

US External Adjustment: The Exorbitant Privilege

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Abstract

This paper looks at a number of issues regarding the US external adjustment. It also details the construction of US gross and net foreign asset positions at market value. MUCH MORE TO COME.

1 Detailed Description of the Construction of the International Investment Position for the U.S.

1.1 Line by Line description, Flows and Positions Data

1.1.1 Assets.

- **Equity:**

- *flows*: after 1982Q1 from BEA (USIT Table 7b line A2 before 1998Q1 and USIT Table 7a line A4 after). Before 1982, from FFA, table F107 line 46 (FU263164003.Q, foreign corporate equities, including ADRs, NSA). Before 1974Q1, the FFA series reports incorrectly the sum of equity and debt holdings by US residents (also reported in USIT Table 1 line 52). The flow series is corrected by subtracting FFA table F107 line 39 (FU263163003.Q, bonds, NSA). This is corrected in the latest version of the FFA (after June 2004).
- *levels*: end of year positions from BEA. After 1976, positions from BEA IIP Table 2 line 21 (corporate stocks, including results from the U.S. Treasury's 1994 and 1997 Benchmark Surveys of U.S. Ownership of Foreign Long-term Securities). Before 1976, positions available from Survey of Current Business (paper version)
- *valuation adjustment*: quarterly equity portfolio dollar capital gains constructed using the U.S. Treasury 1997 Benchmark Surveys of U.S. Ownership of Foreign Long-term Securities (Series EQR97\$). Details on returns provided below.

- **Debt:**

- *flows*: after 1982Q1, from BEA (USIT Table 7b line A13 before 1998Q1 and USIT Table 7a line A18 after). Before 1982, from FFA, Table F107 line 39 (FU263163003.Q, Bonds, NSA).
- *levels*: end of year positions from BEA. After 1976, positions from BEA IIP Table 2 line 20 (Bonds, including results from the U.S. Treasury's 1994 and 1997 Benchmark Surveys of U.S. Ownership of Foreign Long-term Securities). Before 1976, positions available from Survey of Current Business (paper version).
- *valuation adjustment*: Maturity Weights: 25% short term, 75% long term. No valuation adjustment for short term. For long term bonds, weighted average dollar holding period excess return (over yields) (series RN\$@RW). Details on returns provided below.

- **Direct Investment:**

- *flows*: after 1960Q1 from BEA (USIT Table 1 Line 51). Before 1960Q1, from FFA Table F107 line 52 (FU263192005.Q, U.S. direct investment abroad). Note that through 1992Q4, FFA US direct investment abroad excludes net inflows from corporate bonds issued by Netherlands Antillean financial subsidiaries. There is no discrepancy here since these bonds issues start really in 1978.
- *levels*: after 1980, end of year positions at market value, from IMF IIP (line B8505@C111) equivalent to BEA IIP Table 2 line 18 (but BEA only available after 1982).
- *valuation adjustment*: starting 1981Q1, quarterly direct investment portfolio capital gains constructed using rolling weights (series RFDR\$). The weights are constructed using BEA direct investment positions by country (historical cost basis) from 1966 until 2002. The final shares cover 75% of DI assets in each year. The implicit annual return in the BEA positions is regressed on this capital gain series between 1980 and 2002. The regression coefficient (0.754367) is used to scale down the capital gain series. It is smaller than one, as expected. The reason is that the BEA records reinvested earnings as inflows. But reinvested earnings are also part of the capital gain series. Without adjustment, we would be double counting the reinvested earnings. Before 1981Q1, FDI-weighted exchange rate depreciation. This change in the adjustment series is done to prevent the gross DI series from becoming negative.

