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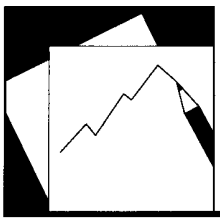

IMF Working Paper

Stock-Flow Adjustments, Government's Integrated Balance Sheet and Fiscal Transparency

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Stock-Flow Adjustments, Government's Integrated Balance Sheet and Fiscal Transparency[1]

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Abstract

This paper re-examines the stock-flow discrepancies of government debt and deficits and correlation with fiscal transparency. Applying the fully integrated relationship between financial stocks and flows allows for a more refined analysis of the deterministic components that make up the 'stock-flow' residual. Using partial measures of these stock-flow residuals, several empirical studies have found them to be significantly correlated with fiscal transparency, inflation, fiscal rules, and banking crisis. Using fully integrated public finance data from the *IMF Government Finance Statistics Yearbook* for a sample of 22 countries, the findings in this paper suggest that stock-flow residuals have a significantly smaller magnitude than previously assumed and are, in fact, not correlated with fiscal transparency. A stronger determinant of fiscal transparency scores appears to be the actual reporting of fiscal data covering general government, especially a full financial balance sheet.

JEL Classification Numbers: D78; E61; H6; H83; M41

Keywords: stock flow adjustments, government finance statistics, fiscal transparency, public finance

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I. INTRODUCTION

The recent financial crisis has highlighted the importance of comprehensive, high quality and transparent balance sheet data which is consistent with financial transactions. The conditions which foster, greater levels of fiscal transparency have become an area of increased interest. Past research has suggested that "stock-flow adjustment" residuals (commonly measured as the difference between changes in gross government debt and deficits) have been representative of a government's engagement in some degree of 'creative accounting' or 'fiscal gimmickry' (Koen and van den Noord 2005, Von Hagen and Wolff 2006; Campos, Jaimovich, and Panizza 2006; Weber 2012). While many of these contributions discuss the residual components that emerge from taking the difference between changes in stocks of gross debt and deficits, none have explicitly examined its underlying accounting identity due to data limitations. Failing to provide a clear exposition of this identity, along with a distinction between transactions, flows, and stocks, leads to some confusion regarding, not only the determinants of this residual, but the name "stock-flow adjustment" itself.

A full understanding of the relationship between government debt, deficits, and fiscal transparency requires a comprehensive examination of financial transactions, other economic flows, and their integrated relationship with stocks at fixed points in time. Due to data limitations, however, previous studies of "stock-flow adjustments" have not been able to accomplish this empirically and have instead relied on a partial measure of this adjustment; specifically the differences between changes in gross debt and deficits. The integrated framework of the IMF's *Government Finance Statistics Manual, 2001* (*GFSM 2001*), promotes the comprehensive reporting of fiscal stocks and flows, making it possible to measure stock-flow residuals *explicitly* through the lense of its deterministic relationship. The findings in this paper suggest that, in most cases, stock-transaction residuals can be fully explained with the reported data in other economic flows and transactions in financial assets. In this sense, governments who provide such data can both, increase transparency ratings, as well as, provide greater legitimacy to their fiscal statistics.

This paper will begin with an overview of the literature on creative accounting and fiscal gimmickry with both anecdotal and generalized past findings in Section II. Section III will provide an explicit overview of transactions and flows from which stocks can be computed in an integrated framework. Once a clear analytical definition of deficits and (changes in) debt are provided, taking the difference between the two is a straightforward algebraic exercise. This allows for a more refined discussion of why, and what, differences exist between deficits and changes in gross debt. Section IV will complement the theoretical exercise found in Section III with an empirical examination of the relationship between transactions, flows, and stocks using data from the IMF *Government Finance Statistics Yearbook (GFSY)*. Section V will re-examine the relationship between fiscal transparency and stock-flow residuals, and Section VI will conclude.

II. ACCOUNTING ILLUSIONS AND FISCAL TRANSPARENCY

The presence of fiscal targets has commonly been associated with a lack of transparency or illusory accounting behavior from policymakers who are hesitant to impose the unpopular reforms necessary to comply with these targets (Easterly, de Haan and Gali 1999; Milesi-Ferretti and Moriyama 2006; Koen and van den Noord 2005, Alt; Lassen and Wehner 2012; Irwin 2012). Given an objective of eluding public scrutiny for mismanaged public accounts, the difficulty lies in the identification of hidden or misclassified stocks and/or financial transactions. The adoption of the Maastricht Treaty, along with close regulatory oversight of these governments' financial accounts, provided a rare and ideal testing ground for the hypothesis that governments might engage in "nonstructural adjustments" (Milesi-Ferretti and Moriyama 2006), "fiscal adjustment illusions" (Easterly, de Haan and Gali 1999) or "fiscal gimmicks" (Koen and van den Noord 2005), which effectively decrease deficits while leaving net worth unchanged, in order to paint a more optimistic picture of fiscal performance.

Some examples of potential ways of achieving nonstructural adjustments discussed in the literature are:[2] i) the privatization of nonfinancial assets; ii) one-off refundable taxes; iii) the assumption of pension liabilities; iv) reclassification of institutional units; v) special dividends; vi) securitization through Special Purpose Vehicles;[3] vii) shifting paydays or delaying payment into next fiscal year; viii) delaying tax refunds or accelerating collection of fees; and ix) the sale of nonfinancial assets to lease them back. From an accounting perspective based on international standards (*System of National Accounts 2008* (2008 *SNA*), *GFSM 2001,* International Public Sector Accounting Standards (*IPSAS*)), although some of these adjustments will lead to one-off improvements in fiscal performance, in most cases, these improvements will be offset by the incurrence of future losses. This is true in the case of the sale of nonfinancial (capital) assets, which will increase a government's surplus, and potentially decrease gross debt in the year of the disposal, but will reduce capital returns in all subsequent years.[4] The same is true for refundable taxes which would increase revenues in the year in which they were imposed, but would be recorded as negative tax revenue in the year in which the refunds took place. Similarly, the assumption of pension liabilities for one-off payments should have no effect on deficit or debt as any increase in financial assets (cash) will be offset in the same fiscal year by the imputed pension liability. It should be noted, however, that this is not the case within the *European System of Accounts* (*ESA 1995*), which allows for these one-off pension assumption payments to be recorded as an increase in financial assets. This allows governments to show a decrease of gross debt without recording future liabilities associated with the assumption of pension obligations.[5] In the case of reclassification of institutional units, where a government reclassifies a loss-incurring public corporation as outside of the public sector, this will have the effect of decreasing the stock of gross debt, but will likely require future subsidies to cover losses. Such decreases in public debt will come with future increases in fiscal deficits.

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[2] For more in depth anecdotal evidence, see: Eurostat (1998); Easterly, de Haan and Gali 1999; Milesi-Ferretti and Moriyama 2006; Petersen 2003; Koen and van den Noord 2005).

[3] There are several cases beginning in 2000 (see Koen and van den Noord 2005 Annex, p.28).

[4] This is not to say that there are not rational motives for the sale of a nonfinancial asset where implicit subsidies exist. See Milesi-Ferretti and Moriyama (2006) and Von Hagen and Wolff (2006) for a more in depth discussion.

