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On U.S. Cross-Border Return Differentials
and the Return on Unrecorded Portfolio Assets

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Author’s Declaration

Unless otherwise indicated in the text or references, or acknowledged above, this thesis is entirely the product of my own scholarly work. Any inaccuracies of fact or faults in reasoning are my own and accordingly I take full responsibility. This thesis has not been submitted either in whole or part, for a degree at this or any other university or institution. This is to certify that the printed version is equivalent to the submitted electronic one.

Date Stefan Holl
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List of Abbreviations

BEA U.S. Bureau of Economic Analysis
BIS Bank of International Settlement
BOP Balance of Payments
BPM Balance of Payments Manual
CE Composition Effect
CPIIS Coordinated Portfolio Investment Survey
EWN External Wealth of Nations
FDI Foreign Direct Investment
FDIUS Foreign Direct Investment in the U.S.
IFS International Financial Statistics
IIP International Investment Position
IMF International Monetary Fund
JPMC JPMorgan Chase & Co.
NIIP Net International Investment Position
OC Other Changes
RE Return Effect
TIC Treasury International Capital
USDIA  U.S. Direct Investment Abroad
SDR    Special Drawing Rights

**List of Mathematical Expressions**

- $A$: Assets
- $AVGPOS_t$: Average Asset or Liability Position at Time $t$
- $c$: Asset or Liability Category (FDI, Debt, Equity, Other Investment)
- $E$: Expectation Operator
- $F_t$: Gross Financial Transactions (Flows) at Time $t$
- $I_t$: Gross Income Flows at Time $t$
- $L_t$: Liabilities
- $NA_t$: Net Foreign Asset Position at Time $t$
- $NF_t$: Net Financial Transactions at Time $t$
- $NI_t$: Net Income Flows at Time $t$
- $\Omega_t$: Missing (i.e. Unrecorded) Portfolio Wealth
- $PC_t$: Price Changes at Time $t$
- $POS_t$: Asset or Liability Position at Time $t$
- $r_t$: Rate of Return at Time $t$
- $s_t$: Share of Global Missing Portfolio Wealth Held by U.S. Residents at Time $t$
- $T$: Number of Time Periods
- $t$: Time (Index Variable)
\textit{VAL}_t \quad \text{Valuation Effects at Time } t \\
\textit{w}_t \quad \text{Weight of Assets or Liabilities in a Category Relative to Total Assets or Liabilities at Time } t \\
\textit{XRC}_t \quad \text{Exchange Rate Changes at Time } t \\
\bar{\gamma} \quad \text{Average Yield}

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Abstract

The positive return differential between U.S. assets and liabilities is at the heart of the claim that the United States enjoys an ‘exorbitant privilege’. In this view, the unique status of the U.S. at the centre of the international financial system grants it an advantage over other countries. While initial estimates of the U.S. return differential might well be labeled ‘exorbitant’, subsequent studies which addressed statistical issues found much smaller return differentials. This thesis provides a detailed decomposition of the U.S. return differential into individual categories and time periods. It computes the return on unrecorded portfolio assets on a global scale and adjusts the U.S. return on assets accordingly. Finally, taking the return on unrecorded assets and mathematical estimation issues into account, this thesis argues that the U.S. return differential may be smaller than previously thought.

1 Introduction

The U.S. return differential, i.e. the difference between the return on U.S. liabilities and U.S. assets, is related to two macroeconomic puzzles. First, despite its significantly negative net international investment position (NIIP), the U.S. is a net receiver of income payments. This is called the income puzzle. Second, the U.S. NIIP decreases less than what would be implied by the large current account deficit. This is the position puzzle. The income puzzle implies that U.S. residents earn substantially higher yields on their foreign assets than foreigners do on U.S. assets. From the position puzzle, it follows that U.S. residents’ assets abroad exhibit higher capital gains than foreigners’ assets in the U.S. Overall, it appears that the U.S. residents’ assets abroad outperform U.S. assets held by foreigners, i.e. the return differential between U.S. assets and liabilities is positive.

The positive return differential is at the heart of the claim that the United States enjoys an ‘exorbitant privilege’. In this view, the unique status of the U.S. dollar as the most important reserve and trading currency grants the U.S. an artificial advantage over other countries. The high demand for dollars and dollar-denominated assets allows the U.S. to finance current account deficits by creating U.S. dollars, and to borrow at lower rates than usual.
Whether the U.S. return differential is exorbitantly high or quite small has been subject to a controversial debate over the last decade. The magnitude of the differential indicates whether the U.S. indeed enjoys an exorbitant privilege or whether it is just the result of statistical anomalies. The literature on the return differential came in three waves. The first wave of studies found relatively high return differentials of about three percent. The second wave contested the first-wave methodology by addressing statistical issues, and arrived at smaller differentials of about one percent. The third wave applied first- and second-wave methodologies to various timespans and found mixed results. (Curcuru et al. 2013, pp. 2-3) In 2013, statisticians from the U.S. Bureau of Economic Analysis (BEA) entered the debate, set forth that the second-wave methodology was more suitable, and computed a U.S. return differential of 1.5 percent. (Gohrband and Howell 2013, table 8.8)

In this thesis, I present an overview of the literature and provide additional details on the evolution of the return differential using recently available data from Gohrband and Howell (2013, table 8.7). I then adjust the U.S. return differential such that it takes into account the return on unrecorded assets held by U.S. residents. For this purpose, I construct an estimate of the return on global unrecorded portfolio assets, assign a portion to the U.S. and recompute the U.S. return differential using the such-adjusted U.S. foreign asset position. The adjusted return differential is one percentage point lower than the unadjusted one. Finally, I address an issue of the construction of average rates of annual returns. The 1.5 percent estimate of Gohrband and Howell (2013) is based on the arithmetic mean which introduces an upward bias on the rates of return of assets and liabilities. The more volatile return on U.S. assets is affected to a greater extent than the more stable return on U.S. liabilities. I recompute the average U.S. return differential using the geometric mean and find that the return differential is substantially lower than the original estimate which used the arithmetic average.

The thesis is organised as follows. Section 2 presents the concepts of the international statistics accounts: the balance of payments (BOP) recording flows and the international investment position (IIP) as a measure of stocks. Section 3 gives an overview of the existing literature on the U.S. return differential and discusses the two methodologies employed. The remaining sections of the thesis contain its
contribution to the literature. Section 4 introduces the databases which serve as the basis for the subsequent empirical analysis. The computation of the official return differential a discussion of associated issues is presented in section 5. Section 6 constructs an estimate of the yield and capital gains on global unrecorded portfolio wealth and adjusts the U.S. return differential accordingly. Section 7 addresses the issue of averaging returns over time and presents corrected return differentials using the geometric mean. Section 8 concludes.

2 The Balance of Payments and the International Investment Position

This section gives an overview of the concepts of the balance of payments (BOP) and the international investment position (IIP) as recommended by the International Monetary Fund (IMF). The IMF provides accounting standards in the form of a Balance of Payments Manual (BPM), to which many countries adhere. The fifth edition of the BPM was published in 1993 and introduced a number of important changes to the fourth edition. For instance, the capital account was split into two parts: the capital account and the financial account; the current account was designed to clearly distinguish between transactions in goods & services and transactions in income; the coverage of financial flows was expanded and restructured; and a measurement of international financial stocks—the international investment position—was introduced. (IMF 1993, pp. 3–4)

Data which are compiled according to BPM5 are available up to 2008. Then, the manual was superseded by the sixth edition which kept the overall framework of the fifth edition but introduced additional detail, clarifications and better integration with other macroeconomic statistics. BPM6 data are available from 2005 onwards. (IMF 2008, p. 4)

Since I use data up until 2008 in this thesis, I refer to the fifth version of the BPM for consistency reasons. The concepts described in this section are very general and apply to the sixth version as well. Section 2.1 presents the balance of payments and section 2.2 covers the international investment position.
2.1 Balance of Payments

The balance of payments captures an economy’s transactions with the rest of the world in each year. There are three broad categories of transactions: (1) transactions of goods, services, and income; (2) transactions of financial claims and liabilities; and (3) transfers. Each transaction is recorded twice, i.e. as a credit and as a debit. Credits are recorded with a positive sign and capture exports, decreases in assets and increases in liabilities. In other words, any decrease in holdings is classified as a credit. Debits have negative signs and report increases in holdings (i.e. imports), increases in assets, and decreases in liabilities. For example, if economy A buys a good worth 10 U.S. dollars from country B, country A records the inflow of the good as a debit (+10 USD) and the outflow of 10 U.S. dollars as credit (-10 USD). In principle, credits and debits should cancel out and the balance of payments should balance. But since credits and debits are often compiled from different sources, a discrepancy may nevertheless arise. This discrepancy is called “net errors and omissions”. (IMF 1993, pp. 6–7)

Transfers are recorded as an imputed offsetting item when there is no counterpart for a transaction. This is the case with gifts, debt abatements, or development aid, for instance. Suppose country A abates 50 U.S. dollars worth of country B’s liabilities to A. A then records the decrease of assets in its balance of payments as a credit. Since there is no associated inflow of goods from B to A, A records a transfer as debit to offset the credit. In general, transfers are recorded as debit whenever they offset a credit and are recorded as credit whenever they offset a debit. Another example for imputed entries in the balance of payments are re-invested earnings from direct investment. The investor earns an income which is recorded as direct investment income but at the same time, the investor’s share in the foreign branch increases. This is recorded as an imputed flow under direct investment–reinvested earnings. (IMF 1993, p. 8)

A territory is a geographical region administered by a government, where goods and capital circulate freely (IMF 1993, p. 7). In the context of this thesis, I use country, economy, and territory interchangeably.

The IMF (1993, p. 7) advises countries to valuate transactions and actual market prices instead of historical cost. Only in some special cases, historical cost
should be used.

Not included in the balance of payments are reclassifications and valuation changes. Reclassifications occur when an investment happens to meet different criteria than before without an according transaction taking place. For example, two investors each hold a seven percent share in a foreign company. Below a ten percent share, such holdings are classified as portfolio investment. Above 10 percent they are considered a foreign direct investment. Now suppose the two investors form an associated group. The group’s share in the foreign firm is now 14 percent and hence reclassified as direct investment. Although portfolio investment decreased and foreign direct investment increased, the balance of payments does not record this change. Instead, it is shown as an ‘other change in volume’ in a separate supplementary statement which reconciles stock and flow positions. (IMF 1993, p. 9)

The balance of payments as recommended by the IMF consists of three accounts: the current account, the capital account, and the financial account. The current account captures transactions of goods and services, income, and current transfers. Goods and services are further broken down by category such as goods for processing, repair on goods, transportation, etc. Income is subdivided into compensation of employees and investment income which in turn distinguishes between direct investment income and portfolio investment income, i.e. income on equity, income on debt, and other investment income. Other investment covers short- and long-term trade credits, loans, currency and deposits, and other accounts receivable and payable. Current transfers comprise all transfers which are not capital transfers. The capital account covers capital transfers and the acquisition and the disposal of non-produced, non-financial assets such as patents, leases, or goodwill, for example. Capital transfers are transfers of ownership of a fixed asset or debt forgiveness without any quid pro quo. Finally, the financial account records transactions involving direct investment, portfolio investment, other investment, and reserve assets. (IMF 1993, pp. 37–42)
2.2 International Investment Position

The international investment position (IIP) is the stock counterpart to the balance of payments. It is designed as a table which captures assets and liabilities of an economy vis-à-vis foreigners at a specific point in time, usually at the end of each year. The rows provide a breakdown of assets and liabilities into direct investment, portfolio investment, and other investment. These categories should, in principle, be further subdivided into more detailed items such as long-term debt for example, but many countries find it difficult to provide information on such a detailed level. The rows also report monetary gold, special drawing rights (SDR), and land ownership, which is treated as a claim on the foreign entity to which the land is attributed. (IMF 1993, p. 104)

The columns present the causes of the change in the IIP from one year to the next. Changes may arise from transactions, price changes, exchange rate changes, or other changes. Transactions are those changes recorded in the balance of payments which affect the IIP for instance, residents selling their shares in foreign companies. Price changes are those changes which arise from increases or decreases in the value which is ascribed to an asset or a liability. Suppose, U.S. residents hold shares in a foreign company which, at some point during the year, announces good news, causing the share price to rise. Accordingly, the magnitude of the portfolio equity entry in the U.S. IIP rises. Exchange rate changes work similarly, but instead of a change in the price of an asset or liability, the value of the currency in which the asset or liability is denominated changes relative to the domestic currency. Finally, ‘other changes’ capture all changes that are not covered elsewhere. They include the allocation or cancellation of SDR, gold monetisation or demonetisation, reclassification, unilateral debt cancelation, expropriation, and uncompensated seizures. (IMF 1993, pp. 104-105)

3 Methodology

The total return of a country’s assets can be split into a yield component and a valuation component. Yields are the income streams generated by assets, such as coupon payments, dividends, or earnings on direct investment. Valuation changes
capture capital gains and losses. They may arise from price or exchange rate movements.