- **Other Assets:**

- *flows*: After 1960Q1, defined as a residual from total BEA assets: total assets (USIT Table 1 line 40, U.S. owned assets abroad) minus equity minus debt minus direct investment and minus Gold (USIT Table 1 line 42). Before 1960Q1, other assets is constructed to match the BEA definitions. Start with other asset flows defined from FFA: FFA total assets (Table F107 line 34, FU264190005.Q, net increase in U.S. liabilities of the rest of the world) minus FFA bonds (F107 line 39, FU263163003.Q, change in bond liabilities of the rest of the world to U.S. residents) minus FFA equity (F107 line 46, FU263164003.Q, net purchase of foreign corporate equities by U.S. residents) [corrected, see the description of equity asset flows] minus FFA direct investment (F107 line 52, FU263192005.Q, U.S. direct investment abroad, excluding bonds sold by Netherlands Antillean financial subsidiaries). Then adjust to map into the BEA definitions: other flow from FFA plus capital account (USIT Table 1 line 39, 0 before 1960) plus change in interbank claims (0 before 1960).
- *levels*: end of year positions from BEA after 1976. IIP Table 2 line 5 (U.S. official reserve assets) minus line 6 (Gold) plus line 10 (U.S. Government assets, other than official reserve assets) plus line 22 (U.S. claims on unaffiliated foreigners reported by U.S. nonbanking concerns) and line 23 (U.S. claims reported by U.S. banks, not included elsewhere). The levels do not include Gold reserves.
- *valuation adjustment*: none.

1.1.2 Liabilities

- **Equity:**

- *flows*: starting 1973Q1, sum of BEA equity (SCB before 1982Q1, USIT Table 7b line B2 between 1982Q1 and 1998, Table 7a line B4 after) and equity held by foreign officials (SCB before 1982Q1, USIT Table 7b line memo 4 before 1998 and Table 7a line memo 4 after). Before 1973, FFA equity Table F10 7 line 28 (FU263064003.Q, net purchases of U.S. corporate equity by the rest of the world). The FFA data includes equity purchased by foreign official agencies (reported separately by the BEA).
- *levels*: end of year positions from BEA. After 1980, positions from IMF IIP (B8660@C111). The IMF data includes equity holdings by foreign official agencies. Before 1980, comparison of the BEA IIP Table 40 (corporate stocks) show that foreign official holdings are 0. Before 1976, positions available from Survey of Current Business (paper version).

- *valuation*: quarterly equity portfolio capital gains (series EQRUS) from S&P 500 (see detailed descriptions for returns below).

- **Debt:**

- *flows*: After 1982Q1, from BEA flows. Sum of private foreign holdings of US corporate and federally sponsored agency bonds (USIT Table 7b line 10 before 1998, Table 7a line 16 and 30) and foreign official holdings of U.S. government securities (USIT Table 1 line 57) and foreign private holdings of U.S. Treasury securities (USIT Table 1 line 65) and corporate and agency bonds held by foreign official agencies (USIT Table 7b line memo 3 before 1998, table 7a memo 3 after 1998). Before 1982, FFA government securities (Table F107.19, FU263061005.Q, U.S. government securities) plus U.S. corporate bonds (Table F107.26, FU263063005.Q, until 1992 including net issues by Netherland Antillean financial subsidiaries of U.S. corporations) minus net issues of corporate bonds from Netherland Antillean financial subsidiaries of U.S. corporations. Each FFA series is corrected as follows:
 - * FFA Table F107 line 21 (FU263061113.Q, foreign official holdings of Treasury securities), a subcategory of F107 line 19, is incorrect before 1981Q4. The series is remapped to BEA Table 1 line 58 (foreign official holdings of U.S. Treasury securities).
 - * FFA Table F107 line 26 adjusted upwards before 1977Q3 for discontinuity in the coverage of the series (see below for a methodological description on how to treat jumps).
 - * net issues of corporate bonds from Net. Antillean financial subsidiaries estimated as the difference between minus FFA-based direct investment assets (Table F107 line 52, FU263192005.Q, U.S. direct investment abroad) and BEA-based direct investment assets (USIT Table 1 line 51). Set to 0 before 1979Q1.
- *levels*: end of year positions from IMF IIP after 1980 (B8669@C111). Includes foreign official agencies holdings of corporate bonds (reported separately in BEA IIP). Between 1976 and 1981, from BEA IIP (Table 2) line 27 (foreign official holdings of U.S. government securities) plus line 37 (foreign private holdings of U.S. Treasuries) plus line 39 (foreign private holdings of corporate and other bonds) plus line 32 (foreign official holdings of other assets). Between 1971 and 1976, same positions available from Survey of Current Business (paper version).
- *valuation*: assumes maturity 25% short term (no valuation) and 75% long term. For the long term valuation, quarterly holding excess return over yields on 10-year U.S. government debt.