[5] The *ESA 1995* update is likely to bring the treatment of pension liabilities in line with *GFSM 2001*.

While all of the above scenarios create a perceived improvement in fiscal performance in the short run, if recorded in compliance with international accounting standards, these short term improvements will likely be offset by losses over the long run. It is also possible that some transactions are simply misclassified, leading to inconsistencies between balance sheets and financial statements.[6] In this sense, there are two ways in which governments can engage in nonstructural adjustments: short term measures using legitimate accounting which bite back in the long run, or, inconsistent recording of financial transactions.

In the case of the first, using a mix of anecdotal evidence along with a more general examination of evolving general government balance sheets, Milesi-Ferretti and Moriyama (2006) find evidence that EU governments constrained by fiscal rules in the run-up to the currency union were more likely to engage in a variety of nonstructural reforms. Evidence from general government balance sheets, mainly the relationships between i) changes in stocks assets and stocks of liabilities, and, ii) changes in net worth and changes in liabilities between two time periods (1992-1997 and 1998-2002) for a sample of 15 European countries, suggests that, in the run-up to the 1998 cut-off point for first round entry into EMU, there was a significant correlation between the disposal of assets and liquidation of liabilities. This finding indicates that reductions in the stock of debt were largely financed by the disposal of financial assets and, therefore, no improvements in net worth were being realized. This evidence confirms that reductions in gross debt were being financed by the sale of financial assets and, therefore, having "no durable impact of public finances as a whole."[7] While the restructuring of financial assets and liabilities can create nonstructural reductions in gross debt figures, this is only one of the two high visibility indicators of fiscal health. The art of nonstructural debt reduction must also consider that deficits are equally important in assessing a government's fiscal performance.

In the case of the inconsistencies resulting from misclassification, Weber (2012) and Von Hagen and Wolff (2006) examine the relationship between the accumulation of government debt and deficit financing transactions. Under the assumption that deficits are relatively more important in assessing a current government's fiscal performance, the findings in both of these papers suggest that the stock of public debt increases more than their accumulated deficits over time, leading to the conclusion that the subsequent inconsistencies or "stock-flow adjustments" (measured as the differences between general government gross debt and deficits) are a key determinant of debt dynamics (Von Hagen and Wolff 2006; Weber 2012). From an unbalanced panel of 163 countries over the 1980-2010 period, the parametric results in Weber (2012) show that average stock-flow adjustments possess significant country-specific differences, after taking into account any effects from inflation, foreign exchange rate fluctuations, debt forgiveness, or the event (and magnitude) of a banking crisis. Furthermore, these country-specific fixed effects are found to have a significant correlation with fiscal transparency scores, leading to the conclusion that higher levels of fiscal transparency reduce governments' ability to make use of accounting gimmicks thereby lowering stock-flow adjustments. Similarly, from a sample of 15 countries covering the 1980-2003 period, Von Hagen and Wolff (2006) find robust

[6] See Koen and van den Noord (2005) Annex.
[7] See Milesi-Ferretti and Moriyama (2006). p. 17

evidence that the introduction of fiscal rules in the European Union led general governments to "systematically use stock-flow adjustments to lower deficits."[8]

At the core of these contributions, is the importance of government reporting of legitimate financial statements and balance sheets, so that any nonstructural adjustments and/or accounting inconsistencies can be easily identified. This is especially true for the two most highly visible indicators of fiscal performance (debt and deficits), which are linked together through an accounting identity. Given previous data limitations, however, a financial 'black box' has lingered in moving beyond proxies into the empirically observable stock-flow adjustment identity and its relationship with fiscal transparency. The purpose of this paper is to re-examine this gap using a balance sheet approach, and to provide some preliminary empirical evidence.

III. THE STOCK-FLOW ADJUSTMENT IDENTITY

Defining deficits/surplus at time *t* (δ_t) as the balancing item of 'above the line' transactions (revenues and expenditures) and 'below the line' financing (transactions in financial assets and liabilities):

$$Rev_t - Exp_t - \widetilde{NFA}_t = \delta_t = \sum_{i=1}^{8} \tilde{x}_{it}^{FA} - \sum_{i=1}^{8} \tilde{x}_{it}^{L} \qquad (1)$$

Gross debt (D), as defined in the *SNA 2008* and *GFSM 2001* frameworks, is a sub-component of the stock of liabilities; mainly, those instruments which require the payment of principal or interest: [9]

$$D_t = D_{t-1} + \sum_{i=1}^{6} (\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) \qquad (2$$

Where:

Rev_t is total revenue at time *t*,

Exp_t is total expense at time *t,*

$\widetilde{NFA}_t$ is the net acquisition of non-financial assets at time *t,* [10]

$\tilde{x}_i^q$ represents transactions in instrument *i* during fiscal year *t* (*q=FA* for financial assets) or (*q=L* for liabilities),[11]

D_{t-1} is the stock of gross debt in period *(t-1),*

x_i^q represents the stock of instrument *i* at the end of fiscal year *t* (*q=FA* for financial assets) or (*q=L* for liabilities*),*

[8] Von Hagen and Wolff (2006) p. 15.
[9] Two liabilities are excluded from the definition of gross debt in the *2008 SNA* and *GFSM 2001* as these instruments do not require the payment of principal or interest. These are equity and investment fund share assets and financial derivatives and employee stock contributions. (See Appendix II)
[10] Note: tilde denotes a transaction throughout the paper.
[11] These are explicitly identified and defined in Appendix II.

$\Delta val_{x_{i,t}^{q}}$ represents holding gains and/or losses or re-evaluations of an asset (q=NFA, FA) or liability (q=L) for instrument *i* at time *t*,

$\Delta vol_{x_{i,t}^{q}}$ represents changes in the volume of an asset (*q=NFA, FA*) or liability (*q=L*) for instrument *i* that do not result from a transaction or from valuation changes.

The complete analytical definition of deficits (1) and changes in gross debt (2) makes the difference between the two identities a matter of straightforward algebra:

$$\Delta D_t - (-\delta_t) = \sum_{i=1}^{6} (\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) - (\sum_{i=1}^{8} \tilde{x}_{it}^{L} - \sum_{i=1}^{8} \tilde{x}_{it}^{FA}) \qquad (3a)$$

or,

$$\Delta D_t = \sum_{i=1}^{6} (\Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) + \sum_{i=1}^{8} \tilde{x}_{it}^{FA} - \sum_{i=7}^{8} \tilde{x}_{it}^{L} - \delta_t \qquad (3b)$$

From equations (3a) and (3b), it is clear that changes in the stock of debt between period *t* and period *(t-1)* equal the surplus/deficit for that period ($\Delta D_t = -\delta_t$) only if the valuation and volume changes for the liabilities included in the definition of debt, plus all transactions in financial assets minus liabilities incurred in equity or derivatives for that period, were equal to zero [i.e. $(\sum_{i=1}^{6}(\Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) + \sum_{i=1}^{8} \tilde{x}_{it}^{FA} - \sum_{i=7}^{8} \tilde{x}_{it}^{L} = 0)$]. As will be shown in Section IV, these conditions do not hold for any of the 22 countries in our sample. In such cases, the stock-transaction residual will tend to overestimate the degree of fiscal gimmickry or creative accounting in that country.