The return differential of a portfolio is the difference between the return on assets and the return on liabilities. A positive return differential indicates that the portfolio earns an overall profit, a negative one indicates an overall loss. Following Curcuru et al. (2013, pp. 2-3), the return differential can be broken down into a composition effect, a return effect, and a timing effect.

The composition effect captures the part of the return differential which stems from different weights on different asset classes. For example, a portfolio which consists predominantly of risky and illiquid assets, as well as safe and liquid liabilities is expected to have a positive return differential. As Gourinchas and Rey (2007, p. 28) show, the U.S. exhibits a positive composition effect, mostly due to high returns on U.S. direct investment abroad.

The return effect arises from different returns within each asset class. It is positive if a country is able to make higher returns on assets relative to liabilities that share the same risk and liquidity features. The contention that the U.S. enjoys an exorbitant privilege is based on the claim that the return effect is in favour of the U.S. (Curcuru et al. 2013, pp. 3)

Finally, the timing effect accounts for the different decisions of when to buy or to sell. Curcuru et al. (2010, p. 26) find that foreigners tend to relocate their portfolios to asset classes that perform poorly after the relocation while U.S. investors seem to make neutral timing decisions, i.e. their assets perform neither particularly well nor particularly poorly after the relocation.

The debate about the exorbitant privilege is heavily focused on the return effect. While the composition effect and the timing effect play an important role for the U.S. returns differential, they are not controversial, because they arise from different risk and liquidity features or from different timing decisions. The return effect, on the contrary, seems to give the U.S. an advantage that is not based on such considerations. Rather, it is argued to be a feature of the U.S. position at the centre of the global financial system. In the 1960s the French finance minister claimed that foreign central banks which buy USD-denoted assets as reserves

\footnote{Valérie Giscard d’Estaing, finance minister in France from 1962 to 1966, first used the term 'exorbitant privilege' in his speech in February 1965. (Giscard d’Estaing 1965)}
allowed the U.S. to finance foreign direct investment at no cost. (Gourinchas and Rey 2007, p. 12) More recently, Bernanke (2005) argued that the large demand of oil exporters and some Asian countries for safe and liquid U.S. assets – mainly treasury bills – allows the U.S. to issue debt at a relatively low interest rate.

The existence and the magnitude of the return effect have been under scrutiny for a decade now. The literature on this topic came in three waves. In the first wave, a return differential of about three percent was computed from U.S. data. Studies in the second wave addressed issues related to data coverage and found much smaller return differentials. The third wave used newly available data for various sample periods and arrived at very differing results. In the following, I discuss the three waves in more detail.

3.1 First Wave

A change in the net foreign asset position is either caused by financial flows, i.e. transactions, or valuation changes.

\[ NA_t - NA_{t-1} = NF_t + VAL_t \]  
(1)

where \( NA_t \) is the net foreign asset position at the end of period \( t \), \( NF_t \) denotes net asset flows during period \( t \), and \( VAL_t \) is the valuation change which stems from either price changes or exchange rate changes: \( VAL = PC_t + XRC_t \). The first studies computed the valuation change as

\[ VAL_t = NA_t - NA_{t-1} - NF_t. \]  
(2)

The return differential between assets and liabilities, \( r_t \), is the sum of valuation changes and income streams—i.e. all profits and losses that accrue to investors—expressed as a percentage of the net foreign asset position.

\[ r_t = \frac{NA_t - NA_{t-1} - NF_t}{NA_{t-1}} + \frac{NI_t}{NA_{t-1}}. \]  
(3)

\( NI_t \) denotes the net income generated by assets or paid to liabilities, i.e. interest, dividends, and earnings on foreign direct investment (FDI). The first term in
The equation represents the percentage capital gains on the net foreign asset position. The second term is the part of the return that stems from income.

Gourinchas and Rey (2007, p. 28) estimate a real return differential of 3.3 percent on the period from 1973 to 2004 for the U.S. Lane and Milesi-Ferretti (2007a, p. 81) find a return differential of 2.7 percent between 1995 and 2004. Obstfeld and Rogoff (2005, p. 82) estimate it at 3.1 percent over the period 1983–2003, and Meissner and Taylor (2008, p. 87) at 3.7 percent. Return differentials of this magnitude explain the gap between the cumulated current account and the NIIP.

3.2 Second Wave

The second wave of studies addressed a data inconsistency arising from different collection methods and revision policies for stock and flow data. BEA collects and revises data on U.S. international positions, capital flows, and income flows. In theory, the changes in the IIP arise from either financial flows, price changes, or exchange rate changes. However, due to data collection issues, the transactions and changes in these three categories do not fully explain the change in the IIP. To reconcile stock and flow data, BEA introduced the term “other changes” (OC). It includes changes in coverage, capital gains and losses of direct investment affiliates, and other adjustments to the value of assets and liabilities. With this data inconsistency, it no longer holds that the change in NA is equal to net asset flows plus price changes plus exchange rate changes. Instead, the change in NA could also stem from OC, as shown in equation 4.

\[ NA_t - NA_{t-1} = NF_t + VAL_t + OC_t \]  

(4)

Thus, by using equation 3 the first wave treated OC as if it accrued to investors as profit and therefore actually computed valuation changes plus other changes.

\[ VAL_t + OC_t = NA_t - NA_{t-1} - NF_t. \]  

(5)

2Calculated in Curcuru et al. (2013, p. 38) as the weighted average of the difference between returns on assets and liabilities across the three periods
The second wave, however, argues that $OC$ should not be included in the return differential. Accordingly, it has to be subtracted as shown in equation 6.

$$r_t = \frac{NA_t - NA_{t-1} - NF_t - OC_t}{NA_{t-1}} + \frac{NI_t}{NA_{t-1}}. \quad (6)$$

Whether or not $OC$ should be included in the estimation of the return differential has been subject to an intense debate. Lane and Milesi-Ferretti (2009) analyse $OC$ in more depth: $OC$ can either stem from mismeasured capital gains, mismeasured flows, or mismeasured initial positions. If $OC$ represents mismeasured capital gains, it accrues to the investor and should thus be included in the return estimate. If it instead arises from mismeasured flows or mismeasured initial positions, it does not affect the return on assets and liabilities and should be excluded from return estimate. The second wave of studies argues that $OC$ primarily contains mismeasured flows and that the first wave estimates are biased for this reason.

Curcuru et al. (2008a) set forth that $OC$ introduces an upward bias in the return estimates. Data on positions are often substantially revised upwards due to new information. Flow data, however, are seldom revised because it is in many cases unfeasible for reporting entities to change their reported history. If data on assets and liabilities were similarly affected, the return differential would not change much since the changes would net each other out. But asset positions tend to be revised upwards by a substantial amount while revisions to liabilities positions are rather small and sometimes even negative. The resulting upward bias is large on the return on assets and small on the return on liabilities which, overall, leads to an upward bias of the return differential. Thus, using the first wave methodology, the return differential estimates are too high. Second wave studies find return differentials of 0.7 percent from 1994 to 2005 (Curcuru et al. 2008a, table II), 0.6 percent from 1983 to 2007 (Lane and Milesi-Ferretti 2009, table 7) and 0.9–1.1 percent over the period from 1990 to 2007 (Curcuru et al. 2008b, table 2).

However, such small return differentials raise another puzzle. They cannot entirely close the gap between the cumulated current account and the actual NIIP.

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30.6 percent is the average over the three time periods in Lane and Milesi-Ferretti (2009, table 7) as computed by Curcuru et al. (2013, table 2)
3.3 Third Wave

The third wave of literature, in turn, stands in contrast to the second wave. Gourinchas et al. (2010, pp. 6–8) argue against allocating OC entirely to flows, because of the large current account mismeasurement that would be implied. For the period from 1973 to 2009, they find a return differential between 1.6 and 3.5 percent, depending on how much of OC is attributed to flows and how much to capital gains. Forbes (2010, table 1) implements the methodology of (Curcuru et al. 2008a) and estimates the U.S. return differential at 6.9 percent. However, this estimate is based on a data set that only covers five years: 2002 to 2006, a period in which annual return differentials were particularly high. Habib (2010, table 2) estimates return differentials for 49 countries of which the U.S. exhibits the largest one with 3.4 percent. While he builds on data covering the period from 1981 to 2007, he does not take into account the data issues addressed by the second wave of literature. Instead, he allocates OC exclusively to capital gains.

In 2013, statisticians from BEA entered the debate. Gohrband and Howell (2013, pp. 266-267) set forth that OC most likely represents mismeasured flows and should therefore not be included in the return on assets and liabilities. OC often arises from series breaks in the underlying data, such as the inclusion of financial derivatives in 2005, which have previously not been covered in the statistics. Furthermore, not all surveys detect all transactions. Sometimes, surveys of positions find new evidence which causes revisions to positions but surveys of transactions did not detect the relevant transaction. The change in position is interpreted as ‘other change’, because it can not be allocated to either financial flows, price changes, or exchange rate changes. All these changes in recorded assets and liabilities do not accrue to investors and therefore do not influence the return. For this reason, an estimate of the returns differential should not include OC.
Using previously unpublished data, Gohrband and Howell (2013, p. 267) estimate the U.S. return differential between 1990 and 2005 at 1.5 percent of which 1.2 stem from income yield and 0.3 from capital gains.

4 Data

This thesis draws from three primary data sources: Official U.S. IIP data compiled by the BEA (Gohrband and Howell 2013, table 8.7), world BOP data from the IMF (2015a), and data on unrecorded security assets (the missing wealth) computed by Zucman (2013). BEA in turn, relies to a large extent on the survey of the Treasury International Capital (TIC). The IMF then uses BEA data as an input for its world IIP. Zucman (2013) combines the External Wealth of Nations data set by Lane and Milesi-Ferretti (2007b) with the IMF’s Coordinated Portfolio Investment Survey (CPIS) and world IIP data among others. The following subsections present an overview of these data sets. I start with the CPIS and TIC data, which are the basis for other data sets. I continue with the U.S. official IIP, the IMF’s world IIP, the External Wealth of Nations, and end with Zucman (2013).

4.1 Treasury International Capital (TIC)

The U.S. Department of Treasury collects data on flows into and out of the U.S. and on the corresponding cross-border holdings of assets and liabilities. It does not include direct investment. The first survey was conducted in 1974. However, it was not repeated annually but only every few years. Continuous annual data is available from 2002 onwards. The data is based on reports of commercial banks and other depository institutions, bank holding companies, securities brokers and dealers, custodians of securities, and non-banking enterprises in the United States, including the U.S. branches, agencies and subsidiaries of foreign-based banks and business enterprises. BEA uses, among others, this data set as an input to compile the U.S. balance of payments statistics and the U.S. international investment position. (U.S. Department of the Treasury 2015)
4.2 Coordinated Portfolio Investment Survey (CPIS)

Since 1997, the IMF publishes an annual survey of countries’ portfolio investment holdings. Countries voluntarily participate in the survey and report year-end asset positions to the IMF. Although not mandatory, participants are encouraged to also report their liabilities. However, data on liabilities are not very reliable because the creditor might not be known to the debtor, for example if the creditor holds the security through a custodian or if the creditor sells the security to another investor. Thus, a geographical decomposition of liabilities can be expected to be flawed.