- **Direct Investment:**

- *flows*: after 1976Q4, from BEA direct investment (USIT Table 1 line 64). The FFA series (Table F107 line 32, FU263092001.Q, foreign direct investment in the U.S.) is identical to the BEA series after 1960. Before 1976Q4, the BEA and FFA series are adjusted upwards for discontinuity in coverage (see below for a methodological description on how to treat jumps).
- *levels*: end of year positions from IMF IIP (B8555@C111), at market value, identical to BEA IIP (Table 2 line 36) after 1982.
- *valuation*: starting 1981Q1, quarterly direct investment portfolio capital gains constructed using S&P 500 capital gains series (EQRUS). The implicit annual return in the BEA positions is regressed on this capital gain series between 1980 and 2002. The regression coefficient (0.681023) is used to scale down the capital gain series. It is smaller than one, as expected. The reason is that the BEA records reinvested earnings as inflows. But reinvested earnings are also part of the capital gain series. Without adjustment, we would be double counting the reinvested earnings. Before 1981Q1, no valuation. This change in the adjustment series is done to prevent the gross DI series from becoming negative.

- **Other liabilities:**

- *flows*: after 1982Q1, defined as residual from total BEA liabilities: total liabilities (USIT Table 1 line 55) minus debt, equity and direct investment. Between 1960Q1 and 1981Q4, defined as

BEA liabilities minus FFA debt and FFA equity. Before 1960Q1, constructed from FFA to match the BEA definition: Start with other liabilities flows defined from FFA: FFA total liabilities (Table F107 line 11, FU264090005.Q, net acquisition of financial assets by the rest of the world) minus FFA bonds (F107 line 19, FU263061005.Q, and line 26, FU263063005.Q)[corrected, see the description of debt liability flows] minus FFA equity (F107 line 28, FU263064003.Q) minus FFA direct investment (F107 line 32, FU263092001.Q). Then adjust to map into the BEA definitions: other flow from FFA minus FFA Gold and SDR (F107 line 12, FU263011005.Q, net purchases of Gold and SDR from the U.S. by the rest of the world) plus change in interbank claims (0 before 1960).

- *levels*: after 1976, end of year positions from BEA IIP. Table 2 line 30 (Other U.S. Government liabilities) and line 31 (U.S. liabilities reported by U.S. banks, not included elsewhere) and line 41 (U.S. currency) and line 42 (U.S. liabilities to unaffiliated foreigners reported by U.S. nonbanking concerns) and line 43 (U.S. liabilities reported by U.S. banks, not included elsewhere).
- *valuation*: none.

1.2 Returns

Most financial data is obtained from the Global Financial Database. Exchange rate data is obtained from

1.2.1 Assets

- **Equity:**

- *Total return*: EQTR97\$. Equity total return, rest of the world. Weights constructed using U.S. Treasury 1997 survey of long term positions. The weights represent 75% of total foreign equity holdings by U.S. investors. The weights are as follows:

country	1966	1987	1997	series
UK	27.43%	25.44%	23.61%	FT-Actuaries All-Share Total Return Index
Japan	17.20%	15.95%	14.80%	Nikko Securities Composite Total Return
France	10.72%	9.94%	9.23%	SBF-250 Total Return Index
Netherlands	13.49%	12.51%	11.61%	CBS Total Return-All Shares
Germany	8.19%	7.60%	7.05%	CDAX Total Return Index
Canada	8.93%	8.28%	7.68%	Toronto SE-300 Total Return Index
Sweden	4.89%	4.54%	4.21%	Stockholm SBX Benchmark Gross Index.
Switzerland	0%	7.24%	6.72%	Performance Index.
Italy	5.24%	4.86%	4.51%	BCI Global Return Index
Mexico	0%	0%	3.79%	SE Return Index
Australia	3.92%	3.64%	3.38%	S&P/ASX 200 Accumulation Index.
Brazil	0%	0%	3.4%	Sao Paulo IBX-50 Return Index.

For each of these countries, a series for dollar quarterly total stock return is constructed. The local currency returns are converted into dollars using end of period nominal exchange rates against the dollar compiled from IFS after 1957 and from GFD before.

