**Title**

The U.S. "2017 Tax Cuts & Jobs Act" Introduces a Significant Data Error in Corporate Net Cash Flow

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**Abstract**

A recent one-time accounting "repatriation tax" charge against a leading cash flow series (e.g., Federal Reserve Economic Data series, Corporate Net Cash Flow with Inventory Valuation Adjustment) introduces a significant change in 4th Quarter, 2017 that is an accounting artifact. This note demonstrates the econometric impact of the charge and illustrates how to back it out resulting in a series consistent with economic activity. Without the proposed adjustment, the series has what is essentially a permanent outlier that is of such magnitude that it can distort regression coefficients and statistical models when the 4th Quarter, 2017 datapoint is included in analysis.

**Keywords**

Economic data; forecasting; repatriation tax; net corporate cash flow

**1 Introduction**

A recent one-time repatriation tax issued under the United States federal law commonly known as the "2017 Tax Cuts and Jobs Act" indirectly impacted the economic series "net cash flow with inventory valuation adjustment"[1] produced by the Bureau of Economic Analysis (BEA).  The BEA accounted for the one-time tax by changing the reported value of the single quarterly data point for the 4th Quarter, 2017.  While this reported value may accurately reflect the legal circumstance, it could have long term ramifications for econometricians, business forecasters, and others who use the series for modeling or forecasting.

This note discusses the legal context for the one-time tax, how it affects the series, and why econometricians should consider using an adjusted version of the series that "backs out" the repatriation tax when using the series for modeling.  We conclude the note with a few simple regression examples illustrating the impact of using the unmodified net cash flow series instead of an adjusted series.

**2 The Context**

The federal law commonly known as the "2017 Tax Cuts and Jobs Act", made significant changes to the tax system in the U.S. when it was signed into law near the end of 2017.  One aspect of the law directly impacted international funds held by corporations, businesses or individuals who own 10 percent or more of a foreign corporation.  These funds were made subject to a one-time repatriation tax on any foreign earnings acquired between 1986 and the end of each company's most recent fiscal year.  This created a one-time tax burden on companies with large interests in foreign corporations; companies were given the option of paying the tax in a single payment or distributing the payments over the course of the following eight years.  The econometric models used in this study were implemented using RStudio, R

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[1] This series, "Addenda for corporate cash flow: net cash flow with IVA", is Line Item 26 in Table 1.12 National Income by Type of Income, of the BEA's NIPA tables. This series is available as the series CNCF from the Federal Reserve Economic Data (FRED), which is a freely available database produced and maintained by the Research division of the Federal Reserve Bank of St. Louis.  More detailed information about the FRED database and service are available from fred.stlouisfed.org and Anderson (2006) [1].

version 3.3.2 (2016-10-31) – "Sincere Pumpkin Patch" on a Platform of x86_64-264-ming232/x64 (64-bit)

[2] on an Intel Core i7-6700HQ CPU laptop running at 2.60GHz with 16 GB of memory, running Windows

10 64-bit Professional operating system.  In addition, the R packages readxl and calibrate were used to

support the analysis [3], [4].  The authors wrote their own R scripts to run the graphs and models in this

study.

This special tax indirectly impacts the corporate cash flow series "net cash flow with inventory

valuation adjustment" produced by the Bureau of Economic Analysis (BEA).  One component of corporate

cash flow is net direct investment abroad [5][2].  Net direct investment abroad is also part of foreign

earnings (see Figure 1).  Since the tax is levied on foreign earnings, any net direct investment abroad is

also directly taxed and in so doing the tax directly impacts corporate cash flow.

Figure 1: How the Repatriation Tax Impacts Corporate Cash Flow
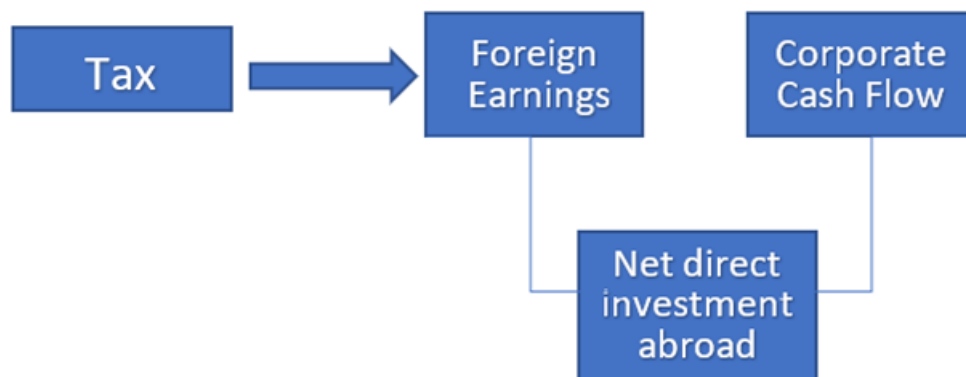