In addition to country-specific data, the IMF includes securities held as foreign exchange reserves and securities held by international organisations. The survey distinguishes between equity and investment fund shares, long-term debt instruments, and short-term debt instruments. (IMF 2015b)

4.3 U.S. Balance of Payments and International Investment Position

The U.S. Bureau of Economic Analysis (BEA) publishes data on flows and stocks of U.S. cross-border liabilities on a quarterly and annual basis. The U.S. balance of payments (BOP) tracks flows in and out of the U.S. It consists of the current account, the capital account and the financial account. The IIP reports asset and liability stocks at the end of each year. It is computed by cumulating the flows within one period and adding it to the IIP value of the previous period. Assets and liabilities are subdivided into direct investment, portfolio investment, other investment, reserve assets, and financial derivatives. Changes in the IIP are caused by financial transactions (i.e. flows), valuation changes (price changes or exchange rate changes), and ‘other changes in asset volume’ (e.g. changes in coverage or classification). (BEA 2014 par. 1.3, 1.4)

The main source for BEA statistics are the TIC data which report financial flows between U.S. and non-U.S. individuals and firms, excluding direct investment (par. 13.26). Additionally, BEA conducts quarterly, annual and benchmark surveys on direct investment, services, and remittances (par. 13.6, 13.10, 13.25). BEA
uses import and export data as reported by the U.S. census bureau (par. 13.51).
For the price changes and yields of equity assets and liabilities, BEA uses share
price indices like the Standard and Poor’s 500 or national Morgan Stanley Capital
International indices. Analogously, price changes and yields of bond holdings are
derived from different Merryl Lynch indices (par. 13.69–13.71). Finally, BEA fills
the remaining gaps with data from other government institutions, central banks,
companies, various specific surveys conducted by other institutions, etc. (BEA
2014, chapter 13)
Due to the large number of different data sources with small differences in
coverage and classification, BEA has to go through a complex process of data
alignment and augmentation. For example, in order to obtain BOP transactions,
BEA starts with TIC data of changes in holdings of U.S. assets and liabilities and
subtracts all changes in value that do not arise from transactions. These are price
changes, exchange rate changes, and ‘other changes’. ‘Other changes’ arise from
changes in coverage, capital gains and losses of direct investment affiliates, and
other adjustments to the value of assets and liabilities such as series breaks due to
coverage changes or data revisions. Whether or not to include ‘other changes’ in
estimates for the return on U.S. assets and liabilities has been an academic debate
for years. (see Section 3 for more detail)
In 2014, BEA restructured the presentation of the BOP and IIP. Most of
the changes were purely cosmetic, i.e. they concerned the way the tables were
organised and categorised. In some categories, additional details like maturity
and counterparty data were added, direct investment is now separated into debt
and equity components in the IIP etc. The underlying data collection process,
however, is unaffected. (Gohrband and Howell 2013, pp. 233-252)

4.4 The World Balance of Payments and International In-
vestment Position
Participating countries report their BOP and IIP to the International Monetary
Fund, who then publishes a summary of the data. The IMF also provides world
aggregates of the BOP and IIP. The world balance of payments reports global
flows of goods and services as well as assets and liabilities on a relatively detailed
level. Financial flows and income are reported separately for FDI, debt, equity, and other investment assets and liabilities. By contrast, the IIP only provides stock data and does not include a breakdown of the changes into flows, price changes, exchange rate changes, and other changes. (IMF 2015a)

4.5 The External Wealth of Nations

Lane and Milesi-Ferretti (2007b) construct estimates of the external asset and liability positions for 145 countries from 1970 to 2004. They disaggregate the net foreign asset position into foreign exchange reserves and debt, portfolio equity and FDI assets and liabilities. Estimates for countries which do not report IIP data are based on extrapolating initial positions as estimated by Sinn (1990) using cumulative capital flows and valuation gains and losses. For countries which report IIP data, the authors extend recent IIP data backwards using the same methodology. For many advanced countries, including the U.S., consistent IIP data are available from 1982 onwards from the IMF’s Balance of Payments Statistics and International Financial Statistics. For earlier periods, these data are supplemented by countries’ official releases of IIP data and by cumulating flows backwards. The rest of this sub-section discusses the components of the data and the extrapolation process in more detail (see Lane and Milesi-Ferretti (2007b, pp. 226-230)).

Portfolio equity data primarily stem from the IMF’s Balance of Payments Statistics and International Financial Statistics, the IMF’s Coordinated Portfolio Investment Survey (CPIS), as well as bilateral estimates on foreign holdings of U.S. portfolio equity and U.S. holdings of portfolio equity overseas on the basis of U.S. treasury data. Valuation effects are measured as the price change of stock market indices. Lane and Milesi-Ferretti (2007b) assume that investors in a given country hold a cross-border equity portfolio that corresponds to the Morgan Stanley Capital International’s world index. The country’s liabilities are assumed to track a broad domestic stock market index.

Data on direct investment is based on IIP estimates and the United Nations Conference on Trade and Development World Investment Report. Some countries report FDI in market-value terms, but most countries report FDI in book-value terms. Lane and Milesi-Ferretti (2007b) treat market-value FDI series similarly to...
portfolio equity assets and liabilities in the sense that they extrapolate them using valuation effects as measured by a stock market index. For the extrapolation of book-value FDI series, they use cumulative flows adjusted by real exchange rates. When real exchange rates fluctuate heavily or FDI is concentrated in commodity-producing or extractive sectors, they use cumulative U.S. dollar flows instead.

Data on debt comes from various sources. Lane and Milesi-Ferretti (2007b, p. 228) take into account the countries’ reported IIP, the World Bank’s Global Development Finance Database and the IMF’s World Economic Outlook (both only for developing countries and emerging markets); the Quarterly External Debt Database by the World Bank and the IMF’s CPIS for portfolio debt; the Bank of International Settlement (BIS) data on a country’s assets and liabilities vis-à-vis reporting Banks; data on foreign assets and liabilities of banks and other banking institutions reported by International Financial Statistics (IFS); and national sources. When extrapolating backwards, the authors use information on the currency composition of debt assets and liabilities to determine the valuation effect. About 100 countries reported IIP data on external debt assets, some of which only started recently. Earlier data are estimated by backwards extrapolation. For the remaining countries, which do not report IIP data, the authors use a combination of the above-mentioned data sources to estimate external debt positions.

Financial derivatives are only reported for very recent periods and only by a few countries. They are included whenever available.

Finally, official reserves data come from the IMF’s International Financial Statistics which include foreign exchange, SDR holdings, the reserve position in the IMF and gold holdings. The authors exclude gold holdings because they do not represent a liability towards another country.

Given the incomplete reporting and the increasing complexity of financial transactions, the data are subject to a large measurement error. Incomplete reporting of IIP and BOP data is an issue especially for Middle East, sub-saharan African countries, and small financial centres. Furthermore, net errors and omissions, i.e. the difference between current account transactions and financial flows, also contribute towards the measurement error. The second source of measurement error is the increasing complexity of financial instruments, company structures, and the
financial markets. Offshore centres raise the level of financial interdependency because they act as an intermediary for financial transaction. When a U.S. company sets up an institution in an offshore centre, then buys U.S. assets through this institution and sells them to a European investor, there will be two transactions recorded: From the U.S. to the offshore centre and from the offshore centre to the European investor. But what actually happened is a single transaction between the U.S. company and the European investor.

4.6 Missing Wealth of Nations

Zucman (2013) uses CPIS, External Wealth of Nations (EWN), and TIC data to estimate the worldwide households’ wealth held in tax havens. In the following, I summarise the construction of the data as described in detail in Zucman’s (2013) online data appendix.

1–2 percent of assets in the CPIS data are not allocated to any country due to confidentiality or because the owner could not be identified. Zucman uses a gravity model to allocate these assets among countries for which no positive claim is reported by a given creditor country. (Zucman 2013, pp. A51-52)

He makes some country-specific adjustments and additions to the CPIS data. The Cayman Islands, for example, did not report mutual fund holdings. Zucman uses predicted U.S. shares and TIC data to infer complete Caymanian holdings. The CPIS data for the Netherlands excludes holdings of special financial institutions which channel funds from non-residents to non-residents. Zucman therefore uses data published by De Nederlandsche Bank, which includes those holdings. Bahrain, Barbados, Gibraltar, India, Latvia, Kuwait, and Mexico did not report IIP data every year. To fill the gaps, Zucman uses a country’s share of total CPIS assets or liabilities in year \( t + 1 \) to impute its holdings in year \( t \). Since China did not participate in the CPIS, Zucman estimates its holdings using extrapolations of existing official Chinese data and from TIC data on U.S. portfolio holdings of Chinese assets and liabilities. For Middle Eastern oil exporters, he also uses TIC data on U.S. portfolio holdings. Other countries which did not participate in the CPIS are covered to a large extent in the EWN data set. Some economies, notably small offshore financial centres, are neither included in the CPIS nor in the
The result of this exercise is a comprehensive matrix of bilateral securities assets and securities liabilities. It comprises 238 countries over 8 years and distinguishes between debt and equity. Hence, it contains $238 \times 238 \times 8 \times 2 = 906,304$ observations. Summing all securities assets (liabilities) of all countries yields a comprehensive figure of total global assets (liabilities). The difference between total global assets and liabilities is the unrecorded wealth. As (Zucman 2013, table A3) shows, about half of it is invested in funds in Luxembourg, the Cayman Islands, and Ireland. These funds, in turn, invest internationally, e.g. in U.S., Japanese, or German securities.

5 The Return on Recorded U.S. Assets and Liabilities

In this section, I calculate the return on U.S. assets and liabilities based on the U.S. official IIP as recorded by the BEA. I present the computation and the issues related with it in section 5.1 and discuss the results in section 5.2 and 5.3.

5.1 Estimation

In order to compute the U.S. return differential, recall that the profit an investor makes on an investment arises either from income streams or capital gains. Capital gains, in turn, are either price changes or exchange rate changes. Thus, the relevant profit on assets or liabilities is given as price changes plus exchange rate changes plus income receipts. Instead of the net notation of section 3, I use gross positions and flows in order to emphasise that I estimate separate figures on the return on assets and the return on liabilities. The difference between these two is the return differential. Also note that, as Gohrband and Howell (2013) do, I use average positions instead of the beginning-of-year positions. I do so in order to account for the fact that investors do not buy assets at the beginning of the year and then wait until the next year but instead buy their assets at various points in time during a
given year. The average asset position in year $t$ is obtained as

$$AVGPOS_t^A = \frac{POS_t^A + POS_{t-1}^A}{2}. \quad (7)$$

and the return on assets (or liabilities) is therefore given as

$$r_t^A = \frac{POS_t^A - POS_{t-1}^A - F_t^A - OC_t^A}{AVGPOS_t^A} + \frac{I_t^A}{AVGPOS_t^A}. \quad (8)$$

The superscript $A$ denotes assets but the relations are entirely symmetric for liabilities. $POS_t^A$ denotes the asset position at the end of year $t$, $F_t^A$ are financial flows—i.e. transactions—of assets during year $t$, and $I_t^A$ denotes gross income received on assets (or paid to liabilities, respectively) during year $t$.

Since $POS_t^A - POS_{t-1}^A = F_t^A + PC_t^A + XRC_t^A + OC_t^A$, equation (8) can be rewritten as

$$r_t^A = \frac{PC_t^A + XRC_t^A}{AVGPOS_t^A} + \frac{I_t^A}{AVGPOS_t^A}, \quad (9)$$

I use the data set published by BEA officials Gohrband and Howell (2013, table 8.7) which contains seven variables each for assets and for liabilities: The IIP position at the beginning of the year, financial flows, price changes, exchange rate changes, other changes, the IIP position at the end of the year, and income streams. I compute returns on assets and liabilities for four different categories: FDI, equity, debt and other investment. Other investment is a residual category which includes all instruments not covered in FDI, equity or debt, such as trade credit and loans. Each category is subdivided into a yield and a capital gains component. The yield component captures income receipts or payments such as dividend and interest payments. Capital gains reflect price changes or exchange rate changes. The sum of yield and capital gain equals the overall return of an individual category. The difference between the return on assets and the return on liabilities is the return differential. In the ‘total’ category, the return is calculated as the total income, price changes and exchange rate changes of assets (liabilities) divided by the total amount of assets (liabilities). It is, however, not equal to the weighted average of the individual categories’ returns. To see why, consider equation (10) which uses the computation of the average yield of assets and liabilities.
as an example. The same concept holds for the total return and its subcomponents as well.

\[
\bar{y}_{TOT}^{\text{TOT}} = \frac{1}{T} \sum_{t} \left( \sum_{c} I_{t}^{c} \cdot \frac{1}{AVGPOS_{t}} \right)
\]

\[
\neq \sum_{c} \left( \frac{1}{T} \sum_{t} \frac{AVGPOS_{t}^{c}}{\sum_{c} AVGPOS_{t}^{c}} \cdot \frac{1}{T} \sum_{t} \frac{I_{t}^{c}}{AVGPOS_{t}^{c}} \right)
\]

where \( c \in \{F, D, E, O\} \) – for [FDI] debt, equity, and other investment, respectively. Instead, the weights would have to be applied before taking the average over all periods. Thus,

\[
\bar{y}_{TOT}^{\text{TOT}} = \frac{1}{T} \sum_{t} \left( \sum_{c} I_{t}^{c} \cdot \frac{1}{AVGPOS_{t}^{c}} \right)
\]

\[
= \frac{1}{T} \sum_{t} \frac{AVGPOS_{t}^{c}}{\sum_{c} AVGPOS_{t}^{c}} \cdot \frac{I_{t}^{c}}{AVGPOS_{t}^{c}}
\]

I also split the overall returns and return differentials into a return effect component and a composition effect component. The return effect component indicates how much of return differential arises from excess return within each category. A positive return effect means that, on average, U.S. investments abroad outperformed foreign investments in the U.S. within each category. The composition effect component shows how much of the return differential arises from the different composition of U.S. assets and liabilities. A positive composition effect indicates that U.S. assets are weighted towards more performant categories relative to U.S. liabilities.