- *Capital gain*: EQR97\$. Capital gains, rest of the world with weights constructed using U.S. Treasury 1997 survey of long term positions. The weights are as follows:

country	<1954	>1954	series
UK	24.44%	23.61%	FT-Actuaries All-Share Index
Japan	15.33%	14.80%	Nikkei 225 Stock Average
France	9.55%	9.23%	SBF-250 Index
Netherlands	12.02%	11.61%	CBS All-Share Price Index
Germany	7.30%	7.05%	CDAX Composite Price Index
Canada	7.95%	7.68%	S&P/TSX 300 Composite Index
Sweden	4.36%	4.21%	Affarsvarlden General Index.
Switzerland	6.95%	6.72%	Stock Indices-Composites - Switzerland Price Index.
Italy	4.67%	4.51%	Banca Commerciale Italiana General Index
Mexico	3.93%	3.79%	SE Indice de Precios y Cotizaciones (IPC)
Australia	3.50%	3.38%	ASX All-Ordinaries.
Brazil	0%	3.40%	Bolsa de Valores de Sao Paulo (Bovespa)

For each of these countries, a series for dollar quarterly total stock return is constructed. The local currency returns are converted into dollars using end of period nominal exchange rates against the dollar compiled from IFS after 1957 and from GFD before.

- **Debt:**

- *Total return:* weighted average of the total return on long term bonds and total return on short term bonds. Maturity composition: 75% long term, 25% short term, from Table 2 and Table 3 in 2002 treasury report on U.S. foreign portfolio holdings.

- * *Long Term:* R\$@RW. weighted average dollar holding period return on foreign long term bonds. The currency weights are taken from the 1999 US Treasury survey of US long term portfolio holdings of foreign securities (Table 11). With the bond yield data availability, we cover about 80% of 1994 long term debt positions. The currency weights are:

Currency	Weights (%)	Source
U.S. dollar	59.67	Yields on U.S. government 10-year constant maturity bonds (IFS)
Yen	12.35	7-year Government Bond Yield (OECD)
Canadian dollar	8.64	Average yield to maturity on government bonds with life over ten years. (IFS)
German DMark	9.05	Yield on federal securities w/ residual maturities of over 9 to 10 years. (IFS)
UK pound	5.35	Gross redemption bond yield, at par with 20 year maturity (IFS)
French Franc	4.94	10-year Government Bond Yield (GFD)

Total quarterly returns are calculated from the changes in yields (assuming that yield=coupon and using the formula (10.1.19) in Campbell et al, p408) converted into US dollars using end of period nominal exchange rates compiled from IFS after 1957 and GFD before.

- * *Short Term:* RSRW\$. weighted average dollar holding period return on foreign short term bonds. The currency weights are taken from the 2001 US Treasury survey of US long term portfolio holdings of foreign securities (Table 14). With the short term returns availability, we cover 99% of the 2001 short term debt positions. The currency weights are:

Currency	Weights (%)	Source
U.S. dollar	85.09	Discount on new issues of 3 months Treasury Bill (IFS)
Dmark	4.98	Germany 3-month Treasury Bill Yield (GFD)
Yen	8.01	Lending rate for collateral and overnight loans in the Tokyo Call Money Market (IFS)
UK pound	1.92	Tender rate at wich 91 days bills are allotted (IFS)

short term local currency returns are converted into US dollars using end of period nominal exchange rates compiled from IFS after 1957 and GFD before.

- *Capital Gains:* RN\$@RW. Same weights are R\$@RW but using *net* returns instead of total returns, where net returns are constructed as $\ln(1+RN)=\ln(1+R)-\ln(1+Y)$ where RN is the net return, R is the total return and Y is the yield. Local net returns converted into dollars using end of period exchange rates.

- **Direct Investment:** returns constructed using rolling weights based on BEA's FDI historical cost positions, 1966-2002. Extract countries representing in each year 75% of US FDIA. Some countries

are excluded for some years b/c of lack of stock market data (e.g. Mexico, Brazil, Switzerland and Panama in early years). For each country, total stock return (in dollars) computed from GFD total return indices and IFS end of period exchange rates.

- *Total return*: TRFDR\$.
- *Capital gain*: RFDR\$. Before 1980Q4, use a multilateral weighted exchange rate for valuation effects.

- **Other Assets:**

- *Total return*: RSRW\$.
- *Capital gain*: zero.