A second noteworthy item in equations (3a) and (3b) are transactions in financial assets. These are included in the definition of government's surplus/deficit but not gross debt, the measure most commonly used in empirical studies. As discussed in Section II, past research has found that governments may take advantage of the fact that gross, relative to net, debt is a more commonly reported figure to assess a government's debt position. In this case, a surplus which is used to purchase financial assets, or a deficit which is financed through the sale of financial assets, will lead to an increase/decrease in net worth but no change in gross debt. The above asymmetry could be easily rectified by using net, rather than gross, debt which would effectively eliminate the $\sum_{i=1}^{8} \tilde{x}_{it}^{FA}$ component from the equation and reduce the identifiable differences between changes in debt and deficits.

While a great deal of literature has considered stock-flow residuals to be a stochastic process,[12] where the difference between changes in debt from period *(t-1)* and the deficit incurred in period *t* can be explained by fiscal transparency, inflation, banking crisis, GDP per capita and political institutions, it should be clear from the above discussion that this residual can be explained as an identity.

[12] Buti *et al* (2007) takes on a more statistically justified approach and would be an exception to this claim.

Thus, any researcher running a regression of the form:

$$\Delta D_t - (-\delta_t) = f(\boldsymbol{X}) \qquad (4)$$

should note that the matrix (**X)** on the right hand side of (4) is an identity as defined on the right- hand side of equation (3a).

IV. EMPIRICAL CONSIDERATIONS

It has been rightly noted that a significant amount of the data required to fill the full stock-flow identity are not available for most countries. Data on deficits and some core components of gross debt (loans and securities) are available for a large number of countries while data on other economic flows and net debt (transactions in financial assets) are much sparser and more complicated to work with. Therefore, past research has relied on a variety of data sources and assumptions to facilitate large *N* parametric analysis for a heterogeneous and globally representative sample of countries. This approach has led to the computation of some very large partial stock-flow adjustments of, between -73 percent and 281 percent of GDP (Campos, Jaimovich, and Panizza 2006) and, -108.6 percent and 168.5 percent of GDP (Weber 2012).[13] These large ranges suggest a scenario whereby policymakers are able to engage in creative accounting to such a degree that the discrepancy between the change in debt and deficits were, in some cases, larger than the stock of debt itself.[14]

The integration of stocks and flows is a central feature of the IMF's *GFSM 2001,* leading the *Government Finance Statistics Yearbook* (*GFSY*) questionnaire to include separate tables for valuation and volume changes of assets (financial and nonfinancial) and liabilities. Although response rates remain somewhat limited for these concepts, there exists sufficient information to evaluate their magnitude for a sample of 22 countries.

Figures (1a) and (1b) show the mean differences in magnitude between the traditionally used measure of partial stock-flow adjustments (1a) and the complete stock-flow adjustment (1b) taken from *GFSY*. Comparing the two figures shows that, while a residual does remain for some countries in Figure (1b),[15] in many cases this is not significantly different from zero and has a much tighter 95 percent confidence band than that seen in Figure (1a). Interestingly, the volatility of both adjustments increased significantly in 2008 at the outset of the financial crisis.

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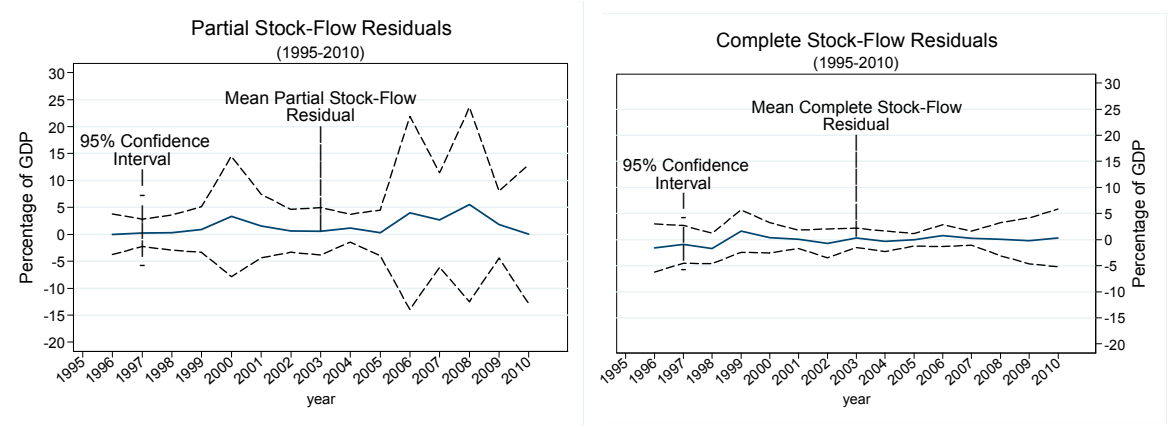
[13] Weber notes that these outliers may reflect other economic flows such as debt relief, debt forgiveness and exchange rate depreciation. After taking out the top and bottom 2 percent of stock-flow adjustments, this range falls to a more modest [-15.8 30.8] (see Weber 2012, p. 5).

[14] From a large sample of 70 countries, the largest stock of gross debt recorded for consolidated central government was 173.13 percent of GDP in Japan in 2010 (Source: *IMF GFSY*).

[15] A non-zero stock-flow residual is also an encouraging sign given that, in many countries, the compilation of fiscal stocks and flows is conducted by several different entities making it likely that small unintentional errors will occur. A non-zero residual suggests that countries are not forcing this residual to be zero in an *ad hoc* manner.

Figure 1a and 1b. Partial and Complete Stock-Flow Residuals (1996-2010)