In order to obtain an estimate for the return and composition effect, I decompose the return differential as described in Gourinchas and Rey (2007, pp. 26-28). Let \( r_{t}^{Ac} \) denote the return on assets in category \( c \) in year \( t \), and \( w_{t}^{Ac} \) the weight of assets in category \( c \) relative to the total asset position in year \( t \). That is, \( w_{t}^{Ac} = \frac{AVGPOS_{t}^{Ac}}{\sum_{c} AVGPOS_{t}^{Ac}} \). For liabilities \( L \), the notation is entirely symmetric. The return on assets or liabilities can thus be decomposed into the
weighted sum of returns within each category:

\[ r_{t}^{ATOT} = w_{t}^{AF} r_{t}^{AF} + w_{t}^{AD} r_{t}^{AD} + w_{t}^{AE} r_{t}^{AE} + w_{t}^{AO} r_{t}^{AO} \]

\[ r_{t}^{LTOT} = w_{t}^{LF} r_{t}^{LF} + w_{t}^{LD} r_{t}^{LD} + w_{t}^{LE} r_{t}^{LE} + w_{t}^{LO} r_{t}^{LO} \]  

(12)

The return differential can then be expressed as

\[
E[r_{t}^{A} - r_{t}^{L}] = E[\tilde{w}_{t}^{F}(r_{t}^{AF} - r_{t}^{LF})] + E[\tilde{w}_{t}^{D}(r_{t}^{AD} - r_{t}^{LD})] + E[\tilde{w}_{t}^{E}(r_{t}^{AE} - r_{t}^{LE})] \\
+ E[\tilde{w}_{t}^{O}(r_{t}^{AO} - r_{t}^{LO})] + E[(w_{t}^{AF} - w_{t}^{LF})(\tilde{r}_{t}^{F} - \tilde{r}_{t}^{O})]  \\
+ E[(w_{t}^{AD} - w_{t}^{LD})(\tilde{r}_{t}^{D} - \tilde{r}_{t}^{O})] + E[(w_{t}^{AE} - w_{t}^{LE})(\tilde{r}_{t}^{E} - \tilde{r}_{t}^{O})].
\]  

(13)

where \( \tilde{w}_{t} = (w^{Ac} + w^{Lc})/2 \) and \( \tilde{r}_{t} = (r^{Ac} + r^{Lc})/2 \). The sum of the first four terms is the return effect, i.e. the excess return of assets over liabilities within each class. The sum of the last three terms is the composition effect, i.e. the part of the overall return differential which is due to different weights to individual categories.

Table 1 shows the average returns on assets and liabilities, and average return differentials for the period 1989 to 2009, the full length of the Gohrband and Howell (2013) data set. They are subdivided by category and each category is further broken up into a yield and a capital gains component. Capital gains, in turn, are decomposed into price changes and exchange rate changes. Additionally, I list the return effect and the composition effect for the overall return differential and its subcomponents.

Overall, I find a return differential of 1.67 percent of which 1.22 percent stem from the yield differential and 0.45 percent from the capital gains differential. Remarkably, the FDI yield differential is relatively high at 4.85 percent, while the remaining yield and capital gains differentials range between −1 and +1 percent. Note that exchange rate changes on liabilities are close to zero in every category because most U.S. liabilities are denoted in U.S. dollars. The decomposition into a return effect and a composition effect confirms this finding. 1.50 percentage points of the 1.67 percent differential stem from within-category differences in return and only 0.17 percentage points from different category weights. Within the return effect, yield is the driving force with 1.68 percent whereas capital gains are even negative. Most of the composition effect arises from differences in price changes.
while the yield component is negative.

Since Zucman’s (2013) data only range from 2001 to 2008, I also compute return differentials specifically for the sub-period 2002–2008 for comparison reasons. Note that even though Zucman’s (2013) data set starts in 2001, it is not possible to compute returns for 2001, because it only provides data for the end of each year. To obtain a return figure, however, the position at the beginning of the period is necessary as well. The sub-period return estimates are shown in Table 2.

The overall return differential increases to 3.41 percent, with 1.38 percent arising from the yield differential and 2.03 percent from the capital gains differential. The gross return on assets and liabilities is significantly smaller for the sub-period from 2002 to 2008. During 1989 and 2009, the return on assets (liabilities) was 7.43 (5.76) percent while it was 4.73 (3.35) percent in the sub-period. The low values during the recessions in the early 2000s and 2008 strongly reduce the return on assets and liabilities because they now have a relatively higher weight. The return effect reaches 3.97 percent whereas the composition effects turns negative at -0.56 percent. The increase in the return effect stems almost exclusively from higher capital gains which rise from -0.18 to +2.30 while the yield component remains nearly unchanged. The change in the composition effect also arises predominantly from changes capital gains which fell from +0.63 to -0.27 percent. Generally speaking, the 2000s seem to be a period where, relative to the 1990s, capital gains were strongly in favour of U.S. investors abroad, especially for FDI and equity. In other words, foreign assets outperformed U.S. assets which is positive for U.S. investors who borrow at home and invest abroad.

To get a clearer picture of the evolution of the return differential, consider figure 1(a). The fluctuations in the return differential arise almost exclusively from movements in the capital gains differential while the yield differential remains steady between 0.74 and 1.75 percent. Until 2002, the return differential ranged between -4.29 and +4.71 percent with the only exception being 1993 where it reached 11.30 percent. Yet in 2003, it started to increase and stayed between 7.20 and 9.55 percent until 2007. In the light of the crisis, the return differential dropped to -17.89 percent but recovered to 12.22 percent in 2009. These strong fluctuations show that the time frame of the analysis of the return differential is crucial to the results. Forbes’ (2010, table 1) result of a return differential of
<table>
<thead>
<tr>
<th>Category</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
<th>Return Effect</th>
<th>Comp. Effect</th>
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Table 1: Percentage returns on reported U.S. assets and liabilities, 1989–2009
Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7)
<table>
<thead>
<tr>
<th>Category</th>
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<tr>
<td>Exchange rate changes</td>
<td>0.46</td>
<td>0.23</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Percentage returns on reported U.S. assets and liabilities, 2002–2008

Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7)
6.9 percent becomes less surprising considering that her timeframe, 2002–2006, includes only positive annual return differentials. Had she included one more year before or after her timeframe, the results would have been drastically different.

Figure 1(b) shows the return differentials by category. FDI and equity return differentials fluctuate the most whereas debt and other investment return differentials are more stable. Panel (c) of figure 1 describes the yield differential by category. Over the entire sample period, the U.S. are able to generate substantially higher FDI yields abroad than foreigners do in the U.S. The FDI yield differential consistently ranges between 3 and 8 percent, whereas yields on the remaining categories mostly stay between -1 and +2 percent. Figure 1(d) presents the capital gains component by category. The equity return differential exhibits the most fluctuation, closely followed by FDI. Both were substantially negative in the 1990s and then turned positive in the mid-2000s. Finally, panel (e) decomposes the return differential into a return effect and a composition effect. The return effect shows much variation while the composition effect stays relatively constant which indicates that the allocation across categories and category-specific returns remains similar across time.

5.2 The Importance of FDI Yields

As discussed in section 5.1 the return differential is mainly driven by direct investment yields. But why are U.S. direct investments abroad so much more lucrative than foreign direct investments in the U.S.? Part of the difference can be explained by disparate taxation and part of it by differing risk and age structures. This subsection presents an overview of these three factors and their magnitude.

U.S. direct investment abroad (USDIA) and foreign direct investment in the U.S. (FDIUS) are treated differently with respect to taxes. In the U.S. balance of payments, USDIA is recorded net of foreign taxes but not net of U.S. taxes. FDIUS, on the contrary, is net of all taxes. U.S. parent firms receive a tax credit against their U.S. tax liability when their affiliates pay taxes to foreign states. If taxes were equally high in the U.S. and abroad, the tax credit would compensate the tax burden of the U.S. parent against the U.S. tax authority. However, since U.S. tax rates tend to be somewhat higher than foreign tax rates, the parent firms
(a) Total yield differential vs. total capital gains differential

(b) Total return differential by category

(c) Yield differential by category

(d) Capital gains differential by category

(e) Return vs. composition effect

Figure 1: The Evolution of the U.S. Return Differential Over Time
Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7)
still have to pay the difference. This difference is not captured in the BOP and therefore the BOP figures of after-tax earnings of FDIUS are too high. (Hines 1996 pp. 662-663)

Curcuru and Thomas (2015, pp. 217-218, table 7.2) estimate an FDI yield differential of 5.6 percent over the period 1983–2010. Accounting for the tax difference on repatriated earnings reduces their differential by 0.8 percentage points. But not all earnings are repatriated immediately. Firms have an incentive to defer repatriation in order to postpone the tax burden. Including all earnings that were made but not yet repatriated reduces the differential by an additional percentage point. Depending on how much of the earnings will be repatriated, tax disparities lower the FDI yield differential by 0.8 to 1.8 percent.

Furthermore, Curcuru and Thomas (2015, pp. 219-220, table 7.2) estimate how much of the yield differential arises from differences in risk. They compute average credit default swaps spreads on sovereign debt and average spreads on corporate debt for the U.S. and foreign countries. These spreads are an indicator of how much additional return is required for U.S. investors to invest abroad rather than in the U.S. The average spread is 0.9 percent over the period from 1983–2010. Thus, they argue, 0.9 percentage points of the 5.6 percent FDI yield differential arise from the risk premium.

An additional difference between FDIUS and USDIA is the age of the affiliates. U.S. affiliates abroad tend to be older than foreign affiliates in the U.S. Older affiliates have already written off high start-up expenses, acquired more experience, and may often borrow at lower rates. For young affiliates, however, these factors diminish earnings and hence the associated yield. Curcuru and Thomas (2015, pp. 222-223, table 7.2) estimate that the age difference accounts for 1.5 percentage points.

Together, taxes, risk, and age account for 3.2 to 4.2 percentage points of the 5.6 percent FDI yield differential of Curcuru and Thomas (2015 pp. 217-218, table 7.2), depending on how much of the earnings will eventually be repatriated. Curcuru et al. (2013, pp. 19) recapitulate that other factors such as transfer-pricing, industry effects, and intangibles are found to have less impact on the yield differential. Transfer pricing is the favourable inter-firm pricing of goods and services. Industry effects relate to the different composition of USDIA and FDIUS.
i.e. affiliates operate in different industries and might be exposed to different risk. Finally, U.S. affiliates abroad are often said to have a larger stock of intangibles which is not included in the BOP. Excluding them biases the yield as a fraction of the direct investment value upwards. Yet, these factors play a minor role.

The important take-away of this exercise is that a large part of the FDI yield differential can be explained by factors which are not related to an exorbitant privilege. Nevertheless, these factors are not statistical oddities (with exception to the tax treatment issue) but real advantages stemming from economic aspects.

5.3 Is there an Exorbitant Privilege?

A return differential of 1.67 percent is not as large as many previous studies suggested, but it is certainly not negligible. However, this differential stems predominantly from differences in the yields of direct investment. To a large extent, these differences can be explained by disparities in tax treatment, risk, and age instead of factors related to an exorbitant privilege.