1.2.2 Liabilities

- **Equity and Direct Investment:**

- *Total return*: EQTRUS. Total Return Indices-Stocks - S&P 500 Composite Total Return Index (Base 1988) (SPXTRQ).
- *Capital gain*: EQRUS: Stock Indices-Composites - S&P 500 Composite (SPXQ)

- **Debt:**

- *Total return*: weighted average of the total return on long term bonds and total return on short term bonds. Maturity composition: 75% long term, 25% short term, from Table 2 and Table 3 in 2002 treasury report on foreign portfolio holdings of US securities.
 - * Long term: R@C111. Quarterly total return on long term bond. Calculated from the change in yields (see formula in Campbell et al (equation 10.1.19 pp408)), assuming that the yield is equal to the coupon. Yields on U.S. government 10-year constant maturity bonds. Before 1985:3, yield data from McKulloch and Kwon (1993), as reported by Campbell et al. After 1985:3, from IFS (L61@C111).
 - * Short term R\$@C111. After 1963:4, discount on new issues of 3 months Treasury Bill (IFS L60@C111). Before 63:4: Treasury bill rate in quarterly SBBI file in CRSP, from Campbell et al.
- *Capital gain*: RN@C111. Quarterly *net* return on long term bond defined as $\ln(1+RN)=\ln(1+R)-\ln(1+Y)$ where RN is the net return, R is the total return and Y is the yield. The yield is already included in the current account transactions.

- **Other liability:**

- *Total return*: R\$@C111. see above.
- *Capital gain*: zero.

1.3 Reconciliation of the Flow of Funds and the BEA data.

The material in this section draws heavily from Hooker and Wilson (1986). Data on the net and gross foreign asset flows and position of the U.S. is available from two sources: the U.S. Bureau of Economic Analysis (BEA) and the Federal Reserve's Flows of Funds Accounts for the rest of the world (FFA). The BEA reports annually its International Investment Position of the United States (IIP). The IIP details the gross and net foreign assets at the end of the year since 1982. In addition, the BEA provides quarterly flow data in its US International Transactions (USIT) tables. The BEA data uses Balance of Payment concepts (BoP), in accordance with the IMF's Manual of the Balance of Payments.

Since 1952, the Federal Reserve publishes the quarterly flows and positions for the "rest of the world" account, as part of the flow of funds accounts. The FFA use National Income and Product Account (NIPA)

concepts. Details on the definitions of the Flow of Funds series is available in the Guide to the Flow of Funds (Federal Reserve (XXXX)).

It is important to understand why and how the FFA and BEA data differ (for an excellent and detailed description of the differences see Hooker and Wilson (1986)). First and foremost, one should realize that the BEA and FFA data are essentially compiled from the same source data. The main differences lie in the definition of the various concepts (NIPA vs BoP), their geographical coverage, and the treatment of valuation effects. This section clarifies the points relevant to our analysis.

To establish a correspondance between FFA and BEA, we start from the key Balance of Payment's identity:

$$CA + KA + FA + SD = 0 \quad (1)$$

where CA denotes the U.S. current account (USIT Table 1 line 76), KA the U.S. capital account (Table 1 line 39, according to the post-1999 terminology), FA denotes the financial account (Table 1 line 40 and 55) and SD the statistical discrepancy (errors and omissions, Table 1 line 70).

The equivalent accounting identity in the FFA takes the following form:¹

$$CA' + KA' + FA' + SD' = 0 \quad (2)$$

where CA' denotes NIPA's current account (Table F107 line 5 minus line 1), KA' is the (NIPA) net capital transfers (Table F107 line 8 with sign reversed), FA' denotes NIPA's Net *Financial* Investment (Table F107 line 10) and SD' denotes the (NIPA) statistical discrepancy (Table F107 line 54). KA' is equal to KA , so that we can combine (1) and (2) to obtain:

$$SD' = (CA - CA') + (FA - FA') + SD \quad (3)$$

The NIPA statistical discrepancy SD' is equal to the BoP statistical discrepancy SD plus an adjustment for the difference in the definitions of the current and financial accounts respectively.

