
Measuring interest accruals on tradable debt securities in economic and financial statistics

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The following article examines a current international debate which could affect the way in which some important macroeconomic statistics are measured. The article is based on a longer paper, commissioned last year by the International Monetary Fund as a contribution to the evolution of international statistical standards. The views expressed here are those of the author and do not necessarily reflect those of either the Bank or the IMF.

Introduction and summary

This article reports a current methodological debate about the way in which interest flows are recorded in a variety of macroeconomic statistics. When new international statistical standards were published in 1993, one of the major changes to the recommended presentation of the System of National Accounts and the Balance of Payments was the adoption of accruals recording for income and expenditure. However, as countries have begun to implement these standards, questions have been raised about their exact interpretation in respect of interest flows associated with tradable debt.

In essence, the issue is how to measure the property income from a fixed-term debt security on which the cash flows are fixed but whose market value is free to vary. Two methodologies in particular are under scrutiny: the first views the accruing interest income as fixed over the life of the security, once the issue price and conditions of future cash flows are known; the second takes the view that there is no *a priori* way of determining what proportion of the future payments stream represents interest and what proportion principal. Under this view the income stream is fixed only for so long as market conditions are constant after issue. Following any change in conditions that results in a change in the value of the security, a new future income profile is established.

Choosing between these alternatives raises some profound conceptual and practical questions. At one level, these concern the accounting rules required for

coherence within the National Accounts—for example defining the boundary between income and holding gains, and the implications of moving from a 'historical cost' system to fair value accounting. At a second level, the issues concern the practical implications of a change in terms of both data collection and interpretation. National accountants and government finance statisticians in the United Kingdom, and most other countries, adopted the first of the two methodologies when implementing the new standards. Moving to the alternative methodology would have consequences for recorded interest flows within the accounts, in turn leading to different profiles for national and sectoral saving and deficits, including the general government surplus/deficit.

This article reviews these alternatives and concludes in favour of the second approach. It is a summary of a longer discussion document, commissioned by the International Monetary Fund (IMF).⁽¹⁾ The full paper looks separately at the principles of accruals accounting; the conditions for coherence within the National and Sector Accounts; measurement problems; and the implications for users, particularly in the area of government debt management. The present shorter text aims to give sufficient flavour of the central arguments to indicate why this is an important issue for users of macroeconomic statistics, and the reasons for recommending a change of practice.

Accruals accounting—some conceptual issues

Prior to the adoption by EU Member States of the European System of Accounts (ESA95)⁽²⁾ as the common

(1) 'Calculating the accrual of interest on tradable debt securities', by Chris Wright and John Joisce prepared for the thirteenth meeting of the IMF's Balance of Payments Committee, October 2000. Papers for the thirteenth meeting will be available shortly at www.imf.org/external/bopage/stindex.htm

(2) The European standards derive in turn from wider international standards—the 1993 *System of National Accounts* (SNA93), and the fifth edition of the IMF's *Balance of Payments Manual* (BPM5).

standard for economic statistics, income flows were recorded on a 'due for payment' basis, ie at the point where cash payments were scheduled to occur. For many economic transactions, this meant that the statistical recording of events through the flow of income did not map well to the timing of the economic events or processes generating these flows. Thus economic activity taking place in a given period would frequently not be recorded in the statistics until some later period.

For many transactions, these timing discrepancies were small. However, for some activities, the due date for settlement could be a considerable time after the economic activity that the National Accounts were seeking to record. This was particularly true for interest income, where the practice of annual or semi-annual interest crediting has been widespread. The advent of zero-coupon bonds, where interest is settled at redemption, made these timing discrepancies even greater, potentially running to many years.

For funds intermediated through the banking system, principally deposits and loans, the concept of interest accrual is generally clear. The actual flows, as recorded under the old standards, represent the contractually agreed rates—fixed or variable—applied to the outstanding balances and settled at the due date. The application of the accruals standards in these cases is generally straightforward: the income accounts record the flow of interest continuously throughout the period(s) that funds are provided/used; the balance sheet simultaneously records the interest as accruing within the asset/liability position of the lender/borrower of the capital sum; and the actual settlement of the interest receivable/payable at the due date is recorded not as interest income, but as a financial transaction which, in the case of a cash payment, may be viewed as extinguishing the accumulated accruals within the balance sheet.