In the exorbitant privilege view, a more important asset class is debt. The U.S. is said to be able to borrow at lower rates because of the U.S. dollar’s distinctive position in the global financial system, which grants the U.S. a liquidity discount on its debt. From 1989 to 2009, I find a return differential of 1.02 percent in this category of which 0.62 percent arise from a yield differential. A positive debt yield differential indicates that the U.S. has on average been able to borrow at lower rates than it was able to lend. 0.62 percent is small but a simple OLS regression of the debt yield differential over time on a constant shows that the constant (i.e. the average debt yield differential) is significantly different from zero at the one percent level. Nevertheless, the result has to be taken with care since the sample only spans 21 years. The next sections show, however, that once unrecorded assets held by U.S. residents as well as an issue with the averaging method are taken into account, the U.S. return differential is substantially smaller.
6 The Return on Unrecorded Wealth

So far, the estimates of returns have only included recorded assets. In this section, I augment the estimates to include unrecorded assets as well. Zucman (2013) estimates the global unrecorded household portfolio wealth as the difference between global cross-border securities assets and liabilities. Global liabilities are relatively easy to measure because there is no incentive for households and firms to conceal liabilities from tax authorities. If anything, reporting liabilities reduces the tax burden of the debtor. Thus, the reported amount of liabilities should reflect the true amount of liabilities. The case is different for assets. Investors holding assets have an incentive not to report their assets in order to reduce their tax burden. Therefore, by computing a return on recorded assets, one only looks at a subset, or sample, of all assets. If unrecorded assets have the same return as recorded assets, the sample are representative of the whole population of assets and the return differential would be unbiased. If not, the return differential estimates based on reported assets are biased. They are too low if unrecorded assets generate higher returns than recorded ones and too high if unrecorded assets perform worse than recorded ones.

In theory, since the total amount of cross-border assets has to be equal to the total amount of cross-border liabilities on a global scale, the difference between reported assets and reported liabilities equals the unrecorded wealth. The difficulty lies in constructing consistent figures of countries’ recorded assets and liabilities. There is no universally ‘correct’ way of reporting the IIP upon which all countries have agreed. Instead, countries use different IIP reporting methodologies, some report it short of detail, and some do not report their IIP at all. Zucman (2013) accounts for these data issues step by step and arrives at an estimate of bilateral holdings of securities for each country. Then he imputes country i’s assets by aggregating the liabilities of all countries j ≠ i vis-à-vis country i. The difference between imputed assets and reported assets should, in principle, equal the amount of unrecorded assets of a country. But this approach does not take into account the existence of countries with strict bank secrecy rules like Switzerland, the Bahamas or Singapore.

As Zucman’s (2013, pp. 1330-1331) data set about Swiss banks reveals, a typ-
ical case of tax evasion in Europe is a French investor buying Luxembourg fund shares through a Swiss bank account. These funds in turn invest in other countries. The reason for the investor’s detour is that Luxembourg does not withhold taxes on cross-border income and Swiss banks do not report the income to foreign authorities. Suppose, for example, that the French investor buys shares of a fund which invests in the U.S. The fund acts only as intermediary and U.S. authorities know who holds its shares, i.e. a Swiss bank or one of its clients in this example. But the Swiss bank does not reveal the ultimate owner of these fund shares (the French investor) and thus the U.S. treats them as if they were liabilities towards Switzerland. However, Switzerland does not record them as assets since the Swiss bank knows that it belongs to a French investor. But French authorities do not know about the French investor holding U.S. assets which is why the French foreign asset position is too low. In summary, the U.S. records a liability towards Switzerland, but neither Switzerland nor France record a U.S. asset. France’s imputed asset position which is obtained by summing all countries’ liabilities towards France, is therefore too low while Switzerland’s imputed asset position is too large. On a global scale, however, these differences cancel out.

Once the overall amount of missing assets is known, we need to determine the return on these assets. Section 6.1 discusses this process in detail. Section 6.2 then adjusts the U.S. return differential to account for missing assets.

6.1 The Return on Global Missing Wealth

There are two possibilities to estimate the return on the unrecorded wealth. The first is to use reference indices of stock and bond price changes and yields. As Zucman (2013, pp. A55-56, tables A3, A13, A14) shows, we have a good understanding of where the missing wealth is invested. About half of it has been invested in mutual funds incorporated in Luxembourg, Ireland and the Cayman Islands. The second half is dispersed across other small offshore financial centres and some industrial countries like the U.S., the UK, Australia, France, Spain, Russia etc. Thus it would, in principle, be possible to impute price changes, exchange rate changes, and yields one these securities by using appropriate indices, which track the respective economies.
In this thesis, I focus on the second possibility: The global current account and the global financial account. Not only is there a discrepancy in asset and liability stocks but also in transactions and income receipts & payments. From the global current account it becomes apparent that more income is paid than received each year. Again, there is little incentive for debtors to conceal income payments since they reduce their tax burden whereas reporting income receipts increases it.

Dividing the income discrepancy of portfolio holdings by the total estimate of unrecorded portfolio wealth produces an estimate of the yield on the unrecorded portfolio wealth $\Omega$.

$$y_t^{\Omega} = \frac{I_t^L - I_t^A}{AVGPOS_t^L - AVGPOS_t^A}$$ (14)

Unfortunately, the IMF only reports a decomposition into FDI and portfolio income but not into equity- and debt-related flows. Therefore, I aggregate debt, equity, and other investment into a ‘portfolio’—or ‘securities’—category to which I then apply the adjustments in the remainder of this section. The returns on assets and liabilities within the aggregate securities category are shown in table 3. They are based on the officially reported data as found in Gohrband and Howell (2013, table 8.7). Remember that the returns are not weighted averages of the individual category returns, because the aggregation of the categories happens before averaging over the time periods (see equation 10).

The next step is to adjust the return estimates to reflect the return on unrecorded portfolio assets. Table 4 shows the computation of the yield on unrecorded assets for each year from 2002 to 2008. I again use average asset and liability

<table>
<thead>
<tr>
<th>Debt, Equity, and Other Investment</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>3.24</td>
<td>3.26</td>
<td>-0.03</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>2.28</td>
<td>-0.05</td>
<td>2.33</td>
</tr>
<tr>
<td>Price changes</td>
<td>0.87</td>
<td>-0.29</td>
<td>1.16</td>
</tr>
<tr>
<td>Exchange rate changes</td>
<td>1.41</td>
<td>0.24</td>
<td>1.17</td>
</tr>
</tbody>
</table>

Table 3: Percentage Returns on Aggregated Reported Debt, Equity and Other U.S. Assets and Liabilities, 2002–2008

Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7)
positions for each year which is why I have no estimate for 2001. The first set of three columns shows the average stock of global asset and liability positions and their difference (gap) for each year. The second set of three columns presents reported income received on assets, payments made to liabilities, and the difference between these two. The last column reports the yield on unrecorded assets which is obtained by dividing the income gap by the stock gap as shown in equation 14. The average yield of unrecorded securities assets over this period is 3.71 percent.

Now that I have an estimate for the yield on the missing wealth I turn to the capital gains component. The world financial account in the IMF balance of payments reports global transactions of assets and liabilities. The difference between asset and liability transactions equals the net acquisition of assets. On a global scale, total transactions should in principle cancel out since every inflow of assets into one country (i.e. borrowing) is associated with an outflow of assets from another country (i.e. lending) of equal amount. In other words, the world as a whole should not amass more assets than liabilities or vice versa.

Using end-of-year positions would produce one more yield observation (for 2001) but the average yield would change only very slightly to 3.77 percent. For consistency reasons, I continue to use the average position.
Yet, the world financial account shows that more liabilities than assets are acquired. Once again, this anomaly is related to offshore financial centres. Suppose a resident invests in an asset through her offshore bank account. The recipient of the invested money (i.e. the debtor) duly reports his new liability. But due to the strict bank secrecy, statisticians miss the asset held in the secret bank account. The global amount of recorded liabilities increases while the global amount of recorded assets does not. Put differently, it appears as if the world acquired a new liability.

If all transactions which serve the purpose of hiding assets from tax authorities impacted on the world balance of payments and investment position in such a way, the difference between asset and liability transactions would be the amount of newly acquired offshore assets. Capital gains on the missing wealth could then simply be computed as

\[ VAL^\Omega_t = \frac{\Omega_t - \Omega_{t-1}}{AVGPOS_t} - F_t^\Omega - OC_t^\Omega \]  

where \( \Omega_t \) denotes global missing assets.

However, there are two caveats with this approach: On the one hand, \( OC_t^\Omega \) are unavailable, and on the other hand, flows are unlikely to reflect the true change in unrecorded assets arising from transactions. In the following, I discuss these two issues in more detail. First, there is no reconciliation of the world balance of payments and the world international investment position which breaks down the changes into transactions, price changes, exchange rate changes and other changes. With no global figure for \( OC_t^\Omega \), the valuation change in equation 15 becomes a first-wave estimate and is therefore expected to be biased. The unavailable breakdown also means that valuation changes can not be computed as the sum of price changes and exchange rate changes. Using equation 15 and assuming \( OC_t^\Omega = 0 \), the average valuation change between 2002 and 2008 is -12.63 percent. That is, the missing wealth depreciated by a substantial amount each year during this time period. Table 5 reports the capital gains for each individual year.

The second caveat is that the flows figure is likely biased. Flows which involve offshore financial centres may have differing effects on flows in international statistics. Some impact the flows figure, some do not. Hence the net flows of assets
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Wealth</th>
<th>Missing Flows</th>
<th>Capital Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2,532</td>
<td>238</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>2,392</td>
<td>402</td>
<td>-22.02 %</td>
</tr>
<tr>
<td>2003</td>
<td>2,858</td>
<td>607</td>
<td>-5.38 %</td>
</tr>
<tr>
<td>2004</td>
<td>3,316</td>
<td>717</td>
<td>-8.39 %</td>
</tr>
<tr>
<td>2005</td>
<td>3,676</td>
<td>448</td>
<td>-2.52 %</td>
</tr>
<tr>
<td>2006</td>
<td>3,760</td>
<td>547</td>
<td>-12.45 %</td>
</tr>
<tr>
<td>2007</td>
<td>5,131</td>
<td>1,234</td>
<td>3.07 %</td>
</tr>
<tr>
<td>2008</td>
<td>4,490</td>
<td>1,318</td>
<td>-40.72 %</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td>-12.63 %</td>
</tr>
</tbody>
</table>

Table 5: Missing Global Portfolio Wealth, Flows, and Capital Gains

Average positions, billions of current USD. Source: IMF (2015a), Zucman (2013, table A3)

and liabilities in the balance of payments do not necessarily report flows involving only missing securities but may well include flows of other securities. In order to better understand the mechanisms of transactions serving tax evasion purposes, Zucman (2013, pp. A63–A74) covers five exemplary cases of transfers of funds to tax havens which I summarise below.

**U.S. residents carrying banknotes, gold, or diamonds to Switzerland**

This transfer goes completely unrecorded by Switzerland as well as by the U.S. Although such assets do not yield any income, they are nevertheless subject to capital gains and losses and should therefore be included in the computation of the return. But since they are not included in the balance of payments, flows are biased downwards. If the funds are legally earned, U.S. statisticians record a “statistical discrepancy” in the national account but if they are illegally earned, even the national account misses the transfer. (Zucman 2013, pp. A63–A64)
U.S. residents making wire transfers to their Bahamian accounts

Suppose a U.S. resident transfers a fund from her Citi bank account in New York to an account at a Bahamian bank which does not have an account at the Fed but uses JPMorgan Chase & Co. (JPMC) as its correspondent in the U.S. In principle, this transfer should be recorded in the U.S. balance of payments as an “other investment credit” because the interbank assets of the U.S. vis-à-vis the Bahamas decrease, and an “other investment debit” because the U.S. resident gains a claim on the Bahamian bank. However, the debit will not be recorded unless the U.S. resident reports the transaction.