The BEA estimated that the tax, essentially a "capital transfer from business to federal government",

is approximately $1 trillion [6].  While this tax does not impact corporate profits, it does reduce the value

for corporate net cash flow with inventory valuation adjustment (IVA).  Accordingly, the BEA reduced their

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[2] King and Larach, 2016, provide insight with a graphic (their Figure 1) which shows the detailed linkage between net direct investment abroad and corporate cash flow.  We have simplified this connection in our Figure 1 to explain the relationship between the tax, foreign earnings, net direct investment abroad and ultimately corporate cash flows.

estimate of the corporate net cash flow with IVA for the 4th Quarter 2017 by $1 trillion to reflect the estimated impact of the one-time deemed repatriation accumulated foreign earnings tax [7].  This accounting process reduced the reported corporate net cash flow by a substantial percent giving an IVA value of $1,438.8 billion (i.e. $1.4 trillion) which is approximately 37 standard deviations below the average.

A time series plot of these data, presented in Figure 2, illustrates that the recent apparent decline is substantially greater than that experienced at the beginning of the Great Recession in 2008.  While a drop of this magnitude would typically signal a fiscal collapse of a magnitude represented in dystopian science fiction films, in this case the reported reduction in the corporate cash flow with IVA is simply an accounting-related one-time charge which affects the balance sheet but remains unrelated to actual ongoing productivity.

Figure 2: Time Series Plot of Corporate Cash Flow with IVA between 1st Quarter, 2000 and 1st Quarter, 2018
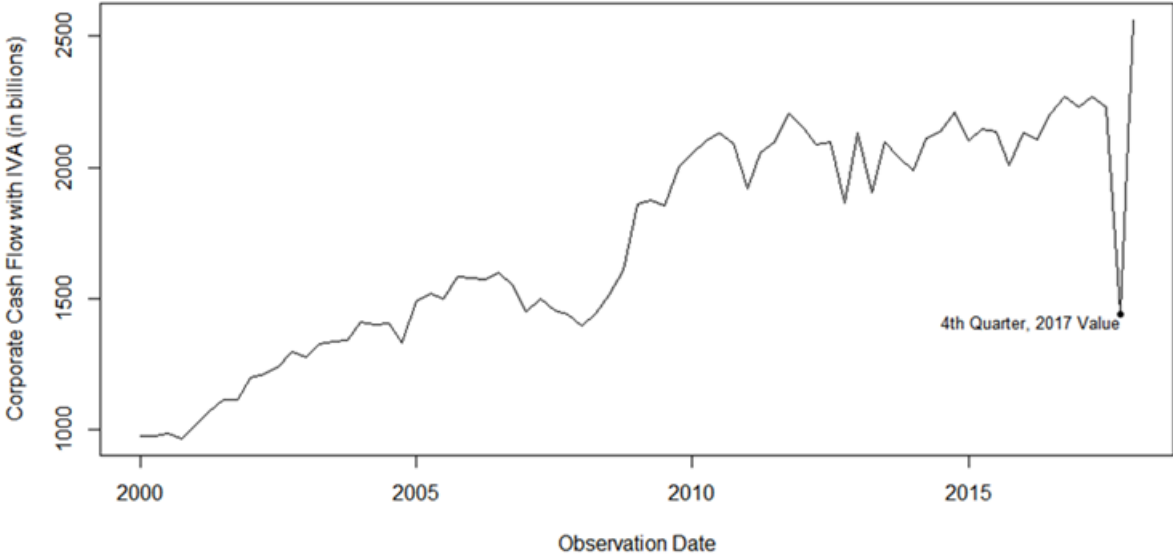


This means that this drop in corporate cash flow with IVA is not a direct indicator of the overall health of U.S. firms. In fact, since the weight of the tax has been entirely recorded in the 4th Quarter, 2017, it is

anticipated that future quarterly values for the corporate net cash flow with IVA will be similar to previous unadjusted values. Corresponding with this expectation, in the next quarter (1st Quarter, 2018) the value rose to $2,560.929 billion ($2.56 trillion), even higher than the 4th Quarter, 2017 adjusted value, $2,438.8 billion (note that at the time of writing, the BEA has only released the preliminary 1st Quarter, 2018 value). Figure 3 highlights the difference between the announced 4th Quarter, 2017 value (unmodified value) and the 4th Quarter, 2017 value "but for" the one-time repatriation tax (adjusted value).



