore portfolios. Interest and dividends are the income earned by the owners of unrecorded offshore portfolios. Source: Appendix Tables A3 and A21; IMF *Balance of Payments Statistics* 2010, Table C-1: “Global discrepancies in balance of payments statistics.”

Table IV: Offshore Wealth – Summary Statistics at Year-End 2008, \$bn

	World	Switzerland
Offshore securities	4,490	1,545
Bonds	37%	35%
Equities	63%	65%
<i>Mutual Fund Shares</i>	48%	50%
Offshore bank deposits	1,388	478
Total offshore financial wealth	5,878	2,022
Global household financial wealth = 73,625		

Note: Global household financial wealth includes bank deposits, portfolios of securities, insurance contracts of households net of households' debt. Offshore financial wealth includes the bank deposits and portfolios of securities held by households in tax havens. It excludes foreign direct investments in tax havens (such as real estate and shares in closely held companies incorporated offshore).

Source: Offshore financial wealth: Appendix Tables A3, A23, and A24. Global household financial wealth: Credit Suisse (2010).

Table V: Accounting for Unrecorded Assets Turns the Eurozone Into a Net Creditor

		Share of non-Swiss fortunes belonging to euro-area			
		0%	25%	50%	75%
	0%	-11%	-6%	0%	6%
Share of Swiss fortunes belonging to euro-area	40%	-6%	0%	5%	11%
	50%	-5%	1%	7%	12%
	60%	-3%	2%	8%	13%

Note: The Table reads as follows. The official eurozone's net foreign asset position/GDP ratio averaged -11% over the 2001-2008 period. If eurozone residents owned 40% of the unrecorded offshore assets managed in Switzerland and 50% of those managed elsewhere, the true net foreign asset position/GDP ratio of the eurozone averaged +5%.

Source: Appendix Table A28.

Table VI: Accounting for Unrecorded Assets Substantially Improves the U.S. Net Foreign Asset Position

		Share of non-Swiss fortunes belonging to the U.S.			
		0%	25%	50%	75%
	0%	-18%	-13%	-9%	-5%
Share of Swiss fortunes belonging to the U.S.	5%	-17%	-13%	-8%	-4%
	15%	-16%	-12%	-7%	-3%

Note: The table reads as follows. The official U.S. net foreign asset position/GDP ratio averaged -18% over the 2001-2008 period. If U.S. residents owned 15% of the unrecorded offshore assets managed in Switzerland and 25% of those managed elsewhere, the true net foreign asset position/GDP ratio of the U.S. averaged -12%.

Source: Appendix Table A29.