The reason for this is as follows. In order to transfer the fund to the Bahamian bank, Citi wires it to JPMC for the benefit of the Bahamian bank. Citi does no longer have a claim on the Fed and a liability to the U.S. resident. JPMC receives a claim on the Fed and a liability to the Bahamian bank. The Bahamian bank now has a new claim on JPMC and a new liability to the U.S. resident. The decrease of JPMC’s net assets on foreign banks is recorded by the U.S. but the increase of the U.S. resident’s cross-border claims is not. (Zucman 2013, pp. A64–A66)

Trade mis-invoicing

Take for example an importer in a country with strict capital controls such as China who wants to send funds to Switzerland. The Chinese firm may only transfer money to foreign banks to pay the imports. However, the Chinese importer can overpay its Swiss trade partner who then transfers the excess payments to a Swiss bank account for the benefit of the Chinese importer. If Chinese statisticians use the importer’s bill to infer the value, there will be no discrepancy; the value of imports matches the amount of money outflows, both are biased upward. Otherwise, there will be negative “errors and omissions” in China’s balance of payments. The same principle applies to a French resident who sets up a sham corporation issuing bills for fictitious services. The French residents pays these bills (essentially to himself) in order to transfer funds into a Swiss bank account. (Zucman 2013, pp. A66–A67)
London traders buying Irish assets through Jersey accounts
Assume that the transaction from the London trader’s UK bank account to her Jersey bank account has been fully recorded by UK statisticians (the Bank of International Settlement records Jersey bank accounts). Now suppose she invests the money in the Jersey bank account in Irish mutual fund shares. Since Jersey does not reporting such transactions, neither the UK balance of payments nor the UK IIP capture the investment. Ireland, however, records a liability to a Jersey bank account. Jersey correctly records nothing. (Zucman 2013, pp. A67–A69)

French investors transferring portfolio securities to Swiss custodians
A French investor may not only transfer bank deposits to offshore banks but also portfolio assets. French statisticians compute portfolio flows as the change of the portfolio stock minus valuation changes. If they are able to capture the transfer, they record a negative ‘other change’. If the transfer goes unnoticed, it incorrectly appears to be a sale of assets. The portfolio stock corrected for valuation effects has decreased hence the transfer is recorded as a sale of portfolio assets. Again, if the investor does not report the new claim on the offshore bank, it will not be recorded in the French statistics. It follows that France’s (and hence the world’s) net foreign asset position decrease. (Zucman 2013, p. A69)

6.2 Adjusting the U.S. Return on Assets
After having obtained an estimate of the return of the unrecorded wealth, the next step is to allocate an appropriate portion of the global portfolio stock and income gaps to the U.S. Ideally, we would know how much the U.S. contributes to the global missing wealth, i.e. how much unrecorded assets U.S. investors hold. This could, in principle, be calculated as the sum of all other countries’ liabilities towards the U.S. minus U.S. resident’s reported claims vis-à-vis foreigners. But while U.S. reported claims are well-known from the IIP or the IMF’s Coordinated Portfolio Investment Survey, the sum of all other countries’ liabilities towards the U.S. is not part of either of those. Therefore, I assign various shares of the offshore wealth to the U.S., ranging from 0 percent to 75 percent.

Before doing so, it is important to notice that a part of the missing wealth
Table 6: Missing Portfolio Wealth Invested in the U.S.


<table>
<thead>
<tr>
<th>Year</th>
<th>Total Missing Wealth</th>
<th>Invested in the U.S.</th>
<th>Not Invested in U.S.</th>
<th>Share of Invested in U.S. Over Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2,532</td>
<td>509</td>
<td>2,023</td>
<td>20%</td>
</tr>
<tr>
<td>2002</td>
<td>2,392</td>
<td>401</td>
<td>1,991</td>
<td>17%</td>
</tr>
<tr>
<td>2003</td>
<td>2,858</td>
<td>495</td>
<td>2,363</td>
<td>17%</td>
</tr>
<tr>
<td>2004</td>
<td>3,316</td>
<td>539</td>
<td>2,777</td>
<td>16%</td>
</tr>
<tr>
<td>2005</td>
<td>3,676</td>
<td>492</td>
<td>3,184</td>
<td>13%</td>
</tr>
<tr>
<td>2006</td>
<td>3,760</td>
<td>354</td>
<td>3,406</td>
<td>9%</td>
</tr>
<tr>
<td>2007</td>
<td>5,131</td>
<td>264</td>
<td>4,867</td>
<td>5%</td>
</tr>
<tr>
<td>2008</td>
<td>4,490</td>
<td>210</td>
<td>4,280</td>
<td>5%</td>
</tr>
</tbody>
</table>

is invested in the U.S. For any given amount of unrecorded wealth held by U.S. residents, it is necessary to subtract the amount of wealth that is reinvested in the U.S. Investments made by U.S. residents in U.S. securities classify as domestic investment and should not appear in the U.S. foreign asset and liability position. The amount of unrecorded wealth invested in the U.S. is simply the U.S. liabilities to foreigners minus foreigner’s claims on the U.S. Table 6 shows the total unrecorded wealth, how much of it is invested in the U.S., and the difference between these two, i.e. the amount of unrecorded wealth invested in countries other than the U.S.

I assume that the U.S. residents’ portion in the missing wealth is representative of the entire missing wealth. The adjusted U.S. gross foreign asset position $\hat{A}_t^{US}$ is then simply

$$
\hat{A}_t^{US} = A_t^{US} + s_t \Omega_t^{ExUS}
$$

(16)

where $A_t^{US}$ is the official U.S. gross foreign asset position, $\Omega_t^{ExUS}$ denotes the amount of missing wealth which is not invested in the U.S., and $s$ is the share of global missing wealth held by U.S. residents. Since global current account data do not allow for a decomposition of the U.S. share in missing flows and missing

37
income, I adjust them in an analogous way:

\[
\hat{F}_{t}^{US} = F_{t}^{US} + s_t \frac{\Omega_t^{ExUS}}{\Omega_t} F_{t}^{\Omega} \\
\hat{I}_{t}^{US} = I_{t}^{US} + s_t \frac{\Omega_t^{ExUS}}{\Omega_t} I_{t}^{\Omega}
\]

(17)

(18)

\(F_{t}^{\Omega}\) and \(I_{t}^{\Omega}\) denote flows and income of missing wealth respectively.

The four asset columns in table 7 report the such-adjusted rates of return, yield and capital gains on U.S. securities assets abroad from 2002 to 2008, for various values of \(s\). For instance, \(s = 0.25\) corresponds to the assumption that 25 percent of the global missing wealth are held by U.S. residents. For \(s = 0\), the rates are equal to the unadjusted ones presented in table 3. The more of the missing wealth is assigned to U.S. residents, the more the overall return on their cross-border assets declines. For example, if \(s = 0.25\), the return on U.S. securities assets abroad equals 4.40 percent. The driving force behind the decrease is the negative valuation component. Not very surprisingly, an average capital loss of \(-12\) percent has a substantial impact, even if the assigned share is low. However, as mentioned in section 6.1, there are many uncertainties associated with the capital gains of the missing wealth, not to mention the short timespan of the data set. In contrast, the more reliable yield component remains nearly unchanged. Even assigning 75 percent of the global missing wealth to U.S. residents only raises the yield from 3.24 percent to 3.47 percent. This is because the average yield of the global missing wealth is 3.71 percent which is very close to the yield of U.S. residents’ yield of recorded assets abroad.

As a reminder, the liabilities column in table 7 reports the unadjusted return, yield and capital gains on recorded U.S. liabilities held by foreigners. They are not adjusted by any share because debtors have an incentive to fully report their liabilities. Thus, the return on liabilities should not be biased.

The last four columns show the adjusted differentials for various shares \(s\). The return differential for a given share \(s\) is obtained by subtracting the return on liabilities from the return on assets adjusted by \(s\). Yield and capital gains differentials are obtained in an analogous way. The main result is that the return differential estimate for debt, equity, and other investment using official data is
likely to be too high for the period 2002 to 2008 because it does not take into account the substantial capital losses of unrecorded securities held by U.S. residents. Assuming that they own 25 percent of global unrecorded securities reduces the return differential from 2.30 percent to 1.33 percent. It falls to 0.50 percent if half of the global unrecorded securities is held by U.S. residents. As discussed before, the decrease stems exclusively from the lower valuation component. The yield differential, by contrast, turns positive but only by a few basis points, not nearly enough to compensate the capital losses.

Having discussed how U.S. residents’ return on cross-border assets changes depending on which share of the missing wealth is assigned to the U.S., the question remains how much unrecorded assets U.S. residents really hold. As mentioned at the beginning of this section, the ideal solution would be to subtract U.S. residents’ claims on foreigners from foreigners’ liabilities to U.S. residents. To my knowledge, however, a global decomposition of liabilities by creditor is not available. If it were, we would have a clearer understanding of the distribution of owners of the missing wealth. The main hurdle here is the statistical coverage. Clearly, creditors know exactly which securities they hold, e.g. a UK government bond. In contrast, issuers of securities do not necessarily have knowledge about the identity of the buyer. This is the case if an investor holds a security through a custodian. The issuer only sees the custodian but not the ultimate owner of the security. Furthermore, after the initial issuance, subsequent transactions between investors are often not recorded. For these reasons, the [IMF](https://www.imf.org) focuses on the assets side in its [CPIS](https://www.imf.org), on
<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>Global</th>
<th>U.S. Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>4,616</td>
<td>13,741</td>
<td>34 %</td>
</tr>
<tr>
<td>2002</td>
<td>4,782</td>
<td>15,362</td>
<td>31 %</td>
</tr>
<tr>
<td>2003</td>
<td>5,584</td>
<td>20,780</td>
<td>27 %</td>
</tr>
<tr>
<td>2004</td>
<td>6,842</td>
<td>25,634</td>
<td>27 %</td>
</tr>
<tr>
<td>2005</td>
<td>8,120</td>
<td>28,723</td>
<td>28 %</td>
</tr>
<tr>
<td>2006</td>
<td>10,241</td>
<td>36,972</td>
<td>28 %</td>
</tr>
<tr>
<td>2007</td>
<td>12,228</td>
<td>44,170</td>
<td>28 %</td>
</tr>
<tr>
<td>2008</td>
<td>9,375</td>
<td>35,607</td>
<td>26 %</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td><strong>29 %</strong></td>
</tr>
</tbody>
</table>

Table 8: U.S. and Global Cross-Border Securities Assets, 2001–2008

Billions of current USD, Source: Gohrband and Howell (2013, table 8.7), Zucman (2013, table A3)

which a large part of the data in this thesis are based. (IMF 2002, p. 2)

In order to obtain an estimate of the U.S. share in the global missing securities, I make the assumption that, on average, all investors conceal a certain percentage of their portfolio wealth and that this percentage is the same across countries. The share of U.S. residents’ recorded securities assets in global recorded securities assets is then equal to the U.S. unrecorded portfolio wealth. Table 6 shows that this share is between 26 and 34 percent. I use the individual annual shares for the adjustment of the returns, as shown in equations 16–18. The results are presented in table 9. Note that the adjusted returns do not necessarily have to lie between the 25 percent and the 50 percent adjustment in table 7 because table 7 assumes constant shares, while table 9 uses a time-varying share.

The total return in assets falls from 5.80 percent to 4.81 percent. As before, the decrease is again driven by the capital gains component which declines by about one percentage point whereas yield remains nearly unchanged. The slight decrease in yield stems from the now larger weight of debt, equity, and other investment relative to FDI. As discussed in section 5, the FDI yield differential is particularly high while debt, equity, and other investment yields are relatively low. The return, yield and capital gains of FDI have not been subject to adjustment and remain

40
<table>
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<tr>
<th></th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>4.81</td>
<td>2.39</td>
<td>2.43</td>
</tr>
<tr>
<td>Yield</td>
<td>4.70</td>
<td>3.35</td>
<td>1.35</td>
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<tr>
<td>Capital Gains</td>
<td>0.11</td>
<td>-0.96</td>
<td>1.07</td>
</tr>
<tr>
<td><strong>FDI</strong></td>
<td>5.96</td>
<td>-1.08</td>
<td>7.04</td>
</tr>
<tr>
<td>Yield</td>
<td>8.06</td>
<td>3.69</td>
<td>4.37</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>-2.10</td>
<td>-4.77</td>
<td>2.67</td>
</tr>
<tr>
<td><strong>Debt, Equity, and Other Investment</strong></td>
<td>4.13</td>
<td>3.21</td>
<td>0.91</td>
</tr>
<tr>
<td>Yield</td>
<td>3.33</td>
<td>3.26</td>
<td>0.07</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>0.80</td>
<td>-0.05</td>
<td>0.84</td>
</tr>
</tbody>
</table>


Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7), IMF (2015a) and Zucman (2013)

unchanged. The return on debt, equity, and other investment decreases from 5.51 percent to 4.13 percent. As before, yield increases only by a small amount while capital gains drop by about 1.5 percentage points to 0.80 percent.