Figure 3: Time Series Plot of Adjusted Corporate Cash Flow with IVA between 1st Quarter, 2000 and 1st Quarter, 2018
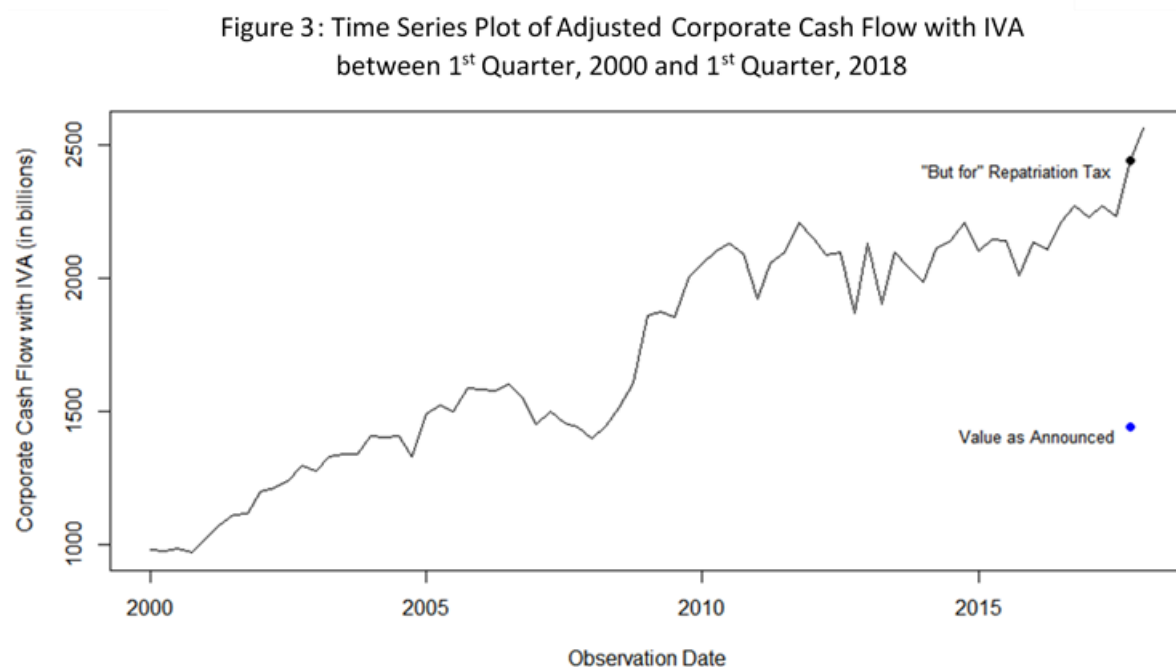
### 3 Example of Impact

We emphasize that this accounting adjustment for the tax unnecessarily impacts any economic analysis, skewing results and leading to false conclusions. As mentioned previously, the impact of the tax was accounted for by subtracting 1 trillion from the raw value of the series in the 4th Quarter of 2017. Therefore, an adjusted version for econometrics purposes is obtained by adding back $1 trillion to the reported value in the 4th Quarter, 2017 (in other words, using a corporate cash flow with IVA of $2,438.8 billion instead of $1,438.8 billion).

Below, we present an example that illustrates how the use of the unmodified corporate cash flow series can skew results. In our example, we have three regression models. The first uses the nominal corporate net cash flow with inventory valuation adjustment (CNCF[3]) over the time period from 1st Quarter, 2010 through the 3rd Quarter, 2017 (one period prior to the recorded tax adjustment). The second uses the nominal unmodified CNCF over the time period from 1st Quarter, 2010 through 1st Quarter, 2018 (in which the 4th Quarter, 2017 value is $1,438.8 billion). The third uses the nominal modified CNCF from 1st Quarter, 2010 through 1st Quarter, 2018 (in which the 4th Quarter, 2017 value is $2,438.8 billion). A model concerning corporate cash flow as adapted from Söhnke M. Bartram [8] is as follows.

$$CNCF = \beta_0 + \beta_1 EURUSD + \varepsilon \qquad (1)$$

Where the $CNCF$ term is the corporate net cash flow with IVA (CNCF) for the United States [9] and the $EURUSD$ term is the U.S. dollar to euro exchange rate [10]. The regression results are shown below in two sets.