(1a) **(1b)**



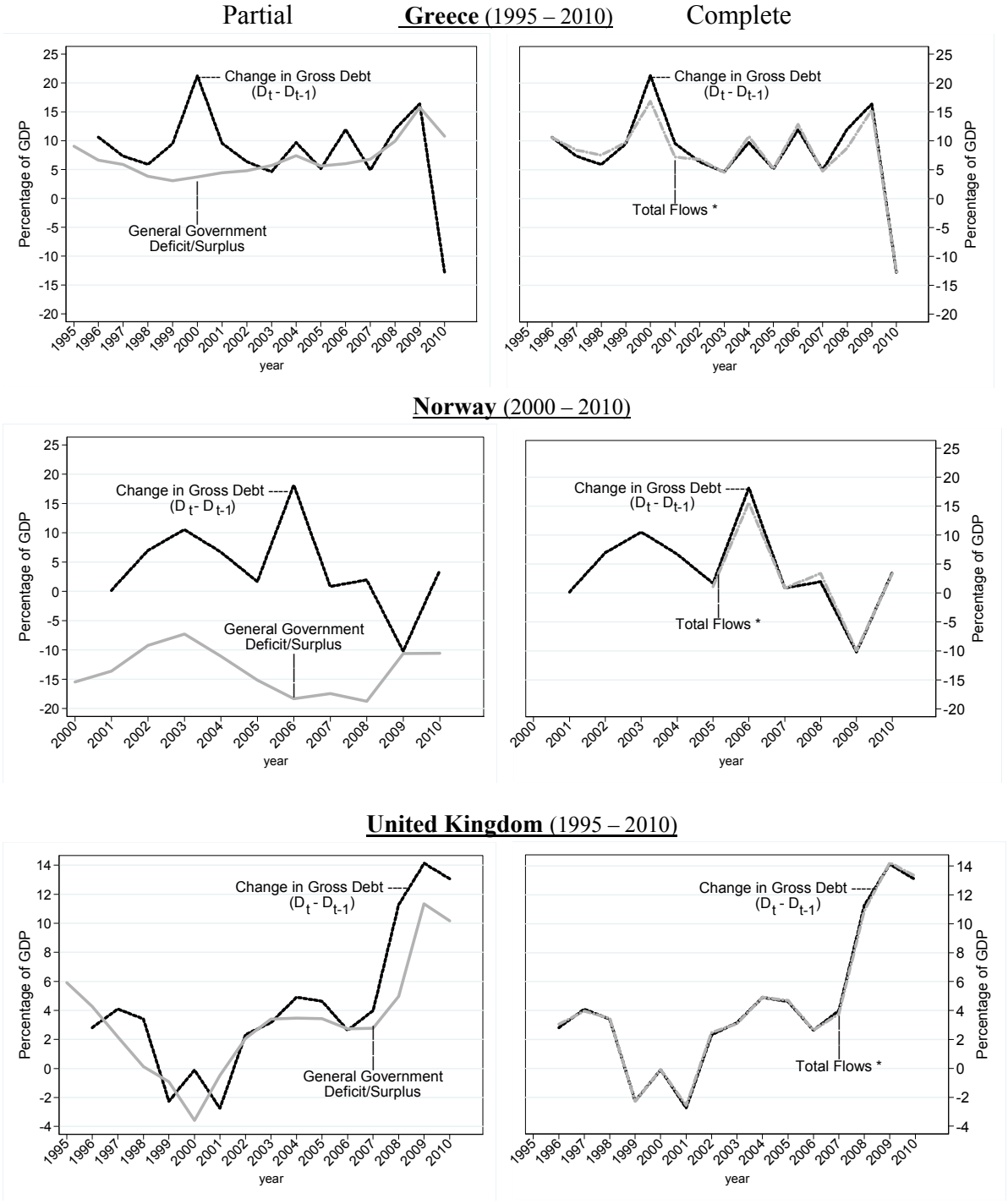
Source: *Government Finance Statistics Yearbook*

It is clear from Figure (1a) and (1b) that where stock-flow adjustments are more comprehensively measured, the emerging residual has a significantly smaller magnitude than what has been computed in past empirical research. To give a better idea of this difference country specific evidence can be seen in Figure 2 below which shows time series plots of transactions, flows, and stocks (changes in debt) for Greece, Norway, and the United Kingdom for the 1995-2010 period.[16]

Taking the difference between the change in gross debt and deficits would amount to taking the difference between the dashed black line and solid grey line for the left panel graphs, which appear to have little or no correlation. The range of this difference is also extremely large ranging between 19.0 percent of GDP in 2000 and -25.5 percent of GDP in 2010 in the case of Greece.[17] Although a residual remains when taking the differences between total flows and changes in debt (right panel graphs), the discrepancies for these years fall to much smaller magnitudes (4 percent of GDP in 2000 and -.05 percent in 2010 in Greece). The same phenomenon occurs in Norway and the United Kingdom.

[16] 2000-2010 in the case of Norway.
[17] Note: some of this difference would be due to the valuation of gross debt at market, rather than nominal, value.

Figure 2. Partial and Complete Stock Flow Residuals in Greece, Norway, and the United Kingdom



* Total Flows = $\sum_{i=1}^{6}(\Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) + \sum_{i=1}^{8} \tilde{x}_{it}^{FA} - \sum_{i=7}^{8} \tilde{x}_{it}^{L} - \delta$

Source: *Government Finance Statistics Yearbook*

Table 1 lists mean partial and complete stock-flow summary statistics for the entire sample of countries along with test statistics for the null hypothesis that these are no significantly different from zero. Although a residual does remain for most of the countries in the fourth column

(complete stock-flow), it becomes significantly smaller than the more commonly used calculation in column three (partial stock-flow).[18] Given the limited degrees of freedom in some of these countries, there are only a few where mean partial stock-flow residuals differ significantly from zero. These cases (Australia, Finland, Hong Kong, Luxembourg, Norway, Spain, and the United Kingdom) can all be explained by the net accumulation of financial assets and other economic flows over the sample period. Once these are accounted for, the significant deviations from zero disappear for all of these countries in column 5 of Table 1. A second concern in the literature has been the accumulation of persistent positive stock-flow adjustments (Von Hagen and Wolff 2006, Weber 2012, Eurostat 2012). While legitimate discrepancies can exist in stock-flow residuals, for example, due to nonintegrated input sources or time of recording issues, persistent positive discrepancies "may draw into question whether the deficit is appropriately measured."[19] Although, in several cases, the sample period for stock-flow residuals is quite limited, Table 1 also includes the cumulative partial and complete stock-flow residuals over the entire sample period. Again, these cumulative stock-flow figures decrease significantly when moving from partial (column 4) to complete (column 6) stock-flow residuals.

[18] See previous footnote.
[19] See Eurostat 2012, p.13.

Table 1. Partial and Complete Stock-Flow Data Summary Statistics
(in percent of GDP)

Country	Years	Mean Partial Stock-Flow Residual (%GDP) [a]	Cumulative Partial Stock-Flow Residual (%GDP)	Mean Complete Stock-Flow Residual (%GDP) [a]	Cumulative Complete Stock-Flow Residual (%GDP)
Australia	2004-2010	3.20*** (4.24)	19.25	0.09 (1.33)	0.54
Austria	1997-2010	0.12 (0.21)	3.74	-0.26 (-0.96)	-3.59
Hong Kong	2006-2009	4.15*** (4.07)	20.77	-0.49 (1.59)	-2.44
Colombia	2009-2010	13.60 (1.44)	8.39	-0.04 (-0.38)	-0.09
Cyprus	2001-2009	2.10* (1.79)	19.01	0.04 (0.69)	0.35
Denmark	1996-2010	1.37 (1.62)	22.18	-0.17 (-0.40)	-1.36
Estonia	1996-2010	0.07* (1.87)	1.03	-0.02 (-0.86)	-0.26
Finland	1996-2010	3.78*** (5.96)	56.79	0.13 (0.48)	1.97
France	1996-2010	0.44 (1.15)	6.61	-0.27 (-0.69)	-4.04
Greece	1996-2010	1.48 (0.69)	22.21	0.40 (0.89)	5.85
Hungary	1996-2010	0.60 (1.29)	8.99	0.24 (0.76)	3.55
Iceland	2002-2008	7.87* (1.86)	56.42	-0.02 (-1.22)	-0.11
Italy	1996-2010	-0.04 (-0.12)	-0.56	-0.99 (-1.19)	-14.88
Lithuania	2008-2010	-0.18 (-0.17)	-1.47	-1.67 (-1.07)	-6.67
Luxembourg	2002-2010	2.60** (2.21)	23.41	0.17 (0.17)	1.54
Malta	2004-2010	6.71 (1.13)	4.94	0.71 (1.62)	4.29
Netherlands	1996-2010	0.21 (0.19)	3.13	-0.36 (-0.75)	-5.35
Norway	2000-2010	17.79*** (6.23)	106.78	0.28 (0.53)	1.69
Portugal	1998-2010	0.59 (1.01)	10.93	0.72 (1.03)	9.40
Slovak Republic	2004-2007	-0.95 (-0.68)	-7.60	-0.10 (-1.31)	-0.40
Spain	1996-2010	0.93** (2.50)	11.44	-0.15 (-0.29)	-2.11
United Kingdom	1996-2010	1.30** (2.21)	19.44	-0.02 (-0.42)	-0.28