The recording of interest may be less straightforward for some other instruments. For example, where an instrument can be issued or acquired at a price different from its face value, the total return—the yield to maturity—will comprise two elements: any contractual payments between the issuer and the holder; and the effects of the reversal of any discount or premium at the time of issue/acquisition. Current statistical standards are not entirely clear about the treatment of this second element. Specifically, the circumstances under which

the yield is to be regarded as synonymous with the interest stream are at best ambiguous and at worst contradictory.

Commercial historical cost and mixed-value accounting practice has long regarded the accrual of discount within the acquisition cost of securities as reflecting the accrual of interest. This confirms two important principles: first, that interest can be delivered through a change in the value of a security as well as by means of an explicit payment as is the case with a Treasury bill or deep-discount bond; and second, that the interest deliverable by a tradable security can be viewed differently by different holders, because the acquisition cost and hence the yield to maturity for new holders will be determined by market conditions at the time of acquisition rather than at the time of issue.

These two principles demonstrate that no clear delineation exists between interest income and the yield to maturity, and that, as a consequence, the historical cost standards permit two agents to report the same economic event in two different ways. This is best illustrated by an example.

A five-year zero-coupon bond, issued for £747 but with a redemption value of £1,000, has a yield to maturity of 6% and would be shown by both the issuer and acquirer as generating an accrual of interest of £45 ($£747 @ 6\%$) during the first year of its life. If there were no change in market conditions, then a new acquirer purchasing this security in the secondary market at the end of the first year would pay £792 and would amortise this smaller discount over the remaining four years to maturity. Under this scenario, both the issuer and the new acquirer of the security would record an accrual of interest of £48 ($£792 @ 6\%$) in the bond's second year. This result satisfies the requirements of the National Accounts that flows of income should be reported symmetrically by counterparties, and, if the accrual of interest is treated as a re-investment within the parent instrument, would also mean that the respective liability and asset positions of the two parties are reported identically.

In practice, the above example is not realistic. Market conditions would normally change over the life of such a bond so that a new acquirer, purchasing in the secondary market, will typically view the return differently from the issuer. If, in our example, market conditions had changed at the end of the first year of

the bond, immediately prior to the new acquirer's purchase, so that the new acquisition price was £823 rather than £792 previously, then the new acquirer will face a yield to maturity of 5% and will amortise the new discount to redemption over the four years to maturity. This gives an accrual of interest of just £41 (£823 @ 5%) in the second year of the bond rather than the £48 (£792 @ 6%) that will be reported by the issuer. Both estimates of accruing interest are meaningful, in the context of each counterparty's reported accounts, but they now fail to satisfy the National Accounts requirement for symmetry. The amortised present value calculations and associated accruing interest estimates by the two parties are set out in Table A.

Table A
Interest accrual under amortised cost accounting

Figures in £s

Year	Issuer		New acquirer	
	Opening value	Interest accrual	Opening value	Interest accrual
1	747	45	n/a	n/a
2	792	48	823	41
3	840	50	864	45
4	890	53	907	45
5	943	57	952	48
Redemption value	1,000	n/a	1,000	n/a

n/a = not applicable.

Under 'fair value' accounting, both the issuer and the holder of tradable securities will record the revalued price of the instrument following any change in market conditions—in the example this means a reported value, by both parties, of £823 outstanding at the end of year 1. The question for the issuer is then how to record the subsequent flow of accruing interest. If he continues to record his original estimate of the flow in the second year of the bond—£48—then the implied effective interest cost is 5.8% as against 6% at the time of issue. Put another way, the internal coherence between the reported stocks and flows in the accounts is impaired: £48 of accruing interest has apparently been re-invested in the bond, yet its fair value increases by only £41 during the second year (from £823 to £864). Market conditions were unchanged throughout this period, so that the 'missing' £7 (£48–£41) cannot be attributed to a price change. The issues raised here take us to the crux of the methodological debate. In a system built on the principle of market prices—the present value of future payment streams—can it be meaningful to base the associated future income stream on a historical interest rate? Based on this example, the answer would appear to be no.