Model 1: Time Range is 1st Quarter, 2010 – 3rd Quarter, 2017

Model 1
Dependent Variable: Nominal CNCF
Method: OLS
Observations: 31
Date Range: 01/01/2010 - 07/01/2017

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Constant | 2611.065 | 172.9598 | 15.09637 | 2.847244e-15 |
| EURUSD | -402.245 | 137.4535 | -2.92641 | 6.601861e-03 |

| | |
|---|---|
| R2: | 0.228 |
| Residual Std. Error | 87.933 (df = 29) |
| F Statistic | 8.564 (df = 1; 29); p-value: 0.006602 |

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[3] FRED uses CNCF as the abbreviated series name for "Corporate Net Cash Flow with Inventory Valuation Adjustment". For consistency we continue to use the abbreviated name here.

Model 1 is an OLS regressions using the unmodified CNCF series on a restricted time period between the 1st Quarter, 2010 and the 3rd Quarter, 2017 (one period before the tax adjustment is recorded). In this model the independent variable (exchange rate) has a p-value of 0.006602 (or 0.66%). Additionally, the $R^2$ is 22.8% (relatively high considering that there is only one independent variable), which tells us that 22.8% of the variation in the CNCF series is explained by the variation in the exchange rate series.

Model 2: Time Range is 1st Quarter, 2010 – 1st Quarter, 2018

**Model 2**
**Dependent Variable: Nominal Unmodified CNCF**
**Method: OLS**
**Observations: 33**
**Date Range: 01/01/2010 - 01/01/2018**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Constant | 2478.4091 | 332.5267 | 7.453264 | 2.139690e-08 |
| EURUSD | -302.2895 | 264.9475 | -1.140941 | 2.626323e-01 |

| R2: | 0.0403 |
|---|---|
| Residual Std. Error | 170.7 (df = 31) |
| F Statistic | 1.302 (df = 1; 31); p-value: 0.2626 |

Model 3: Time Range is 1st Quarter, 2010 – 1st Quarter, 2018

**Model 3**
**Dependent Variable: Nominal Modified CNCF**
**Method: OLS**
**Observations: 33**
**Date Range: 01/01/2010 - 01/01/2018**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Constant | 2727.4354 | 245.6843 | 11.10138 | 2.496024e-12 |
| EURUSD | -477.2621 | 195.7541 | -2.43807 | 2.069447e-02 |

| R2: | 0.1609 |
|---|---|
| Residual Std. Error | 126.1 (df = 31) |
| F Statistic | 5.944 (df = 1; 31); p-value: 0.02069 |

Models 2 and 3 show OLS results using the unmodified and the modified CNCF series over the time period between the 1st Quarter, 2010 and the 1st Quarter, 2018 (thus including the data point with the tax adjustment). When reviewing Model 2, which contains the unmodified $1,438.8 billion value, the

exchange rate now has a p-value of 0.2626 (or 26.26%) and the model's $R^2$ has dropped to 4.03%.

Reviewing the regression results for Model 3 where the cash flow has been adjusted for the impact of the "2017 Tax Cuts and Jobs Act" (using the $2,438.8 billion instead of $1,438.8 billion), we find that the exchange rate has a p-value of 0.02694 (or 2.69%). Model 3 also has a $R^2$ of 16.09%. While in Model 2 the variation in the exchange rate only explains 4.03% of the variation in the CNCF, it explains 16.09% of the variation in the CNCF in Model 3. Using the unmodified cash flow series might lead one to believe there is little statistical relationship between the exchange rate and the corporate cash flow series, when in fact, once you disregard the effect of the tax bill, there is strong evidence of a relationship.

**4 Conclusion**

As illustrated in the examples above, using the corporate net cash flow series without backing-out the recent tax impact on the corporate net cash flow with IVA will alter the results of economic and financial analysis. Business economists should be aware of this change going forward and appropriately implement a permanent adjustment to the corporate cash flow series when incorporating it in their analyses.

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