Source: *Government Finance Statistics Yearbook*

[a] – t -statistic in parenthesis for H_o: $\mu=0$ (*** p<.01; **p<.05; * p<.1)

V. STOCK-FLOW ADJUSTMENTS AND FISCAL TRANSPARENCY: A RE-EXAMINATION

A consistent finding from past research of "stock-flow adjustments" is a high correlation between partial stock-flow residuals and fiscal transparency. Whether this correlation exists in the context of complete stock-flow residuals has not yet been tested, largely due to data limitations. Although virtually all governments collect some form of fiscal data, this section will consider 'reporters' to be those countries who compile public finance statistics in a manner which is consistent with international accounting standards set out in *SNA 2008* and *GFSM 2001* and provide the data to the International Monetary Fund for public dissemination. The reasoning for this is: i) dissemination to the IMF signals a willingness on the part of a country to have their public finance data examined by a large international community of experts (transparency), and ii) by reporting within a well defined international accounting framework ensures a high level of comparability without having to make assumptions about definitions of series or institutional coverage (both of which have a significant impact on the data).[20] Because reporting of fiscal data is an important prerequisite to computing stock-flow residuals, this section will first examine the relationship between levels of reporting (as defined above) for fiscal data and transparency.

By separating a sample of 90 countries into three categories of: i) non-reporters of fiscal data for general government; ii) reporters of fiscal transactions for general government; and iii) reporters of fiscal stocks for general government (financial balance sheets),[21] we run a simple pooled linear regression of expected transparency scores based on two separate transparency rankings.[22] The first is the IMF Transparency Index from the 'Fiscal Transparency Report on Observance of Standards and Codes' (ROSC) Database, and the second is the transparency component from the Budget Institution Index found in the 'Budget Institutions and Fiscal Performance in Low Income Countries' IMF Working Paper (WP/10/80).[23] These indices were also used in other related papers (Weber 2012), and therefore allows for greater comparability of results. Expected transparency scores (normalized to [0 1]) are given below for both indices across the three categories of fiscal data reporting to the IMF Statistics Department in Figure 3 below. As expected, in both cases there is a statistically significant difference in transparency scores that comes with increased levels of reporting of general government fiscal data. On average, governments who move from not reporting to reporting a full financial balance sheet are expected to almost double their score from .42 to .73 in the case of the Fiscal Transparency ROSC index, and from .47 to .63 in the case of the Budget Transparency Index for Emerging and Low Income countries.

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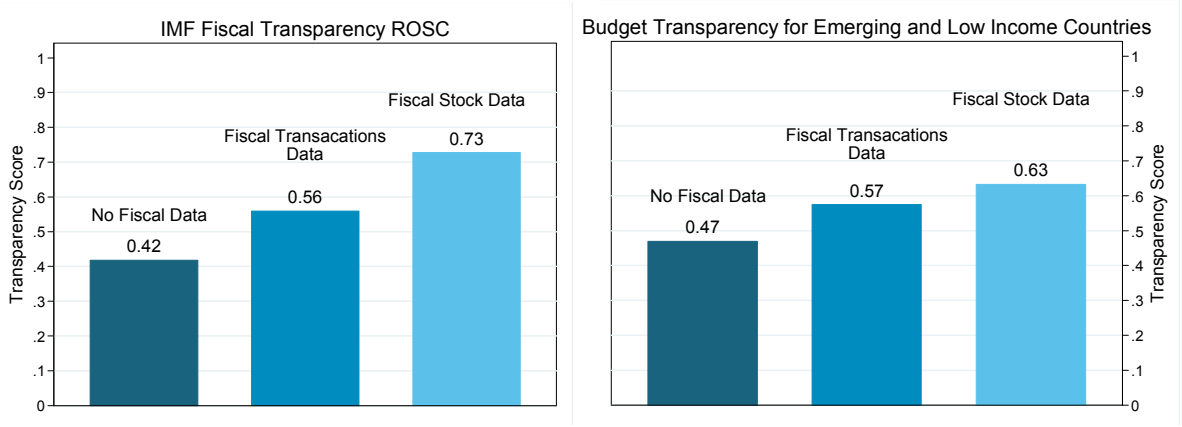
[20] For a good example of the magnitude of these differences in the context of government debt, see Dippelsman, R., Dziobek, C. and Gutierrez Mangas, C. *What Lies Beneath: Statistical Definitions of Public Debt* (2012).

[21] All countries who fall into category iii) would also classify in category ii).

[22] See Hameed, F. (2005). "Fiscal Transparency and Economic Outcomes." IMF Working Paper 05/225. Washington: International Monetary Fund.

[23] See Dabla-Norris *et al* (2010). "Budget Institutions and Fiscal Performance in Low-Income Countries" *International Monetary Fund Working Paper* (WP/10/80). Washington: International Monetary Fund. Note: the sample size in this dataset was limited to 72 low-income countries therefore the sample size in this regression was smaller than the first.

Figure 3. Reporting of Government Finance Statistics to the IMF and Fiscal Transparency



Source: IMF *Government Finance Statistics Yearbook* (1995-2011), Dabla-Norris *et al* (2010) 'Budget Institutions and Fiscal Performance in Low-Income Countries', and, Hameed (2005) 'Fiscal Transparency Report on Observance of Standards and Codes (ROSC) Database'

Given that the reporting of fiscal statistics signals fiscal transparency relative to nonreporters (*ceteris paribus*), the results from Figure 3 are fairly intuitive. The magnitude of improvement should, however, be emphasized. As mentioned above, many past studies using partial stock-flow adjustments and fiscal transparency have relied on statistics from a variety of sources covering various levels of government, in order to obtain large samples of countries. This makes it more difficult to assess the impact of fiscal data which may not follow a single unified methodological framework.[24] Confining the sample to general government reporters from a single source (*GFSY*) allows us to isolate the effect of reporting comparable fiscal data covering the entire general government sector on transparency from the effect of reporting data with non-zero stock-flow residuals.

Confining the sample of countries to those who report sufficient data to compute stock-flow residuals for general government allows for a test of whether past findings from partial stock-flow data are consistent with those obtained using complete stock-flow residuals.