Since liabilities remain unaffected, these changes translate directly into the return differential. The overall return differential decreases from 3.41 percent to 2.43 percent, the yield differential slightly decreases from 1.38 to 1.35 percent and the capital gains differential drops from 2.03 percent to 0.84 percent. In the aggregate debt, equity, and other investment category, the return differential falls from 2.30 percent to 0.91 percent, yield turns slightly positive by a few basis points, and capital gains decline from 2.33 to 0.84 percent.

Although the capital gains components of the debt, equity, and other investment category are subject to some quality issues, this result is striking. Over the period from 2002 to 2008, the U.S. return differential is almost one percentage point lower when an estimate of U.S. residents’ unrecorded wealth is included. With this result, this thesis continues the trend of return differential literature. While the first wave of literature found substantially positive return differentials,
subsequent studies of the second and third wave claimed that these estimates were biased upwards because of the inclusion of ‘other changes’. In this thesis, I argue that the inclusion of unrecorded assets decreases the return differential even further. While the claim that the U.S. enjoys an exorbitant privilege still remains valid, its extent appears to become smaller and smaller the more studies address this topic. Of course, the short timespan does not allow to infer that official return differential estimates have always been too high. In fact, the sample used in this thesis covers a very specific period of time. It starts during a recession, then tracks some years of economic boom time, and ends during the recession following the burst of the bubble. A generalisation of the result therefore has to be taken with care.

7 Arithmetic versus Geometric Mean

In the previous sections, the computation of average returns over time was based on the arithmetic mean in order to be comparable to the existing literature, especially to Gohrband and Howell (2013) who published the data set and computed the associated U.S. return differential. The arithmetic mean is defined as

\[
\bar{r}_{\text{arithmetic}} = \frac{1}{T} \sum_{t} r_t
\]

where \( t \) is an index variable denoting time, \( T \) is the total number of time periods in the sample, and \( r_t \) is the rate of return at time \( t \).

However, the arithmetic mean is not the accurate tool to obtain averages of returns over time. Instead, averaging rates of return over multiple periods requires the geometric mean. The reason is that the annual rates of return are not independent of each other. The return made in a given year has an impact on the starting capital in the next year. A positive return in year \( t \) increases the starting capital in year \( t + 1 \), a negative return decreases it. But once the starting capital changes, equal rates of returns do not translate into equal amounts of gross capital gains. Consider this example for clarification. Suppose an investor starts with 100 USD. In year \( t \), she makes a 10 percent return. Thus, her starting capital in \( t + 1 \)
equals 110 dollars. In $t + 1$, she makes a 10 percent loss, i.e. her starting capital in $t + 3$ is 99 dollars. Overall, she made a loss of one USD. But using the arithmetic mean to compute the average rate of return would result in a zero percent change: $(0.1 - 0.1)/2 = 0$. The rate of return obtained by taking the average mean is too high.

Using the geometric mean instead, this issue does not arise. The geometric mean is defined as

$$r_{\text{geometric}} = \left( \prod_t (1 + r_t) \right)^{\frac{1}{T}} - 1$$

(20)

In the example, the correct average return using the geometric mean is approximately -0.5 percent: $(1.1 \times 0.9)^\frac{1}{2} - 1 = -0.00501$.

In general, the arithmetic mean overstates the average rate of return (Steele 2004, pp. 20–21) which is why the rate of return estimates presented in sections 5 and 6 can be expected to be too high. The magnitude of the bias depends on the fluctuation of the rate of return within the sample period. The more fluctuation the rate exhibits, the stronger the bias. The effect on the return differential is dependent on whether the bias of assets or the bias of liabilities is greater. If the bias of assets (liabilities) is greater, the arithmetic-mean estimate of the return differential is too high (low). Since the U.S. invests in relatively risky (i.e. volatile) assets and issues less risky liabilities, we would expect the average rate of return on assets to be biased more than the average rate of return on liabilities. The return differential would then be expected to be too high.

Table 10 shows the official return estimates obtained by using the geometric mean. Indeed, the overall return differential is smaller than the one obtained by the arithmetic mean. For the period 1989–2009, it falls from 1.67 percent to 1.21 percent. This decrease is entirely driven by the average capital gains differential which drops from 0.45 to -0.07 percent. Given the stability of the yield over time, the average yield differential remains at 1.22 percent. Looking at individual categories, FDI and equity exhibit the strongest change. Their average capital gains differentials have been overestimated by about one percent—they are now around -2 percent instead of previously -1 percent. Debt and other investment, by contrast, show little change because their rates of return do not fluctuate as much.
<table>
<thead>
<tr>
<th>All Categories</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
<th>Return Effect</th>
<th>Comp. Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>6.75</td>
<td>5.54</td>
<td>1.21</td>
<td>1.38</td>
<td>0.13</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>5.09</td>
<td>3.87</td>
<td>1.22</td>
<td>1.68</td>
<td>-0.46</td>
</tr>
<tr>
<td>Price Changes</td>
<td>1.60</td>
<td>1.68</td>
<td>-0.07</td>
<td>-0.31</td>
<td>0.59</td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>1.58</td>
<td>1.63</td>
<td>-0.05</td>
<td>-0.38</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.05</td>
<td>0.08</td>
<td>0.07</td>
<td>0.02</td>
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<table>
<thead>
<tr>
<th>FDI</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>7.75</td>
<td>4.68</td>
<td>3.07</td>
<td></td>
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</tr>
<tr>
<td>Capital Gains</td>
<td>7.29</td>
<td>2.44</td>
<td>4.86</td>
<td></td>
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</tr>
<tr>
<td>Price Changes</td>
<td>0.14</td>
<td>2.20</td>
<td>-2.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>0.11</td>
<td>2.20</td>
<td>-2.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.23</td>
<td>0.00</td>
<td>0.23</td>
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<table>
<thead>
<tr>
<th>Debt</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>7.29</td>
<td>6.35</td>
<td>0.93</td>
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</tr>
<tr>
<td>Capital Gains</td>
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<td>6.23</td>
<td>0.63</td>
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<td>Price Changes</td>
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<td>0.03</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.04</td>
<td>0.09</td>
<td>-0.13</td>
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<tbody>
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<td>Yield</td>
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<td>7.24</td>
<td>-1.67</td>
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<tr>
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<td>2.20</td>
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</tr>
<tr>
<td>Price Changes</td>
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<td>4.99</td>
<td>-2.16</td>
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</tr>
<tr>
<td>Exchange Rate Changes</td>
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<td>4.99</td>
<td>-1.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.10</td>
<td>0.00</td>
<td>0.10</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Other Investment</th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
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<td>3.90</td>
<td>0.58</td>
<td></td>
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</tr>
<tr>
<td>Capital Gains</td>
<td>4.20</td>
<td>3.84</td>
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</tr>
<tr>
<td>Price Changes</td>
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<td>0.06</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>0.14</td>
<td>0.00</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.06</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Percentage Returns on Reported U.S. Assets and Liabilities using the Geometric Mean, 1989–2009

Source: Author’s computation using data from Gohrband and Howell [2013, table 8.7]
<table>
<thead>
<tr>
<th>Category</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
<th>Return Effect</th>
<th>Comp. Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Categories</td>
<td>4.39</td>
<td>2.12</td>
<td>2.27</td>
<td>3.85</td>
<td>-0.66</td>
</tr>
<tr>
<td>Yield</td>
<td>4.73</td>
<td>3.35</td>
<td>1.38</td>
<td>1.67</td>
<td>-0.29</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>-0.45</td>
<td>-1.24</td>
<td>0.78</td>
<td>2.17</td>
<td>-0.37</td>
</tr>
<tr>
<td>Price Changes</td>
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<td>-1.40</td>
<td>-0.29</td>
<td>0.80</td>
<td>-0.45</td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>1.62</td>
<td>0.18</td>
<td>1.43</td>
<td>1.37</td>
<td>0.09</td>
</tr>
<tr>
<td>FDI</td>
<td>1.75</td>
<td>-3.03</td>
<td>4.78</td>
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<tr>
<td>Yield</td>
<td>8.06</td>
<td>3.69</td>
<td>4.37</td>
<td></td>
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</tr>
<tr>
<td>Capital Gains</td>
<td>-7.08</td>
<td>-6.74</td>
<td>-0.34</td>
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<td></td>
</tr>
<tr>
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<td>-1.61</td>
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<td>-0.45</td>
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</tr>
<tr>
<td>Price Changes</td>
<td>-0.96</td>
<td>-0.08</td>
<td>-0.88</td>
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</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>0.89</td>
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</tr>
<tr>
<td>Equity</td>
<td>0.36</td>
<td>-3.36</td>
<td>3.72</td>
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<td></td>
</tr>
<tr>
<td>Yield</td>
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<td>0.67</td>
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<td>Capital Gains</td>
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<td>2.71</td>
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<td></td>
</tr>
<tr>
<td>Price Changes</td>
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<td>-5.39</td>
<td>2.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
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<td>2.57</td>
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<tr>
<td>Other Investment</td>
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<td>0.51</td>
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<tr>
<td>Capital Gains</td>
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<td>0.81</td>
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</tr>
<tr>
<td>Price Changes</td>
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<td>0.00</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate Changes</td>
<td>0.46</td>
<td>0.23</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11: Percentage Returns on Reported U.S. Assets and Liabilities using the Geometric Mean, 2002–2008

Source: Author’s computation using data from Gohrband and Howell [2013, table 8.7]
<table>
<thead>
<tr>
<th>Total</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>3.40</td>
<td>2.12</td>
<td>1.28</td>
</tr>
<tr>
<td>Yield</td>
<td>4.70</td>
<td>3.35</td>
<td>1.35</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>-1.41</td>
<td>-1.24</td>
<td>-0.17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FDI</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>8.06</td>
<td>3.69</td>
<td>4.37</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>-7.08</td>
<td>-6.74</td>
<td>-0.34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Debt, Equity, and Other Investment</th>
<th>3.32</th>
<th>3.11</th>
<th>0.21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>3.33</td>
<td>3.26</td>
<td>0.07</td>
</tr>
<tr>
<td>Capital Gains</td>
<td>-0.05</td>
<td>-0.16</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Table 12: Percentage Returns on Recorded plus Unrecorded U.S. Assets and Liabilities, Geometric Mean, 2002–2008

Source: Author’s computation using data from Gohrband and Howell (2013, table 8.7), IMF (2015a) and Zucman (2013)

The average rates of return between 2002 and 2008 in table 11 show a similar adjustment. While the average yield differential remains unchanged, the average capital gains differentials and thus the overall average return differential drop by more than one percentage points.

Table 12 presents the rates of returns and the return differentials adjusted by the unrecorded wealth, using the geometric mean. The correction for the mean decreases the average return differential between 2002 and 2008 from 2.43 percent to 1.28 percent, a drop of more than one percentage point. This drop stems entirely from the average capital gains differentials whereas the average yield differential is again almost unaffected. The FDI figures are the same as in table 11 but the debt, equity, and other investment category changed. Using the geometric mean instead of the arithmetic mean, the average adjusted return differential declines from 0.91 percent to 0.21 percent, which is again driven by the average adjusted capital gains differential.

The correction of the average differentials when the geometric mean is applied
is far from being negligible. Focusing on the arithmetic mean thus introduces an upward bias of more than one percent. Together with the adjustment for unrecorded wealth, the average U.S. return differential between 2002 and 2008 drops from 3.41 percent to 1.28 percent; a downward correction of 2.13 percent.

8 Conclusion

With the implementation of the Bretton-Woods system in 1944 the United States became the centre of the global financial system. The currencies of Bretton-Woods member countries were fixed against the U.S. dollar which, in turn, was convertible into gold. Over time, these countries’ economies grew and so did their demand for dollar reserves. In order to accumulate dollar reserves, countries ran a current account surplus vis-à-vis the U.S. and the U.S. met the demand with newly created dollars. In the 1960s, the French claim of an ‘exorbitant privilege” arose that the Bretton-Woods allowed the U.S. to effectively finance its imports for free. The confidence in the Bretton-Woods system diminished when the amount of dollar reserves (i.e. claims on U.S. gold) surpassed the amount of gold the U.S. could possibly supply, and in 1973, the system collapsed. But the U.S. dollar had already become the global currency and allowed the United States to remain at the centre of the global financial system. Whether this status grants the U.S. an exorbitant privilege has been subject to discussion for many years.