Nevertheless, the revaluation of the security associated with the change in market conditions can be perceived differently by the two parties: the issuer may view the revaluation as a temporary disturbance that is reversed over the remaining life of the security; while the new acquirer accepts the revaluation as a once and for all change that establishes a new future income stream. Understanding these differences of perception is crucial. In principle, changes in the capital value of a bond occur either as an unplanned 'windfall' gain or loss, or as an incremental change in value, which is 'expected' in the sense that it is implicit in the yield to maturity. The distinction between these two is conceptually unambiguous. The former occurs as the consequence of some external event—for example through a change in market conditions or because of a change in the credit rating of the issuer. The effect of such a change may only be viewed with hindsight, ie, it is backward-looking. By contrast, the latter type is wholly forward-looking, a new future stream: the accrual of value associated with the yield to maturity, which the holder can rely upon subject to the non-default of the issuer. In a world where securities are recorded at amortised cost, agents record their 'expected' valuation changes based on the cost at issue/acquisition. In this situation, differences in the reported income stream follow directly from differences in the reported value of the security. By contrast, where both agents report a security at the same market value, there can be only a single interpretation of 'expected' and 'unexpected' valuation changes: in the example above, the change in value from £792 to £823 at the end of year 1 was 'unexpected'—a windfall gain (loss) to any agent holding (issuing) the security; but thereafter, the new present value profile of the bond represents the yield faced by both agents.

Why then might perceptions be thought to differ? The key to unlocking this question is the issuer's perception of the bond itself. An explicit feature of the above example was the ability of the bond holder to sell the security and for a new acquirer to assume ownership. However, an implicit, and erroneous, assumption is that the security will remain in the market until it matures—ie that the issuer either cannot or will not redeem the liability early. If this assumption were true, then the issuer's liability cannot be strictly viewed as tradable as the issuer would, in effect, be locked into a loan with no right of early repayment. Under such circumstances, the issuer would rightly pay more regard to the historical cost measure of accruing interest liabilities. In practice, of course, the issuer is free to buy back the bond so that

the interest cost should reflect the prevailing rather than the historical cost of finance. Tradability is the primary distinguishing feature of securities from other financial instruments and is the central element of this debate.

To anchor this point, suppose that, in the earlier example, the issuer redeemed the bond at the end of the first year, immediately following the change in market conditions. However, no sooner has he redeemed the bond than he decides to re-issue it at the same price (£823) at which he re-bought it. What are the consequences of this action? Abstracting from any transfer costs, one would hope that the issuer's position is unaffected—his balance sheet has been restored to its position prior to the dual transaction. However, if the issuer had thought that his recorded stream of accruing interest liabilities would also return to its previous historical cost path, then he is mistaken. By his own amortised cost calculation he will now record an interest stream of £41 in year 2, in line with the new yield to maturity. While the specific example may appear implausible, the general principle here is sound: the issuer is free to re-finance his borrowings at any time, so that the relevant cost of his current liability is that given by the current yield.

Interest accrual within the National Accounts

It should be clear from these examples that the use of the standard amortised cost calculations for accruing interest fails to satisfy one of the most basic principles of the National Accounts—the symmetrical recording of flows by counterparties. Two alternative solutions have been proposed: imposing symmetry by the overlaying of the flows, as viewed by one counterparty (typically the issuer), onto the accounts of both parties (the 'debtor' approach); and the recalculation of interest flows subsequent to any change in market conditions (the 'creditor' approach). These alternatives form the subject of the current methodological debate.⁽¹⁾

The current SNA/ESA guidance is generally understood to recommend the first of these approaches.⁽²⁾ Under this treatment, the future flow of interest is determined at the point of issue—ie it is not affected by any subsequent changes in market conditions. Supporters of the approach argue that it best represents the cost of capital associated with the security and that this cost

remains the most relevant flow for financial analysis, even though it may not be recognised by a purchaser in the secondary market, who may be unaware of the original issue price. This treatment is widely referred to as the 'debtor approach' because it records the accrual of interest from the perspective of the issuer.