Denoting $y_{j,t}$ as the stock flow adjustment in country *j* at time *t,*[25] the following specification is estimated:

$$y_{j,t} = \mu_j + \boldsymbol{X\beta} + \varepsilon_{j,t} \qquad (5)$$

Where $\boldsymbol{X}$ is a matrix of variables which have been shown to have a systematic correlation with partial stock-flow residuals (inflation, banking crisis, and fiscal rules), $\boldsymbol{\beta}$ is a vector of unknown parameters to be estimated, and μ_i is the conditional fixed-effect for country *j*, after controlling for the variables in $\boldsymbol{X}$. The results for an unbalanced panel of the 21 countries listed below in

[24] In depth metadata are provided for all countries in the *GFSY* Institutional Tables.

[25] From 3b, $y_{j,t}$ would be equivalent to $\Delta D_{jt} - \sum_{i=1}^{6}(\Delta val_{x^L_{jit}} + \Delta vol_{x^L_{jit}}) - \sum_{i=1}^{8}\tilde{x}^{FA}_{jit} + \sum_{i=7}^{8}\tilde{x}^{L}_{jit} + \delta_{jt}$

Table 2, as well as a full sample of countries who reported sufficient data to compute partial stock-flow residuals, are given below for both partial and complete stock-flow residuals.

Table 2. Determinants of Partial and Complete Stock-Flow Residuals
(Unbalanced panel estimates with fixed effects and bootstrapped standard errors in parenthesis)

Variables	*Partial Stock-Flow Sample I (Full) (%GDP)*	*Partial Stock-Flow Sample II (Subsample) (%GDP)*	*Complete Stock-Flow Sample II (%GDP)*
Inflation	0.70***	0.58***	-0.08
	(0.16)	(0.18)	(0.07)
Fiscal Cost of Banking Crisis	5.31*	6.21**	1.27
(%GDP)	(2.82)	(2.66)	(1.05)
Fiscal Rule	0.77	1.21	-0.26
	(1.69)	(1.61)	(0.64)
Constant	-0.44	-1.42	0.23
	(1.49)	(1.90)	(0.75)
Observations	343	227	227
Countries	36	22	22
R^2 (*within*)	.08	.08	.01
F-test ($\mu_j = 0;\ \forall j$)	6.33	6.43	0.76
(p-value)	(<0.001)	(<0.001)	(0.77)

*** p<.01; **p<.05; * p<.1

Source: IMF *Government Finance Statistics Yearbook* (1995-2011) and Staff Calculations

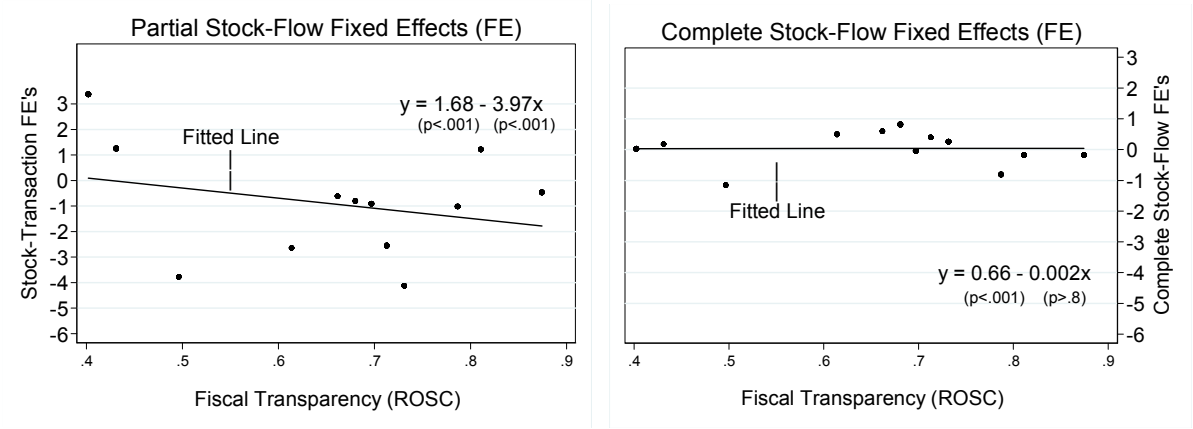
Several interesting differences emerge from the results in Table 2. Firstly, consistent with findings from past research (Von Hagen and Wolf 2006; Weber 2012), inflation and the fiscal cost of banking crisis, both have an expected positive correlation with partial stock-flow residuals for both the full sample and subsample of countries (which are significant at conventional confidence levels). These correlations, however, disappear (i.e. are not significantly different from zero) in the case of complete stock-flow residuals. This is likely due to the fact that the net acquisition of financial assets, and valuation and volume effects would correlate with inflationary pressure and government's acquisition of private bank assets, especially in times of financial distress. This is to say that, where government debt is measured in gross, rather than net terms, the partial stock-flow residual would include transactions in financial assets causing this residual to grow significantly in times where government may be purchasing equity in private firms to maintain their solvency during a financial crisis. All three specifications also exhibit very low R^2 values which suggests a weak partial association between the right hand side variables from equation (5) and the partial stock-flow residual (in the case of the first two regressions) and complete stock-flow residuals (in the case of the last regression). In the complete stock-flow residual regression, the R^2 value drops significantly from the partial stock-flow regressions indicating that, once we take into account all of the components of the stock-flow residual, the explanatory power of formerly significant variables disappears and the equation itself becomes more poorly specified.

Also noteworthy is the F-test for results for non-zero fixed effects. Because transparency scores are only available for a fixed point in time (and likely don't change much over short periods), past research has exploited the remaining 'idiosyncratic' country fixed effects (after controlling for other dynamic factors) by examining their correlation with transparency scores.[26] The last row of Table 3 suggests that, while country fixed effects are significantly different from zero in the case of partial stock-flow residuals, they are not significantly different from zero in the case of stock-flow residuals. This effectively means that, once we control for inflation, the fiscal cost of banking crisis and the existence of fiscal rules, there does not remain any significant variance/differences across country stock-flow residuals. In the context of fiscal transparency, this implies that it is not possible to explain stock-flow variance across countries with variance in fiscal transparency scores simply because no significant variance exists in the former in countries that report a full financial balance sheet.

It should be emphasized that the findings of this paper do not invalidate the conclusions from past research which has relied on a partial measure of stock-flow residuals, but do suggest that a more granular approach is necessary to disentangle the relationship between stock-transaction residuals and fiscal transparency. The consistent parametric findings with past research in columns 1 and 2 suggest that there do remain unexplained country-specific differences in stock transaction residuals. Figure 4 below also confirms past findings that these country-specific effects are significantly correlated with transparency scores. The fact that this relationship only holds for partial stock-flow residuals, and not complete stock-flow residuals (see right graph), however, implies that the correlation are likely to be found in other economic flows and/or transactions in financial assets. Although outside the scope of this paper, this is likely to be an important avenue for future research.