The way to analyse the problem was to look at the U.S. return on foreign assets versus foreigners’ returns on U.S. assets. Should the former be larger, this would be evidence in favour of the exorbitant privilege. The first studies in the mid-2000s found that the U.S. return differential, i.e. the difference between U.S. residents’ return on foreign assets and foreigners’ return on U.S. assets was about three percent. This was strong evidence for the exorbitant privilege hypothesis. However, then came a second wave of literature which set forth that returns had been miscalculated because they included ‘other changes in volume” which represent mismeasured flows and thus do not accrue to investors as a return. The second wave of literature found substantially smaller return differentials, namely less than one percent. The third wave of literature consists of very differing studies, some of which applied the second-wave methodology, some of which did not.
These studies found return differentials between 1.6 and 3.5 percent, depending on the methodology and the timespan. Gohrband and Howell (2013), statisticians from the U.S. Bureau of Economic Analysis, which compiles the relevant data, announced their views on the debate. According to them, ‘other changes’ represent changes in volume that do not accrue to investors and should thus be excluded from the return differential estimate. Using previously unpublished data, they found a return differential of 1.6 percent.

The return differential can be decomposed in two ways: on the one hand into a valuation and a yield component, and on the other hand into the categories FDI, debt, equity, and other investment. Valuation changes, i.e. capital gains and losses, arise from price changes of assets or exchange rate changes of the currency in which the asset is denominated. Yield comprises the income received due to the holding of an asset such as coupon and dividend payments. In general, the large disparities of the studies arise mainly from differences in estimates of capital gains because the debate about ‘other changes’ impacts only capital gains. The yield, by contrast, remains approximately the same across the literature, with some variations depending on the analysed time period. Gohrband and Howell (2013) decompose the return differential into a yield and a valuation component and show that 1.3 percent stem from a difference in yields and 0.3 percent from a difference in capital gains. Decomposing the return differential into categories shows that it is largely driven by FDI yields. Curcuru and Thomas (2015) examine the FDI yield differential in more detail and conclude that it more than half of it can be explained by differences of foreign affiliates in the U.S. and U.S. affiliates abroad with respect to tax treatment, risk, and age. U.S. affiliates abroad report their earnings net of all taxes, tend to invest in riskier markets, and have, in general, already written off their initial start-up expenses.

So far, the literature has only looked at recorded assets and liabilities but did not take unrecorded assets into account. Investors have an incentive to conceal their asset holdings in order to decrease their tax burden. For this purpose, assets are transferred to countries with low tax rates and strict bank secrecy rules. Unless investors voluntarily report their holdings, these assets disappear from the statistics accounts. But they nevertheless grant income streams and capital gains to their owners. If the return on unrecorded assets were the same as the return on
recorded assets, the overall return differential would remain the same. However, it turns out that they are not.

By its very nature, the unrecorded wealth is not directly observable but can be computed as the difference between total global liabilities and total global assets. In contrast to creditors, debtors do not have an incentive to conceal their liabilities, because liabilities reduce the tax burden of the debtor. For this reason, liabilities can be expected to be accurately measured. The gap between total assets and total liabilities is the unrecorded wealth. Flows and income streams of unrecorded assets are obtained in a similar way. This thesis implements this approach for debt, equity, and other investments between 2002 and 2008 and finds that while the yield of global unrecorded wealth is very close to the yield of recorded U.S. assets held abroad, the valuation component is substantially lower, even negative. As a result, the U.S. return differential decreases by about one percentage point when the unrecorded wealth held by U.S. residents is taken into account.

Correcting the return differential for the appropriate method of averaging over multiple time periods further decreases the U.S. return differential. The arithmetic average used in Gohrband and Howell (2013) overestimates the return on assets and liabilities. The more the individual annual rates of return fluctuate, the stronger the bias. While the return on U.S. liabilities is relatively stable, the return on U.S. assets is more volatile. The correction of the return differential shows that it has been overstated by as much as 1.2 percentage points due to the incorrect use of the arithmetic mean.

The adjustment for unrecorded wealth and the correction of the averaging method continue the trend of uncovering upward biases in the U.S. return differential. The first wave of studies which addressed this topic found that the U.S. could borrow at significantly lower rates than it was able to invest, i.e. a positive return differential. Subsequent studies set forth that a part of this advantage was likely caused by statistical issues such as the treatment of ‘other changes in volume’ and taxes on FDI. Accounting for unrecorded wealth and the appropriate averaging method further decreases the return differential. While the claim that the U.S. enjoys an exorbitant privilege due to its unique position at the centre of the global financial system is certainly not disproved, its extent might not be as great as initially thought.
References


A Data Appendix

This section describes the calculations made in this thesis in more detail. The statistical package used to perform the analysis is Stata. I start with three databases: Official BEA data on the return on U.S. assets and liabilities (Gohrband and Howell 2013, table 8.7), Zucman’s 2013 Missing Wealth of Nations data set, and data on the global balance of payments from the IMF (2015a).

Before going into detail, it is useful to get an overview of the basic structure of the computation. It is divided into three parts: The computation of the official U.S. return differential, the calculation of the return on missing wealth, and the adjustment of the U.S. return differential. The following provides a brief summary of the steps:

for mean = arithmetic, geometric {

1) Computation of the Official U.S. Return Differential
use BEA data
aggregate debt, equity, and other investment into a separate category
    compute official return differentials, return effects, and composition effects
}

2) Calculation of the Return on Missing Wealth
extract relevant data from Zucman’s data set (2002–2008)
add IMF BOP data
compute yield and capital gains of missing wealth

3) Adjustment of the U.S. Return Differential
merge Zucman’s and IMF data with BEA data
compute the share of U.S. security claims in global security claims
subtract missing wealth which is invested in the U.S. from total missing wealth
generate adjusted U.S. asset positions, flows, and income
compute the adjusted return differentials
}
Most of these steps require many individual commands in order to be implemented. In the following, I will discuss each step in more detail. The first step is to initialise the loop which tells the subsequent commands whether to the arithmetic or geometric mean for averaging returns over time. Everything that follows is located within this loop.

**A.1 Computation of the Official U.S. Return Differential**

The BEA data (Gohrband and Howell 2013, table 8.7) provide everything to compute the official return differential, the return effect, and the composition effect. For both U.S. assets and liabilities and for each category (Total, FDI, equity, debt, and other investment), the data set contains the position at the beginning of the year, flows, price changes, exchange rate changes, other changes, total changes (i.e. price changes + exchange rate changes + other changes), and income. The data range from 1989 to 2009. First, I create the aggregate debt, equity, and other investment category which will later be needed for comparison with Zucman’s and the IMF’s data. I also generate the average position of assets and liabilities of each category during each year as

$$AVGPOS_t = \frac{POS_{t-1} + POS_t}{2}. \quad (21)$$

Next, I compute the overall returns, price changes, exchange rate changes, and income on both assets and liabilities as growth factors for 1989–2009 and the sub-period 2002-2008 for each category. Using growth factors allows for the application of arithmetic and geometric mean likewise. In order to translate these growth factors into the percentage returns as shown in the thesis, I subtract 1 and multiply by 100 before I export the results. The return differential is simply the difference between the (growth factor) return of assets and the (growth factor) return on liabilities—plus one in order to obtain growth factors again. The next step is to average the growth factors using the arithmetic and the geometric mean.

Finally, I calculate the return effect and the composition effect. Following Gourinchas and Rey (2007, pp. 26-28), I compute the weights of the individual categories as $w^Ac_t = AVGPOS^Ac_t / \sum_c AVGPOS^Ac_t$, where the superscript $c$ de-
notes the category (FDI, equity, debt, other investment), and A denotes assets but is interchangeable with L for liabilities. The return effect (RE) and composition effect (CE) are then obtained as:

\[ RE_t = E[\tilde{w}_t^F(r_t^{AF} - r_t^{LF})] + E[\tilde{w}_t^D(r_t^{AD} - r_t^{LD})] + E[\tilde{w}_t^E(r_t^{AE} - r_t^{LE})] + E[\tilde{w}_t^O(r_t^{AO} - r_t^{LO})] \]  

(22)

\[ CE_t = E[(w_t^{AF} - w_t^{LF})(\tilde{r}_t^F - \tilde{r}_t^O)] + E[(w_t^{AD} - w_t^{LD})(\tilde{r}_t^D - \tilde{r}_t^O)] + E[(w_t^{AE} - w_t^{LE})(\tilde{r}_t^E - \tilde{r}_t^O)] \]  

(23)

A.2 Calculation of the Return on Missing Wealth

Zucman’s (2013) data set contains bilateral holdings of recorded and unrecorded portfolio assets and liabilities for all countries worldwide and for each year between 2001 and 2008. That is, it states how much claims and liabilities country i has vis-à-vis country j for all i ≠ j. Summing the assets (liabilities) over all j for a given i yields country i’s reported gross foreign asset (liability) position. The sum of all gross foreign asset (liability) positions is the amount of global cross-border assets (liabilities). The difference between global cross-border liabilities and assets equals the amount of unrecorded wealth. The data set also contains other variables which Zucman used to compute his figures, such as EWN cross-border asset and liability estimates or distance measures for his gravity model. For the purpose of this thesis, however, I am only interested in the amount of recorded and unrecorded portfolio assets of each country and the amount of unrecorded portfolio wealth invested in the U.S. The latter is simply obtained as the difference between U.S. liabilities towards foreigners and foreigner’s claims on the U.S. Zucman reports asset and liability positions in millions of USD while BEA reports their data in billions of USD. I divide the Zucman values by 1000 in order to be consistent with the BEA data which will become relevant again later on.

Having extracted the positions data from Zucman’s data set, I add flow and income data from the IMF (2015a) balance of payments statistics which reports world aggregates of individual countries’ current accounts, capital accounts, and

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\(^5\)see equation (13) and the subsequent paragraph for more details
financial accounts, as well as their IIP. For the calculation of the return on the
missing wealth, values of flows of missing securities and of income associated with
missing securities are required. The missing flows are simply computed as the dif-
ference between recorded flow credits and debits. Missing income is the difference
between recorded income payments and receipts. These figures are aggregates of
debt, equity, and other investment.

Now the only variable left is ‘other changes’. Unfortunately, OC are not avail-
able on a global scale since many countries do not report them. I therefore assume
that OC = 0. I use average positions again for the purpose of computing the
returns. Since I do not have a value for the beginning of 2001, this means that the
list of average positions only starts in 2002. Yield and capital gains growth factors
are then obtained as shown in equation 14 and 15:

\[
y^i_\Omega = \frac{L_t - A_t}{AVGPOS^\Omega_t} \\
VAL^\Omega_t = \frac{\Omega_t - \Omega_{t-1} - F^\Omega_t - OC^\Omega_t}{AVGPOS^\Omega_t}
\]

Finally, arithmetic and geometric means are applied to calculate the average re-
turns between 2002 and 2008. The difference between the asset and liability growth
factors is then the return differential (again plus one to obtain a growth factor).

A.3 Adjustment of the U.S. Return Differential

The third part assigns a part of the missing wealth to U.S. investors and recal-
culates the return differential based on the such-adjusted figures. As discussed in
section 6.2 it is not known what portion of the unrecorded wealth is held by U.S.
residents. Hence, I impose various portions from 0 to 75 percent. I also assume
that U.S. residents hold an amount of unrecorded assets proportionate to their
recorded holdings (see table 8). I obtain this portion by dividing the recorded
foreign portfolio wealth held by U.S. residents by global recorded portfolio wealth.

Now that I have the portions, I adjust the U.S. gross foreign asset position,
flows and income as shown in equations 16-18. This happens within two loops.
The outer one loops through the portions, the inner one through the categories:
FDI the aggregated debt, equity, and other investment category; and total assets, i.e. the sum of debt, equity, and other investment. Once the adjusted values are established, I compute the total return, yield, and capital gains, and average them. This still happens within the loops. Note that with this approach, FDI values are also adjusted by a portion of the missing portfolio wealth. Of course, this is not only unnecessary but simply incorrect. Thus, I replace every value that is based on wrongly adjusted FDI figures by a missing value. It is of course possible to exclude FDI from the loop in the first place but the setup which includes FDI allows for a more compact notation and produces a consistent and tidy output.