We can decompose the financial accounts FA' and FA as follows:

$$\begin{aligned} FA' &= FA'_f - FA'_{us} \\ FA &= FA_f + FA_{us} \end{aligned}$$

where FA'_f (resp. FA_f) represents the change in foreign-owned U.S. assets (gross liabilities) in the FFA (resp. the BoP) and FA'_{us} (resp. FA_{us}) represents the change in U.S.-owned assets abroad (gross assets) in the FFA (resp. the BoP).² The Guide to the Flows of Funds establishes the following correspondance between FA'_f and FA_f :

$$\begin{aligned} FA'_f &= FA_f + \text{Gold and SDR (12)} \\ &\quad + \text{net issuance of bonds by Net. Antillean subsidiaries (26b)} \\ &\quad - \text{change in interbank claims on foreigners (13f to 13l)} \end{aligned} \quad (4)$$

Accordingly, gross external liabilities according to the BEA and the FFA exhibit three differences:

1. The FFA treats transactions involving gold and SDR as changes in foreign assets, while the BEA treats them as changes in U.S. assets. In the FFA, Gold and SDR (12) corresponds to sales of Gold and SDR by the U.S. (USIT Table 1 lines 42 and 43), with the sign reversed.
2. In the 1970s and 1980s, many U.S. corporations established financial subsidiaries in the Netherland Antilles to tap international capital markets and avoid capital control and tax laws. The subsidiary would issue Eurobonds, and channel the funds back to the U.S. parent company. The Balance of Payments considers all transactions between parent and affiliates as part of Direct Investment and subtract issuance of eurobonds by foreign financial subsidiaries from direct investment outflows. By

¹Note that we write this equation from the point of view of the U.S., while the FFA is from the perspective of the rest of the world. So CA' is the *opposite* of the current account recorded in the FFA.

²with the BoP convention that $FA_{us} < 0$ when there is a gross capital outflow.

contrast, the FFA treats these capital flows as direct bond issuance by the U.S parent companies, adds them to bond liabilities and adds them back to foreign direct investment outflows.³ The removal of the withholding tax in 1984 eliminated the incentive to use overseas subsidiaries to issue Eurobonds. The practice was discontinued in 1992Q4.

3. The FFA nets interbank claims while the BEA reports claims on a gross basis.⁴ In order to map back the FFA to the BEA, we need to subtract the “changes in net interbank claims on foreigners” (lines 13f to 13l).

FA'_{us} must satisfy the key identity (2), given SD' :

$$FA'_{us} = FA'_f + CA' + KA' + SD'$$

The last piece of the puzzle is the definition of SD' in the FFA given by:

$$\begin{aligned} SD' \text{ (54)} &= -CA' - KA' \text{ (59, or 9 with minus sign)} \\ &+SD \text{ (54a)} \\ &+CA \text{ (54b with opposite sign)} \end{aligned}$$

Combining with equation (3), we find that:

$$FA' = FA + KA$$

The capital transfers are included in the FFA net financial position.

We can now extract FA'_{us} as:

$$\begin{aligned} FA'_{us} &= -FA_{us} - KA \\ &+ \text{gold and SDR (12)} \\ &+ \text{net issuance of bonds by Net. Ant. subsidiaries (26b)} \\ &- \text{change in interbank claims on foreigners (13f to 13l)} \end{aligned}$$

To summarize, the asset flow side has the same adjustments as the flow liability side, plus the subtraction of the capital account transactions.

In order to provide a measure of the U.S. international investment position comparable with existing measures, we adopt the BEA’s classification, with one difference: because Gold holdings of the U.S. do not represent a liability of the rest of the world, we exclude them from the International Investment Position.

Accordingly, we adopt the following decomposition for gross assets and liabilities:

$$FA_f = FEL + FDL + FFL + FOL$$

with

$$\begin{aligned} FA_f &= \text{Foreign-owned assets in the US (Table 1 line 55)} \\ FEL &= \text{Equity (Table 7a line B4 and memo line 4)} \\ FDL &= \text{Debt (Table 7a line 16, 30 and memo line 3)} \\ FFL &= \text{Direct investment (Table 1 line 64)} \end{aligned}$$

³This assumes that issuance is purchased entirely by the rest of the world.