[26] This approach should also come with several econometric caveats, including the assumption that transparency scores are not correlated with any of the variables in $\boldsymbol{X}$ **(**i.e. $cov(transp_j, \boldsymbol{X}) = 0$ **)** and an assumption that the dynamic equation does not suffer from a omitted variable bias (i.e. the variance across fixed effect estimates is not partly explainable with variables which were not included in $\boldsymbol{X}$**).** Also, by regressing country specific 'fixed effect' point estimates on transparency scores assumes that they are known values with no uncertainty about their true values, which is not the case.

Figure 4. Partial and Complete Stock-Flow Fixed Effects and Fiscal Transparency



Source: IMF *Government Finance Statistics Yearbook* and Staff Calculations
Note: y = county fixed effects (μ_j) from equation (5) and x = fiscal transparency score (ROSC)
1/ Norway was removed from the sample due to extremely large transactions in financial assets.

VI. CONCLUSION

The central goal in this paper is to highlight the differences between partial and complete stock-flows residuals in public finance statistics and their relationship with fiscal transparency. In past literature, residuals have been calculated as the difference between fiscal deficits and the change in gross debt from one year to the next. However, this does not incorporate other economic flows (valuation and volume changes) or transactions in financial assets which in many cases have significant effects on a government's balance sheet. The difference between changes in gross debt between period (*t)* and (*t-1),* and the surplus/deficit from period *(t),* is, therefore, only a partial view of the complete stock-flow adjustment.

From an empirical perspective, the integrated accounting framework of the *GFSM 2001,* and associated collection of complete financial flow data, makes it possible for researchers to validate their stock-flow results using observed data for at least 22 economies that reflect the true accounting identity. The unified underlying methodology also ensures that the stock and flow data are comparable and consistent with respect to concept definitions and sectoral coverage.

Comparing partial with complete stock-flow residuals for these countries suggests that the magnitude of past measures of residuals was highly overestimated. Furthermore, fiscal transparency appears to be much more predictable by examining the publishing of fiscal data, rather than the magnitude of stock-flow residuals, which do not seem to vary significantly across countries who report a full financial balance sheet. While further research remains to be done to disentangle the granular relationship between financial flows, balance sheets and fiscal transparency, the findings in this paper suggest that governments who report a full financial balance sheet do a pretty good job of integrating stocks and flows, and experience significantly higher fiscal transparency ratings.

Appendix I. Summary Statistics and Data Sources

Summary Statistics *

Variable	*Mean (s.d.)*	*Min*	*Max*	*Source*
Stock-Transaction Residual [a] (% of GDP)	1.83 (5.23)	-23.52	36.45	IMF *Government Finance Statistics Yearbook*
Stock-Flow Residual [b] (% of GDP)	-0.50 (1.65)	-7.16	7.50	IMF *Government Finance Statistics Yearbook*
Inflation	2.90 (2.10)	-0.89	14.21	IMF *International Finance Statistics*
Fiscal Cost of Banking Crisis (% GDP)	0.05 (0.12)	0	0.47	IMF Financial Crisis Database
Fiscal Rules [c]	0.83	0	1	IMF Fiscal Rules Database
General Government Gross Debt [d] (%GDP)	0.63 (0.34)	0.06	1.33	IMF *Government Finance Statistics Yearbook*

* Number of observations = 209

[a] – Formally, the Stock-Transaction (*ST*) residual above is measured as:

$$ST_{jt}\Big/GDP_{jt} = \frac{\Delta D_{jt} - \delta_{jt}}{GDP_{j,t}}$$

[b] – Formally, the Stock-Flow (*SF*) residual above is measured as:

$$SF_{j,t}\Big/GDP_{j,t} = \frac{\Delta D_{jt} - \sum_{i=1}^{6}(\Delta val_{x_{jit}^{L}} + \Delta vol_{x_{jit}^{L}}) - \sum_{i=1}^{8}\tilde{x}_{jit}^{FA} + \sum_{i=7}^{8}\tilde{x}_{jit}^{L} + \delta_{jt}}{GDP_{jt}}$$

[c] – Fiscal rules (expenditure, revenue, debt and balanced budget) are coded as 1 if at least one rule exists within country *j* in period *t*, and 0 otherwise.

[d] – Formally, General Government Gross Debt is measured as:

$$\frac{D_{jt}}{GDP_{jt}} = \frac{D_{t-1} + \sum_{i=1}^{6}(\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}})}{GDP_{jt}}$$

Appendix II. Flows, Transactions, Net Worth, and Debt in Fiscal Statistics[27]

Denoting an institutional unit's [28] operating balance (OB) at time *t* as:

$$Rev_t - Exp_t = OB_t \qquad (1)$$

Where,

Rev_t is an institutional unit's total revenue at time *t*,

Exp_t is an institutional unit's total expense at time *t,*

and,

defining an institutional unit's surplus or net lending at time *t* (δ_t) as [29]:

$$OB_t - \widetilde{NFA}_t = \delta_t \qquad (2)$$

Where,

$\widetilde{NFA}_t$ is an institutional unit's net acquisition of non-financial assets at time *t* [30],

and,

These 'above the line' transactions are well known and straightforward concepts to most fiscal economists. Surpluses ($\delta > 0$) can then be invested in financial assets or used to pay off liabilities. Likewise, deficits ($\delta < 0$) can be financed through the sale of financial assets (*FA*) or incurrence of liabilities (*L*).

$$\delta_t = \overbrace{\sum_{i=1}^{8} \tilde{x}_{it}^{FA}}^{\text{Net Acquisition of financial assets}} - \underbrace{\sum_{i=1}^{8} \tilde{x}_{it}^{L}}_{\text{Net Incurrence of Liabilities}} \qquad (3)$$

[27] Unless otherwise noted, the terminology used throughout this appendix is based on the standard international macroeconomic accounting framework found in System of National Accounts 2008 (*SNA 2008*), the IMF Government Finance Statistics Manual 2001 (*GFSM 2001*) and IMF Public Sector Debt Statistics: Guide for Compilers and Users 2012.

[28] 'Institutional unit' could encompass the entire public sector or be central, state, local or general government (See *Government Finance Statistics Manual 2001*, Chapter 2).

[29] This depends on whether the institutional unit was using cash or accrual as a basis of recording. Although basis of recording has substantive implications, for simplicity, the remainder of this paper will use the terms deficit/surplus and net lending/borrowing interchangeably but it is assumed that the institutional unit is recording fiscal data on an accrual basis.

[30] Note: tilde denotes a transaction throughout the paper.

Where the following denote an institutional unit's transactions in,[31]

$\tilde{x}_1^q$ monetary gold and SDR assets (q=*FA*)

$\tilde{x}_2^q$ currency and deposit assets (q=*FA*) or liabilities (q=*L*)

$\tilde{x}_3^q$ debt security assets (q=*FA*) or liabilities (q=*L*)

$\tilde{x}_4^q$ loan assets (q=*FA*) or liabilities (q=*L*)

$\tilde{x}_5^q$ other accounts payable (q=*L*)/receivable (q=*FA*)

$\tilde{x}_6^q$ insurance, pensions, and standardized guarantee schemes

$\tilde{x}_7^q$ financial derivatives and employee stock contributions

$\tilde{x}_8^q$ equity and investment fund share assets (q=*FA*) or liabilities (q=*L*)

The deterministic relationship between above and below the line *transactions* can, therefore, be summarized by the surplus/deficit. A common mistake in the literature is to assume that the sum of *transactions* over all periods is equal to the stocks for that period. For example, assuming a generic definition of gross debt (D_T),[32] the sum of deficits/surpluses over all periods is equal to debt ($\sum_{t=0}^{T} \delta_t = D_T$). This is missing a clear definition of *flows*.