Many national accountants and government finance statisticians favour the debtor approach on practical data collection grounds. The quality and availability of data from issuers of securities has tended to be higher than from holders, so that practical considerations have commonly made it acceptable to impose the data provided by issuers.

The arguments ranged against the debtor approach typically focus on the conceptual rather than the practical. A key concern is that, while the accounting requirement for symmetry is met (by constraining the flows of the holder), the historical cost flows fail to reconcile the changes in the market value of the security subsequent to a change in market conditions. This is best illustrated through a further example.

Consider a five-year bond with a face value of £1,000 and paying an annual coupon of £50. The bond is issued at £1,000 and so delivers a yield of 5%, with the issuer recording an annual accruing interest liability of £50 which is exactly extinguished at the year-end by the annual coupon. At the end of the third year, market conditions change and the value of the bond drops to £964, ie, a current yield to maturity of 7%. During the fourth year of the bond, under the 'debtor' approach, the accounts will continue to record an annual interest accrual of £50, but the market price of the bond has now increased to £981. In the final year the bond returns to its face value of £1,000 at redemption. The reconciliation between opening and closing balance sheet positions is set out in Table B.

Table B
Balance sheet reconciliation under the debtor approach

Figures in £s

Year	Opening market value	Interest accrual	Coupon payment	Revaluations		Closing market value
				Market revaluations	Other revaluations	
1	1,000	50	-50	0	0	1,000
2	1,000	50	-50	0	0	1,000
3	1,000	50	-50	-36	0	964
4	964	50	-50	0	17	981
5	981	50	-50	0	19	1,000

(1) Some sources refer to a third method—the so-called 'acquisition approach'. Like the debtor approach, this relies on an amortised cost measure of interest income—in this case viewed from the perspective of the acquirer. While this does, in practice, represent the way in which source data for asset positions are still frequently available, this third approach is not materially different in principle from the debtor model.

(2) This treatment has since been endorsed by the *ESA95 manual on government deficit and debt*, first edition 2000, which states that the debtor approach should be used in national accounts for the government sector.

The main point to note here is that following the debtor approach requires the addition of revaluation adjustments in each period after the initial change in market conditions, in order to reconcile movements between the opening and closing balance sheet positions. Put another way, the receipt of the annual coupon is not sufficient to prevent the value of the outstanding principal from changing. Critics of the debtor approach argue that only the first revaluation adjustment—a fall of 36 in year 3—is analytically meaningful, being linked to a change in market conditions. The recorded revaluations in years 4 and 5 cannot be explained either as a consequence of wider market conditions or as the result of changing perceptions about the creditworthiness of the issuer. They may only be interpreted as a balancing entry and thus constitute evidence of mis-measurement somewhere in the other changes of assets account. Adopting the fair value creditor approach to income recognition eliminates the need for these additional balancing entries. The equivalent flows for the last example are set out for comparison below.

Table C
Balance sheet reconciliation under the creditor approach

Year	Opening market value	Interest accrual	Coupon payment	Revaluations Market revaluations	Other revaluations	Closing market value
1	1,000	50	-50	0	0	1,000
2	1,000	50	-50	0	0	1,000
3	1,000	50	-50	-36	0	964
4	964	67	-50	0	0	981
5	981	69	-50	0	0	1,000

User practice

Supporters of the debtor approach commonly cite user practice, particularly in the field of government debt management.

Central to this issue is the question of how debt managers perceive their strategic role. Traditionally this has been cast as one of minimising government funding costs for a given view of interest rate risk. Put simply, the aim has been to minimise the funding costs of each new issue on the assumption that it will be in the market to maturity. Under such a rule, no policy objective has been formulated in respect of the market value of debt and, consequently, no role is given to prevailing market rates as indicative of the opportunity cost of existing issued debt.

More recently, the move to public sector surpluses in a number of OECD countries, coupled with a concern for the liquidity of government bond markets, has motivated

some buying in/switching, facilitating higher new issuance than would otherwise have been the case, and helping to concentrate liquidity in the most actively traded stocks. Buy-backs and switches are now becoming a common feature of debt management. The UK Debt Management Office is active in both.