⁴Net interbank claims (13) = interbank liabilities (13a-e) - interbank claims (13f-l). An additional distinction comes from the treatment of International Banking Facilities, counted as domestic entities in the BoP and foreign entities in the FFA. We lump this term with the change in interbank claims on foreigners.

and

$$-FA_{us} = FEA + FDA + FFA + FOA + G$$

with

$$\begin{aligned} FA_{us} &= \text{U.S.-owned assets abroad, Table 1 line 40} \\ FEA &= \text{Equity (Table 7a line A4)} \\ FDA &= \text{Debt (Table 7a line 18)} \\ FFA &= \text{Direct investment (Table 1 line 51)} \\ G &= \text{Gold (Table 1 line 42)} \end{aligned}$$

We have similar definitions for the FFA based gross flows:

$$FA'_f = FEL' + FDL' + FFL' + FOL'$$

with

$$\begin{aligned} FA'_f &= \text{Net acquisition of financial assets (Table 107 line 11)} \\ FEL' &= \text{Equity (Table F107 line 28)} \\ FDL' &= \text{Debt (Table F107 line 19 and 26)} \\ FFL' &= \text{Direct investment (Table F107 line 32)} \end{aligned}$$

as well as for FA'_{us} :

$$FA'_{us} = FEA' + FDA' + FFA' + FOA'$$

with

$$\begin{aligned} FA'_{us} &= \text{Net increase in liabilities of the rest of the world (Table 107 line 34)} \\ FEA' &= \text{Equity (Table 107 line 46)} \\ FDA' &= \text{Debt (Table 107 line 39)} \\ FFA' &= \text{Direct investment (Table 107 line 52)} \end{aligned}$$

According to the Guide to the Flow of Funds, the FFA and BoP series satisfy:

$$\begin{aligned} FDL' &= FDL \\ &\quad + \text{net issuance of bonds by Net. Ant. subsidiaries (26b)} \\ FEL' &= FEL \\ FFL' &= FFL \\ FEA' &= FEA \\ FDA' &= FDA \\ FFA' &= FFA \\ &\quad + \text{net issuance of bonds by Net. Ant. subsidiaries (26b)} \end{aligned}$$

from which we conclude that:

$$\begin{aligned} FOL' &= FOL + \text{Gold and SDR (12)} \\ &\quad - \text{change in interbank claims on foreigners (13f to 13l)} \\ FOA' &= FOA - KA \\ &\quad + \text{Gold and SDR (12)} + G \\ &\quad - \text{change in interbank claims on foreigners (13f-13l)} \end{aligned}$$

Note that before 1969 (when this applies), $SDR = 0$, and with our sign convention Gold and SDR (12) $+G = 0$.

1.4 The Dynamics of the External Budget Constraint.

The stock data in the BEA is updated as follows:

$$P\tilde{X}_{t+1}^i = P\tilde{X}_t^i + FX_{t+1}^i + DX_{t+1}^i \quad (5)$$

where $P\tilde{X}_t^i$ represents the position at the *end of period* t for series i , FX_t^i the flow during period (BEA definition) t and DX_t^i a discontinuity reflecting a market valuation adjustment or a change of coverage in the series between $t - 1$ and t .

Summing across all the series, we obtain the international investment position:

$$\begin{aligned} N\tilde{A}_{t+1} &= \sum_j P\tilde{A}_{t+1}^j - \sum_i P\tilde{L}_{t+1}^i \\ &= \sum_j \left(P\tilde{A}_t^j - FA_{t+1}^j + DA_{t+1}^j \right) - \sum_i \left(P\tilde{L}_t^i + FL_{t+1}^i + DL_{t+1}^i \right) \\ &= N\tilde{A}_t - \left(\sum_j FA_{t+1}^j + \sum_i FL_{t+1}^i \right) + \left(\sum_j DA_{t+1}^j - \sum_i DL_{t+1}^i \right) \end{aligned}$$

In turn, the flow data satisfies:

$$\begin{aligned} -FA_t &= -\sum_j FA_t^j - \sum_i FL_t^i \\ &= CA_t + SD_t + KA_t + G_t \end{aligned}$$

where we used the fundamental BoP equation. So,

$$N\tilde{A}_{t+1} = N\tilde{A}_t + CA_{t+1} + SD_{t+1} + KA_{t+1} + G_{t+1} + ND_{t+1}$$

where

$$ND_t = \sum_j DA_t^j - \sum_i DL_t^i$$

is the net discrepancy. In the case where there is no change in coverage of the data, this net discrepancy corresponds to the capital gains. Further, we can write the current account as follows:

$$CA_t = NX_t + I_t + UT_t$$

where I_t denotes net income receipts (including interest income, distributed dividends and FDI earnings), and UT_t represents unilateral transfers plus net compensation of employees.⁵ The sum of I_{t+1} and ND_{t+1} represents the total return on the net foreign asset portfolio between t and $t + 1$, $(R_{t+1} - 1)N\tilde{A}_t$. We can then rewrite the accumulation equation as:

$$N\tilde{A}_{t+1} = R_{t+1}N\tilde{A}_t + NX_{t+1} + UT_{t+1} + KA_{t+1} + G_{t+1} + SD_{t+1}$$