Denoting the *stock* of instrument i at time t as x_{it}, the relationship between *transactions*, *flows* and *stocks* is:

$$\overbrace{x_{it}^q}^{Stocks} = \underbrace{x_{it-1}^q}_{\substack{Stocks \\ (t-1)}} + \underbrace{\overbrace{\tilde{x}_{it}^q}^{transactions} + \Delta val_{x_{it}^q} + \Delta vol_{x_{it}^q}}_{flows} \qquad (4)$$

Where x_{it-1}^q is the opening balance (*stock*) for instrument *i,* and, $\tilde{x}_{it}^q$ are the *transactions* for the same instrument during the current period *t*. The last two terms on the right-hand side of (4) represent other economic flows, which are not transactions but can change the value of an asset, liability and net worth (*SNA 2008; GFSM 2001*). The first other economic flow($\Delta val_{x_{i,t}^q}$) represents holding gains and/or losses or re-evaluations of an asset (q=*NFA, FA*)

[31] For a more in depth discussion of these instruments, see Dippelsman, R., Dziobek, C. and Gutierrez Mangas, C. *What Lies Beneath: Statistical Definitions of Public Debt*. (2012), *GFSM 2001* and *PSDSG 2012*

[32] An explicit formal definition of gross and net debt will be provided in Section III (p.8).

or liability ($q=L$) for instrument i at time t. Examples of valuation changes would be any changes in the monetary value of an asset or liability resulting from changes in the level and structure of prices and/or the exchange rate, assuming that the asset or liability has not changed qualitatively or quantitatively. Any such change in value would be classified as a valuation change (*GFSM 2001*, *PSDSG 2012*).

The second term ($\Delta vol_{x_{i,t}^{q}}$) represents changes in the volume of an asset ($q=NFA, FA$) or liability ($q=L$) for instrument i that do not result from a transaction or from valuation changes. Some examples of these would be natural disasters, restructuring or reclassification of an institutional unit or unilateral debt write-offs.[33]

From (2), (3) and (4) it is clear that, while deficits measure fiscal performance through *transactions*, these do not account for other economic flows. In times of natural disasters, banking crisis, large fluctuations in exchange rates or government restructuring, these may be significantly large and have real effects on a government balance sheet and debt position. Thus, the difference between debt and deficits is, by definition, a stock-*transaction* residual.

Net Worth and Debt

From (4), the total stock of assets and liabilities at time t is simply the sum of the 8 instruments listed previously in Section II:

$$q_t = \sum_{i=1}^{8} x_{it}^{q} = \sum_{i=1}^{8} (x_{it-1}^{q} + \tilde{x}_{it}^{q} + \Delta val_{x_{it}^{q}} + \Delta vol_{x_{it}^{q}}); \ (q \equiv \{NFA, FA, L\}) \quad (5)$$

Equation (5) provides a snapshot of an institutional unit's accumulation of assets and liabilities at a specific point in time by summing stocks from the previous period (x_{it-1}^{q}) with flows from that specific period ($\tilde{x}_{it}^{q} + \Delta val_{x_{it}^{q}} + \Delta vol_{x_{it}^{q}}$). With this, government's financial position, or net worth (NW), at time t is simply the stock of assets (nonfinancial and financial) minus the stock of liabilities:

$$NW_t = NFA_t + FA_t - L_t$$

or,

$$NFW_t = FA_t - L_t$$

for net financial worth (NFW).

While deficits give an indication of government's fiscal performance through *transactions* over a specific period of time (equations (2) and (3)), net worth (or changes in net worth) provides a complimentary, and equally important, indicator of fiscal health. A well known example of the benefits, in terms of fiscal transparency, from using (changes in) net worth as an indicator of fiscal health is government sales of capital assets which would have a positive effect on the surplus/deficit making it appealing for policymakers to improve their fiscal image in the short-

[33] See IMF Public Sector Debt Statistics: Guide for Compilers and Users 2012, p.193.

term, yet would have no effect on net worth.[34] A greater emphasis on changes in net worth may therefore reduce the incentive for policymakers to engage in potentially sub-optimal fiscal behavior for short term gains.[35]

Throughout this paper gross debt was defined as in the *2008 SNA* and *GFSM 2001,* but extensions for net debt, as well as the Maastricht definition of government debt, which does not include other accounts payable, are straightforward and easily incorporated into the framework.[36]

Gross debt (D) is a sub-component of the stock of liabilities and is defined as:

$$D_t = D_{t-1} + \sum_{i=1}^{6} (\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) \qquad (6a)$$

Where D_{t-1} is the stock of gross debt in period *(t-1)*. The two instruments excluded from the identity above in the *2008 SNA* and *GFSM 2001* are equity and investment fund share assets and financial derivatives and employee stock contributions as these instruments do not require the payment of principal or interest.[37]

Rearranging the first term on the right-hand side of (6a) gives the change in an institutional unit's gross debt between period *t* and *(t-1)*. With the conventional notation (Δ) representing a change this is defined as:

$$\Delta D_t = \sum_{i=1}^{6} (\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) \qquad (6b)$$

The advantages to examining fiscal performance or fiscal health through the balance sheet rather than confining such diagnostics to transactions should be clear from the inclusiveness in equation (5) relative to (3). Although this still fails to give a thorough assessment of fiscal risk from probabilistic future, or contingent, liabilities, it is a large step forward from the confines of fiscal transactions and allows for a complete algebraic definition of true stock-flow residuals.

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[34] In this paper, it is assumed that the sale of a nonfinancial asset does not also include the elimination of an implicit subsidy. See Milesi-Ferretti and Moriyama (2006) for a more in depth discussion which includes government paying an implicit subsidy. (p.10)

[35] As noted in footnote (9), this is not to argue that all sales of nonfinancial assets constitute sub-optimal fiscal behavior as there are many cases where such sales can increase fiscal performance.

[36] The Maastricht definition of gross debt which does not include other accounts payable, (6a) would become: ${D_t}^{M} = {D^{M}}_{t-1} + \sum_{i=1}^{5}(\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}})$.

In the case of net debt (*GFSM 2001* definition), (6a) would become: ${D_t}^{N} = {D^{N}}_{t-1} + \sum_{i=1}^{6}(\tilde{x}_{it}^{L} + \Delta val_{x_{it}^{L}} + \Delta vol_{x_{it}^{L}}) - \sum_{i=1}^{6}(\tilde{x}_{it}^{A} + \Delta val_{x_{it}^{A}} + \Delta vol_{x_{it}^{A}})$ where ${D^{N}}_{t-1}$ would also include financial assets.

[37] For a more detailed discussion of these instruments, see *GFSM 2001* p.126-128.

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