In practice, incentives to refinance debt could arise in a number of ways. For example, governments could set objectives for their net debt, on a marked to market basis, at some future horizon; or patterns might develop where governments perceive trade-offs between the cash measure of the debt interest bill and the nominal value of outstanding debt. The point to note here is that the ultimate drivers may be based as much in short-term presentational pressures—to meet a cash flow objective or an EU Stability Pact target—as in a strategy to minimise funding costs over the longer term.

Nevertheless, longer-term thinking about the role and objectives of debt managers is likely to require the further development of forward-looking funding strategies and the wider use of buy-backs and switch auctions. Just how far this process can go will depend on the circumstances of individual markets. It may be that large quantities of old debt could not be exchanged for new without paying some premium, so that it may remain prudent for a debt manager to assume that any bond, once issued, will remain in the market until maturity, and that the debt manager is committed to the full set of cash flows on it until that time. But it may also now be the case that more attention than in the past will be given to the options for switching operations to take advantage of lower funding costs within benchmark issues, or to modify the maturity structure of debt to reflect longer-term strategic goals.

Impact on sectoral and national saving estimates

One of the concerns that has been raised about the creditor approach is the impact that it will have on measured sectoral and national saving. Critics of the creditor approach argue that one of the purposes of so-called fixed-rate debt is that it provides an assured payment stream, and that interest payments are known in advance. And by adopting the creditor approach that certainty would be eliminated: in effect, all debt becomes floating, and extraneous changes in interest rates would increase (decrease) sectoral/national saving with no changes in the behaviour of the borrowers/lenders.

This charge is correct: under the creditor approach, a sector/nation would find its deficit (surplus) increased (decreased) following an increase in market rates for debt. But that is what must happen under an accrual system that requires market pricing of assets and liabilities. To believe that sectoral saving is unaffected by a change in interest rates is to misunderstand the nature of financial markets, or of a system that is based on accruals and market prices.

However, this is less of a change than resulted from the introduction of the 1995 European System of Accounts, indeed merely a clarification. Moving from a 'due for payment' basis, or even a strict cash basis of accounting, involved considerably more adjustment. Moreover, what the introduction of the creditor approach would also mean is that more interest/emphasis would be placed on other aspects of the National Accounts and balance of payments than on the 'above the line' transactions. The financial account, and above all, the balance sheet/international investment position would become more useful analytical tools than they are at present. In particular, net worth and changes in net worth due to saving and capital transfer would be more valuable analytical concepts and statistics.

The changes to sectoral balances resulting from any change to the accounting methodology have not been estimated here, but are likely to be material. The yield curve has shifted downwards considerably during the last several years, the result of reductions in actual and expected inflation. Moreover, as governments have moved into surplus or sold assets, they have retired a considerable amount of debt outstanding (as noted above). There have been two primary results from

these developments. The first is that debt that was issued in a period of higher inflation usually carried a higher-coupon payment than equivalent debt issued recently. There will be a substantial portion of long-term debt issued in periods of higher coupon that are still outstanding in the market. The prices of most of these instruments will have risen as the yield has fallen. At the same time, the increasing scarcity of certain instruments that have resulted from governments reducing their borrowing needs and/or retiring debt has meant that, in some countries, the yield curve has become inverted. Part of the reason for this is that certain lenders (notably life insurance companies and pension funds) with very long-term durations for their liabilities need long-term assets to match. As the supply has dwindled, the price has risen, pushing down the yield. As a result of these developments, there may be a considerable difference between the measured interest payments under a debtor approach versus a creditor approach.

Conclusions

This article has reviewed two possible ways of measuring interest accrued on tradable debt within economic statistics. While many statisticians and users have become accustomed to a measure based on the amortised cost at the time of issue (the 'debtor' approach), it has been argued here that such an approach fails to satisfy the wider accounting rules for the System of National Accounts. Once the designers of the System chose to adopt market prices as the underlying basis for all aspects of the system, not just transactions but balances as well, the creditor approach for the calculation of interest flows became the only method consistent with the System's overall integrity.

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