Finally, we map this equation to the definitions that we use in the paper. The paper defined NA_t as the *beginning of period* net foreign asset. The relationship between NA_{t+1} and $N\tilde{A}_t$ is as follows:

$$NA_{t+1} = R_{t+1}N\tilde{A}_t$$

This implies the following dynamic accumulation equation:

$$\begin{aligned} NA_{t+1} &= R_{t+1}N\tilde{A}_t \\ &= R_{t+1} \left(R_t N\tilde{A}_{t-1} + NX_t + UT_t + KA_t + G_t + SD_t \right) \\ &= R_{t+1} (NA_t + NX_t + UT_t + KA_t + G_t + SD_t) \end{aligned}$$

In our empirical implementation, we omit the residual term $RES_t = UT_t + KA_t + SD_t + G_t$. Direct inspection reveals that it is very volatile but we can reject a unit root, so the term RES_t/W_t would be negligible. Therefore, we rewrite the accumulation equation as:

$$NA_{t+1} = R_{t+1} (NA_t + NX_t)$$

⁵According to the BOP manual, direct investment income in the CA includes distributed earnings as well as the share of reinvested earnings. So there is an entry in the current account and an offsetting entry in the financial account.

1.5 Additional remarks:

1. how to fit the calculated returns (implicit) to the BEA returns.

Denote $P\tilde{X}_t$ the stock at the end of period t for series X and FX_t the flow for the same period. Assume that the returns are accrued at the beginning of the period, so that the accumulation equation from quarter t to quarter $t + 1$ takes the following form:

$$P\tilde{X}_{t+1} = P\tilde{X}_t R_{t+1} + FX_{t+1}$$

From the constructed series $P\tilde{X}_t$ and FX_t we can extract the implicit return:

$$R_{t+1} = \frac{P\tilde{X}_{t+1} - FX_{t+1}}{P\tilde{X}_t}$$

We then compare the continuously compounded annual returns $R_{t,t+4} = \ln(R_t R_{t+1} R_{t+2} R_{t+3})$ with the annual return that is used to value the BEA series, $\tilde{R}_{t,t+4}$.

2. How to treat discontinuities? The accumulation equation assumes that ND_t represents capital gains. In some cases, the discontinuity is too big to be justified by capital gains. Instead, it represents a rebasing of the underlying series (e.g. Table F.107 line 26, U.S. corporate bond liabilities, or Table F.107 line 32, direct investment liability). The valuation equation is

$$P\tilde{X}_{t+1} = P\tilde{X}_t + FX_{t+1} + DX_{t+1}$$

DX_t reflects both the capital gain and the discontinuity in year t . If there is a discontinuity at time T , we need to adjust both positions and flows before T . Our approach is to attribute all the adjustment at time T to the discontinuity. Define the adjustment factor $\kappa = 1 + \frac{DX_T}{P\tilde{X}_{T-1}}$. Next, scale all positions, flows and previous discontinuities by κ for $t < T$:

$$\begin{aligned} P\hat{X}_0 &= \kappa P\tilde{X}_0 \\ F\hat{X}_t &= \kappa FX_t \end{aligned}$$

The accumulation equation becomes

$$\begin{aligned} P\hat{X}_{t+1} &= P\hat{X}_t + F\hat{X}_{t+1} + D\hat{X}_{t+1} \\ &= \kappa P\tilde{X}_{t+1} \end{aligned}$$

Then,

$$\begin{aligned} P\hat{X}_T - P\hat{X}_{T-1} - F\hat{X}_T &= P\tilde{X}_T - \kappa P\tilde{X}_{T-1} - F\hat{X}_T \\ &= P\tilde{X}_T - P\tilde{X}_{T-1} - DX_T - F\hat{X}_T \\ &= DX_T - DX_T \\ &= 0 \end{aligned}$$